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POVERTY REDUCTION IN SUB-SAHARAN AFRICA: A CALL FOR FINANCIAL INCLUSION

By

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Plagiarism Declaration

I, Shamiso Malekano, hereby declare that the work on which this dissertation is based is my own original work, except where acknowledgements indicate otherwise; and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree at this or any other university. I authorise the University to produce, for the purpose of research, either the whole or any portion of the contents in any manner whatsoever.

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Shamiso Malekano

Abstract

This dissertation proposes an Index of Financial Inclusion (IFI) for Sub-Saharan Africa and then uses the developed index to investigate the significance of the relationship between financial inclusion and economic development and growth. This is important because there is no consensus in the literature on how to measure financial inclusion or on the direction of the causal relationship between financial inclusion and economic development or growth. This dissertation aims to contribute to these two debates whilst focusing on Sub-Saharan Africa, where development (potentially encouraged by financial inclusion) is desperately needed.

The IFI for Sub-Saharan Africa is arrived at by first determining those dimensions of financial inclusion that are important for the countries in the region. This was done through a text analysis of National Financial Inclusion Strategies (NFISs) of 13 Sub-Saharan African countries overlaid on a detailed literature review. Access, Usage and Quality are the key dimensions for measuring levels of financial inclusion in the region. Thereafter, appropriate variables for the measurement of those dimensions were identified and combined using different methodologies: the simple geometric mean method, the inverse Euclidean distance method and, lastly, the factor analysis method. The relationship between the developed index and economic development and growth is tested using correlations and regression analyses.

It was demonstrated that the IFI fits the NFISs of Sub-Saharan African countries and is practically executable. This implies that the IFI is perhaps more appropriate to be used in the region than the global measures previously proposed. Weak correlations between the IFI and economic development or growth were found. These last tests were hampered by small sample sizes and thus the causation debate, mentioned in the motivation paragraph, could not be resolved. However, the proposed IFI for Sub-Saharan Africa shows potential.

Dedication

This dissertation is dedicated to my late husband, Tarcisius Tsonga, and my children Jennings and Justyn.

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Above all I would like to thank God for giving me good health, wisdom, intelligence and for lifting me up when I was weak to carry on. "I alone know the plans I have for you, plans to bring you prosperity and not disaster, plans to bring about the future you hope for," declares the Lord (Jeremiah 29:11).

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List of Acronyms and Abbreviations

AFI	Alliance for Financial Inclusion
ATMs	Automated Teller Machines
CGAP	Consultative Group to Assist the Poor
CFA	Confirmatory Factor Analysis
FASs	Financial Access Surveys
FI	Financial Inclusion
FinTech	Financial Technology
FIS	Financial Inclusion Strategy
GDI	Gender Development Index
G20	Group of Twenty Major Economies
GDP	Gross Domestic Product
GDPPC	GDP per Capita
Global Findex	The World Bank Global Financial Inclusion Database
GNP	Gross National Product
GPFI	Global Partnership for Financial Inclusion
HDI	Human Development Index
HPI	Human Poverty Index
ICT	Information and Communication Technology
IFI	Index of Financial Inclusion
IRFs	Impulse Response Functions
IMF	International Monetary Fund
INF	Inflation Rate
IRDA	Insurance Regulatory and Development Authority
MDGs	Millennium Development Goals

MFIs	Micro-Finance Institutions
M-PESA	M for Mobile, pesa is Swahili for Money
MSMEs	Micro, Small and Medium Enterprises
NFIS	National Financial Inclusion Strategy
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
POP	Population Growth Rate
PPP	Purchasing Power Parity
SEP	Primary School Enrolment
TRADE	Trade Percentage of GDP
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNEMP	Unemployment Rate

1. Introduction

The concept of Financial Inclusion (FI) has recently attracted the attention of several role players. These include governments, central banks, other financial regulators, the banking industry, development actors and researchers. This attention towards financial inclusion emanates from the promise it holds as an instrument for economic development and growth, particularly in poverty alleviation. Inspired by this promise, most economies have enhanced their efforts to improve levels of financial inclusion to reduce poverty. This is the case especially in Sub-Saharan Africa, which until now has remained a region with high levels of poverty, despite registering economic growth in recent years.

The rate of poverty reduction in Sub-Saharan Africa is slow relative to other developing regions. In a desperate move to overcome poverty, countries in the region have intensified efforts to improve levels of FI, which are low at the moment[1]. For example, the government of Lesotho has been in collaboration with the United Nations Development Programme (UNDP) and the United Nations Capital Development Fund (UNCDF) in order to embark on a three-year programme, from 2011 to 2014, to reduce poverty and promote economic growth by addressing the gaps that had impeded financial inclusion in the country (UNDP & UNCDF, 2014).

However, the literature does not show, clearly, any causal relationship between FI and economic development and growth. Some researchers (including Kim, Yu & Hassan, 2018; Zhang & Posso, 2019) support the idea that FI is an important tool for poverty alleviation and economic development and/or growth. Other researchers argue that financial inclusion does not cause economic development or economic growth; instead, it is economic development or growth that enhances the levels of financial inclusion (Sarma & Pais, 2011; Allen, Demirgüç-Kunt, Klapper & Martinez Peria, 2016). When one considers the trust that has been placed on FI and its associated effect on economic development and growth, this calls for evidence for the developmental and poverty impacts of an inclusive financial system.

[1] Recent evidence from Global Findex for 2017 shows that only 38% (34% in 2014 and 24% in 2011) of adults aged 15 and above in Sub-Saharan Africa have an account with a formal financial institution, and most people aged 15 and above use informal methods to borrow and save.

A measure of FI is therefore critical to the establishment of the link between FI and the economic variables. Nonetheless, the literature on the subject targeting Sub-Saharan Africa has mainly focused on investigating the correlation between mobile phones or ICT and inclusive development (Asongu & Nwachukwu, 2016; Asongu & Le Roux, 2017). Other literature has focused on assessing the gender gap in accessing finance (Aterido, Beck & Lacovone, 2013). There is hardly any literature that has empirically investigated the measures of FI for the region. Measuring FI is also important for tracking progress, evaluating whether financial inclusion goals are being met and assessing if the designed interventions are bearing positive results, which feeds into evidence-based policy making.

Researchers agree about the benefits brought by an all-inclusive financial system and there is a consensus on how FI is defined; however, there are still debates on how to measure FI. The IFI constructed by Sarma (2008) uses the three dimensions of 'banking penetration', 'availability of banking services' and 'usage of the banking system'. Amidžić, Massara and Mialou (2014) recognise three dimensions of 'outreach, usage and quality' for measuring the levels of FI. Honohan (2008) recognises the dimensions of 'access and depth of financial services' but focuses on using the access indicators. The inconsistencies are also observed in the dimensions of FI adopted by different policy makers and development actors. For example, the Alliance for Financial Inclusion (AFI) supports the use of two dimensions of 'access and usage of formal financial services' while The World Bank, The Global Partnership for Financial Inclusion (GPFI) and the G20 Financial Inclusion Indicators, use three indicators for measuring FI; 'access, usage and quality'.

It is clear that one single dimension fails to capture, adequately, the levels of FI; hence, collective dimensions should be used to measure the extent of FI. For example, a country may score highly in access measures but poorly in usage measures. Such variations across dimensions make it necessary to determine a set of dimensions to assess the levels of FI in a country or across countries. Currently, the inherent economic nature of different countries determines the dimensions that deserve special attention in order to achieve greater levels of FI. Thus, countries use different indicators and methods to measure financial inclusion.

This study determines the dimensions for measuring FI in Sub-Saharan Africa through the text analysis of National Financial Inclusion Strategies (NFISs), in the case of those countries in the region which have developed and published NFISs. Indicators for each dimension are determined through both the studied NFISs and the available literature on the subject. This study acknowledges the importance of country-specific dimensions and indicators for measuring levels of FI in respect of differences in economic, geographic, social and cultural factors. Nevertheless, the set of dimensions and indicators of FI for Sub-Saharan Africa, derived from the NFISs, is of great importance; after all, it is tailored to the specific FI needs of the region and helps to achieve some level of comparability in the way financial inclusion is measured and interpreted by different countries and across different time periods.

A consistent measure of FI obtained from a common set of dimensions enables countries to benchmark, easily, their progress when compared to other countries. This also helps development partners to save time in implementing new policies in countries where they operate; after all, there will be no need for them to learn and adapt to new country-specific variables used to implement and measure financial inclusion policy impact, except for minor adjustments. Furthermore, development partners can easily measure national progress against the resources invested in different countries and then make evidence-based policy decisions.

The academic literature describes various methods for measuring FI. However, most of the literature adopts the method proposed by Sarma (2008) which is similar to the one used by UNDP for computing development indices such as the Human Development Index (HDI), Human Poverty Index (HPI) and Gender Development Index (GDI) (Refer to Goel & Sharma, 2017; Amidžić et al., 2014; Gopalan & Rajan, 2018; Chakravarty & Pal, 2013; Sarma & Pais, 2011; Park & Mercado, 2015; Yorulmaz, 2013; Sarma & Pais, 2008; Amberkhane, Singh & Venkataramani, 2016; Alamelu & Sankaramuthukumar, 2015; Wang & Guan, 2017 and Bozkurt, Karakuş & Yildiz, 2018).

This study has been motivated by the conflict described in the literature on measures of FI and by the weak empirical support for the causal relationship between FI and economic development and growth. As such, the study attempts to establish a set of dimensions for measuring FI in Sub-Saharan Africa based on a text analysis of NFISs

for countries in the region and then seeks to use that to develop an IFI. The study employs three different methods to compute the index: Simple Geometric Mean, Inverse Euclidean Distance and Factor Analysis. This study also attempts to establish the causal relationship between FI and economic development and growth in Sub-Saharan Africa over a period of seven years from 2010 to 2017, by using correlation tests, regression analyses, Granger causality tests and co-integration tests.

The dissertation uses the Financial Access Surveys (FASs) data from 2010 to 2017. The FASs collect data from the supply side, thus representing data from commercial banks, other deposit-taking institutions and mobile money service providers. The dissertation also makes reference to the Global Findex which collects data from the demand side, thus representing data from the users of formal financial services. Therefore, this dissertation uses data from both the demand- and supply-side aspects of FI. In order to establish the relationship between FI and economic development and growth, use is made of various data from the World Development Indicators and the United Nations Development Programme.

This study contributes to the debate in the academic literature on measures of FI and inclusive financial and economic growth. It does so, by providing a potential solution to the financial inclusion measures puzzle and by investigating whether financial inclusion leads to economic development and/or growth. Perhaps this study's most important contribution is that it proposes a measure of FI that fits the NFISs of the Sub-Saharan African countries.

This study proceeds as follows. Section 2 presents a discussion of the academic literature on the definition of financial inclusion and IFI. It examines the relationship between FI and economic development and growth and gives reasons for limiting the study to Sub-Saharan Africa. Section 3 provides a detailed description of the data and methods used in performing this study. Section 4 presents the results and an analysis of the findings. Section 5 concludes and presents limitations of the study.

2. Literature Review

2.1. Financial Inclusion Definition

The way in which "financial inclusion is defined shapes the expectations around what aspects of the market" should be emphasised and which "participants, both public and private, will benefit" (AFI, 2017: 3). According to the AFI (2017: 3), 15 of the "27 respondents to the current state of practice survey" of 2014 indicated that "their governments have a concrete definition of financial inclusion". The national FI definitions express the national FI goals and form the basis for NFIS. The AFI guideline further establishes that definitions of financial inclusion are similar across member countries although there are differences in "the approaches used to arrive at" such "definitions and the weighting assigned" to the differences (AFI, 2017: 3).

However, it is highly important to note that the definitions will never be exactly the same for all countries throughout the world due to reasons such as financial industry setup[2], the political factors that determine the financial system in the country, differences in social and economic institutions and different laws such as anti-money laundering legislation. Hence, a single definition for all countries is not possible and any attempt to arrive at one would do more harm than good to a specific country; thus, it would introduce ambiguity and complications to that country's financial inclusion metrics. Countries should however tailor and localise the definition of financial inclusion to be more applicable.

Chakravarty and Pal (2013: 814) suggest "that a significant part of formal financial services in countries" such as "India should be directed towards priority sectors such as agriculture, small business activities and economically backward sections of the population". This contrasts to countries such as the United Kingdom (UK) which recognise three major dimensions of FI: 'access to banking, access to affordable credit and access to face-to-face money advice'. Appendix 1 presents the definitions of financial inclusion adopted by selected AFI Financial Inclusion Strategy (FIS) Peer Learning Group (PLG) members. Despite that the definitions are similar, "there are notable differences between what countries consider" to be important (AFI, 2017: 3).

[2] For example, the ratio of number of formal financial institutions against the adult population.

The literature includes several studies that define FI based on the key concepts of use and access. Sarma (2008: 3) observes that the definitions of FI emphasise financial exclusion as being “a manifestation of a much broader issue of social exclusion of certain societal groups such as the poor and the disadvantaged”; FI is thus defined as “a process that ensures the ease of access, availability and usage of the formal financial system for all members of an economy”. The same definition is given by Sarma and Pais (2008), Park and Mercado (2015) and Kim et al. (2018). Also: “Financial inclusion aims at drawing the unbanked population into the formal financial system so that they have the opportunity to access financial services ranging from savings, payments, and transfers to credit and insurance” (Hannig & Jansen, 2010:1).

Gupte, Venkataramani and Gupta (2012: 134) define FI as “the process of ensuring access to financial services and timely adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost”. Allen et al. (2016: 2) simply define FI “as the use of formal financial services”. Table 1 illustrates how some writers have defined FI and presents the key elements of the definition.

Table 1. Definitions of Financial Inclusion from Selected Literature

Literature	Definition of Financial Inclusion	Key Elements of the Definition
Amidžić et al., (2014:5) and Gopalan and Rajan (2018: 562)	"An economic state where individuals and firms are not denied access to basic financial services based on motivations other than efficiency criteria."	Access to basic financial services Based on motivations
Bozkurt et al. (2018: 1474)	"To access and use all financial products needed by all individuals and businesses and the necessary knowledge and skills to use these products."	Access to all financial products Use of all financial products Knowledge and skills to use financial products
Zhang and Posso (2019: 1618)	"Access to useful and affordable financial products and services that meet individual's needs for transactions and payments, savings, credit, and insurance."	Access to financial products and services Useful and affordable financial products and services
Cámara and Tuesta (2014: 6)	"An inclusive financial system is one that maximizes usage and access, while minimizing involuntary financial exclusion."	Usage and Access Minimizing involuntary financial exclusion
Yorulmaz (2013: 81)	"Building an inclusive financial system that is available to all population groups and serves financial services as many people as possible in an economy."	Inclusive financial system Available to whole population
Ramji (2009: 6)	"Firstly, financial inclusion refers to a customer having access to a range of formal financial services, from simple credit and savings services to the more complex such as insurance and pensions. Secondly, financial inclusion implies that customers have access to more than one financial services provider, which ensures a variety of competitive options".	Access to a range of formal financial services More than one financial service provider

It is clearly apparent from Table 1 that access and usage are key elements in most of these definitions. The definitions also give an impression that financial exclusion occurs mainly among the economically marginalised population of an economy. The importance of a clear and concise definition cannot be over-emphasised. A careful and thoughtful choice of concepts of a definition for financial inclusion is important in making sure that the focus is on right things and sustains the purpose of trying to achieve an inclusive financial system. It is evident from the definitions in the academic literature that formal financial systems should be made available in an economy,

should be accessible to everyone and all members of the economy must be empowered to use the formal financial systems around them.

The emphasis *on formal financial systems* is to ensure the minimisation of financial exclusion that emanates from market or government failure.

> "The definition of formal financial institution used by the Global Findex encompasses all types of financial institutions that offer deposit, checking, and savings accounts; including banks, credit unions, microfinance institutions and post offices, and that fall under prudential regulation by a government body"[3] (Demirgüç-Kunt, Klapper, Singer, Ansar & Hess, 2018: 32).

A clear definition leads to clear and concise national financial inclusion goals, strategies, policies and measures. These in turn allow for the proper allocation of resources with a focus on the key priorities. This study constructs the definition of FI for Sub-Saharan Africa (as presented in the methodology section of this paper) by studying the definitions of FI for 13 Sub-Saharan Africa countries that have developed and published National Financial Inclusion Strategies. A definition derived in this manner is tailored to the FI needs of Sub-Saharan Africa by focusing on the key factors that matter across that region.

2.2. Pillars of Financial Inclusion

The essence of financial inclusion is in trying to ensure that a range of appropriate financial services is available to every individual and enabling them to understand and access those services (Mohapatra & Kumar, 2014). However, there is scant treatment of the main approaches referred to as key pillars, in the nascent literature on the subject of financial inclusion (Chibba, 2009). Available literature agrees that the poor need access to affordable and sustainable financial services including credit, savings, insurance, money transfer and that they need to know how to use the savings for productive investment (Atkinson & Messey, 2013; Thorat, 2006). Apart from regular form of financial intermediation, financial inclusion may include savings products suited to the pattern of cash flows of a poor household, investment such as a no frills banking account for making and receiving payments, credit in the form of small loans

3 The definition does not include nonbank financial institutions such as pension funds, retirement accounts, insurance companies, or equity holdings such as stocks.

and overdrafts for productive personal and other purposes, insurance products and payment gateway in the form of money transfer facilities (Mohapatra & Kumar, 2014). Those five aspects form pillars of financial inclusion. Virtually, data on measures of financial inclusion, including the World Bank's Global Findex and the IMF's Financial Access Surveys data have embedded those pillars in different variables.

Savings

There is still a dearth of products to carter to the small ticket need of the poor. It is important to understand the financial service needs of the rural poor and designing products and processes to address these needs. Analysis of saving decisions across different segments of the population reveals that most individuals especially in Uganda, Zambia and Kenya save at home, while in Malawi, a significant category of individuals do not save (Ouma & Were, 2017). Savings is key because it puts households on firmer financial footing, enabling stable and sustainable economic development.

Investment

As billions of people join the financial system they are empowered to make investments which support wider social objectives.

Credit

Non availability of quality credit data in respect of prospective borrowers results in failure to assess credit risks and other risks leading to credit delinquencies. Establishment of rural credit information bureaus would ensure availability of data on potential borrowers. Credit enables the economically marginalised sections of the economy to invest in small-scale income generating activities.

Insurance

Insurance to low-income people involving modest premiums and benefit packages which require different design and distribution strategies such as premium based on community risk rating as oppose to individual risk rating is necessary. Insurance is important to low–income people mainly because of cost-effective risk hedging instruments.

Payment gateway

Financial inclusion initiatives should aim to reduce the cost of sending remittances in rural areas. Banks can create linkages with e-money service providers such as telecommunications companies or become e-money issuers either directly or through outsourcing arrangements for example the European Commission recommended that all its members should ensure that all consumers have access to a basic payment account that promotes financial and social inclusion for individuals across Europe (The World Bank, 2012). Payment systems that allow parties to settle transactions quickly, cheaply, securely, and with acceptable risk are key for ensuring financial inclusion (The World Bank, 2012).

2.3. Measures of Financial Inclusion

2.3.1. The Dimensions and Indicators for Measuring Financial Inclusion

The measurement of FI serves two main purposes; firstly, to measure and monitor levels of FI, and secondly, to deepen one's "understanding about factors" that correlate "with financial inclusion and subsequently, the impact of policies" (Hannig & Jansen, 2010: 4; Yorulmaz, 2013: 81). A better measure of FI also allows for the study of the relationship between FI and other macroeconomic variables (Cámara & Tuesta, 2014). However, there is no consensus regarding the dimensions through which FI can be measured. At present, the inherent economic nature of the different countries determines the dimensions that deserve special attention to achieve greater levels of financial inclusion. Thus, countries use different indicators and methodologies to measure financial inclusion.

In order to create consistent and comparable quantitative data across countries, AFI's Financial Inclusion Data Working Group formulated a core set of financial inclusion indicators: these related to 'access to, and usage of', formal financial services. In contrast to that approach, The World Bank, The Global Partnership for Financial Inclusion (GPFI) and the G20 Financial Inclusion Indicators, propose three dimensions for measuring FI: 'access, usage and quality'. The literature has measured FI mostly in terms of the two dimensions of 'access and usage', using the supply side data (Gopalan & Rajan, 2018; Park & Mercado, 2015). Cámara and Tuesta (2014) consider 'access and usage' as being necessary outputs of FI; however, those writers feel that

these are “not sufficient for measuring the inclusiveness of a financial system”. Therefore, they suggest that it is imperative to consider demand-side individual data on the apparent reasons why individuals neglect to utilise formal financial services, when deciding the degree of FI.

The literature on this subject agrees that financial exclusion is in two types; voluntary[4] and involuntary[5] (Devlin, 2005; Claessens, 2006; Johnson & Nino-Zarazua, 2011; Demirgüç-Kunt & Klapper, 2013; Cámara & Tuesta, 2014; Fungáčová & Weill, 2015). Only those barriers that represent involuntary exclusion are considered because these represent market failure and can be addressed if the necessary measures are instituted. The index developed by Sarma (2008) uses the following three dimensions: ‘banking penetration’, ‘availability of banking services’ and ‘usage of the banking system’. In contrast, Amidžić et al. (2014) recognise the three dimensions of ‘outreach, usage and quality’ for measuring the levels of FI. The study conducted by Amidžić et al. (2014) does not include the quality dimension indicators when computing the index; it indicates that the scarcity of data in most of the sampled countries poses a challenge.

Honohan (2008) recognises ‘access and depth’ of financial services but focusses on using the access indicators. Hannig and Jansen (2010) suggest that FI should be measured by using the four dimensions of ‘access, quality, usage and impact’. “There is a consensus, at least from a policy maker’s perspective, that financial inclusion encompasses three main dimensions, namely the outreach, usage, and quality of financial services” (Amidžić et al., 2014: 8). There is proof to propose that the principle reason for limiting the dimensions to access and usage has been because of a scarcity of data on the quality/barriers dimension (Amidžić et al.,2014). Table 2 provides a summary of the dimensions used in the literature to measure FI.

[4] Where people do not display an interest for financial services, resulting in self-exclusion. This could be a result of social reasons, absence of money, negative word of mouth or confusion. Also they may not know about the advantages of financial services.

[5] Exclusion resulting from market flaws, for example, the absence of financial services or an improper range of services that do not fulfil the requirements of customers. Also factors, for example, distance, absence of the essential documentation, reasonableness and absence of trust in the formal financial system.

Table 2. Dimensions used for Measuring Financial Inclusion from Selected Literature

Literature	Dimensions Used
Gopalan and Rajan (2018)	Accessibility
	Usage
Sarma (2012)	Banking penetration
	Availability of banking service
	Usage
Park and Mercado (2015)	Availability of banking services
	Usage
Amidžić et al. (2014)	Outreach
	Usage
	Quality
Hannig and Jansen (2010)	Access
	Quality
	Usage
	Impact
Goel and Sharma (2017)	Banking penetration
	Availability of banking service
	Access to insurance

"A good measurement of the extent of financial inclusion should be set up based on some criteria and must incorporate information on as many dimensions of financial inclusion as possible and should be comparable" (Yorulmaz, 2013: 86). "Demand-side individual surveys that gather information on the perceived reasons why people fail to use formal financial services add significant information about the degree of inclusiveness of a financial system" (Cámara & Tuesta, 2014: 5). In general, a good measure of FI ought to consider both the demand- and supply-side data of FI. However, the literature that considers the demand-side data (Demirgüç-Kunt & Klapper, 2012) focuses on assessing the usage and barriers indicators individually. These dimensions give fractional information on the levels of FI if measured individually and can be misleading.

The academic literature has also been criticised for using a limited number of indicators but, as mentioned above, this has been attributed to challenges with availability of data; however this leads to results that give a limited picture of financial inclusion. For example, Goel and Sharma (2017) use only three indicators to develop an IFI, Gopalan and Rajan (2018) use six indicators from the IMF's Financial Access Surveys to measure financial inclusion for 50 emerging markets and developing economies. Amidžić et al. (2014) use four indicators while Park and Mercado (2015) use five indicators.

The following discussion refers to the dimension of FI and their variables, as defined in the relevant literature.

Access or Outreach or Availability of Banking Services

A lack of access (also referred to as 'outreach') to formal financial services is a basic instrument in "generating persistent income inequality as well in maintaining slower economic growth" (Beck, Demirgüç-Kunt & Honohan, 2009: 120). Therefore, growing access to formal financial services remains a significant test for most economies. Access to formal financial services is a critical measure of FI in Sub-Saharan Africa: this differs from the situation in the developed countries where technology and banking correspondents are broadening access to financial services. Thus, "for low-income countries, the relevant question for poor households is not how much financial assets they have, but whether they have access to financial intermediaries at all" (Honohan, 2008: 16). Imperfections in the financial market limit access to finance and by doing so, "play an important role in perpetuating inequalities; therefore, financial sector reforms that promote broader access to financial services should be at the core of the development agenda" (Beck et al., 2009: 120).

"Access refers to the availability of a supply of reasonable quality financial services at reasonable costs, where reasonable quality and reasonable cost have to be defined relative to some objective standard, with costs reflecting all pecuniary and nonpecuniary costs" (Claessens, 2006: 210). On the other hand, Amidžić et al. (2014: 8) define outreach as the "ability to easily reach a point of service." There are three categories of access of which the first is availability;[6] here the focus is on whether financial services are available and in what quantities. The second is costs, focussing on the costs at which the financial services are available "including the opportunity costs of having to wait in a line for a teller or having to travel a long distance to a bank or branch". The third is "range, type and quality of financial services being offered" (Claessens, 2006: 212). A study conducted by Brune, Giné, Goldberg and Yang (2013) noted that farmers in Malawi[7] withdraw funds soon after they are deposited to

[6] Some literature (Park & Mercado, 2015; Sarma, 2012; Goel & Sharma, 2017) recognises the "availability of banking services" as a standalone dimension of FI, whose indicators are part of the access dimension.
[7] According to Brune et al. (2013), farmers in Malawi have to travel a distance of 20 kilometres on average by foot, bus, or bicycle, to get to a bank branch.

limit costs related to commuting to and from the bank, and costs related to waiting (one hour on average) to withdraw money.

In order for policy makers to comprehend the effect of access to formal "financial services and to design effective policies to improve access, it is very important to measure and identify the barriers to access" (Yorulmaz, 2013: 81). Geography, or physical access, is one of "the barriers that prevent small firms and poor households in many developing countries from using" formal financial services (Beck et al., 2009: 125). Consequently, levels of access are determined by recognising and investigating possible barriers to account ownership and usage of a bank account. Examples of these include the following: cost and physical proximity of bank service points such as branches, Automated Teller Machines (ATMs), agents (third party entity transacting cash-in and cash-out on behalf of a formal financial institution including mobile money agents) and Point of Sale (POS) devices.

It is important that only the access points of regulated financial institutions are counted, and not informal providers. This allows for comparability and consistency because data from unregulated and informal entities can be limited or may not be traced. Sarma (2008) uses the number of banks per 1,000 population to measure the availability dimension; this is because very many countries lack comparable data on the number of ATMs and number of staff. On the other hand, Cámara and Tuesta (2014) use four indicators from the supply side data at country level to measure access to financial services: these are ATMs per 1,000 adults, commercial bank branches per 1,000 adults, ATMs per 1,000km^2 and commercial bank branches per 1,000km^2.

Amidžić et al. (2014) use the number of ATMs and branches per unit of land mass as a variable for the outreach dimension, because of the perceived barrier embedded in the physical distance to the physical points of service. However, "having a bank account by itself is not sufficient for an inclusive financial system; in addition, the banking services must be adequately utilised" (Yorulmaz, 2013: 88). This highlights the significance of the usage dimension as a measure of FI in a country. This is discussed, further, below.

Usage

Access to financial products and services is viewed as the first move towards an all-inclusive financial system. However, there must also be active usage of the products and services offered, in order to make an impact on improving lives. Therefore, sufficient use of financial services is a significant part of FI and “a measure of financial inclusion that is based on the proportion of adults/households with a bank account ignores some other important aspects of an inclusive financial system” (Sarma, 2012: 5). Individuals may prefer to utilise an informal financial service rather the formal service in light of the prohibitively high costs of using and maintaining that service; also, there can be barriers such as minimum balance and withdrawal fees. In those economies where greater FI is key, policymakers and commercial banks need to introduce new products which will motivate existing account holders to use formal institutions to save and borrow (Demirgüç-Kunt & Klapper, 2013).

The ‘usage’ dimension refers to people’s ability to make use of the formal financial services that are available in an economy. “An inclusive financial system should have as many users as possible; that is, an inclusive financial system should penetrate widely amongst its users” (Sarma, 2012: 15). This ‘usage’ dimension is propelled by the idea of an imperceptibly banked populace, as seen by Bihari (2011); thus, individuals holding accounts with formal financial institutions were found to make a very limited use of them, or did not utilise the financial services available to them. “To measure usage, it is critical that information reflect the user’s point of view; that is, data gathered through a demand-side” (Hannig & Jansen, 2010: 4)

Levels of usage are determined through the analysis of the regularity, recurrence and term of utilisation of formal financial services over time; the measurements include the number of transactions per account, number of electronic payments per account and average savings balances. “…beyond the basic adoption of banking services, usage focuses more on the permanence and depth of financial service and product use hence determining usage requires more details about the regularity, frequency, and duration of use over time” (Hannig & Jansen, 2010: 3).

Sarma (2008) measures this usage dimension by using “the volume of credit and deposits as a proportion of the country’s GDP”. Cámara and Tuesta (2014) apply three

indicators as follows: “holding at least one financial product; keeping savings; and, having a loan in a formal financial institution”. Amidžić et al. (2014: 9) measure this dimension by using two variables: “number of household borrowers per 1,000 adults and the number of household depositors per 1,000 adults”. However, “the number of loan and deposit accounts tends to overstate the usage dimension” “when there are multiple loan and deposit accounts by the same household”; therefore, the “number of borrowers” is “a more suitable proxy” (Gopalan & Rajan, 2018: 564).

Banking Penetration

Economic growth can be driven by banking penetration. Likewise, the role of government is essential insofar as it enables individuals to access and use banking services with relatively few complexities (Sharma, 2016). Levels of banking penetration are determined by the size of the banked populace; in other words, the number of individuals having a bank account (Sarma, 2008; Bihari, 2011). Specifically, Sarma (2008) measures this banking penetration dimension by using the data on bank deposit accounts, including checking, savings and time deposit accounts for businesses, individuals, and others.

Sarma (2012) uses the number of deposit bank accounts per 1,000 adult population as an indicator for this dimension. Similarly, Chakrabarty (2012) recognises the average population per branch or number of deposit bank accounts per 1,000 population as indicators for the banking penetration dimension. Sharma (2016) defines banking penetration by using two variables; the number of deposit accounts held by commercial banks per 1,000 adults, and the number of loan accounts held by commercial banks per 1,000 adults. It is clear from these indicators that this banking penetration dimension forms part of the usage dimension. In addition, Gopalan and Rajan (2018), point out that the indicators adopted by the literature discussing banking penetration tend to overstate that dimension whenever there are various credit or savings accounts held by one individual, family or business.

Quality

The ‘quality’ dimension encompasses the experience of the consumer of financial products or services, “demonstrated in attitudes and opinions towards those products or services” available to them (Hannig & Jansen, 2010: 3). Amidžić et al. (2014: 8)

define the quality dimension as “the extent to which financial services address the needs of the customers.” Hannig and Jansen (2010: 3) and Serrao, Sequeira and Hans (2012: 6) define the quality dimension as “the relevance of the financial service or product to the lifestyle needs of the consumer”.

Levels of quality are determined through the analysis of the scope of choices accessible to clients, their awareness and comprehension of financial products and an assessment of whether financial products and services satisfy clients’ requirements. “The measure of quality therefore would be used to gauge the nature and depth of the relationship between the financial service provider and the consumer as well as the choices available and consumers’ levels of understanding of those choices and their implications” (Hannig & Jansen, 2010: 3). Amidžić et al. (2014) consider various indicators to characterise the quality dimension. Their indicators are further sub-categorised into ‘financial literacy, disclosure requirements, dispute resolution and cost of usage’.

Barriers

According to Demirgüç-Kunt & Klapper (2012: 1) 35 percent of the world’s unbanked population “report barriers to account use that can be addressed by public policy;” these include high costs, physical proximity and absence of appropriate documentation. The barriers to financial inclusion are impediments that deter the unbanked individuals from utilising formal financial services (Cámara & Tuesta, 2014). If one assumes that people’s economic well-being is enhanced by access to, and usage of, financial products and services, then it is important to identify and measure barriers limiting the growth of financial inclusion. Numerous intricate factors involuntarily deter fast progress towards the objective of FI, and these can be categorised into supply-side and demand-side factors (Shankar, 2013). The “supply-side factors include non-availability of suitable products, physical barriers and non-eligibility on account of documentation issues” while the demand-side barriers include “financial literacy” and “financial capability”[8] (Shankar, 2013: 63).

[8] The term “‘financial literacy’ refers to the basic understanding of financial concepts”, while “‘financial capability’ refers to the ability and motivation to plan” financially, “seek out information and advice and apply these to personal circumstances” (Shankar, 2013: 63).

Nonetheless, a study by Demirgüç-Kunt and Klapper (2012), conducted in Brazil, recognises the six barriers of indebtedness, bureaucracy, lack of information, waiting lines, absence of sufficient credit approaches and high loan fees. Cámara and Tuesta (2014) use all the barriers cited in the Global Findex questionnaire to develop an IFI; these were distance, affordability, documentation and absence of trust. Demirgüç-Kunt and Klapper (2012: 4) argue that "relaxing documentation requirements could also potentially increase the share of adults with an account, by up to 23 percentage points in Sub-Saharan Africa". Any critical review of the academic literature easily shows a commonality between those variables considered under the quality dimension and those considered under the barriers dimension. Therefore, these two dimensions touch on the same aspects of FI.

Impact

The 'impact' dimension of financial inclusion should be assessed "in terms of both demand and supply of financial services" (Hannig & Jansen, 2010; Serrao et al., 2012: 9). Literature that considers the impact dimension (Hannig & Jansen, 2010: 4) admits that "measuring changes in the lives of consumers that can be attributed to the usage of a financial device or service poses serious methodological challenges to survey design." As such, there is only a limited amount of information in the literature concerning this dimension of financial inclusion.

Access to Insurance

Insurance features in the discussion of FI because of the opportunities it presents in respect of risk management. "The lack of insurance products means lack of opportunities for risk management and wealth smoothening" (Shankar, 2013: 61). However, there is only a limited amount of literature that considers access to insurance as a measure of FI. Goel and Sharma, (2017) measure the access to the insurance dimension by using the number of life insurance offices. Ramji (2009) measures the level of insurance penetration by using the insurance premiums as a percentage of GDP.

The dimensions used to measure FI must be identified with great care because if they are wrongly identified, then priority will focus on wrong interventions. It is also most important that the dimensions used to assess FI are consistent across different

economies; this ensures that the levels of FI are comparable across countries at a specific point in time, allowing policy makers to monitor progress of policy initiatives. It is evident that one single indicator fails to capture, sufficiently, levels of FI; therefore, collective measures should be used to determine the levels of FI. For example, a country may score highly in access measures but poorly in usage measures.

It is clear from the preceding review of the literature that the indicators used to measure FI in different dimensions do differ, but in some cases they overlap. That literature review shows that the access dimension should cover access to all financial products and services; this means that the access to the insurance dimension forms part of the access dimension and the same applies to any other financial product or service on offer to the public. Similarly, as shown above, usage of financial products and services entails banking penetration; therefore, these two dimensions are one and the same even though they have been presented differently in the academic literature. Again, strong similarities are obvious between the quality and barriers dimensions even though they have also been presented separately in the academic literature. Such variations make it necessary to determine a set of dimensions to assess the levels of FI in a country or across countries. However, as pointed out in the literature, data availability has been the major challenge for compiling an IFI (Yorulmaz, 2013). The other important aspect of measuring financial inclusion on which the literature has yet to agree refers to methods and approaches. This issue is discussed below.

2.3.2. Methods used to Measure Financial Inclusion

The literature describes various approaches for measuring financial inclusion, but a formal consensus has yet to be reached. For example, Sarma (2008: ii) proposes a multi-dimension IFI "that captures information on various dimensions of financial inclusion in one single digit lying between 0 and 1, where 0 denotes complete financial exclusion and 1 indicates complete financial inclusion in an economy". The measure is similar to that utilised by the UNDP for construction of development indices such as the HDI, HPI and GDI.

Unlike the UNDP's indices which use "pre-fixed values for the minimum and maximum for each dimension", the index developed by Sarma (2008: 10) uses distance-based methodology; in other words, an "empirically observed minimum and maximum for

each dimension". Several researchers have used the model with and without modifications (Goel & Sharma, 2017; Amidžić et al., 2014; Gopalan & Rajan, 2018; Chakravarty & Pal, 2013; Sarma & Pais, 2011; Park & Mercado, 2015; Sarma, 2012; Yorulmaz, 2013; Sarma & Pais, 2008; Amberkhane et al., 2016; Alamelu & Sankaramuthukumar, 2015; Wang & Guan, 2017; Bozkurt et al., 2018). Some of the findings of these researchers are discussed below.

The index developed by Goel and Sharma (2017), in the context of India, measures FI in terms of 'direction, degree and intensity', using the same concept of UNDP's indices. Their study used data from the IMF and Insurance Regulatory and Development Authority of India (IRDA) covering the period between 2004 and 2015. Their index (Goel & Sharma, 2017) attaches a weight to each dimension which is 1≥ weight ≥0. However, the study assigns an equal weight of 1 to all dimensions thereby assuming that all dimensions have a similar effect on FI. However, it should be noted that "if variables are grouped into dimensions and if those dimensions are further aggregated into a composite, then applying equal weighting to the variables may imply an unequal weighting of the dimension"; in other words, the dimensions that have grouped a "larger number of variables will have a higher weight" (OECD, 2008: 31). This leads to "an unbalanced structure in the composite index" (OECD, 2008: 31).

In order to address the issue of assigning equal weights to all dimensions, Amidžić et al. (2014: 11) developed an index derived from the same UNDP's indices methodology. They then use FA to identify the dimensions of FI and establish "whether the statistical groups obtained from" the FA "are the same as the theoretical" ones; weights are subsequently assigned. The index developed by Amidžić et al. (2014: 16) uses the geometric mean to address "the issue of perfect substitutability between variables within a dimension and/or between dimensions"; this has been a concern raised over the use of the UNDP's indices previously. Amidžić et al. (2014: 4) are pleased to note that the index is "subsequently used to rank countries".

Sarma and Pais (2011) use an IFI computed by Sarma (2008) in trying to determine the link between FI and development for 54 countries. After calculating the dimensional indices, Sarma and Pais (2011: 616) assign a weight of "1 for the index of penetration, 0.5 for the index of availability and 0.5 for the index of usage". This is done on the basis of a "lack of adequate data" for some "important indicators that

completely" characterise "the availability and usage dimensions". Sarma and Pais (2011) argue that the use of fewer indicators to calculate the dimensional index can only partially depict the level of a dimension; therefore, without adequate data, a total characterisation of the dimensions is impossible. A similar approach is used in Sarma and Pais (2008).

This study agrees that data must be available for most of the important indicators if one is to achieve a better measure of financial inclusion. Nevertheless, this study finds that the approach used by Sarma and Pais was subjective, in both their 2008 and 2011 studies, as far as assigning weights was concerned. As already mentioned in this paper, the IFI must allow countries or economies to compare the levels of FI at a specified time period in order to help policy makers to produce evidence-based policies. However, an index that permits the assignment of weights based on opinions (Sarma & Pais, 2008, 2011) presents difficulties in comparing the calculated levels of FI across countries or economies. Similarly, the OECD (2008: 32) notes that this approach "could be biased towards the readily-available indicators", thereby "penalising the information that" poses statistical problems in terms of identifying and measuring.

Park and Mercado (2015) follow the methodology of Sarma (2008) in developing a FI measure which uses cross country-data, concentrating on 37 developing economies in Asia. However, in contrast to Sarma (2008), Park and Mercado (2015) use five indicators[9] in the two dimensions of availability of banking services and usage. They make use of data from the World Bank's World Development Indicators for the period 2004 – 2012. Similarly, Yorulmaz (2013) considers the index developed by Sarma (2008) to be a comprehensive measurement tool of FI and therefore adopts the method to provide a measure of FI in Turkey for the period between 2004 and 2010; three dimensions are used, as in Sarma (2008), but with additional indicators.

The index developed by Chakravarty and Pal (2013) uses an axiomatic approach to measure FI: thus, calculates the percentage contributions of different dimensions to the overall attainment of FI. In contrast to this approach, the index developed by Cámara and Tuesta (2014: 21) considers that the level of FI is established by the

[9] These are: ATMs per 100,000 adults; commercial banks per 100,000 adults; borrowers from commercial banks per 1,000 adults; depositors with commercial banks per 1,000 adults; and, domestic credit to GDP ratio.

intensification of “usage and access to formal financial services, on the one hand, as well as by the minimization of obstacles causing involuntary exclusion’’. Cámara and Tuesta (2014) use PCA to develop an IFI. These attempts to measure FI, as described in the literature, emanate from the perceived economic benefits that come with an inclusive financial system. This issue is discussed below.

2.4. Financial Inclusion and Economic Development and Growth

It is worth remembering that “tackling poverty by addressing the needs of the unbanked, thus focusing on financial inclusion in developing countries, originated approximately 30 years ago through the social banking model of Mahammed Yunus” (Chibba, 2009: 214). Promoters of FI highlight that the broadening of access to financial services is a solution to poverty as it offers a model for integration “into, and participation in, market economies” (Manji, 2010: 993). Financial inclusion is considered to enhance money management, provide access to finance at reasonable costs and offer a safe place to keep one’s savings. It also reduces the growth of informal sources of credit such as money lenders[10] and provides for a wide range of choices than those accessible in the informal sector (Mohan, 2006; Sarma & Pais, 2011 and Chibba, 2009).

“Financial inclusion offers incremental and complementary solutions to tackle poverty”, “promote inclusive development” “and address the Millennium Development Goals” (MDGs) (Chibba, 2009: 213; Wang & Guan, 2017). Financial inclusion is featured in 8 of the 17 Sustainable Development Goals (SDGs) for 2030[11] which have been adopted by 193 countries. “Access to safe, easy and affordable credit and other financial services by the poor and vulnerable groups, disadvantaged areas and lagging sectors is recognised as a pre-condition for accelerating growth and reducing income

[10] Money lenders (also known as loan sharks in Malawi) are exploitive because they charge high interest rates leading to customers being unable to service and pay off the loan. This often results in loss of assets that are pledged as collateral for such a loan. In most cases the collateralised assets are of higher value than the value of the loan secured leading to severe losses on the part of the customer. The loan terms are generally unfavourable.

[11] These include: Sustainable Development Goal number 1, on poverty eradication; Sustainable Development Goal number 2, on ending hunger; Sustainable Development Goal number 3, on profiting health and well-being; Sustainable Development Goal number 5, on gender equality and economic empowerment of women; Sustainable Development Goal number 8, on promoting economic growth and jobs; Sustainable Development Goal number 9, on supporting industry, innovation and infrastructure; Sustainable Development Goal number 10, on reducing inequality; and Sustainable Development Goal number 17, on strengthening the means of implementation.

disparities and poverty'' (Swamy, 2014: 2). "A failure to broaden access to financial services would leave large segments of the population", and their "innovative capacity, untapped" (Manji, 2010: 991). It is therefore not surprising that "in recent years, much hope has been placed on the transformative power of financial access" as a poverty alleviation tool (Karlan & Morduch, 2009: 2).

Because of this belief that high levels of FI spur economic development and growth, especially in the area of poverty alleviation, countries in Sub-Saharan Africa have intensified efforts to improve levels of financial inclusion in a desperate move to overcome poverty. The Republic of Mozambique indicates in its NFIS that FI has always been part of its government's economic policies (Mozambique National Financial Inclusion Strategy 2016 - 2022, 2016). "There is a realization that lack of access to finance adversely affects economic growth and poverty alleviation, as the poor find it difficult to accumulate savings, build assets to protect against risks, as well as invest in income-generating projects" (Neaime & Gaysset, 2018: 231). "Access to well-functioning and efficient financial services can empower individuals economically and socially, allowing them to better integrate into a country's economy and actively contribute to its growth" (Imboden, 2005: 65).

The literature does not indicate any kind of clear causal relationship between FI and economic development and growth. There is a large amount of literature, however, in support of view that financial system development is able to lower levels of income inequality and poverty (for example, Allen et al., 2016; Honohan, 2008; Peachey & Roe, 2004; Banerjee & Newman, 1993; Clarke, Xu & Zou, 2006; Imboden, 2005; Galor & Zeira, 1993 and Honohan, 2005). Some writers (Beck, Levine & Loayza, 2000; Beck, Demirgüç-Kunt & Levine, 2007) have gone further to argue that financial system development is a key to poverty alleviation and economic development. However, Sarma and Pais (2011: 615) question such arguments by observing "that even 'well-developed' financial systems such as those in the" United States and the United Kingdom "have not succeeded" in being "all-inclusive", with "certain segments of the population" still remaining "outside the formal financial systems". Nevertheless, that subject is not the focus of this study; instead, the emphasis is on investigating the link between FI and economic development and growth.

Kim et al. (2018: 1) attempted to unveil the relationship between FI and economic growth, using the dynamic panel data estimation, panel VAR, IRFs and panel Granger causality tests. They find that "financial inclusion has a positive effect on economic growth" in Organisation of Islamic Cooperation (OIC) countries. In a similar study, Zhang and Posso (2019) used finance survey data covering more than 6,200 Chinese households to examine the effect of FI on household income. Zhang and Posso (2019: 1616) established that FI has a strong positive effect on household income and that "low-income households are found to benefit more from financial inclusion than high- and" medium-income level households[12].

According to Mader (2018: 463), "currently there is insufficient evidence for financial inclusion being development-promoting, poverty-alleviating, and indeed profitable enough, to justify all the attention and resources directed toward it." The perceived significance of FI in economic development and growth has led to the birth of networks and organisations with a particular focus on the FI agenda. These include, for example: Alliance for Financial Inclusion, Better than Cash Alliance, Centre for Financial Inclusion, Global Partnership for Financial Inclusion, Centre for Financial Regulation and Inclusion and the United Nations Secretary General's Special Advocate for Inclusive Finance and Development.

To date, the evidence available on the relationship between FI and economic development and growth has not been convincing; this applies despite the huge amount of resources that have been invested to promote improvements in FI around the world. The Consultative Group to Assist the Poor (CGAP) Funder Survey for 2017 reveals that international funders committed US$42 billion to financial inclusion[13] (CGAP, 2019). "The macro argument for financial inclusion rests on the suggestion that expanding access to finance drives growth and other pro-poor macro-economic changes; but the evidence, as we have seen, is inconclusive or of questionable" (Mader, 2018: 469). Most of the literature on this subject agrees that there is some correlation between FI and economic development and growth variables but there is limited evidence to support the contention that FI leads to economic development and/or growth. This issue is elaborated on, below.

[12] The effect was applicable across all households with different levels of income.
[13] Of which 4.7 billion (11.19 percent) was committed to Sub-Saharan Africa in the areas of capacity building, infrastructure, policy and funding supply.

Mader (2018: 472) argues that “allowing poor households to smooth consumption or manage shocks, or generally give them more choices, can be indicative of helping them cope with poverty, but not of helping them escape poverty”. Mader (2018: 478) then suggests that “it may be that growth and development actually drive financial inclusion”. An empirical analysis conducted by Sarma and Pais (2011) indicated that income as measured by GDPPC is an important variable in explaining the level of FI in a country; thus, the results of that analysis indicate that levels of FI and human development in a country move closely with each other.

Similarly, Allen et al. (2016: 4) established that in “developing economies, account ownership, on average, increases” with “economic development”. Honohan (2008: 15) suggests that “if development lowers poverty, it is in its depth dimension rather than the access dimension.” Other researchers also find little or no evidence for a causal relationship between access to financial services and economic development or growth (Khan, 2009; Khandker, 2005). Neaime and Gaysset (2018) find that FI has no impact at all on poverty.

These observations present an ambiguity regarding the causal relationship between FI and economic development and growth. The question still remains about whether FI is an essential driver of economic development and growth. This ambiguity should provide an essential caution to policy makers (governments, central banks, other financial regulators, the banking industry and development actors) who have placed so much trust on the perceived positive impact of FI on economic development and growth.

For example, the government of Zimbabwe aligns financial inclusion with the broader national development objectives of the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET) which supports the three key clusters of food security and nutrition, social services and poverty eradication and value addition (Zimbabwe National Financial Inclusion Strategy (2016-2020), 2015). “While expectations are high for financial inclusion to serve as a core pro-poor intervention,” they do not appear justified (Mader, 2018: 479). This position calls for evidence regarding the developmental and poverty impacts of an inclusive financial system.

The following Section provides the reasons why this dissertation is limited to the Sub-Saharan Africa.

2.5. Reasons for Limiting Study to Sub-Saharan Africa

Sub-Saharan Africa faces more substantial challenges than the rest of the world mainly because of higher levels of poverty; as such, the region requires special attention. It a well-known fact that Sub-Saharan Africa is the poorest region in the World. Thus, “decades of economic stagnation and declining living standards have turned Sub-Saharan Africa into the world’s poorest region” (Caldero´n & Serve´n, 2010: i13). Chen and Ravallion (2004: 141) state that “Sub-Saharan Africa has become the region with the highest incidence of extreme poverty and the greatest depth of poverty.” “Poor quality institutions, weak rule of law, an absence of accountability, tight controls over information, and high levels of corruption” are among the many challenges that imped on the region’s efforts to overcome poverty (Bräutigam & Knack, 2004: 255).

Despite the headline growth in Human Development indicators and the GDPPC growth, poverty and income disparity remain a difficult challenge for Sub-Saharan Africa. The rate of poverty reduction in Sub-Saharan Africa is significantly slow when compared to other developing regions. There are unique challenges facing the region, as mentioned in the literature. In addition, human economic development is uneven and there are low levels of financial inclusion. Unless these issues are addressed then the growth rate in Human Development indicators and the GDPPC, paint an over-optimistic picture. Caldero´n and Serve´n (2010: i13) indicate that “in spite of an incipient recovery since the end of the 1990s, with per capita income growth rates outpacing those of rich countries for the first time in many years, leading observers in the development and policy community are advocating a ‘big push’ to help the region escape poverty and regain the lost ground vis-a-vis the rest of the developing world”.

“Economic Crisis and unsustainable debt, civil wars, and political instability have all taken their toll” in the region over the past years (Bräutigam & Knack, 2004: 255). It is hardly surprising therefore, that Sub-Saharan Africa countries account for 50% (17 out of 34 countries) of the Harmonised List of Fragile Situations for 2017;[14] this situation

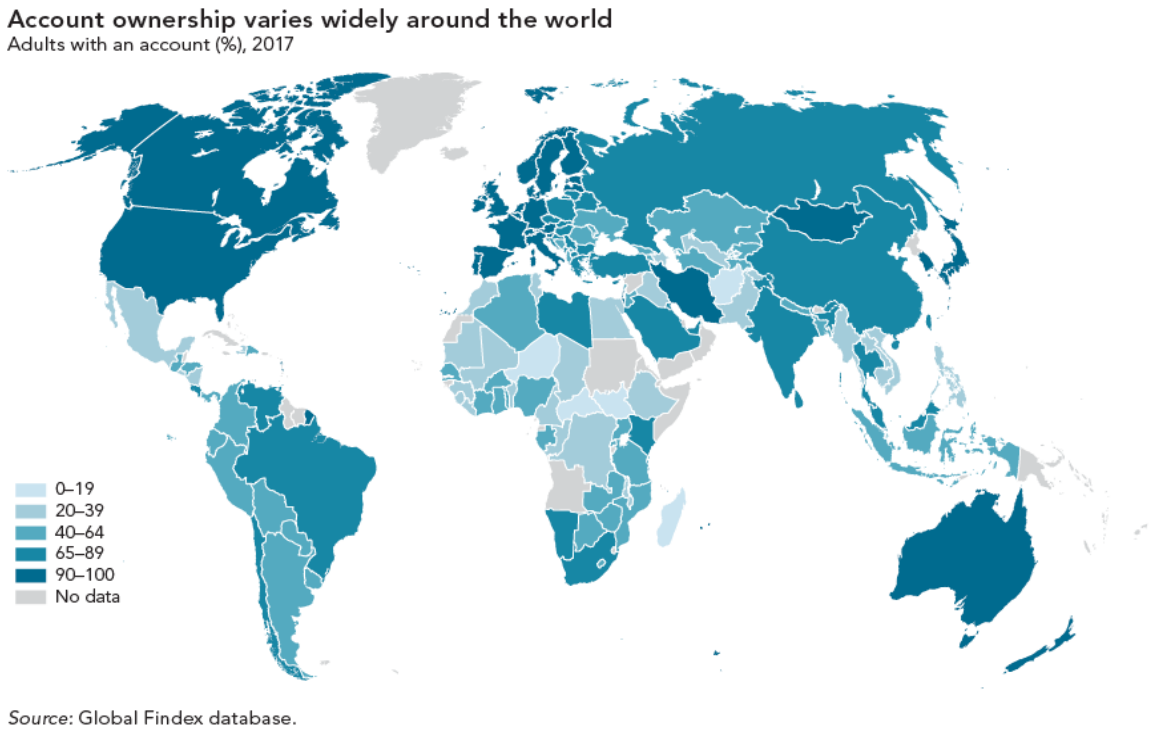
[14] As reported by the African Development Bank.

prevents the well-functioning of the financial system in the region and impacts negatively on the economy at large. “Fragile states are also characterised by low financial sector development and limited financial inclusion” (Demirgüç-Kunt & Klapper, 2013: 94). As shown by Beegle, Christiaensen, Dabalen and Gaddis (2016: 3), “all developing regions except Africa have reached the Millennium Development Goal of halving poverty between 1990 and 2015.”

Africa in general is ranked at the bottom of the list of developing economies in terms of access to infrastructure and is far behind Latin America and East Asia. “Essential infrastructure such as security services, telecommunication facilities and proper road network are still underdeveloped” (Chikalipah, 2017: 10). Sub-Saharan Africa ranks at the bottom of all developing regions as far as infrastructure development is concerned (Caldero´n & Serve´n, 2010). “The lack of infrastructure may explain why Sub-Saharan Africa has been at the forefront of mobile financial services which is considered a bright spot in improving financial inclusion” (Demirgüç-Kunt & Klapper, 2013). It is reported that in that region, 16% of adults have used a mobile phone to pay bills, send or receive money. Most of these adults are in Kenya, where the mobile money service, M-PESA, was launched in 2007; however, many mobile money users were not otherwise included in the formal financial system (Demirgüç-Kunt & Klapper, 2012).

Growth must be inclusive if it is to be culturally and politically sustainable (Demirgüç-Kunt & Klapper, 2013). FI is viewed as a basic tool that makes growth inclusive, because access to finance means that economic agents can settle on longer-term utilisation and speculation choices. They can also take an interest in profitable activities and adapt to startling momentary stuns; an aspect in which Sub-Saharan Africa has been lingering behind other regions of the world. Although financial exclusion is a universal problem, the financially excluded population is large in a developing country (Chibba, 2009). Recent evidence from the 2017 Global Findex database shows that only 38% (34% in 2014 and 24% in 2011) of adults aged 15 and above in Sub-Saharan Africa have an account with a formal financial institution (see Figure 1). Most adults in the region use informal methods to save and borrow.

Figure 1. Account Ownership Levels around the World



In comparison to "other developing economies, high-growth small and medium enterprises in Africa are less likely to use formal financing, which suggests" that "formal financial systems are not serving the needs of enterprises with growth opportunities" (Demirgüç-Kunt & Klapper, 2012:1). This observation holds more for Sub-Saharan Africa. According to the NFISs for countries in the region, micro, small and medium enterprises do not take part entirely in the formal financial system: as a result, they do not have a safe way to save, invest money or gain access to credit, and so they rely on informal lenders and personal networks. The "proportion of" the "rural population is found to be negatively associated with financial inclusion" (Sarma & Pais, 2011: 623).

The most frequently cited reason for not having a formal account is absence of the money needed to use one, followed by cost, distance and documentation. Insufficient documentation is cited as a reason by younger adults in Sub-Saharan Africa while distance from a bank is a significant barrier for individuals living in rural areas. It is a standard practice across the world to have a minimum account balance and in addition, there are account service fees and transaction fees, apart from in a few

economies such as the United Kingdom; these fees are high in Sub-Saharan Africa. Demirgüç-Kunt & Klapper (2012: 7) agree that “fixed fees and high costs of opening and maintaining accounts seem to be particularly important in Eastern and Southern Africa.”

However, the literature on FI in Sub-Saharan Africa focuses on studying the relationship between mobile phones or ICT and inclusive development (Asongu & Nwachukwu, 2016; Asongu & Le Roux, 2017). There is also a focus on studying the gender gap in accessing finance (Aterido et al., 2013). However, if the benefits attributed to financial inclusion are real and if financial inclusion really does lead to economic development and growth, then there is a need for a measure of FI to achieve meaningful results. Nevertheless, the important questions remain unanswered for Sub-Saharan Africa:

1. How should FI be measured in Sub-Saharan Africa?
2. Does FI lead to economic development and growth?

3. Data and Methodology

3.1. Description of Data

This study uses data from the IMF Financial Access Surveys (FASs) to construct the IFI for Sub-Saharan Africa; the applicable period is the 7 years from 2010 to 2017. The FAS is the most comprehensive world-wide supply-side data on FI, covering 189 countries in the world. The FAS has been conducted every year since 2009 and focuses on collecting data on access to, and use of, formal financial services. The dataset contains a total of 65 indicators in the two dimensions of access and usage, expressed as ratios of GDP, adult population or land area. The data is disaggregated by the types of financial product or service providers (for example commercial banks, insurance companies, other financial intermediaries, deposit-taking microfinance institutions, credit unions and cooperatives) and by type of financial service (for example deposits, mobile money, insurance and loans). The IMF makes the data, which dates back from 2004, accessible to the public at http://data.imf.org/FAS.

For the purposes of this study, the other important complementary supply-side dataset of financial inclusion is the World Bank Global Payment Surveys. This provides comparable data with a narrow focus on national payments and securities settlement systems in 139 countries around the world. However, the data is only available up to 2015 and does not cover the entire period of the scope of this study. Therefore, this study focuses on using only data from the FAS for the supply-side aspect of FI indicators in order to compute the index for Sub-Saharan Africa. However, reference has been made to this dataset where necessary.

For a meaningful measure of FI, it is vital to take into account demand-side data; this collects information from households and individuals (Honohan, 2008). The literature on this subject is in agreement that demand- and supply-side data are complementary rather than substitutes. Although this study has not used The World Bank Global Financial Inclusion Database (Global Findex) in computing the IFI for the region, due to its limited scope in terms of the timeframe covered by the study, extensive reference has been made to the dataset in determining the dimensional variables of FI for Sub-Saharan Africa.

The Global Findex is the most comprehensive world-wide demand-side data on FI, with the latest database containing a total of 765 indicators. The World Bank launched the Global Findex in 2011 and this collects data on how adults save, borrow, make payments and manage risks in more than 140 countries around the world. The Global Findex incorporates the results of surveys which are conducted at intervals of three years. The initial survey was conducted in 2011 and was followed by a second one in 2014 while the latest survey was conducted in 2017. The data represents approximately 1,000 adults aged 15 and above in each of the countries where the survey was conducted. The Global Findex combines information about socio-demographic conditions and contains significant amounts of detail on access and usage of formal financial services, including those variables that hinder FI. The World Bank makes the database accessible to the public at www.worldbank.org/globalfindex.

In contrast to other demand-side datasets such as the FinScope, the Global Findex is comparable across countries. The sample size and indicators in the FinScope surveys vary widely across countries and the surveys are conducted at different time intervals in different countries. Therefore, the FinScope data is useful for in-country policy making and not for measuring and comparing levels of FI across countries. Furthermore, not all Sub-Saharan Africa countries have conducted the FinScope Surveys, which makes it difficult for the dataset to be used for this kind of study. Hence, this study makes reference to the Global Findex to capture the demand-side aspect of FI.

The IMF's Financial Access Surveys and the Global Findex are comprehensive and they both use standard methodologies when conducting surveys in all countries. This makes it possible to compare variables across countries. These two databases are innovative as they have kept introducing new methods and indicators. For example, the Global Findex database for 2017 includes data on Financial Technology (FinTech) indicators. Both the FASs and the Global Findex are well-established financial inclusion databases; thus, the surveys have been successfully repeated for a significant period of time. The Global Findex and FAS are frequently cited in the academic literature on the subject of FI. The websites for these two databases are well documented in a way that makes available all the details of the survey including the

questionnaires, methodology and definitions. In view of all of this, it was imperative for this study to focus on using these datasets.

In order to examine the relationship between FI and economic development and growth, this study uses data from the World Development Indicators GDPPC based on Purchasing Power Parity (PPP) and United Nations Development Programme HDI as proxies for economic growth and economic development respectively. GDPPC is a measure of economic growth used widely in the literature (Chen & Fleisher, 1996; Calderón & Liu, 2003; Levine & Zervos, 1998, Sarma & Pais 2011; Park & Mercado 2015; Yorulmaz, 2016; Kim, Yu & Hassan, 2018) .

In this study, the HDI is used as a measure of economic development. The HDI was created in 1990 to provide a measure of development of a country in the following three areas: a long and healthy life, knowledge and education and standard of living (United Nations Development Programme, 2018). The Human Development reports are published annually by Oxford University Press on behalf of UNDP. The HDI is a geometric mean of normalised indices for each of the three core areas. Over the years, some modifications and refinements have been made to the index in response to criticisms and concerns raised.

For example McGillivray (1991) questioned both the composition of the HDI and its helpfulness as a new index of development. Kelly (1991) also argued that the HDI offered only constrained insights past those gained by little adjustments to basic measures of economic development such as the GNP per capita. Kelly then further questioned some of the underlying assumptions and features of the HDI. Similarly, Sagar and Najam (1998: 249) evaluated how HDI reports had met their conceptual mandate and concluded that those reports had “lost touch with their original vision and that the index” failed “to capture the essence of the world it seeks to portray”. Sagar and Najam (1998: 249) found that the HDI “focuses almost exclusively on national performance and ranking but does not pay much attention to development from a global perspective”. However, the adequacy of the GNP per capita as a measure of development has also been questioned over the years. The main reason is because it focuses on measuring income, which has been seen to have a very minor contribution to human development. Therefore, the HDI provides modified insights

when compared with the usual measure of economic development: the GNP per capita (Kelly, 1991).

In 1994 the minimum and maximum values were fixed in order to facilitate year-on-year comparisons. The methodology was also changed many times, especially during the first years. Because of those changes, it is difficult to compare the levels of HDI across years, in those early days of the survey. However, in recent years the methodology has become much more established and there have not been any changes during the period of the scope of this study. However, the criticism over the inadequacy of the dimensions used has not yet been resolved. In the first Human Development Report of 1990 it was mentioned that human development is not complete without human freedom.[15] This kind of additional dimension presents challenges in measurement as well as in translating into a mathematical concept. However, this particular issue does not represent a significant shortfall in this study of whether financial inclusions result in economic development. Hence at this point, the HDI is considered to be an adequate measure of economic development. Having said that, it should be pointed out that to date, none of the statistical approaches is without some kind of shortfall.

This dissertation also uses data from the World Development Indicators on a number of macro-level factors associated with FI. These are summarised in bullet points below:

- Inflation Rate (%): “The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly”.

- Population Growth Rate (%): “Annual population growth rate for year “T” is the exponential rate of growth of midyear population from year “T-1” to “T,” expressed as a percentage. Population is based on the *de facto* definition of population, which counts all residents regardless of their legal status or citizenship”.

[15] There has also been reference to human rights and the environment, among others.

- Unemployment Rate (%): “The percentage of the labour force that is without work but available for and seeking employment”.

- Primary School Enrolment: “The number of new entrants (enrollments minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education”.

- Trade Percentage of GDP (%): “The sum of exports and imports of goods and services measured as a share of gross domestic product”.

3.2. Methodology: Index of Financial Inclusion

3.2.1. Dimensions of Financial Inclusion for Sub-Saharan Africa

This study determines the dimensions of FI for Sub-Saharan Africa through a text analysis of National Financial Inclusion Strategies for countries in the region. Currently, there are 17 countries that have developed and published a NFIS. These are: Botswana, Burundi, Comoros, Côte d’Ivoire, Eswatini[16], Ethiopia, Liberia, Madagascar, Malawi, Mozambique, Niger, Nigeria, Sierra Leone, Tanzania, Uganda, Zambia and Zimbabwe, (see Appendix 2). The study analyses all of these countries except Comoros, Côte d’Ivoire, Madagascar and Niger whose published NFISs are in French.

The “NFIS outlines a vision and definition for financial inclusion” (Republic of Zambia National Financial Inclusion Strategy (2017 – 2022), 2017: 2). It also allows for the “determination of priority action points in order to achieve the financial inclusion vision and mission” (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 33). The strategy establishes a roadmap with key outputs and formal structures for implementing financial inclusion initiatives and widely accepted strategic frameworks. NFIS creates a robust organisational structure which facilitates the “development and implementation of coordinated and sound policy reforms” and FI regulation (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 7). Most importantly, the NFIS “defines the parameters for ongoing measurement and evaluation of the impact

[16] Previously known as Swaziland.

of specific actions", which enables "monitoring of progress over the implementation period" (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 8).

In the analysis of the NFISs, specific emphasis is directed towards the definitions of financial inclusion adopted by the various countries. As shown in the previous chapters of this study, the definition of financial inclusion provides a guide as to what areas of FI are most important to a country or an economy. This study first identifies the key elements of the definitions of financial inclusion as shown in Table 3, upon the understanding "that the definition of financial inclusion" addresses "key dimensions of financial inclusion" in an economy (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 36). This study then analyses each of the key elements of the definitions in terms of how frequently it has dominated the various countries; a weight is then assigned to each of the key elements (see Table 4). The weights are on a scale of 0-1 where 0 denotes irrelevance and 1 denotes a high degree of relevance.

Table 3. Definitions of Financial Inclusion Adopted by Countries with a Published NFIS.

Country Name	Definition of Financial Inclusion	Key Elements of the Definition	Link to Source
Botswana	There is no specific definition of financial inclusion in the country's Financial Inclusion Roadmap and Strategy for 2015 – 2021. However, the focus is on "Making Access Possible (MAP)".	Access	Botswana Financial Inclusion Roadmap and Strategy 2015 – 2021, (2015)
Burundi	"Permanent access by the adult population to a set of financial products and services (i) offered by formal and sustainable financial institutions, governed by adequate regulations, (ii) that are diversified, affordable and adapted to the needs of the population, and (iii) used by the latter for contributing to improvement in the conditions of their socioeconomic life".	Access A set of financial products and services Formal and sustainable financial institutions Diversified Affordable Adapted to the needs of the population Use Improvement of the conditions of socioeconomic life	Republic of Burundi National Financial Inclusion Strategy 2015 - 2020, (2014)
Eswatini	"… the effective access by citizens to a range of quality financial services such as credit, savings, insurance, payments and remittances, provided by diverse financial service providers."	Access All citizens A range of financial services Quality financial services Diverse financial service providers	National Financial Inclusion Strategy for Swaziland 2017 - 2022, (2017)
Ethiopia	"Access and use of a range of suitable (quality and affordable) financial products and services provided by regulated financial institutions by all individuals and enterprises, through innovative and convenient channels, to promote economic growth, poverty reduction, and financial stability".	Access Use A range of financial products and services Quality Affordable financial products and services Regulated financial institutions Promote economic growth, poverty reduction, and financial stability	Ethiopia National Financial Inclusion Strategy 2014-2020, (2017)

Liberia	"To build a sustainable microfinance industry, in order to secure diversified and affordable financial services for all".	Sustainable microfinance Diversified Affordable financial services	The Liberian Strategy for Financial Inclusion, 2009-2013, (2009)
Malawi	"Effective access by citizens to a range of quality financial services such as credit, savings, insurance, payments and remittances, provided by diverse financial service providers (banks, micro-finance banks, deposit-taking micro-finance institutions [MFIs] non-deposit-taking MFIs, financial cooperatives, NGOs, etc.)".	Access All citizens A range of financial services Quality financial services Diverse financial service providers	Malawi National Strategy for Financial Inclusion 2016 - 2020, (2018)
Mozambique	"Process of awareness, access and effective use of financial products and services offered by regulated institutions to the Mozambican population as a whole, contributing to enhance their quality of life and social welfare".	Awareness Access Effective use of financial products Regulated institutions Enhance quality of life and social welfare	Mozambique National Financial Inclusion Strategy 2016 - 2022, (2016)
Nigeria	"Financial Inclusion is achieved when adult Nigerians have easy access to a broad range of formal financial services that meet their needs at an affordable cost".	Easy access A broad range of financial services Formal financial services Meet needs at an affordable cost	Nigeria National Financial Inclusion Strategy 2010-2020, (2012)
Sierra Leone	"Financial inclusion is about the broadening of financial services to those people and businesses who do not have access to financial services sector; the deepening of financial services for those who have minimal financial services; and greater financial literacy and consumer protection so that those who are offered financial products can make appropriate choices".	Broadening of financial services To people and businesses who do not have access Deepening of financial services for those who have minimal financial services Financial literacy Consumer protection	Sierra Leone National Strategy for Financial Inclusion 2017-2020, (2017)
Tanzania	"The regular use of financial services, through payment infrastructures to manage cash flows and mitigate	Regular use Payment infrastructures Manage cash flows	Tanzania National Financial Inclusion Framework 2018 -2022, (2018)

	shocks; services are delivered by formal providers through a range of appropriate services, with dignity and fairness”.	Mitigate shocks Formal providers A range of appropriate services Dignity and fairness	
Uganda	“Having access to and using a broad range of quality and affordable financial services which help ensure a person’s financial security”.	Access Use A broad range of financial services Quality Affordable financial services Financial security	The Republic of Uganda National Financial Inclusion Strategy 2017 - 2022, (2017)
Zambia	“Access to, and informed usage of, a broad range of quality and affordable savings, credit, payment, insurance, and investment products and services that meet the needs of individuals and businesses”.	Access Informed usage A broad range of financial services Quality Affordable financial services Meet the needs of individuals and businesses	Republic of Zambia National Financial Inclusion Strategy 2017 - 2022, (2017)
Zimbabwe	“The effective use by all Zimbabweans of a wide range of quality, affordable & accessible financial services, provided in a fair and transparent manner through formal/regulated entities”.	Effective use A wide range of financial services Quality Affordable Accessible financial services Fairness and transparency Formal or regulated entities	Zimbabwe National Financial Inclusion Strategy 2016 - 2020, (2015)

Table 4. Analysis of the Key Elements of Definitions of Financial Inclusion Adopted by Sub-Saharan Africa Countries.

Key Elements of the Definitions	Recognised by (Country)	Count	Weight (0-1)
Access	Botswana, Burundi, Eswatini, Ethiopia, Malawi, Mozambique, Nigeria, Sierra Leone, Uganda, Zambia, Zimbabwe	11	0.85
Diversified/ A range of financial products and services/ Broadening of financial services	Burundi, Eswatini, Ethiopia, Liberia, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda, Zambia, Zimbabwe	11	0.85
Affordable financial services	Burundi, Ethiopia, Liberia, Nigeria, Uganda, Zambia, Zimbabwe	7	0.54
Use	Burundi, Ethiopia, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe	7	0.54
Quality	Eswatini, Ethiopia, Malawi, Uganda, Zambia, Zimbabwe	6	0.46
Formal/regulated financial institutions	Burundi, Ethiopia, Mozambique, Nigeria, Tanzania, Zimbabwe	6	0.46
Adapted to the needs of the population/ Meet the needs of individuals and businesses	Burundi, Zambia, Nigeria	3	0.23
Diverse financial service providers	Eswatini, Malawi	2	0.15
Mitigate shocks/ Financial security	Tanzania, Uganda	2	0.15
Dignity and fairness/ Fairness and transparency	Tanzania, Zimbabwe	2	0.15

Key Elements of the Definitions	Recognised by (Country)	Count	Weight (0-1)
Improvement of the conditions of socioeconomic life	Burundi	1	0.08
Promote economic growth, poverty reduction, and financial stability	Ethiopia,	1	0.08
Sustainable microfinance	Liberia	1	0.08
Awareness/ Financial literacy	Mozambique,	1	0.08
Enhance quality of life and social welfare	Mozambique,	1	0.08
To people and businesses who do not have access	Sierra Leone	1	0.08
Deepening of financial services for those who have minimal financial services	Sierra Leone	1	0.08
Consumer protection	Sierra Leone	1	0.08
Payment infrastructures	Tanzania	1	0.08
Manage cash flows	Tanzania	1	0.08

Table 4 indicates that most of the Sub-Saharan African countries regard access to a range of diversified financial products and services as being a key element of FI. The results presented in Table 4 also give the impression that access to financial services alone is not adequate; the effective usage of financial products and services is also a key issue in ascertaining the depth of FI in a country. For example, the Republic of Burundi National Financial Inclusion Strategy 2015 - 2020, (2014) emphasises that it is not only the question of providing the population with sustainable access to financial products and services, but also ensuring that their usage is guaranteed; one prerequisite for this is to ensure that the terms and conditions of usage are not unacceptably onerous to the user.

The NFISs for those countries in the sample make it clear that financial services should be affordable and must come from formal or regulated financial institutions in order to be meaningfully inclusive. The other important feature notable in most of the definitions above is ‘quality financial products and services’ which has been directly considered by 6 countries. The Malawi National Strategy for Financial Inclusion 2016-2020, (2018) indicates that the term ‘quality’ encompasses affordability, appropriateness or product fit, convinience and provision of financial services with diginity (including customer care, consumer protection and consumer privacy). If one applies this generalisation, then it becomes clear that all the other key elements considered by just one or two countries now fall under the quality aspect. This study discusses each of the key elements of financial inclusion from the NFISs, below.

Access

The element of ‘access’ entails that financial products and services should be close to the intended beneficiaries in terms of distance. Moreover, there should not be onerous requirements acting as barriers to access; one example is the ‘know your customer procedures’. As pointed out earlier in this study, distance is a significant issue for individuals living in the rural areas of Sub-Saharan Africa and this is in contrast to the developed countries where technology and banking correspondents overcome the physical barrier of access to formal financial services. Most people in Sub-Saharan Africa live in rural areas. Therefore, this element of ‘access’ addresses the “accessibility of financial products and services to the majority of the population” (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 37). Almost all

of the NFISs specifically indicate that the main obstacles to financial inclusion include limited expansion of formal financial access points because of a lack of basic infrastructure, particularly in the rural areas. Therefore, infrastructure must be developed to promote access to formal financial products and services.

Wide range of products and services

Financial inclusion entails that people have access to a broad range of financial products and services such as insurance, banking, pension, credit, investment products, remittances and sharia-compliant financial services.[17] The NFISs for the sampled countries agree that there are only a few products and services developed and marketed to address the requirements of those segments of the economy with poor or no access to financial services.

Usage

FI entails that the "use of formal financial products" and services "should not be considered" to be "the preserve of a few"; this should be "a way of life for all" people in the economy (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 36).

Quality

If participation in financial markets is to be increased, in terms of both access to and usage of formal financial products and services, then individuals and businesses must be informed about product features, as well as their rights and the available redress mechanisms. Individuals and businesses must also be informed about where to seek advice. They must have the confidence to interact with formal financial products and service providers. Financial consumer protection mechanisms should be developed to protect consumers from the risks associated with interactions with providers of formal financial products and services. The term 'financial inclusion' means that the financial services must meet the requirements and needs of the clients. The provision of quality financial products and services ensures that those products and services have a positive effect on the welfare of users (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015). Quality encompasses affordability, appropriateness or product

[17] Sharia compliance is important for countries such as Ethiopia, which has a significant Muslim population.

fit, financial literacy, convenience and provision of financial services with diginity (including customer care, consumer protection, dispute resolution mechanisms and consumer privacy).

Formal financial institutions

Here, the focus is on formalising the provision of financial services to 'marginalised' people. "This reduces the exploitation of low income groups by providers of informal" financial products and services (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 11). The use of formal financial products and services also promotes stability of the financial system and helps to manage the risks of money laundering, because formal financial institutions are subject to regulation.

By all people of the economy

The goal is for all individuals aged 15 and above to have access to, and be able to use, formal financial products and services. Enhancing access to and usage of, formal financial products and services, may have limited or no relevance to universal financial inclusion; after all a key consideration is who has access to the financial system. For example, some efforts made to enhance access to, and usage of, formal financial products and services might only benefit those sections of the economy already served and might not reach people on the margins; if so, then this does not result in inclusive finance. Hence, this key element ensures "that the marginalised sections of the" "population gain access to appropriate products and services without being" discriminated against (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015: 37). Virtually all NFISs for the region recognise the financial needs of special groups such as micro, small and medium enterprises (MSMEs), as well as the rural population, women, small-scale agriculture communities and the youth.[18]

The preceding analysis shows clearly that if meaningful levels of FI in Sub-Saharan Africa are to be achieved, then attention should be directed towards the three dimensions of '**access**, **usage** and **quality'**.

[18] The Republic of Uganda National Financial Inclusion Strategy (2017-2022), (2017) also specifically recognises Persons With Disabilities (PWD).

Access

The access dimension reflects the “depth of outreach of financial services, such as penetration of bank branches or point of sale devices” “or demand-side barriers, that customers face” when “accessing financial services” or products (Zimbabwe National Financial Inclusion Strategy 2016-2020, 2015: 84).

Usage

This dimension “measures the extent to which clients use financial services”, in terms of “regularity and duration of financial product/service” (Zimbabwe National Financial Inclusion Strategy 2016-2020, 2015: 84).

Quality

This dimension “reflects the degree to which financial products and services match” the client’s needs and also reflects “the range of options available to customers, and clients’ awareness and understanding of financial products” (Zimbabwe National Financial Inclusion Strategy (2016 – 2020), 2015:). Considerations of product-fit, transparancy, safety, consumer protection and financial capability are also embedded in this measure of financial inclusion for Sub-Saharan Africa.

Definition of Financial Inclusion

Based on the preceding analysis, this study defines FI for Sub-Saharan Africa as ***access to and usage of a wide range of quality financial products and services offered by formal financial institutions, by all people of the economy***. This definition is objective, transparent and relevant to the region because the focus is not placed on what indicators are available but rather on factors that are key to Sub-Saharan Africa. This definition is live and will evolve as new products and services become available.

3.2.2. Indicators or Variables for Measuring the Dimensions of Financial Inclusion for Sub-Saharan Africa.

The following discussions include lists of indicators for each dimension. Those lists are not conclusive but they include indicators that are applicable to the region in respect of the studied NFISs and the available literature.

Table 5 includes the access dimension indicators applicable to Sub-Saharan Africa, based on the National Financial Inclusion Strategies and literature review.

Table 5. Access Dimension Indicators of Financial Inclusion

Indicators	Definition	Data Source
Branches of commercial banks per 100,000 adults	"Denotes the number of commercial banks and their branches for every 100,000 adults in the reporting jurisdiction".	IMF Financial Access Surveys
Branches of commercial banks per 1,000km^2	"Denotes the number of commercial banks and their branches for every 1,000 square kilometers in the reporting jurisdiction".	IMF Financial Access Surveys
Branches of all MFIs per 1,000km^2	"Denotes the number of deposit taking and non-deposit taking microfinance institutions and their branches for every 1,000 square kilometers in the reporting jurisdiction".	IMF Financial Access Surveys
Branches of all MFIs per 100,000 adults	"Denotes the number of deposit taking and non-deposit taking microfinance institutions and their branches for every 100,000 adults in the reporting jurisdiction".	IMF Financial Access Surveys
Branches of credit unions and financial cooperatives per 1,000 km^2	"Denotes the number of credit unions and credit cooperatives and their branches for every 1,000 square kilometers in the reporting jurisdiction".	IMF Financial Access Surveys
Branches of credit unions and financial cooperatives per 100,000 adults	"Denotes the number credit unions and credit cooperatives and their branches for every 100,000 adults in the reporting jurisdiction".	IMF Financial Access Surveys
Automated Teller Machines (ATMs) per 1,000 km^2	"Denotes the total number of ATMs of all financial institutions for every 1,000 square kilometers in the reporting jurisdiction".	IMF Financial Access Surveys
Automated Teller Machines (ATMs) per 100,000 adults	"Denotes the total number of ATMs of all financial institutions for every 100,000 adults in the reporting jurisdiction".	IMF Financial Access Surveys
Mobile money agent outlets: active per 1,000 km^2	"Denotes the number of mobile money agent outlets that have facilitated at least one transaction over the past 30 days for every 1,000 square kilometers in the reporting jurisdiction".	IMF Financial Access Surveys
Mobile money agent outlets: active per 100,000 adults	"Denotes the number of mobile money agent outlets that have facilitated at least one transaction over the past 30 days for every 100,000 adults in the reporting jurisdiction".	IMF Financial Access Surveys
Number of Point of Sale (POS) terminals per 100,000 adults	"Total number and value of payments at POS (at merchant physical locations) with credit or debit cards for every 100,000 adults".	World Bank's Global Payment Sytems Surveys
Number of e-money accounts for mobile payments	"Total number and value of payments by e-money instruments. E-money is a record of funds or value available to a consumer stored on a payment device such as chip, prepaid cards, mobile phones or on computer systems".	World Bank's Global Payment Sytems Surveys

Source: Developed by self, with information from the following NFISs: Zimbabwe, Eswatini, Ethiopia, Nigeria, Mozambique, Uganda, Zambia, Sierra Leone and Tanzania with G20 Financial Inclusion Indicators and academic literature.
Note: Definitions are from the IMF "Financial Access Survey: Glocery Indicators" and World Bank's Global Payment Sytems Surveys.

Table 6 presents the usage dimension indicators applicable to Sub-Saharan Africa, based on the National Financial Inclusion Strategies and the literature review. The study also considers other indicators relevant to Sub-Saharan Africa that are not included in Table 6 because of a scarcity of data. Those additional usage indicators include the number of life- and non-life insurance policy holders per 1,000 adults, as well as MSMEs with a deposit at a formal financial institution and MSMEs with an outstanding loan or line of credit.

Table 6. Usage Dimension Indicators of Financial Inclusion

Indicators	Definition	Data Source
Depositors with commercial banks per 1,000 adults	"Denotes the total number of deposit account holders that are resident nonfinancial corporations (public and private) and individuals from the household sector at commercial banks for every 1,000 adults in the reporting jurisdiction	IMF Financial Access Survey
Depositors and customers with all MFIs per 1,000 adults	Definition not given".	IMF Financial Access Survey
Depositors with credit unions and financial cooperatives per 1,000 adults	"Denotes the total number of deposit account holders that are resident nonfinancial corporations (public and private) and individuals from the household sector, at credit unions and credit cooperatives, for every 1,000 adults in the reporting jurisdiction".	IMF Financial Access Survey
Borrowers at commercial banks per 1,000 adults	"Denotes the total number of resident customers that are nonfinancial corporations (public and private) and individuals from the household sector who obtained loans from commercial banks for every 1,000 adults in the reporting jurisdiction".	IMF Financial Access Survey
Borrowers at credit unions and financial cooperatives per 1,000 adults	"Denotes the total number of resident customers that are nonfinancial corporations (public and private) and individuals from the household sector who obtained loans from credit unions and credit cooperatives for every 1,000 adults in the reporting jurisdiction".	IMF Financial Access Survey
Borrowers at all MFIs per 1,000 adults	"Denotes the total number of resident customers that are nonfinancial corporations (public and private) and individuals from the household sector who obtained loans from microfinance institutions for every 1,000 adults in the reporting jurisdiction".	IMF Financial Access Survey
Used a debit or credit card to make a purchase in the past year (% age 15+)	"Denotes the percentage of respondents who report using a debit or credit card to make a purchase in the past 12 months".	Global Findex
Sent or received domestic remittances: through a mobile phone (% age 15+)	"Denotes, among respondents reporting personally sending any of their money in the past 12 months to, or receiving any of it from, a relative or friend living in a different area of their country, the percentage who report doing so through a money transfer service".	Global Findex
Sent or received domestic remittances: through a financial	"Denotes the percentage of respondents who report personally receiving any money in the past 12 months from a relative or friend living in a different area of their country through a bank or another type of financial institution. This	Global Findex

institution (% age 15+)	includes at a branch, at an automated teller machine (ATM), or through direct deposit into an account".	
Deposit in the past year (% with a financial institution account, age 15+)	"Denotes, among respondents with a financial institution account, the percentage who report one or more deposits into their account in the past 12 months. This includes cash or electronic deposits or any time money is transferred into the account by the respondent, an employer, or another person or institution".	Global Findex

Source: Developed by self with information from the following NFISs: Zimbabwe, Eswatini, Ethiopia, Nigeria, Mozambique, Uganda, Zambia, Sierra Leone and Tanzania as well as G20 Financial Inclusion Indicators and academic literature.
Note: Definitions are from the IMF "Financial Access Survey: Glossary Indicators" and from "2017 Global Findex glossary".

Indicators for the quality dimension applicable to the region are presented in Table 7. These indicators are generated from the analysis of the National Financial Inclusion Strategies and the academic literature. This study also recognises other indicators of the quality dimension that have not been included in Table 7 because of scarcity of data. These include the average cost of opening a basic current account, the average cost of maintaining that basic account and the average cost of credit transfers; all these considerations impact on the affordability element of the quality dimension.

In order to provide a comprehensive measure for the quality dimension, it is necessary to have data on financial literacy, disclosure requirements and a reflection of the existence of formal internal and external dispute resolution mechanisms. The World Bank Financial Capability and Financial Consumer Protection Surveys collect data on these indicators, amongst others. These indicators are not incorporated in Table 7 for two reasons. Firstly, the data on these indicators does not cover the entire period of the scope of this study and secondly, data on these indicators is qualitative rather than quantitative. The surveys provide data on a scale of 1-0, where 1 denotes "YES" and 0 denotes a "NO" and this presents challenges when attempting to incorporate the data for the index development, with that from the IMF's FASs. The OECD National Financial Literacy and Inclusion Surveys also provide data on financial literacy measures which presents the same challenges.

Table 7. Quality Dimension Indicators of Financial Inclusion

Indicators	Definition	Data Sources
Main source of emergency funds: savings (% able to raise funds, age 15+)	"Denotes, among respondents reporting that in an emergency they can raise 1/20 of gross national income (GNI) per capita in local currency, the percentage who cite savings as their main source of this money".	Global Findex
Main source of emergency funds: family or friends (% able to raise funds, age 15+)	"Denotes, among respondents reporting that in an emergency they can raise 1/20 of gross national income (GNI) per capita in local currency, the percentage who cite family, relatives, or friends as their main source of this money".	Global Findex
Main source of emergency funds: money from working (% able to raise funds, age 15+)	"Denotes, among respondents reporting that in an emergency they can raise 1/20 of gross national income (GNI) per capita in local currency, the percentage who cite money from working as their main source of this money".	Global Findex
Main source of emergency funds: loan from a bank, employer, or private lender (% able to raise funds, age 15+)	"Denotes, among respondents reporting that in an emergency they can raise 1/20 of gross national income (GNI) per capita in local currency, the percentage who cite borrowing from a bank, an employer, or a private lender as their main source of this money".	Global Findex
Main source of emergency funds: sale of assets (% able to raise funds, age 15+)	"Denotes, among respondents reporting that in an emergency they can raise 1/20 of gross national income (GNI) per capita in local currency, the percentage who cite the sale of assets as their main source of this money".	Global Findex

Source: Developed by self with information from the following NFISSs: Zimbabwe, Eswatini, Ethiopia, Nigeria, Mozambique, Uganda, Zambia, Sierra Leone and Tanzania as well as G20 Financial Inclusion Indicators and academic literature.
Note: Definitions are from the "2017 Global Findex glossary".

Preparing Data

As in the case of previous literature on the subject of Index of FI, this study is faced with data challenges. Ignoring those challenges can lead to serious ramifications in the development of the index as well as in any subsequent inferences made. If a study were to consider all the indicators in all dimensions, then no index would be developed for all the years subjected to this study. Because of the challenges posed by the lack of availability of comparable data, this study does not consider all the indicators in the three dimensions when constructing the index. Table 8, below, summarises the final list of indicators used in this study to construct the IFI for Sub-Saharan Africa. The dimension of quality is not incorporated in the index construction because data is not available for most years; indeed it is only available for 2014 and 2017.

Table 8. List of Indicators Used by the Study

Dimension	Indicator
Access	Branches of commercial banks per 100,000 adults (BranchAdults) Branches of commercial banks per 1,000km^2 (Branchkm^2) Automated Teller Machines (ATMs) per 1,000km^2 (Atmkm^2) Automated Teller Machines (ATMs) per 100,000 adults (AtmAdults)
Usage	Depositors with commercial banks per 1,000 adults (DepositorAdults) Borrowers at commercial banks per 1,000 adults (BorrowersAdults)

Data is available for these six indicators for 15 countries from 2014 to 2017: Seychelles, Cabo Verde, São Tomé and Príncipe, Botswana, Nigeria, Ghana, Lesotho, Rwanda, Zimbabwe, Uganda, Comoros, Madagascar, Guinea, Central African Republic and Chad. Here, it should be noted that there are 48 countries in Sub-Saharan Africa (see Appendix 2). Although focusing on 15 countries out of the total of 48 would give a comprehensive picture of FI, by limiting the inconsistences that arise due to missing data, the sample of 15 represents only 31% of the countries in the region.

In view of this limitation, some countries with data missing in a specific year are included in the analysis in those years for which data is available for all the six indicators. This allows for the study to be conducted on a total of 26 countries; this represents 54% of the countries in the region (see Appendix 2). Moreover, this enables the study to be conducted over a period of 7 years, from 2010 to 2017. In order to create a comprehensive picture of the levels of FI for the region, the analysis is performed in two parts. Thus, the first part covers the 26 countries and the second part covers the 15 countries.

3.2.3. Methods used to Measure Financial Inclusion

There is no universally accepted scientific rule for constructing an IFI. In this study, the index for Sub-Saharan Africa is developed using three approaches. This is in order to have a benchmark reference. The index is first estimated using the simple geometric mean that is applied for the UNDP's HDI. Secondly, the index is constructed using the Inverse Euclidean Distance method adopted by Sarma (2008); this approach complies with most of the literature on the subject of the Index of Financial Inclusion. Finally,

the index is constructed by using the Factor Analysis method described by Amidžić et al., (2014); this has attempted to address the issue of applying equal weights to indicators and dimensions.

3.2.3.1. Simple Geometric Mean

First, the methodology of the UNDP's HDI is followed. Thus, the UNDP uses two steps in its index development:

1. Creating the dimensional indices, and
2. Aggregating the sub-indices to produce the IFI.

Normalisation of Variables: Creating the Dimensional Indices

The variables are normalised so that they are comparable, bearing in mind that the variables in the data set have different measurement units. Various methods of normalisation are available, including ranking, Z-score, Min-Max, Distance to a reference and categorical scale (OECD, 2008; Freudenberg, 2003). The HDI methodology uses the Min-Max to normalise the variables. The minimum and maximum values (goal posts) are set in order to transform the indicators into indices in the range 0 - 1. The goal posts are fixed for a consistent measure to allow for comparability across years. In this study, the Min and Max change year-on-year in order to measure the extent of FI in a country relative to the prevailing situation in the entire Sub-Saharan Africa area (see Sarma 2008). The dimension indices are calculated as follows:

$$d_i = \frac{A_i - m_i}{M_i - m_i}$$

Where:

$$A_i = Actual\ value\ of\ dimension\ i$$
$$m_i = minimum\ value\ of\ dimension\ i$$
$$M_i = Maximum\ value\ of\ dimension\ i$$

Min-Max normalisation is said to "widen the range of indicators lying within a small interval", thereby "increasing the effect on the composite indicator" and taking into account the fact that the "outliers could distort the transformed indicator" (OECD, 2008: 28). However, the other normalisation methods also have shortcomings. For example

'the distance to a reference' method is said to be based on extreme values if the group leader is taken as the reference point.

In instances where there are more than one indicator in the dimension, the preceding equation is first applied to each of the indicators, and then the arithmetic mean of the resulting indices is taken. Use of the arithmetic mean allows for perfect substitutability of variables within a dimension. This approach has been criticised because similar countries, which are very close in a ranking, can nevertheless have significantly different results in particular dimensions. This is why the methodologies described below have tried to address this shortcoming.

Aggregating the sub-indices to produce the Index of Financial Inclusion

There are two commonly-used aggregation methods: linear and geometric. The linear method is also known as the additive aggregation method and is the sum of weighted indicators (Dobbie & Dail, 2013). The linear aggregation method is best suited for whenever all the "individual indicators have the same measurement unit", given "that some mathematical properties are respected" (OECD, 2008: 32). The linear aggregation method rewards base indicators proportionately to the weights. In contrast, the geometric aggregation method "is the product of indicators with weighted exponents" (Dobbie & Dail, 2013: 271).

The geometric aggregation method is applicable whenever there is a need for some degree of non-compensability between individual indicators or dimensions. In contrast to the linear aggregation method, the geometric aggregation method rewards indicators with higher scores. Linear aggregation is more compensatory, insofar as a good score in one indicator will compensate for the poor score indicators (OECD, 2008; Dobbie & Dail, 2013). In "contrast, geometric aggregation is less compensatory, but small gains" in indicators performing poorly "lead to greater marginal improvement in the composite index" (Dobbie & Dail, 2013: 271). The geometric mean of all the dimensional indices is computed using the formula below:

$$Financial\ Inclusion\ Index = (I_1 * I_2 * \ldots * I_n)^{1/n}$$

3.2.3.2. Inverse Euclidean Distance

As seen from the preceding discussion, the simple geometric mean method adopted by the UNDP's indices suffers from a perfect substitutability of variables within a dimension. The index of Sarma (2008) is based on a measure of the distance from the ideal, which addresses this shortcoming. Having followed the UNDP's Indices method, the study now follows the method of Sarma (2008).

The Min-Max normalisation formula as shown in the UNDP's Indices methodology above, ensures that $0 \leq d_i \leq 1$. The higher the value of d_i, the higher the country's achievement in dimension i. Thus, if n dimensions are considered, then a country i will be represented by a point $D_i = (d_1, d_2, d_3, \ldots d_n)$ on the n -dimensional Cartesian space. Here, the point (0,0,0, …,0) indicates complete financial exclusion while the point (1,1, 1, …,1) represents complete financial inclusion. The Index of Financial Inclusion IFI_i is constructed by the normalised Inverse Euclidean Distance, using the following formula.

$$IFI_i = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \cdots + (1-d_n)^2}}{\sqrt{n}}$$

The normalisation is done in order to make the value lie between 0 and 1. On the other hand, the inverse distance is considered so that a higher value of the index corresponds to a higher degree of financial inclusion. It is important to standardise the variables because "Euclidean Distances can be greatly influenced by variables that have the largest values" (OECD, 2008: 156).

3.2.3.3. Factor Analysis

As already mentioned in the literature review chapter of this paper, early indices of financial inclusion assigned weights subjectively. Most of those indices assigned equal weights (Sarma, 2008; Chakravarty & Pal, 2013). However, Sarma and Pais (2008, 2011) allocated weights based on the statistical quality of the data. Analysts might also reward (or punish) variables or dimensions that are deemed to be more (or less) influential, in the view of expert opinion, with the intention of obtaining a better reflection of policy priorities (OECD, 2008).

Nonetheless, weights have a significant effect on the overall composite indicator and country rankings. Hence, weights have to be determined based on weighting techniques (OECD, 2008). Various such techniques exist such as conjoint analysis, factor analysis, unobserved components models, data envelopment analysis and analytic hierarchy processes. Some recent literature on the Index of Financial Inclusion have chosen weights based on statistical methods (Amidžić et al., 2014; Wang & Guan, 2017; Bozkurt et al., 2018). In this third method, the approach of Amidžić et al., (2014) is followed, as described below.

Normalisation of Variables

Amidžić et al. (2014) use the 'distance to a reference' method to normalise the variables. The distance to a reference measures the relative position of a given variable with respect to a reference point (OECD, 2008). That reference point could be an external benchmark country, or a target to be reached in a given time frame, the group leader or the average country of the group. This study defines the "reference point for each variable as the maximum value of the variable across countries" as used in Amidžić et al. (2014: 11). "This means that for a given variable, the benchmark country is the group leader" (Amidžić et al. (2014: 11). Therefore, a score of 1 is attributed to the group leader in that indicator and the others are given percentage points away from the leader with the minimum of 0. If x_{qc} is the raw value of variable q for country c, and M_q is the maximum value of the variable across countries, then the normalised value nx_{qc} of x_{qc} is given by:

$$nx_{qc} = \frac{x_{qc}}{M_q}$$

Despite that, taking the group leader as reference point "is based on extreme values which could be unreliable outliers" (OECD, 2008: 28). If one were to use a benchmark country outside Sub-Saharan Africa, such as the United Kingdom by way of example, then this would distort the essence of establishing an index for Sub-Saharan Africa. After all, as shown in the literature review of this paper, this is a region with unique characteristics in respect of FI. On the other hand, different countries have different financial inclusion goals and so basing the reference point on the target to be reached in a given time frame is unrealistic. Sub-Saharan African countries fall at the bottom of the ranking of countries worldwide, in respect of financial inclusion indicators.

Therefore, the reference must be a level high enough yet at the same time, the level must be attainable in order to motivate action.

Consequently, the average country of the group is not the correct reference point for this study. Moreover, taking the group leader as a reference point "satisfies most of the required technical properties, including the scale invariance property"; "this is provided by the fact that the image set of the normaliser is a subset of the unit interval" (Amidžić et al., 2014: 12). "It is also consistent with nonlinear aggregators that require prior transformation of raw variables using" the logarithm function (Amidžić et al., 2014: 12).

Statistical Identification of Dimensions

Factor Analysis (FA) is employed to evaluate and confirm the measurement variables in both the dimensions of access and usage. These dimensions were constructed using the text analysis of the NFISs, and were finally selected on the basis of data availability. There are 6 variables, and this step aims to confirm whether the variables in each of the two dimensions are relevant to that dimension or whether they possess attributes of other dimensions.

Factor Analysis identifies correlations between and among variables to bind them into one underlying factor driving their values. There are two basic types of factor analysis: exploratory and confirmatory (Pett, Lackey & Sullivan, 2003). Confirmatory Factor Analysis (CFA) is used in this study to evaluate the goodness of fit and the interpretability and strength of the resulting parameter estimates (Brown, 2014). In addition, CFA is used to evaluate whether a scale's measurement properties are invariant across the data set and it allows for the specification of relationships among indicator uniqueness (Brown, 2014).

Measurement invariance is an important aspect of scale development, as this helps to determine whether a testing instrument is appropriate for use in various countries. Hence, multiple groups CFA is also used to evaluate the generalisability of a variety of important constructs (Brown, 2014). CFA is also well-known for its ability to estimate relationships between variables, adjusting for measurement error. This is in contrast to the OLS approaches such as correlation and multiple regression analysis, which consider the variance of all observed measures as a true score variance.

The dimensions are classified according to the groupings suggested by Varimax Rotations. Three variables are apportioned to each dimension. However, the variables are highly correlated and therefore one factor is suggested, using the Kaiser Varimax Rotations. A mineigen of 0.3 is therefore set, and maximum factors of 2, to force the postulated dimensions of two.

Weighting and Aggregation

The literature review highlighted weaknesses in the practice of assigning equal weights and choosing weights based on the quality of data. In this third method, therefore, weights are computed statistically using the factor analysis model. The main weakness of factor analysis is that weights can only be assigned if there is a correlation between indicators. However, the other approaches have some estimation problems (OECD, 2008). Therefore, this study follows the approach of Amidžić et al. (2014).

In accordance with the method of Amidžić et al. (2014) the weighted geometric mean aggregator is used to derive the IFI using the formula below:

$$A = exp\left(\frac{\sum_{i=1}^{N} w_i Log x_i}{\sum_{i=1}^{N} w_i}\right)$$

Where w_i is the weight associated with variable i.

For any $x_{i0,}$ the partial derivative of A with respect to x_{i0} is:

$$\frac{\partial A}{\partial x_{i0}} = w_{i0}\frac{exp\left(\frac{\sum_{i=1}^{N} w_i Log x_i}{B}\right)}{B x_{i0}}$$

Where $B = \sum_{i=1}^{N} w_i$ and the marginal rate of technical substitution between x_{il} and x_{i0} is:

$$MRTS_{xi1,i0} = \frac{w_{il}}{w_{i0}}\frac{x_{i0}}{x_{il}}$$

Therefore, the elasticity of substitution between x_{il} and x_{i0} is $\sigma = 1$

3.3. Methodology: Financial Inclusion and Economic Development and Growth

A simple regression analysis is used to test the relationship between financial inclusion and economic development and growth in Sub-Saharan Africa. Regression analysis is one of the most widely used statistical tools because it provides simple methods for establishing a relationship between variables (Chatterjee & Hadi, 1999). As mentioned earlier, a total of 26 countries are covered in this study. The IFI constructed using the Factor Analysis method[19] is used as a proxy for the FI variable. Also, the Gross Domestic Product per Capita is used as a proxy for economic growth while the HDI is used as a proxy for economic development.

Macro-level factors are first identified that are associated with financial inclusion (Yorulmaz, 2016). As shown in Table 9, a set of socio-economic factors are identified: Gross Domestic Product per Capita (GDPPC); Inflation Rate (%) (INF); Population Growth Rate (%): (POP); Unemployment Rate (%) (UNEMP); Primary School Enrolment (SEP); Trade Percentage of GDP (%) (TRADE); and; Human Development Index (HDI). The selection of these socio-economic factors is based on previous studies; for example, Sarma and Pais (2011), Park and Mercado (2015), Yorulmaz, (2016) and Kim, Yu and Hassan, (2018).

[19] This study uses the index developed using Factor Analysis because this method addresses a number of the weaknesses of the other two methods: Simple Geometric Mean of the UNDP's Human Development Index and Inverse Euclidean Distance of Sarma (2008). These include the inadequacy of the weighting scheme for both the variables and dimensions and the inability of the aggregators to capture imperfect substitutability between dimensions.

Table 9. List of Select Variables Used in Regression Analysis and Descriptive Statistics (1990 – 2017)

Variable Name	Variable Description and Data Source	Mean	Standard Deviation	Min/Max	Obs
Gross Domestic Product Per Capita (GDPPC)	Real Gross Domestic Product Per Capita: PPP (2011 constant US Dollar prices) *Source:* World Bank WDI (2019)	4599 [5649]	6387.7 [7428.69]	354.3 /40015.8 [593.0/ 35632.1]	717 208
Inflation Rate (%): (INF)	Annualized Consumer Price Inflation Rate. *Source:* World Bank WDI (2019)	66.55 [6.60]	980.52 [6.02]	-11.69/23773.13 [-4.29/ 37.14]	614 191
Population Growth Rate (%): (POP)	Total Population Growth Rate *Source:* World Bank WDI (2019)	2.52 [2.52]	1.06 [0.85]	-6.18/ 7.92 [-2.63/ 4.52]	728 208
Unemployment Rate (%): (UNEMP)	Annualized Total Unemployment rate. *Source:* World Bank WDI (2019)	8.89 [8.14]	7.69 [6.58]	0.3/37.94 [0.60/27.19]	675 200
Primary School Enrolment (SEP)	Primary School Enrolment. *Source:* World Bank WDI (2019)	99.70 [108.56]	23.92 [18.47]	34.77/ 158.27 [61.58/ 147.32]	598 159
Trade percentage of GDP (%): (TRADE)	Exports minus Imports as a percentage of GDP *Source:* World Bank WDI (2019)	72.27 [82.78]	35.75 [38.62]	19.68/ 225.02 [20.72/ 216.48]	658 198
Human Development Index (HDI)	Human Development Index *Source:* UN, World Bank, IMF (2019)	0.47 [0.54]	0.11 [0.10]	0.199/ 0.797 [0.34/ 0.79]	650 208
Index of Financial Inclusion (IFI)	Composite Index of Financial Inclusion constructed from Access and Usage Dimensions using Factor Analysis weights. *Source:* Author's own estimation	--- [0.12]	--- [0.18]	---/--- [0.00279/0.93510]	--- 151

*Note: The Descriptive statistics for data covering the period from **1990** to **2017** are outside the squared brackets. Descriptive Statistics for the key sub-sample from **2010** to **2017** are inside the squared brackets and imposed by the study's Index of Financial Inclusion availability.*

A test is conducted to determine which factors are significantly influenced by FI in the Sub-Saharan Africa region. Specifically, the correlation of the socio-economic variables is tested against FI for the period from 2010 to 2017.

Some literature argues that causation manifests itself in correlation (see, for example, Cohen, 1923); however, the general view is that correlation does not mean causation. More importantly, evidence of a correlation does not indicate the magnitude of the underlying relationships and it does not indicate the direction of causality. Nonetheless, causality tests between financial inclusion variables and economic development and economic growth variables are necessary. Statistical tests such as Granger causality and co-integration are normally used to determine causality. However, because of data limitations, it is not possible to conduct these tests as part of this study. The panel is both small “T” and small “N” and thus renders co-integration tests and Granger causality tests which are based on large timeframe and large sample size not possible.

This study therefore uses simple regression analysis to test the significance of the relationship between FI and economic development and growth. A regression analysis is first conducted in respect of the real GDPPC, HDI versus IFI. A regression analysis is then performed between real GDPPC, HDI versus IFI at country level, for all countries in the sample, in order to determine the significance of the relationship between the FI variable (IFI), the economic growth variable (real GDPPC) and the economic development variables (HDI). In order to make some robustness checks, the GDPPC growth, HDI growth and IFI growth between 2010 and 2017 were tested at country level.

4. Results

The results are presented and analysed in this section. All the calculations were made in Stata, except where specifically stated otherwise. The mean levels of composite IFI for the three methods are presented in Appendix 3.

4.1. Results: Index of Financial Inclusion

4.1.1. Simple Geometric Mean

Dimension 1: Access to Financial Products and Services

The results of the analysis of the access dimension indicate that Seychelles has the best access to financial products and services; they lead the 26 countries in the sample for all the years between 2010 and 2017. The Seychelles are followed by Cabo Verde, São Tomé and Príncipe, Namibia and Botswana, in that order. At the bottom end of the results, it was found that Chad, Congo Democratic Republic, Central African Republic, Guinea and Madagascar have the least levels of access to financial products and services, of the 26 countries included in the analysis. The ranking of other countries does not seem to vary, when the analysis excludes Seychelles in respect of taking out outliers.

The study notes that Seychelles, Cabo Verde and São Tomé and Príncipe are island nations, and small ones in terms of the landmass. Namibia and Botswana have small population sizes despite relatively large landmasses. Hence, when interpreting these results, it may be important to consider the land areas and population sizes of the countries. This is important, bearing in mind that the variables used to develop the index in this study are expressed as ratios of adult population or land area.

The access dimension was also analysed for those 15 countries which had usable data on all dimensions for the period between 2014 and 2017. In this instance, it was found that Seychelles, Cabo Verde and São Tomé and Príncipe maintained their first, second and third positions. However, the other countries in that sample of 15 moved up or down the rank in relation to other countries; for example, Zimbabwe, Madagascar and Guinea switched positions, and the same applied to Lesotho and Comoros. This indicates that data availability, in terms of the number of indicators included in the analysis, has an impact on the index construction.

Dimension 2: Usage of Financial Products and Services

The results of the analysis of the usage dimension indicated that, generally speaking, countries with higher levels of access also have higher levels of usage; for example Cabo Verde, Seychelles, Botswana, Namibia, São Tomé and Príncipe and Nigeria. The opposite also applies. Thus, countries with relatively little access to financial products and services have lower levels of usage; for example, Congo Democratic Republic, Chad, Burundi, Central Africa Republic and Guinea. However, the order differs from that calculated for the access dimension. Again, removing the outliers (Seychelles and Cabo Verde) does not affect the ranking of other countries.

The usage dimension was also analysed for the 15 countries for which usable data was available on all dimensions between 2014 and 2017. The results showed that countries maintain their positions in relation to other countries in the sample. This finding was in contrast to the access dimension, where some countries moved up or below the rank relative to other countries.

Composite Index

The composite index combines the access and usage dimensions. Countries in the sample are ranked from the most financially inclusive to the least (see Figure 2). Seychelles is ranked as the most financially inclusive country, relative to the other countries in the sample, followed by Cabo Verde. This applies for all seven years between 2010 and 2017. At the other end of the scale, Congo Democratic Republic, Chad, Guinea and Central Africa Republic have the lowest levels of FI relative to other countries in the sample (see Figure 2).

Figure 2. Ranking Composite IFI

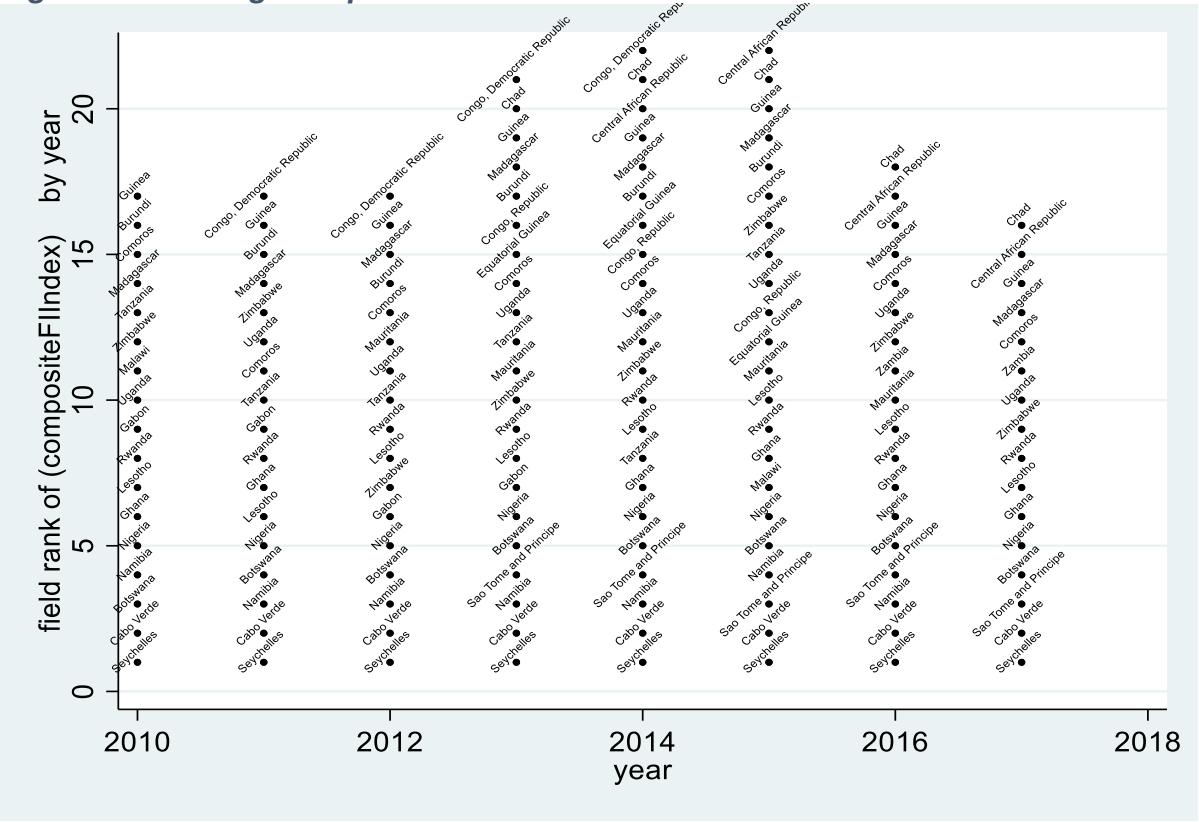
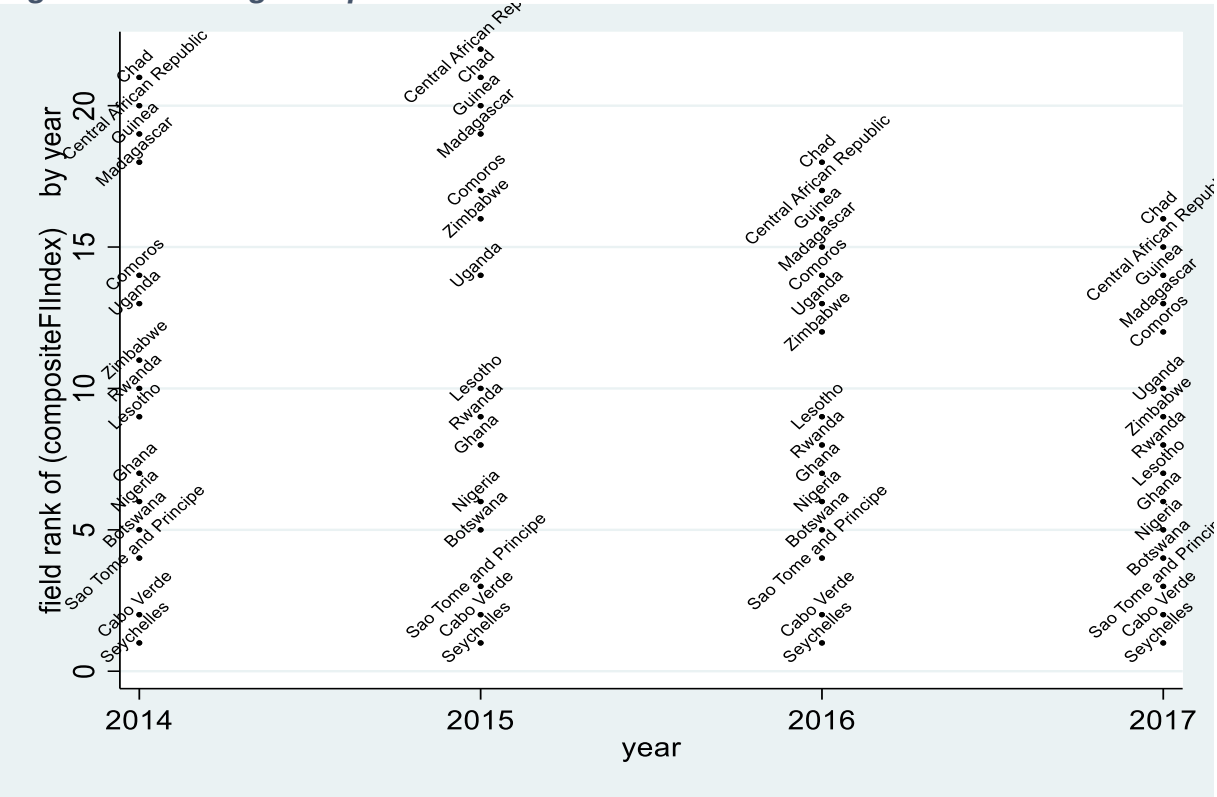


Figure 3 presents the results of the composite index for the analysis of the 15 countries which had data on all dimensions for the period between 2014 and 2017. Those countries have maintained their positions in relation to other countries in the sample.

Figure 3. Ranking Composite IFI: 15 Countries



4.1.2. Inverse Euclidean Distance

Dimension 1: Access to Financial Products and Services

The results of the analysis of the access dimension indicate that Seychelles has the best access to financial products and services and as such, leads the 26 countries in the sample in all the years between 2010 and 2017. Seychelles is followed by Cabo Verde, São Tomé and Príncipe, Namibia and Botswana, in that order. At the other end of the scale, Congo Democratic Republic, Chad, Central Africa Republic, Guinea and Madagascar have the lowest levels of access to financial products and services, of the 26 countries included in the analysis. As in the case of the simple geometric mean method, discussed above, the ranking of other countries does not seem to vary, when the analysis does excludes Seychelles in respect of taking out outliers.

The access dimension was also analysed for the 15 countries for which data was available for all dimensions between 2014 and 2017. The results showed that countries maintain their positions relative to other countries in the sample.

Dimension 2: Usage of Financial Products and Services

The results of the analysis of the usage dimension indicate that countries with higher levels of access also have greater levels of usage; this applied to Cabo Verde, Seychelles, Botswana, Namibia, São Tomé and Príncipe and Nigeria. This finding was similar to the one obtained using the simple geometric mean method. Similarly, countries with less access to financial products and services have lower levels of usage; for example, Congo Democratic Republic, Chad, Burundi, Central Africa Republic and Guinea. Again, removing the outliers (Seychelles and Cabo Verde) under this method, does not affect the ranking of other countries.

The usage dimension was analysed for the 15 countries which had usable data on all dimensions for the period between 2014 and 2017. It was found that countries maintained their positions relative to the other countries in the sample.

Composite Index

The composite index combines the access and usage dimensions. Countries in the sample are ranked from the most financially inclusive to the least. Seychelles is ranked as the most financially inclusive country out of the countries in the sample, followed by Cabo Verde; this applies for all the seven years from 2010 to 2017. At the bottom end of the scale, Congo Democratic Republic, Chad, Guinea and Central Africa Republic have the lowest FI levels relative to the other countries in the sample (see Figure 4).

Figure 4. Ranking Composite IFI

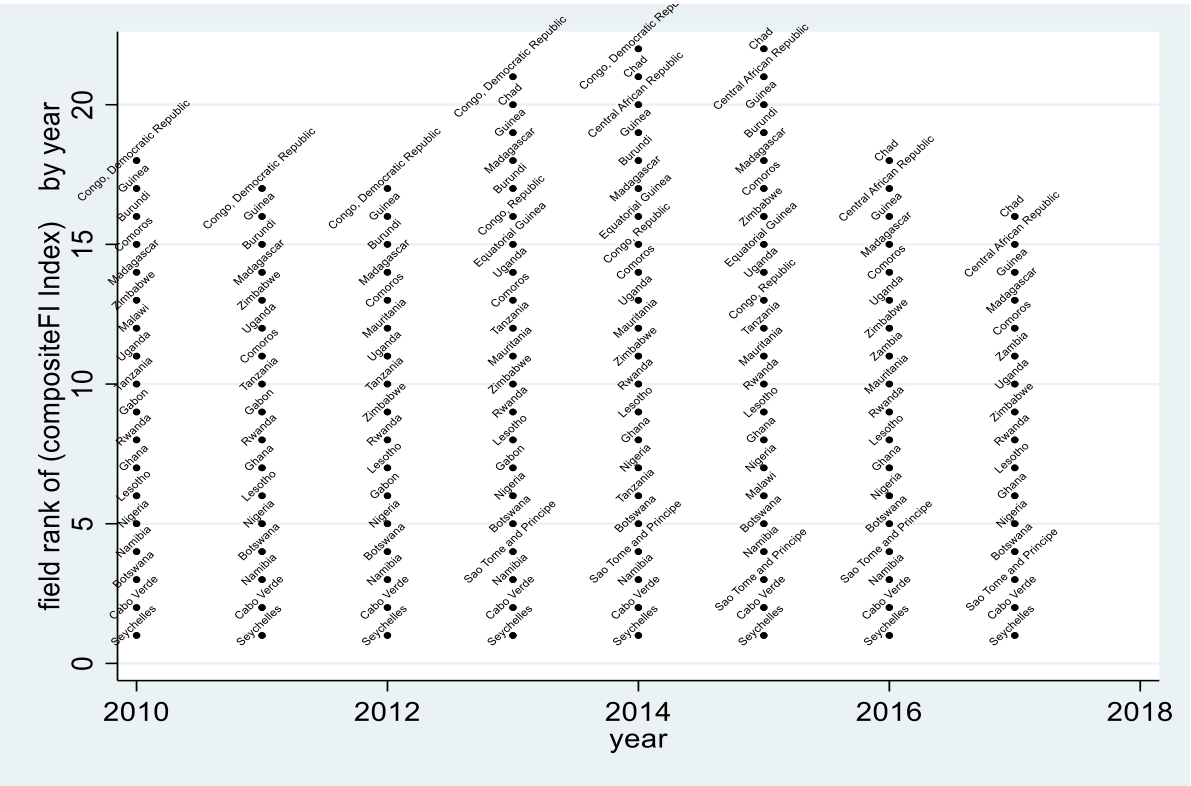
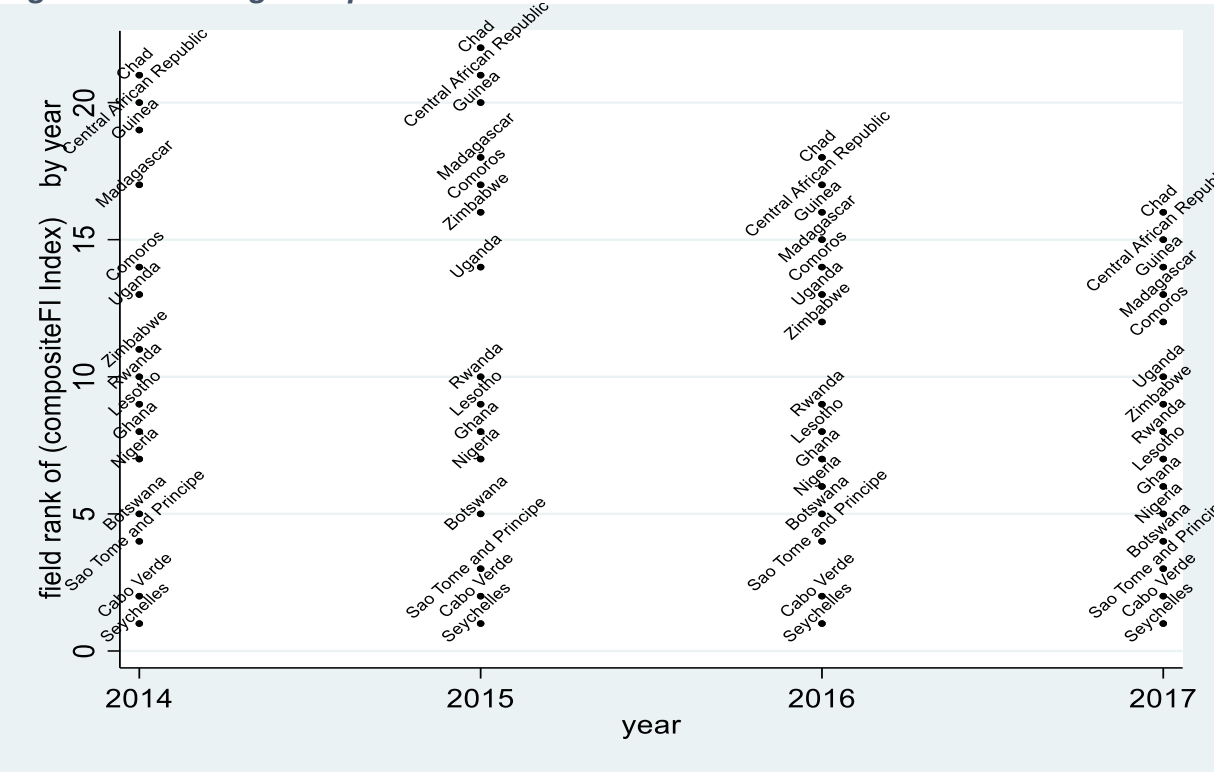


Figure 5 presents the results of the composite index for the analysis of those 15 countries with usable data on all dimensions for the period between 2014 and 2017. Countries maintained their positions in relation to other countries in the sample.

Figure 5. Ranking Composite IFI: 15 Countries



4.1.3. Factor Analysis

The pairwise correlation results indicate that the six variables are positively correlated. There is a strong positive correlation between the variables apart from the relationship between 'borrowers at commercial banks per 100,000 adults' and 'branches of commercial banks per 1,000km^2' and 'ATMs per 1,000km^2'. The correlation between 'borrowers at commercial banks per 100,000 adults' and 'branches of commercial banks per 1,000km^2' is weak. Similarly, there is a weak positive correlation between 'borrowers at commercial banks per 100,000 adults' and 'ATMs per 1,000km^2' (see Table 10 below).

Table 10. Pairwise Correlations of Raw Variables (2010 - 2017)

Variables	Branch Adults	Branchkm^2	Atmkm^2	AtmAdults	DepositorAdults	BorrowersAdults
BranchAdults	1.0000					
Branchkm^2	0.9324	1.0000				
Atmkm^2	0.9018	0.9689	1.0000			
AtmAdults	0.8425	0.6993	0.7382	1.0000		
DepositorAdults	0.8366	0.7171	0.7791	0.8650	1.0000	
BorrowersAdults	0.6389	0.4722	0.4946	0.8372	0.6800	1.0000

Table 11 presents the results of the correlation structure for the dataset. A test was first conducted to see whether the covariance matrix is diagonal. A spherical restriction was then added using the Bartlett's spherical test where the null hypothesis is that the covariance is the identity matrix (see Amidžić et al., 2014). For all periods between 2010 and 2017, all the tests were found to reject the null hypothesis. It is concluded, therefore, that the dataset satisfies the required conditions for the use of Factor Analysis

Table 11. Multivariate Tests of the Covariance Matrix (Bartlett- Tests)

Year	Null Hypothesis	LR Chi2	Degree of Freedom	Prob>chi2
2010	Covariance matrix is diagonal	157.79	15	0.0000
	Covariance matrix is spherical	170.01	20	0.0000
2011	Covariance matrix is diagonal	145.04	15	0.0000
	Covariance matrix is spherical	156.00	20	0.0000
2012	Covariance matrix is diagonal	147.70	15	0.0000
	Covariance matrix is spherical	157.38	20	0.0000
2013	Covariance matrix is diagonal	200.43	15	0.0000
	Covariance matrix is spherical	210.07	20	0.0000
2014	Covariance matrix is diagonal	196.55	15	0.0000
	Covariance matrix is spherical	205.72	20	0.0000
2015	Covariance matrix is diagonal	195.49	15	0.0000
	Covariance matrix is spherical	206.53	20	0.0000
2016	Covariance matrix is diagonal	195.34	15	0.0000
	Covariance matrix is spherical	204.80	20	0.0000
2017	Covariance matrix is diagonal	178.27	15	0.0000
	Covariance matrix is spherical	188.06	20	0.0000

In the case of all the years in the range, the Kaiser test (eigenvalue>1) suggests that only one factor should be retained. This is based on *a-priori* hypothesis of two

dimensions and retain two dimensions. This method's scope is limited to confirmatory factor analysis to the extent it allows one to extrapolate weights for IFI construction. Thus, the minimum eigenvalue is set at 0.3 and the maximum factor to two, to achieve two dimensions (see Table 12 for the results).

Table 12. Confirmatory Factor Analysis; Estimated using Principal Component Technique (PCT) - Varimax Rotated

FACTOR	Variance	Difference	Proportion	Cumulative
(1)	(2)	(3)	(4)	(5)
2010				
Factor 1	2.96058	0.67376	0.4934	0.4934
Factor 2	2.47738	.	0.4129	0.9063
2011				
Factor 1	2.91228	0.22999	0.4854	0.4854
Factor 2	2.68229	.	0.4470	0.9324
2012				
Factor 1	3.17433	0.70586	0.5291	0.5291
Factor 2	2.46846	.	0.4114	0.9405
2013				
Factor 1	3.37310	1.02785	0.5622	0.5622
Factor 2	2.34526	.	0.3909	0.9531
2014				
Factor 1	3.32130	0.96183	0.5535	0.5535
Factor 2	2.35947	.	0.3932	0.9468
2015				
Factor 1	3.66253	1.74056	0.6104	0.6104
Factor 2	1.92197	.	0.3203	0.9307
2016				
Factor 1	3.13908	0.51184	0.5232	0.5232
Factor 2	2.62724	.	0.4379	0.9611
2017				
Factor 1	3.01579	0.27698	0.5026	0.5026
Factor 2	2.73880	.	0.4565	0.9591

The results presented in Table 13 suggest tentatively that Automated Teller Machines (ATMs) per 1,000 km^2 (Atmkm^2), branches of commercial banks per 1,000 km^2 (Branchkm^2) and branches of commercial banks per 100,000 adults (BranchAdults) are loaded to dimension 1. On the other hand, Automated Teller Machines (ATMs) per 100,000 adults (AtmAdults), depositors with commercial banks per 1,000 adults (DepositorAdults) and borrowers at commercial banks per 1,000 adults (BorrowersAdults) are loaded to the other dimension.

The first rotated factor was classified as **Access Dimension** based on *ex ante* taxonomy. The second rotated factor was classified as **Usage Dimension** also based on *ex ante* taxonomy. The variables grouping in the usage dimension differs slightly

from the situation reported in the literature because Automated Teller Machines (ATMs) per 100,000 adults (AtmAdults) is considered to be an indicator of access to financial products and services (Cámara & Tuesta, 2014). The G20 Financial Inclusion Indicators also support this. However, this variable was not included in the study by Amidžić et al., (2014). Hence, there is no basis for direct comparison of results in this instance.

Table 13. Rotated Factor Loadings and Uniqueness

Variable	Factor 1	Factor 2	Uniqueness
(1)	(2)	(3)	(4)
2010			
BranchAdults	**0.8311**	0.5454	0.0118
Branchkm^2	**0.9640**	0.2346	0.0157
Atmkm^2	**0.9377**	0.3345	0.0088
AtmAdults	0.4122	**0.8117**	0.1712
DepositorAdults	0.4606	**0.7426**	0.2363
BorrowersAdults	0.2812	**0.8959**	0.1183
2011			
BranchAdults	**0.8312**	0.5430	0.0143
Branchkm^2	**0.9652**	0.2200	0.0200
Atmkm^2	**0.9450**	0.2992	0.0174
AtmAdults	0.3879	**0.8918**	0.0541
DepositorAdults	0.4433	**0.7547**	0.2339
BorrowersAdults	0.2230	**0.9405**	0.0657
2012			
BranchAdults	**0.8443**	0.5018	0.0354
Branchkm^2	**0.9627**	0.2065	0.0305
Atmkm^2	**0.9644**	0.2414	0.0117
AtmAdults	0.4943	**0.8539**	0.0266
DepositorAdults	0.5874	**0.6872**	0.1828
BorrowersAdults	0.1238	**0.9563**	0.0702
2013			
BranchAdults	**0.8482**	0.4615	0.0676
Branchkm^2	**0.9602**	0.2277	0.0262
Atmkm^2	**0.9371**	0.2695	0.0492
AtmAdults	0.5352	**0.8366**	0.0136
DepositorAdults	0.7329	**0.6072**	0.0941
BorrowersAdults	0.1729	**0.9691**	0.0310
2014			
BranchAdults	**0.8645**	0.4512	0.0491
Branchkm^2	**0.9574**	0.2402	0.0256
Atmkm^2	**0.9402**	0.2869	0.0338
AtmAdults	0.5509	**0.8056**	0.0474
DepositorAdults	0.6617	**0.6800**	0.0997
BorrowersAdults	0.1788	**0.9510**	0.0636
2015			
BranchAdults	**0.9037**	0.3929	0.0289
Branchkm^2	**0.9625**	0.1708	0.0444
Atmkm^2	**0.9612**	0.1925	0.0391
AtmAdults	0.6352	**0.7052**	0.0992
DepositorAdults	**0.7558**	0.5546	0.1212
BorrowersAdults	0.1443	**0.9469**	0.0826
2016			
BranchAdults	**0.8156**	0.5541	0.0277

Branchkm^2	**0.9537**	0.2693	0.0180
Atmkm^2	**0.9533**	0.2773	0.0143
AtmAdults	0.4457	**0.8814**	0.0244
DepositorAdults	0.6434	**0.6793**	0.1245
BorrowersAdults	0.2071	**0.9656**	0.0247
2017			
BranchAdults	**0.7547**	0.6419	0.0184
Branchkm^2	**0.9023**	0.4262	0.0041
Atmkm^2	**0.8825**	0.4552	0.0139
AtmAdults	0.6272	**0.7615**	0.0268
DepositorAdults	0.4193	**0.8595**	0.0853
BorrowersAdults	0.5329	**0.7869**	0.0969

Tables 14 and 15 present the weights for each of the variables and dimensions for the years between 2010 and 2017, derived through factor analysis. Appendix 4 presents the weights of those 15 countries that had complete and usable data from 2014 to 2017.

Table 14. Weights Assigned to Variables

Year	Dimension 1			Dimension 2		
	BranchAdults	***Branchkm^2***	***Atmkm^2***	***AtmAdults***	***DepositorAdults***	***BorrowersAdults***
2010	28%	37%	35%	33%	27%	40%
2011	27%	37%	36%	35%	25%	40%
2012	28%	36%	36%	34%	22%	44%
2013	29%	37%	34%	35%	18%	47%
2014	29%	36%	35%	32%	23%	45%
2015	31%	35%	34%	29%	18%	53%
2016	27%	37%	36%	36%	21%	43%
2017	26%	38%	36%	30%	38%	32%

Table 15. Weights Assigned to Dimensions

Year	Dimension 1	Dimension 2
2010	54%	46%
2011	52%	48%
2012	56%	44%
2013	59%	41%
2014	58%	42%
2015	66%	34%
2016	54%	46%
2017	52%	48%

Dimension 1: Access to Financial Products and Services

The results of the analysis indicate that Seychelles has the greatest access to financial products and services, and as such, leads the 26 countries in the sample in all the years between 2010 and 2017. Seychelles is followed by Cabo Verde, São Tomé and Príncipe, Rwanda and Nigeria, in that order. At the other end of the scale, Chad, Central African Republic, Mauritania and Madagascar have the lowest levels of access to financial products and services out of the 26 countries included in the analysis.

The access dimension was analysed in the case of the 15 countries with usable data for all dimensions for the period between 2014 and 2017. It was found that those countries maintained their positions relative to other countries in the sample.

Dimension 2: Usage of Financial Products and Services

The analysis of the usage dimension indicated that countries with higher levels of access also have greater levels of usage; for example, Seychelles, Cabo Verde, Namibia, Botswana, and São Tomé and Príncipe. The opposite also applied. Thus, countries with relatively little access to financial products and services have lower levels of usage; see Congo Democratic Republic, Chad, Burundi, and Central Africa Republic.

The analysis of the usage dimension was also performed on the 15 countries with usable data for all dimensions for the period between 2014 and 2017. It was found that the countries maintained their positions relative to other countries in the sample.

Composite Index

The composite index combines the access and usage dimensions. Countries in the sample are ranked from the most financially inclusive to the least. Seychelles is ranked as the most financially inclusive country in the sample, followed by Cabo Verde; this applies for all seven years between 2010 and 2017. At the other end of the scale, Congo Democratic Republic, Chad, Guinea and Central Africa Republic have the lowest FI levels of the countries in the sample. The country ranking differs from the ones constructed using the Simple Geometric Mean and the Inverse Euclidean Distance (see Figure 6). Appendix 6 graphically illustrates these differences in country ranking for all the methods.

Figure 6. Ranking Composite IFI

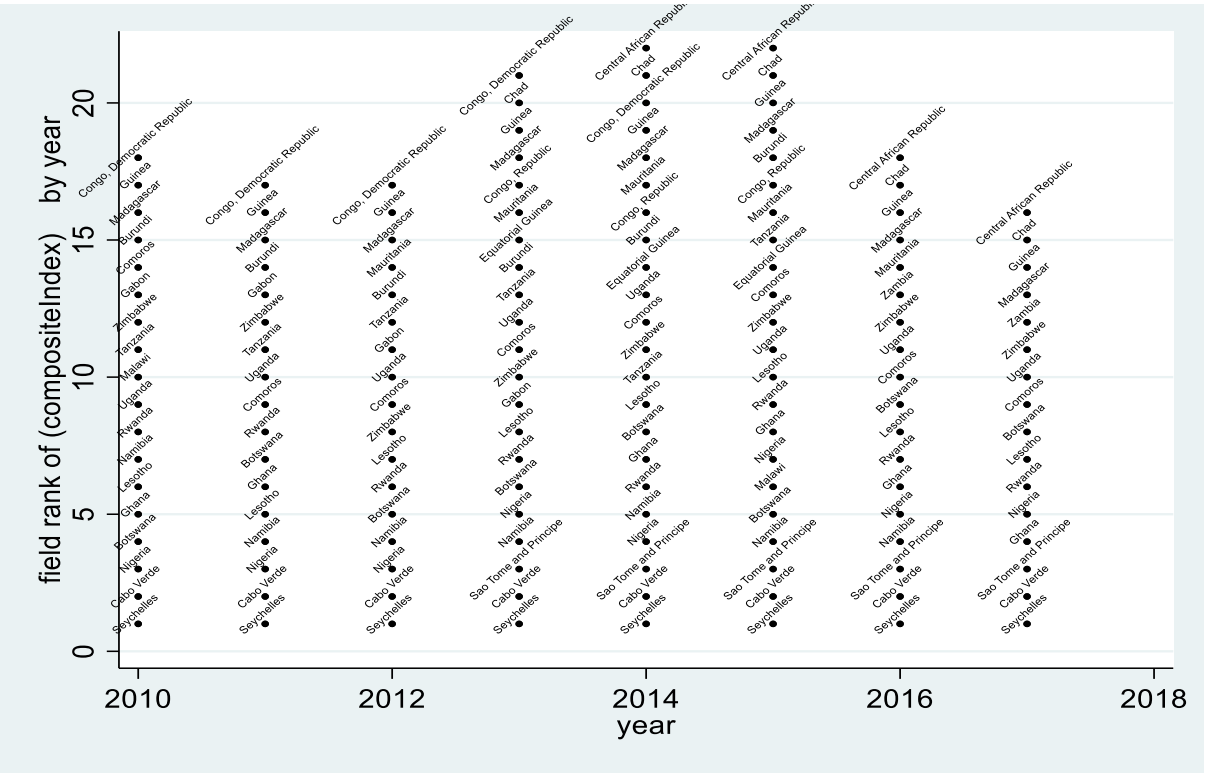
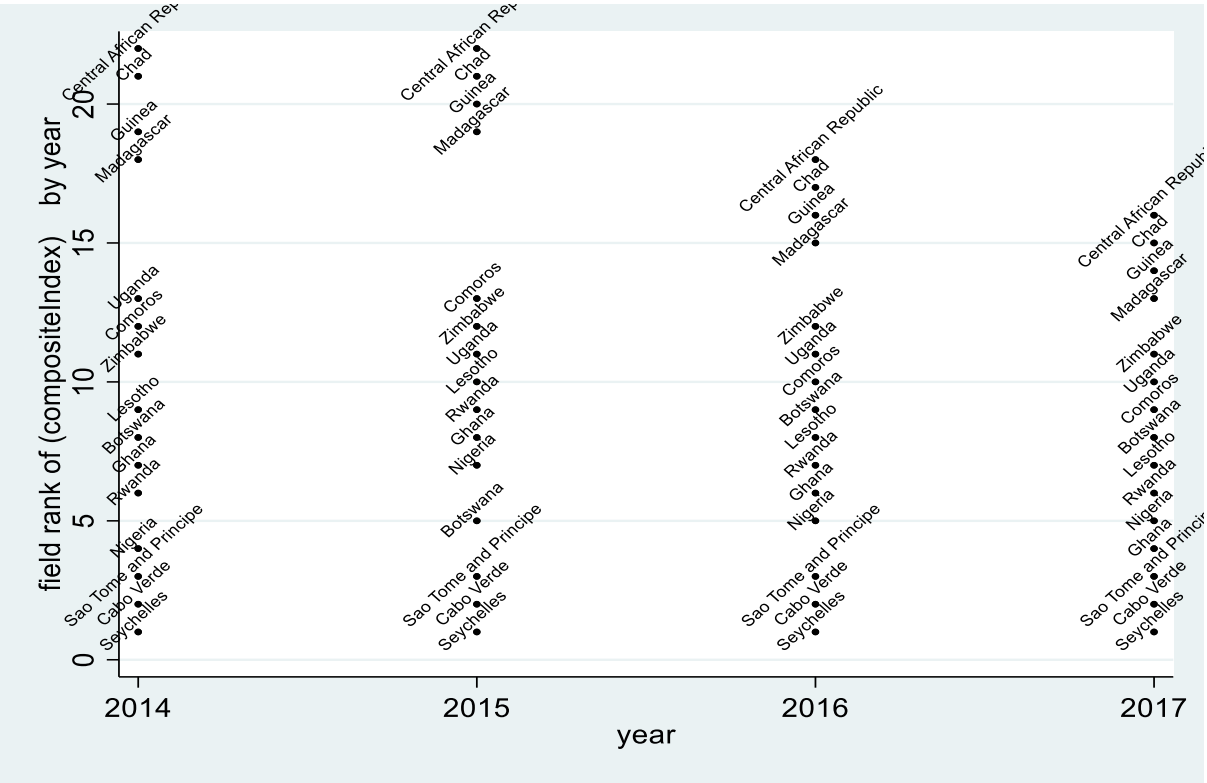


Figure 7 illustrates the results of the composite index for the analysis conducted on those 15 countries with usable data on all dimensions, for the period 2014 to 2017. Countries maintained their positions in relation to other countries in the sample.

Figure 7. Ranking Composite IFI: 15 Countries



In order to establish the sensitivity of the index ranks, a decision was taken to discard the factor loading suggested through the factor analysis in the second test, as presented in Appendix 5. The dimensions were weighted, based on the theoretical groupings. The results of this second part of the factor analysis method are presented in Appendix 5. The comparative results of all the methods used are presented in Appendix 6; here, it is evident that different methods of index construction produce slightly different results.

4.2. Results: Financial Inclusion and Economic Development and Growth

In this section, the results obtained from studying the relationship between financial inclusion and economic development and growth, are presented. The results of the correlation test indicate the importance of economic development (as measured by the HDI) and economic growth (as measured by GDPPC). The results show a positive correlation between FI and economic development and growth (see Table 16).

Table 16. Correlation Matrix (2010 – 2017)

Variable	GDPPC	INF	POP	UNEMP	SEP	TRADE	HDI	FI
GDPPC	1.0000							
INF	**-0.2719***	1.0000						
POP	0.0588	0.0215	1.0000					
UNEMP	**0.4174***	**-0.2027***	**-0.3987***	1.0000				
SEP	**-0.2663***	**0.1826***	-0.0380	-0.1289	1.0000			
TRADE	**0.5235***	**-0.2575***	**-0.2347***	**0.5683***	-0.1345	1.0000		
HDI	**0.6870***	**-0.3201***	**-0.1867***	**0.6095***	-0.0221	**0.5463***	1.0000	
FI	**0.5495***	**-0.2566***	**-0.4863***	**0.2786***	-0.0463	**0.5954***	**0.6754***	1.0000

*Note: The * denotes significance at the 5% level using Pearson's correlation test with null hypothesis that the pairwise correlation is zero.*

A number of regression analyses were run. The first of these were regression analyses for the real GDPPC, HDI versus IFI, having taken into account the time series characteristics of the dataset available for this study. The objective was to gain some preliminary insights into the strength of the relationship between FI and economic development and growth. The correlation between real GDPPC, HDI versus IFI was then tested at country level to determine the significance of the relationship between the FI variable (IFI) and the economic development variables (HDI) and the economic growth variable (real GDPPC) for all the countries used to develop the IFI. The results of these tests are presented in Appendix 7.

Those results in Appendix 7 reveal that the significance of the relationship is weak. However, the growth rate results presented in Appendix 8 reveal that levels of FI and human development move closely together. This applies for all countries in the sample with the exception of Madagascar. On the other hand, the country GDPPC growth, and IFI growth between 2010 and 2017 present contrasting results. It seems that financial inclusion does provide an entirely accurate prediction of economic growth, as measured by GDPPC. The IFI growth rate moves in the same direction of GDPPC in only four countries: Cabo Verde, Guinea, Tanzania and Madagascar (see Appendix 8). These findings confirm that FI is an important factor in explaining human

development in Sub-Saharan Africa. Also, the effect of FI on GDPPC differs across countries in the region.

4.3. Discussion of Results

A text analysis was conducted on the National Financial Inclusion Strategies (NFISs) of those countries that have developed and published NFISs in Sub-Saharan Africa. It was found that FI should be measured in terms of the three dimensions of 'Access, Usage and Quality' in that region. Because of challenges in the availability of usable data, the index construction was limited to the access and usage dimensions. Access to financial products and services was found to be the most important dimension for determining the levels of FI in a country. This position is also supported by the higher weighting allocated to the dimension by factor analysis.

This signifies the relevance of the point made by Honohan (2008): thus, in the case of lower income groups, the relevant question to ask regarding their financial assets is not about how many assets they choose to hold or how much they choose to borrow; on the contrary, the question should ask whether or not they have access to financial products and services. It is impossible to intensify efforts to improve usage and quality of financial products and services when there is limited or no access. The best method is to keep the weights and the aggregation approach unchanged across different time periods when the aim is to compare levels of financial inclusion over time. However, if the aim is to define best practice or set financial inclusion priorities, then weights should have to change over time (OECD, 2008; Dobbie & Dail, 2013).

Four different approaches have been used in this study to construct the IFI for Sub-Saharan Africa. It was found that financial inclusion levels have increased, over the years, in virtually all those countries studied, with the exception of the Central African Republic (see Appendix 8). The results also indicate that the different methods of constructing the index produce different results. Although the variances in the mean measures are not significant, the ranking of the countries is impacted. The simple geometric mean approach and the Inverse Euclidean Distance approach produce results that are closely related. However, these results slightly differ from those found from Factor Analysis approach (see for example Rwanda, Botswana, Madagascar, Burundi, Congo Republic, Mauritania, Gabon, Comoros, Zimbabwe, Uganda and

Lesotho). Appendix 6 graphically presents the differences. Therefore, the choice of the method to use for constructing an index is critical, especially when used for benchmarking purposes.

There is a significant positive correlation between the IFI and the HDI, followed by the Trade Percentage of GDP and the GDPPC. These results agree with the evidence presented in the academic literature on the subject (Yorulmaz, 2016; Sarma & Pais, 2011; Park & Mercado, 2015). Therefore, the preliminary conclusion is that countries with high levels of FI also have relatively high levels of human development. Also, it can be concluded that countries with high levels of financial inclusion also have relatively high levels of income.

Park and Mercado (2015) conducted a study in developing Asia and established that a larger population would increase access to formal financial products and services. In contrast to their findings, a significant negative correlation was found between the IFI and population growth rate in Sub-Saharan Africa. In other words, as the population growth rate increases, the levels of FI decrease. This is because the increase in population rate has not been accompanied by any corresponding increase in the number of access points for financial products and services; these are mainly bank branches and ATMs. There is also a significant negative correlation between the IFI and inflation rate. It is concluded, therefore, that depositors would be hesitant to save with formal financial institutions because they fear that their funds will lose value over time. Some of the literature also finds that inflation has a significant negative effect on long-term savings (Heer & Süssmuth, 2007, 2009).

The significance of the relationship between the IFI and the HDI and the GDPPC is presented in Appendix 7; here it is shown that the significance of the relationship is weak. The growth rate results presented in Appendix 8 reveal that levels of FI and human development move closely together; this applies for all the countries in the sample except for Madagascar. On the other hand, the country GDPPC growth, and IFI growth between 2010 and 2017 present contrasting results. It seems that financial inclusion, by itself, does not give an entirely accurate prediction of economic growth as measured by GDPPC. The IFI growth rate only moves in the same direction of GDPPC in four countries: Cabo Verde, Guinea, Tanzania and Madagascar (see Appendix 8).

Tests on the causal relationship between the IFI and the HDI and the GDPPC were hampered by small sample sizes. As a result, the debate on causation, mentioned earlier, could not be resolved.

5. Conclusion

There is no consensus in the literature on how to measure FI or on the direction of the causal relationship between FI and economic development or growth. Therefore, this dissertation has proposed a measure of FI for Sub-Saharan Africa through the text analysis of NFISs for countries in that region with developed and published NFISs. In this dissertation, an IFI that fits Sub-Saharan Africa has been constructed. That IFI has the potential to enable countries in the region easily to benchmark their progress against other countries. This study has demonstrated that in order to achieve sustainable inclusive finance in Sub-Saharan Africa, the focus should be on the three dimensions of 'Access, Usage and Quality', in that order.

In this study, it is argued that this standard measure of FI for Sub-Saharan Africa plays a critical role in helping development partners to save time in implementing new policies in countries where they operate. Thus, apart from minor adjustments, there will be no need to learn and adapt to new country-specific variables used to implement and measure the effect of FI policy. Furthermore, development partners can easily measure national progress against the resources invested in different countries and then make well-thought evidence-based policy decisions.

In this study, the IFI was constructed in three ways as follows: first, by using the Simple Geometric Mean method of the UNDP's HDI; second, the Inverse Euclidean Distance of Sarma (2008) and third, the Factor Analysis described by Amidžić et al., (2014). The results show that the method used to measure financial inclusion has an impact on the mean levels as well as on the ranking of countries. Hence, a country may be ranked either high or low purely because of the method used and not necessarily because of actual improvements in, or deterioration in, the indicators of financial inclusion. Therefore, it is essential to be consistent in the method used if the levels of FI are to be used for comparison or benchmarking purposes across different time periods and/or across different economies.

In this dissertation an attempt was also made to investigate the relationship between FI and economic development and growth using correlation tests and simple regression analyses. Correlation coefficients of 0.5495 and 0.6754 were found for IFI and GDPPC and HDI respectively (see Table 16). This signifies the importance of FI

in explaining economic development and growth, but at the same time, the significance of the relationship is weak. If these results are valid, then countries in the region should be cautious in pursuing financial inclusion policies combined with economic development and growth policies. On the other hand, the study was unable to establish the causal relationship between FI and economic development and growth. This was because the study made use of observation data and there is no controlled experiment.

5.1. Limitations and Suggested Areas of Future Study

Not all countries have developed and published a NFIS. In this study, the dimensions of FI for Sub-Saharan Africa were constructed by means of a text analysis of NFISs for 13 countries out of a total of 48 countries in the region (see Appendix 2); this represents only 27%, which is not a representative sample. Nonetheless, the sample includes countries with different economic sizes and characteristics: large economies such as Nigeria and Tanzania; middle income economies such as Zambia and Botswana and small economies such as Eswatini and Burundi. More importantly, the key elements of FI considered by the countries in the sample are similar. This provides some confidence in inferring the dimensions as being key to the rest of the countries in the region.

A second limitation of the study concerns the limited availability of data. This is a challenge that has been cited in previous studies on the subject (Goel & Sharma, 2017; Gopalan & Rajan, 2018; Amidžić et al., 2014; Park & Mercado, 2015; Yorulmaz, 2016). Data in respect of most indicators is not available. Thus, the quality dimension has been completely excluded from the study because of the unavailability of comprehensive comparable data. If one considers all three dimensions, then the results could be different and the relationship with development and growth could be significant.

On the other hand, the construction of an index is ultimately subjective as a result of the decisions made in that construction: after all, there is no universally accepted scientific rule. It is plausible that the ranking of a country could be attributed to the method used to construct the index and might not reflect that the country has genuinely performed well or badly in terms of financial inclusion. Hence, this paper has fully documented each decision and the trade-offs and compromises noted, where

necessary. This observation should be kept in mind when evaluating other work on the subject.

Finally, the time series data was limited to enable the determination of the causal relationship between FI and economic development and growth. A total of 26 countries were studied for over a period of 7 years. Thus, the study relied on graphical representations and correlation analysis. However, correlation does not indicate causality. There is scope for future studies to conduct the direction of causation and an impact study on FI and economic development and growth to identify policy priorities.

References

AFI. 2017. *Defining Financial Inclusion:* Alliance for Financial Inclusion, *Guideline Note No. 28.* Available: https://www.afi-global.org/sites/default/files/publications/2017-07/FIS_GN_28_AW_digital.pdf [2019, September 12].

Amberkhane, D., Singh, A. S. & Venkataramani, B. 2016. Developing a Comprehensive Financial Inclusion Index. *Management and Labour Studies. 41*(3): 216-235.

Amidžić, G., Massara, A. & Mialou, A. 2014. Assessing countries' financial inclusion standing - A new composite index. *IMF Working Paper* WP/14/36.

Alamelu, K. & Sankaramuthukumar, S. 2015. Financial Inclusion Index: South East Asian scenario. Available: *https://doi-org.ezproxy.uct.ac.za/10.1177/0019466220120204* [2019, September 12].

Allen, F., Demirgüç-Kunt, A., Klapper, L. & Martinez Peria, M. S. 2016. The foundations of financial inclusion: Understanding ownership and use of formal accounts. *Journal of Financial Intermediation. 27:* 1-30.

Asongu, S. A. & Nwachukwu, J. C. 2016. The role of governance in mobile phones for inclusive human development in Sub-Saharan Africa. *Technovation. 55-56:* 1-3.

Asongu, S. A. & Le Roux, S. 2017. Enhancing ICT for inclusive human development in Sub-Saharan Africa. *Technological Forecasting and Social Change. 118:* 44-54.

Aterido, R., Beck, T. & Lacovone, L. 2013. Access to finance in Sub-Saharan Africa: Is there a gender gap? *World Development. 47:* 102-120.

Atkinson, A. & Messey, F.A. 2013. Promoting financial inclusion through financial education. *OECD Working Papers on Finance, Insurance and Private Pensions* No. 34 .

Banerjee, A. V. & Newman, A. F. 1993. Occupational choice and the process of development. *Journal of Political Economy. 101*(2): 274-298.

Bank of Mozambique. 2016. *National Financial Inclusion Strategy 2016-2022*. Available: http://pubdocs.worldbank.org/en/469371468274738363/mozambique-national-financial-inclusion-strategy-2016-2022.pdf [2019, September 12].

Bank of Sierra Leone. 2017. *National Strategy for Financial Inclusion 2017-2020*. Available: https://www.bsl.gov.sl/SL%20FI%20Strategy%202017%20-%202020.pdf [2019, September 12].

Bank of Uganda. 2017. *The Republic of Uganda National Financial Inclusion Strategy 2017-2022.* Available: https://www.bou.or.ug/bou/bou-

downloads/publications/special_pubs/2017/National-Financial-Inclusion-Strategy.pdf [2019, September 12].

Beck, T., Levine, R. & Loayza, N. 2000. Finance and the sources of growth. *Journal of Financial Economics. 58:* 261-300.

Beck, T., Demirgüç-Kunt, A. & Levine, R. 2007. Finance, inequality and the poor. *Journal of Economic Growth. 12*(1): 27-49.

Beck, T., Demirgüç-Kunt, A. & Honohan, P. 2009. Access to financial services: Measurement, impact, and policies. *The World Bank Research Observer. 24*(1): 119-145.

Beegle, K., Christiaensen, L., Dabalen, A. & Gaddis, I. 2016. *Poverty in a Rising Africa.* Washington, DC: World Bank.

Bihari, S. C. 2011. Growth through financial inclusion in India . *Journal of International Business Ethics. 4*(1).

Bozkurt, I., Karakuş, R. & Yildiz, M. 2018. Spatial determinants of financial inclusion over time. *Journal of International Development. 30*(8): *1474-1504*.

Bräutigam, D. A. & Knack, S. 2004. Foreign aid, institutions, and governance in Sub-Saharan Africa. *Economic Development and Cultural Change. 52*(2): 255-285.

Brown, T. A. 2014. *A Confirmatory Factor Analysis for Applied Research.* Guilford Publications. New York: London.

Brune, L., Giné X., Goldberg, J. & Yang, D. 2013. *Commitments to save: A Field Experiment in Rural Malawi.* Washington DC: World Bank.

Calderón, C. & Liu, L. 2003. The direction of causality between financial development and economic growth. *Journal of Development Economics. 72*(1): 321 - 334.

Caldero´n, C. & Serve´n, L. 2010. Infrastructure and economic development in Sub-Saharan Africa. *Journal of African Economies*. *19* (AERC Supplement 1): i13–i87.

Cámara, N. & Tuesta, D. 2014. Measuring financial inclusion: A multidimensional index*. Banco Bilbao Vizcaya Argentaria Research Paper 14/26.*

Central Bank of Nigeria. 2012. *National Financial Inclusion Strategy 2010-2020*. Available: https://www.afi-global.org/publications/1831/Nigeria-National-Financial-Inclusion-Strategy [2019, September 12].

CGAP. 2019. *CGAP Funder Survey 2017: Trends in international funding for financial inclusion.* Consultative Group to Assist the Poor, Washington DC. Available: https://www.cgap.org/sites/default/files/publications/Brief-CGAP-Funder-Survey-2017-Jan-2019.pdf [2019, September 12].

Chakrabarty, K. S. C. 2012. *Financial inclusion – Issues in Measurement & Analysis.* Bank Negara Malaysia: Bank for International Settlements. Irving Fisher Committe on Central Bank Statistics.

Chakravarty, S. R. & Pal, R. 2013. Financial inclusion in India: An axiomatic approach. *Journal of Policy Modeling. 35*(5): 813-837.

Chen, J. & Fleisher, B. M. 1996. Regional income inequality and economic growth in China. *Journal of Comparative Economics. 22*(2): 141–164 .

Chen, S. & Ravallion, M. 2004. How have the world's poorest fared since the early 1980s? *The World Bank Research Observer. 19*(2): 141-169.

Chatterjee, S. & Hadi, A. S. 1999. *Regression Analysis by Example*, 3rd Ed*, ISBN 0-471-31946-5.* Canada: Wiley Interscience*.*

Chibba, M. 2009. Financial inclusion, poverty reduction and the Millenium Development Goals. *European Journal of Development Research. 21:* 213-230.

Chikalipah, S. 2017. What determines financial inclusion in Sub-Saharan Africa? *African Journal of Economic and Management Studies. 8*(1): 8-18.

Claessens, S. 2006. Access to financial services: A review of the issues and public policy objectives. *The World Bank Research Observer. 21*(2): 207-240.

Clarke, G. R. G., Xu, L. C. & Zou, H. 2006. Finance and income inequality:What do the data tell us? *Southern Economic Journal. 72*(3): 578-596.

Cohen, J. C. 1923. A*pplied Regression/correlation Analysis for the Behavioral Sciences, 2nd Ed.* New York: New York State Psychiatric Institute and Columbia University School of Public Health.

Demirgüç-Kunt, A. & Klapper, L. 2012. Financial inclusion in Africa: An overview. *World Bank, Development Research Group*. *Policy Research Working Paper* 6088*.*

Demirgüç-Kunt, A. & Klapper, L. 2012. Measuring financial inclusion: The Global Findex Database. *The World Bank Development Research Group Finance and Private Sector Development Team,* https://doi.org/10.1596/1813-9450-6025.

Demirgüç-Kunt, A. & Klapper, L. 2013. Measuring financial inclusion: Explaining variation in use of financial services across and within countries. *Brookings Papers on Economic Activity*, 2013(1): 279-340.

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. & Hess, J. 2018. Global Findex Database 2017: Measuring financial inclusion and the Fintech revolution*.* Washington DC: World Bank.

Devlin, J. F. 2005. A detailed study of financial exclusion in the UK. *Journal of Consumer Policy. 28(1):* 75-108.

Dobbie, M. J. & Dail, D. 2013. Robustness and sensitivity of weighting and aggregation in constructing composite indices. *Ecological Indicators. 29:* 270 - 277.

Financial Inclusion National Council. 2018. Tanzania National Financial Inclusion Framework (2018-2022). Available: https://www.afi-global.org/sites/default/files/publications/2017-12/NFIF%202018-2022.pdf [2019, September 12].

Fungáčová, Z. & Weill, L. 2015. Understanding financial inclusion in China. *China Economic Review. 34:* 196-206.

Freudenberg, M. 2003. Composite indicators of country performance: A critical assessment. *OECD Science, Technology and Industry Working Papers* 2003/16.

Galor, O. & Zeira, J. 1993. Income distribution and macroeconomics. *Review of Economic Studies. 60*(1): 35-52.

Goel, S. & Sharma, R. 2017. Developing a Financial Inclusion Index for India. *Procedia Computer Science. 122:* 949-956.

Gopalan, S. & Rajan, R. S. 2018. Foreign banks and financial inclusion in emerging and developing economies: An empirical investigation. *Journal of International Development. 30*(4): 559-583.

Gupte, R., Venkataramani, B. & Gupta, D. 2012. Computation of Financial Inclusion Index for India. *Procedia - Social and Behavioral Sciences. 37:* 133-149.

Hannig, A. & Jansen, S. 2010. Financial inclusion and financial stability: Current policy issues. *Asian Development Bank Institute*. *ADBI Working Paper Series,* 259.

Heer, B. & Süssmuth B. 2007. Effects of inflation on wealth distribution: Do stock market participation fees and capital income taxation matter? *Journal of Economic Dynamics and Control. 31*(1): 277-303.

Heer, B. & Süssmuth B. 2009. The savings-inflation puzzle. *Applied Economics Letters. 16*(6): 615-617.

Honohan, P. 2005. Measuring microfinance access: Building on existing cross-country data. Washington DC: World Bank.

Honohan, P. 2008. Cross-country variation in household access to financial services. *Journal of Banking and Finance. 32:* 2493-2500.

Imboden, K. 2005. Building inclusive financial sectors: The road to growth and poverty reduction. *Journal of International Affairs. 58*(2): 65-86.

Johnson, S. & Nino-Zarazua, M. 2011. Financial access and exclusion in Kenya and Uganda. *The Journal of Development Studies. 47*(3): 475-496.

Karlan, D. & Morduch, J. 2009. Access to finance. *Handbook of Development Economics, 5 (June),* 86.

Kelly, A. C. 1991. The Human Development Index: "Handle with care." *Population and Development Review. 17*(2): 315 - 324.

Khan, S. 2009. Poverty reduction efforts: Does microcredit help? *SAIS Review of International Affairs. 29*(2): 147-157.

Khandker, S. R. 2005. Microfinance and poverty: Evidence using panel data from Bangladesh. *World Bank Economic Review. 19*(2): 263-286.

Kim, D., Yu, J. & Hassan M. K. 2018. Financial inclusion and economic growth in OIC countries. *Research in International Business and Finance. 43: 1-14*.

Levine, R. & Zervos, S. 1998. Stock markets, banks, and economic growth. *The American Economic Review. 88:* 537-558.

Mader, P. 2018. Contesting financial inclusion. *Development and Change Forum 2018. 49*(2): 461-483.

Manji, A. 2010. Eliminating poverty? 'Financial inclusion', Access to land, and international development. *The Modern Law Review. 73*(6): 985-1004.

McGillivray, M. 1991. The Human Development Index: Yet another redundant composite development indicator? *World Development. 19*(10): 1461-1468.

Ministry of Finance and Economic Development Planning. 2014. *National Financial Inclusion Strategy 2015-2020*. Available: https://www.afi-global.org/publications/1830/Republic-of-Burundi-National-Financial-Inclusion-Strategy [2019, September 12].

Ministry of Finance and Economic Development. 2015. *Botswana Financial Inclusion Roadmap and Strategy 2015 - 2021*. Available: https://www.finance.gov.bw/images/publications/fin/2BotsMAPRMPFinal.pdf [2019, September 12].

Ministry of Finance. 2017. *Republic of Zambia National Financial Inclusion Strategy 2017-2022.* Available: http://www.boz.zm/NFISZambiaverFeb182017forConsultation.pdf [2019, September 12].

Ministry of Finance. 2017. *National Financial Inclusion Strategy for Swaziland 2017 - 2022*. Available: https://www.afi-global.org/sites/default/files/publications/2018-01/Swaziland%20National%20Financial%20Inclusion%20Strategy%202017%20-2022.pdf [2019, September 12].

Ministry of Finance, Economic Planning & Development. 2018. *National Strategy for Financial Inclusion 2016-2020.* Available:

http://finance.gov.mw/index.php?option=com_docman&task=cat_view&gid=98&Itemid=55 [2019, September 12].

Mohan, R. 2006. *Economic growth, financial deepening and financial inclusion. Dynamics of India Banking:* Atlantic Publishers & Distributors (P) LTD. New Delhi: India.

Mohapatra, N. & Kumar, P. 2014. *Pillars of Financial Inclusion: Remittances, Micro Insurance and Micro Savings*. Available: https://www.skoch.in/images/stories/Governance_knowledge/Pillars%20of%20Financial%20Inclusion%20Remittances_Micro%20Insurance%20and%20Micro%20Savings.pdf [2020, April 21].

National Bank of Ethiopia. 2017. *National Financial Inclusion Strategy 2014-2020.* Available: https://www.nbe.gov.et/pdf/service/Ethiopian%20National%20Financial%20Inclusion%20Strategy.pdf [2019, September 12].

Neaime, S. & Gaysset, N. 2018. Financial inclusion and stability in MENA: Evidence from poverty and inequality. *Finance Research Letters. 24:* 230-237.

OECD. 2008. Handbook on constructing composite indicators: Methodology and User Guide. *Organisation for Economic Co-operation and Development (Vol. 3).* Ispra, Italy: OECD & Joint Research Centre (JRC).

Ouma, S. A. & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization? *Review of Development Finance 7*(1): 29-35.

Park, C. & Mercado, R. V. Jr. 2015. Financial inclusion, poverty, and income inequality in Developing Asia*. ADB Economics Working Paper Series*, No. 426.

Peachey, S. & Roe, A. 2004. *Access to finance. A study for the World Savings Banks Institute.* Oxford Policy Management. Available: http://www.arabic.microfinancegateway.org/sites/default/files/mfg-en-paper-access-to-finance-2004.pdf [2019, September 12].

Pett, M. A., Lackey, N. R. & Sullivan, J. J. 2003. *Making sense of Factor Analysis: The Use of Factor Analysis for Instrument Development in Health Care Research*. New Delhi: SAGE.

Ramji, M. 2009. Financial inclusion in Gulbarga: Finding usage in access. *Institute for Financial Management and Research Centre for Micro Finance, Working Paper Series* No. 26.

Reserve Bank of Zimbabwe. 2015. *Zimbabwe National Financial Inclusion Strategy 2016-2020.* Available: https://library.buse.ac.zw/docs/gvt-publications/zim-fin-strat.pdf [2019, September 12].

Sagar, A. D. & Najam, A. 1998. The Human Development Index: A critical review. *Ecological Economics. 25*(3): 249 - 264.

Sarma, M. 2008. Index of Financial Inclusion. Indian Council for Research on International Economic Relations, (Working Paper No. 215).

Sarma, M. & Pais, J. 2008. *Financial Inclusion and Development: A Cross Country Analysis.* New Delhi: Madras Schools of Economics.

Sarma, M. & Pais, J. 2011. Financial inclusion and development. *Journal of International Development. 23*(5): 613-628.

Sarma, M. 2012. Index of Financial Inclusion - A measure of financial sector inclusiveness. Berlin (GE): *Berlin Working Papers on Money, Finance, Trade and Development*, (Working Paper No. 07/2012).

Serrao, M. V., Sequeira A. H. & Hans, B. 2012. Designing a methodology to investigate accessibility and impact of financial inclusion. Investigahttp://dx.doi.org/10.2139/ssrn.20.

Shankar, S. 2013. Financial inclusion in India: Do microfinance institutions address access barriers? *ACRN Journal of Entrepreneurship Perspectives. 2*(1): 60-70.

Sharma, D. 2016. Nexus between financial inclusion and economic development: Evidence from the emerging Indian economy. *Journal of Financial Economic Policy. 8*(1): 13-36.

Swamy, V. 2014. Financial inclusion, gender dimension, and economic impact on poor households. *World Development. 56:* 1-15.

The Government of Liberia. 2009. *The Liberian Strategy for Financial Inclusion, 2009-2013.* Available: http://siteresources.worldbank.org/EXTFINANCIALSECTOR/Resources/282884-1339624653091/8703882-1339624678024/8703850-1368556147234/9184715-1404333315582/Liberia-2009-2013-National-Strategy-for-Financial-Inclusion.pdf [2019, September 12].

The World Bank. 2012. Financial Inclusion Strategies - Reference Framework. Available: www.worldbank.org/financialinclusion [2020, April 21].

Thorat, U. 2006. Financial inclusion and the millennium development goals. Available: http://sustainabledfs.lbs.edu.ng/FI-Resources/2006_Thorat.pdf [2020, April 21].

UNDP & UNCDF. 2014. *Support to financial inclusion in Lesotho (SUFIL) End of Project Evaluation Report.* New York: United Nations and Development Programme and United Natitions Capital Development Fund.

United Nations Development Programme. 2018. H*uman Development Indices and indicators: 2018 Statistical Update.* New York: United Nations Development Programme.

Wang, X., & Guan, J. 2017. Financial inclusion: Measurement, spatial effects and influencing factors. *Applied Economics. 49*(18): 1751-1762.

Yorulmaz, R. 2013. Construction of a regional Financial Inclusion Index in Turkey. *Journal of BRSA Banking and Financial Markets*. *7*(1): 79-101.

Yorulmaz, R. 2016. Construction of a Financial Inclusion Index for the member and candidate countries of the European Union. *Journal of Turkish Court of Accounts/Sayistay Dergisi. 102:* 91-106.

Zhang, Q. & Posso, A. 2019. Thinking inside the box: A closer look at financial inclusion and household income. *The Journal of Development Studies. 55*(7): *1616-1631*.

Appendices

Appendix 1. Definitions of Financial Inclusion Adopted by Selected AFI's Financial Inclusion Strategy (FIS) Peer Learning Group (PLG) Members

Country	Definition	Target Group	Concept/Dimensions Included
Bangladesh	No formal definition has been established but a standard definition is used which is as follows: "…a state in which all working age adults have effective access to credit, savings, payments, and insurance from formal service providers…" (the G20 definition of financial inclusion)	All working adults	Effective access to financial services Formal service providers for financial services
Burundi	"It is an approach which seeks to include more and more poor people in the formal financial sector"	General broader inclusion of the poor	Inclusion of the underprivileged A formal financial sector
El Salvador	The draft bill to facilitate financial inclusion in its clauses, item # II states: "of the state's interest to provide with access to formal services and the use of retail payment instruments to citizens in order to ensure their participation in productive activities, helping to improve their quality of life."	Citizens (all working adults)	Access to financial services Use of retail payment instruments Ensuring productive participation
Indonesia	"The right of every individual to have access to a full range of quality financial services in a timely, convenient, informed manner and at an affordable cost in full respect of his or her personal dignity. Financial services are provided to all segments of the society, with particular attention to low income poor, productive poor, migrant workers and people living in remote areas".	Every individual (all working adults) Particularly applicable to the poor and those living in remote areas	Access to financial services Service must be timely, convenient and informed Service must be affordable Respect and dignity for the customer
Pakistan	"Access to need-based financial services for low-income and underserved segments such as MSMEs, rural and agricultural finance, low-income housing finance, microfinance, payments, remittance, insurance, etc".	Low-income segments of the population	Access to need-based financial services Detailed areas of service requiring attention
Peru	"Financial inclusion is the access and use of quality financial services for all segments of population"	All segments of the population (all working adults)	Access to financial services
Turkey	"Financial inclusion is a broad concept which includes financial access, financial education and financial consumer protection".	No scope	Access to financial services Financial education Consumer protection

Source: Alliance for Financial Inclusion Guideline Note No. 28 of July 2017

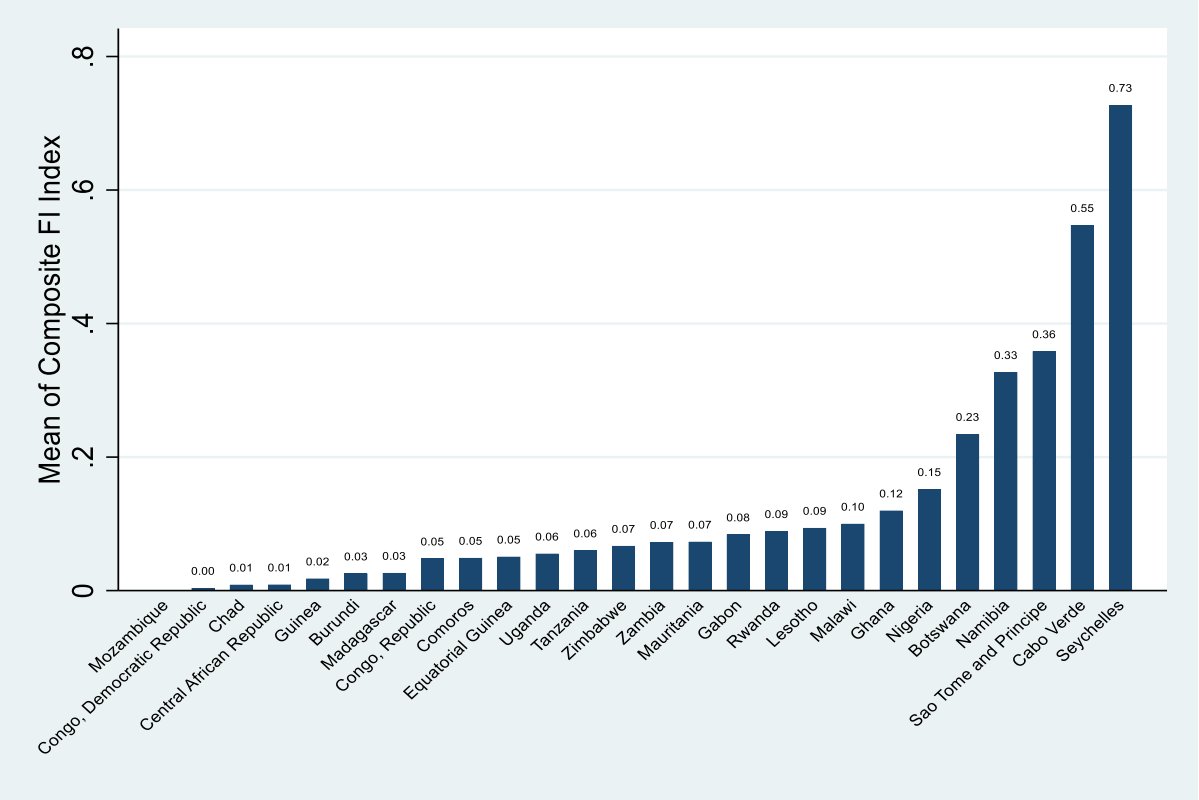
Appendix 2. List of Sub-Saharan African Countries

Country Name	Published an NFIS	Data on All Indicators Available for Most Years (2010 – 2017) (Country included in the study)
Angola	×	×
Benin	×	×
Botswana	√	√
Burkina Faso	×	×
Burundi	√	√
Cabo Verde	×	√
Cameroon	×	×
Central African Republic	×	√
Chad	×	√
Comoros	√	√
Congo, Democratic Republic	×	√
Congo, Republic	×	√
Côte d'Ivoire	√	×
Equatorial Guinea	×	√
Eritrea	×	×
Eswatini	√	×
Ethiopia	√	×
Gabon	×	√
Gambia, The	×	×
Ghana	×	√
Guinea	×	√
Guinea-Bissau	×	×
Kenya	×	×
Lesotho	×	√
Liberia	√	×
Madagascar	√	√
Malawi	√	√
Mali	×	×
Mauritania	×	√
Mauritius	×	×
Mozambique	√	√
Namibia	×	√
Niger	√	×
Nigeria	√	√
Rwanda	×	√
São Tomé and Príncipe	×	√
Senegal	×	×
Seychelles	×	√
Sierra Leone	√	×
Somalia	×	×
South Africa	×	×
South Sudan	×	×
Sudan	×	×
Tanzania	√	√
Togo	×	×
Uganda	√	√
Zambia	√	√
Zimbabwe	√	√

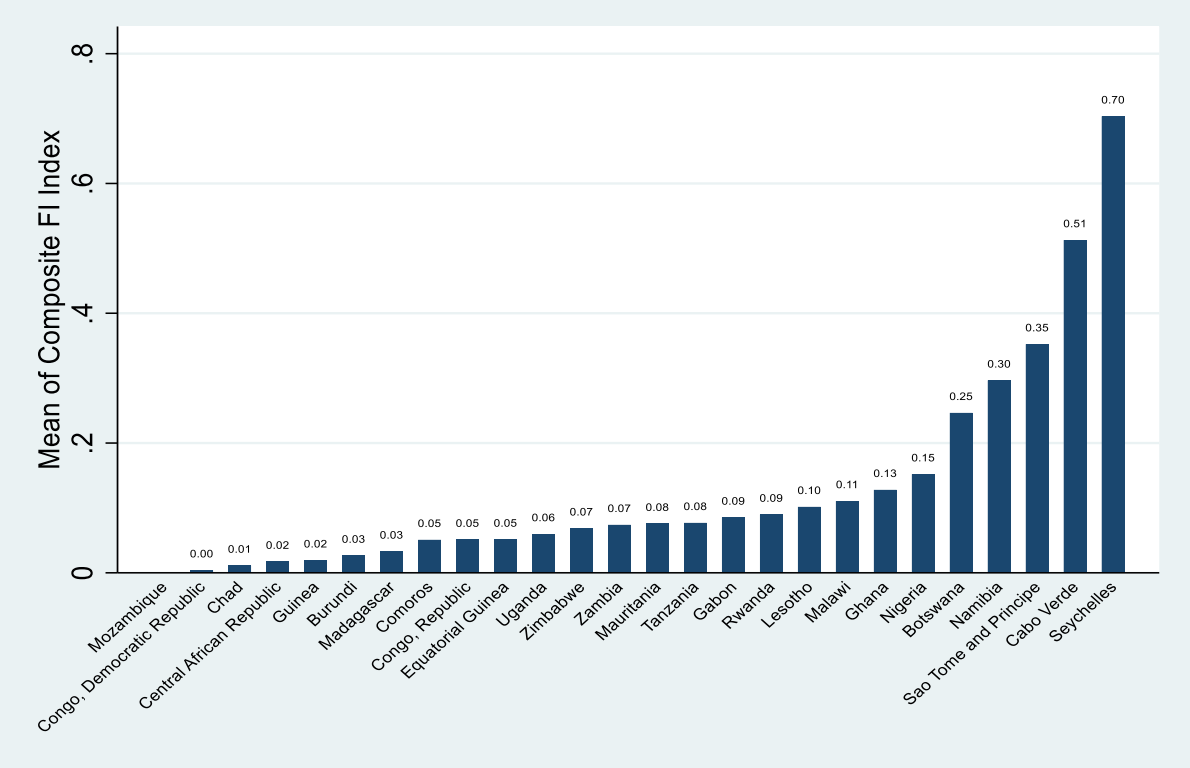
Source: Developed by self, based on The World Bank's list of Sub-Saharan Africa countries.

Appendix 3. Mean Levels of Composite IFI

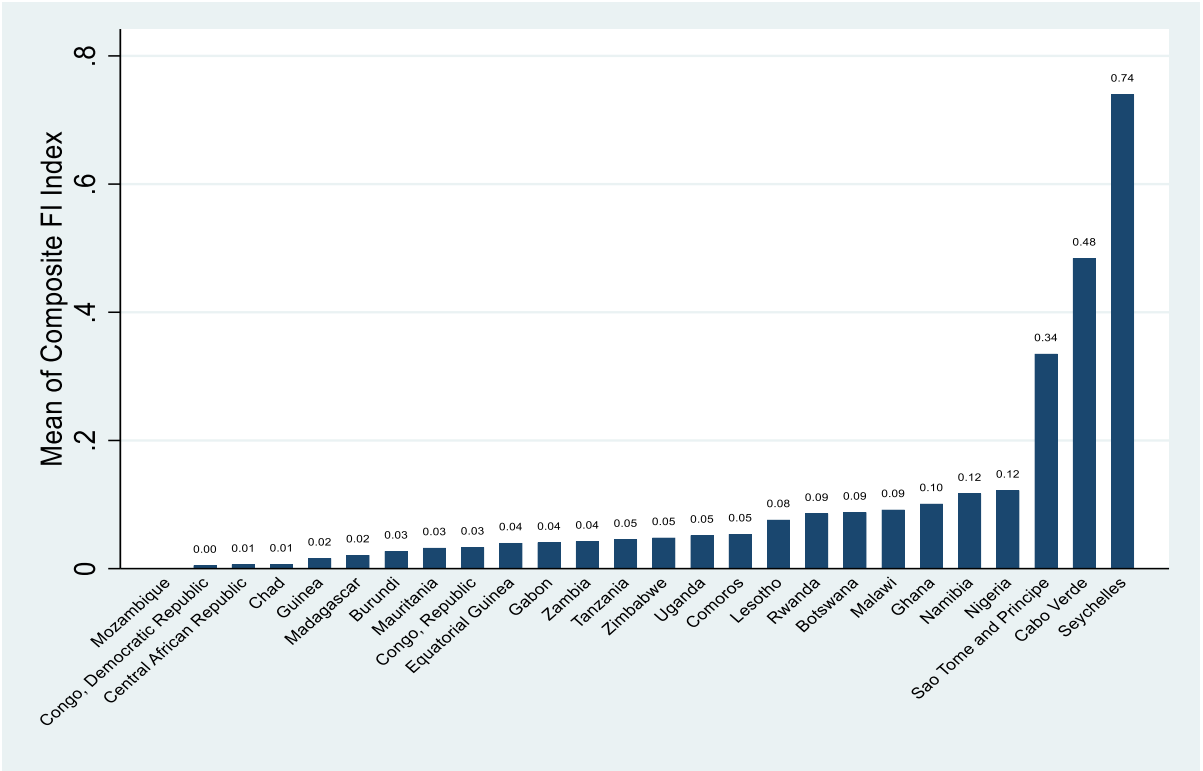
Simple Geometric Mean



Inverse Euclidean Distance



Factor Analysis


Mean of Composite FI Index
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0.01
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0.03
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0.05
0.05
0.08
0.09
0.09
0.09
0.10
0.12
0.12
0.34
0.48
0.74
Mozambique
Congo, Democratic Republic
Central African Republic
Chad
Guinea
Madagascar
Burundi
Mauritania
Congo, Republic
Equatorial Guinea
Gabon
Zambia
Tanzania
Zimbabwe
Uganda
Comoros
Lesotho
Rwanda
Botswana
Malawi
Ghana
Namibia
Nigeria
Sao Tome and Principe
Cabo Verde
Seychelles

Appendix 4. Weights Derived Through Factor Analysis for 15 Countries (that have Complete Data) Tracked from 2014 to 2017

Country	Sub-Index for Usage Dimension	Sub-Index for Access Dimension	Index for Financial Inclusion (IFI)	IFI Rank
PANEL A: 2014				
Seychelles	0.7668	0.9142	0.8256	1
Cabo Verde	0.5944	0 .4109	0.5091	2
São Tomé and Príncipe	0.2572	0.3639	0.2976	3
Nigeria	0.1623	0.1002	0.1325	4
Rwanda	0.0877	0.1355	0.1053	5
Ghana	0.1469	0.0622	0.1024	6
Botswana	0.4173	0.0115	0.0923	7
Lesotho	0.1678	0.0347	0.0865	8
Zimbabwe	0.0773	0.0389	0.0579	9
Comoros	0.0449	0.0769	0.0563	10
Uganda	0.0653	0.0388	0.0525	11
Madagascar	0.0470	0.0081	0.0225	12
Guinea	0.0286	0.0095	0.0180	13
Chad	0.0177	0.0014	0.0062	14
Central African Republic	0.0216	0.0010	0.0060	15
PANEL B: 2015				
Seychelles	0.7296	0.9322	0.7930	1
Cabo Verde	0.6368	0.4163	0.5511	2
São Tomé and Príncipe	0.3714	0.3798	0.3743	3
Botswana	0.5311	0.0124	0.1480	4
Nigeria	0.1472	0.0946	0.1267	5
Ghana	0.1613	0.0774	0.1257	6
Rwanda	0.0892	0.1416	0.1044	7
Lesotho	0.1417	0.0386	0.0911	8
Uganda	0.0725	0.0406	0.0595	9
Zimbabwe	0.0816	0.0241	0.0539	10
Comoros	0.0439	0.0755	0.0528	11
Madagascar	0.0573	0.0095	0.0311	12
Guinea	0.0370	0.0117	0.0250	13
Chad	0.0221	0.0017	0.0093	14
Central African Republic	0.0251	0.0009	0.0082	15
PANEL C: 2016				
Seychelles	0.7874	0.9596	0.8624	1
Cabo Verde	0.6339	0.4079	0.5176	2
São Tomé and Príncipe	0.3589	0.3240	0.3424	3
Nigeria	0.1543	0.0947	0.1233	4
Ghana	0.1613	0.0789	0.1161	5
Rwanda	0.0837	0.1486	0.1090	6
Lesotho	0.1491	0.0401	0.0815	7
Botswana	0.4169	0.0110	0.0785	8
Comoros	0.0497	0.0852	0.0637	9
Uganda	0.0831	0.0397	0.0591	10
Zimbabwe	0.0973	0.0227	0.0499	11
Madagascar	0.0512	0.0098	0.0239	12
Guinea	0.0316	0.0113	0.0196	13
Chad	0.0223	0.0017	0.0068	14
Central African Republic	0.0307	0.0009	0.0060	15

PANEL D: 2017				
Seychelles	0.8830	0.9950	0.9351	1
Cabo Verde	0.6774	0.3977	0.5246	2
São Tomé and Príncipe	0.4005	0.3409	0.3707	3
Ghana	0.1971	0.0911	0.1361	4
Nigeria	0.1949	0.0915	0.1356	5
Rwanda	0.0766	0.1504	0.1059	6
Lesotho	0.1604	0.0394	0.0817	7
Botswana	0.3954	0.0104	0.0691	8
Comoros	0.0553	0.0851	0.0681	9
Uganda	0.0986	0.0378	0.0622	10
Zimbabwe	0.1195	0.0201	0.0508	11
Madagascar	0.0511	0.0105	0.0239	12
Guinea	0.0319	0.0114	0.0194	13
Chad	0.0205	0.0017	0.0062	14
Central African Republic	0.0274	0.0010	0.0055	15

Appendix 5. Factor Analysis Part 2 Results

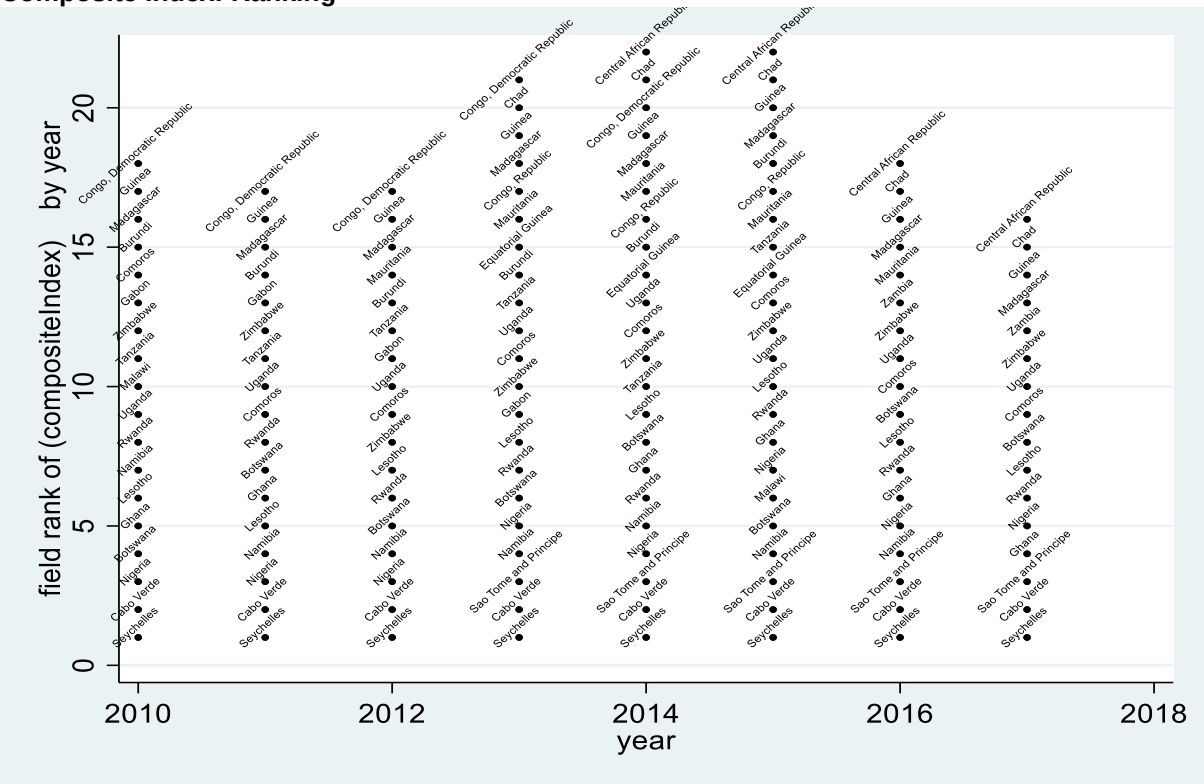
Weights Assigned to Variables

Year	Dimension 1				Dimension 2	
	BranchAdults	***Branch*** km^2	***Atm*** km^2	***AtmAdults***	***DepositorAdults***	***BorrowersAdults***
2010	26%	35%	33%	6%	41%	59%
2011	26%	35%	33%	6%	39%	61%
2012	25%	33%	33%	9%	34%	66%
2013	26%	33%	31%	10%	28%	72%
2014	26%	32%	31%	11%	34%	66%
2015	27%	30%	30%	13%	26%	74%
2016	25%	34%	34%	7%	33%	67%
2017	22%	32%	30%	16%	54%	46%

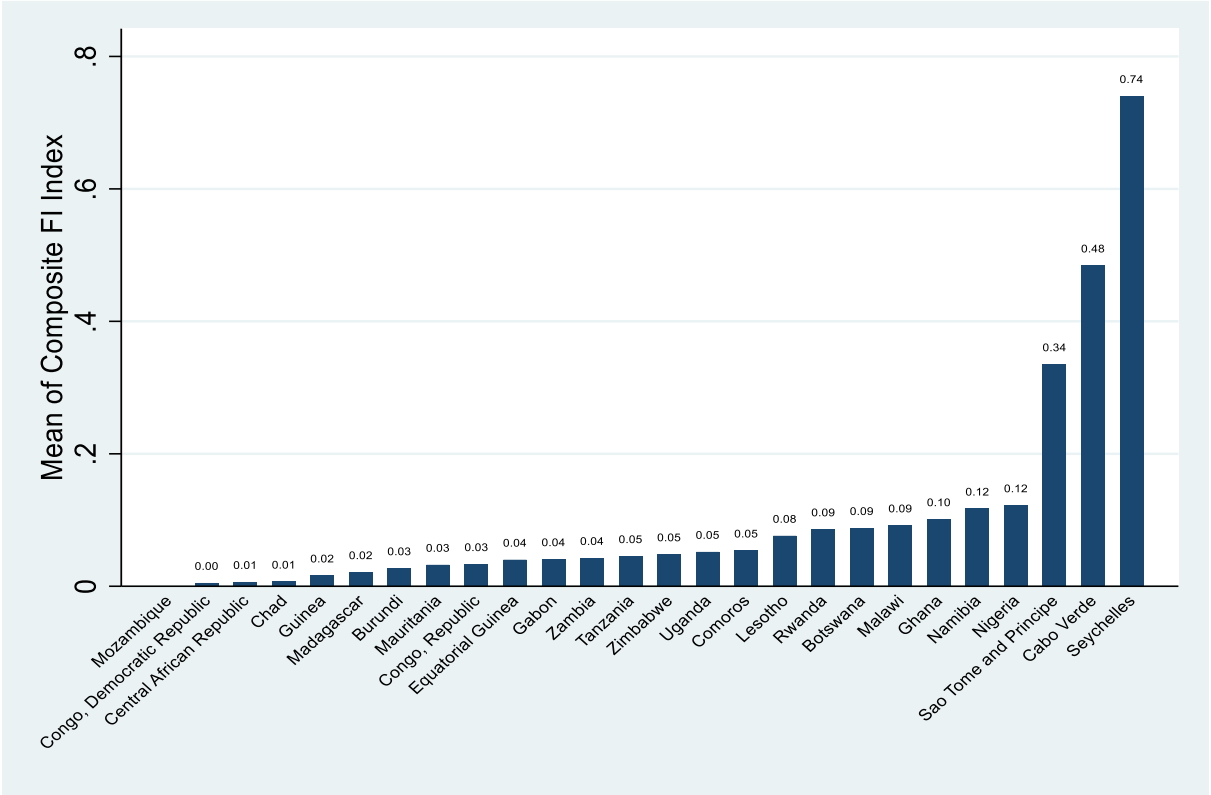
Weights Assigned to Dimensions

Year	Dimension 1	Dimension 2
2010	54%	46%
2011	52%	48%
2012	56%	44%
2013	59%	41%
2014	58%	42%
2015	66%	34%
2016	54%	46%
2017	52%	48%

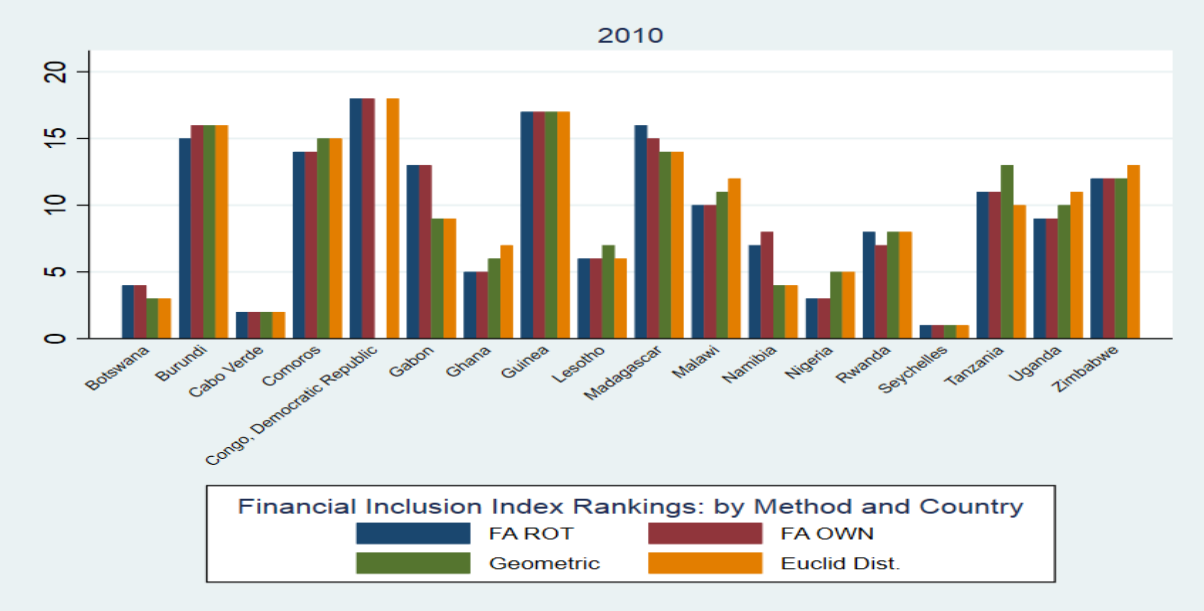
Composite Index: Ranking

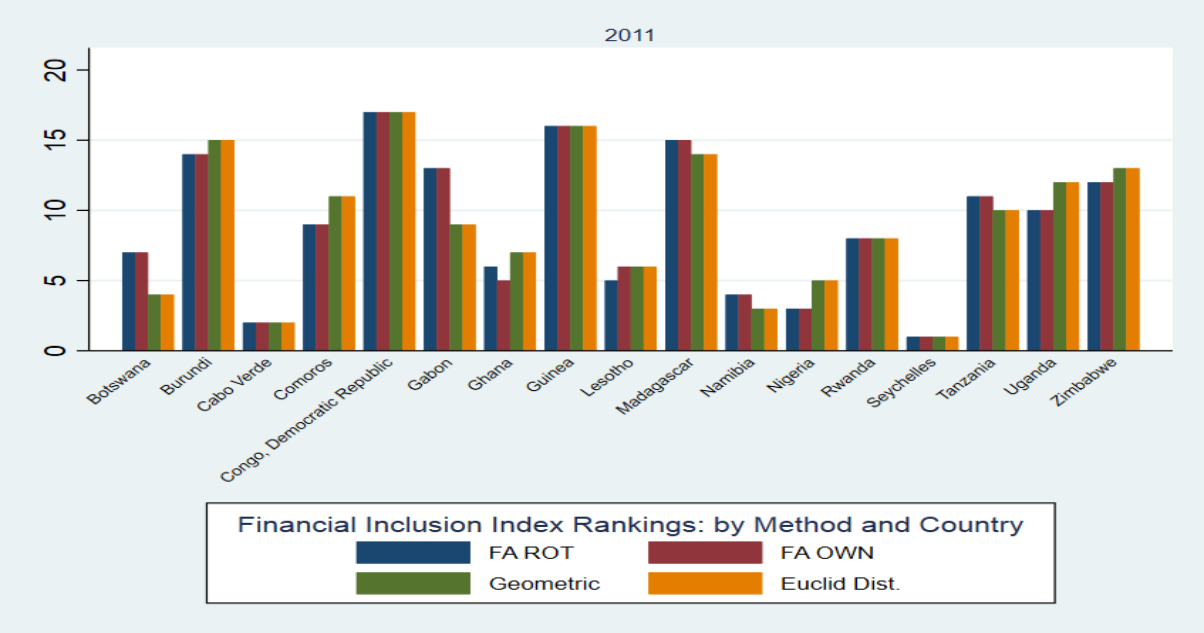


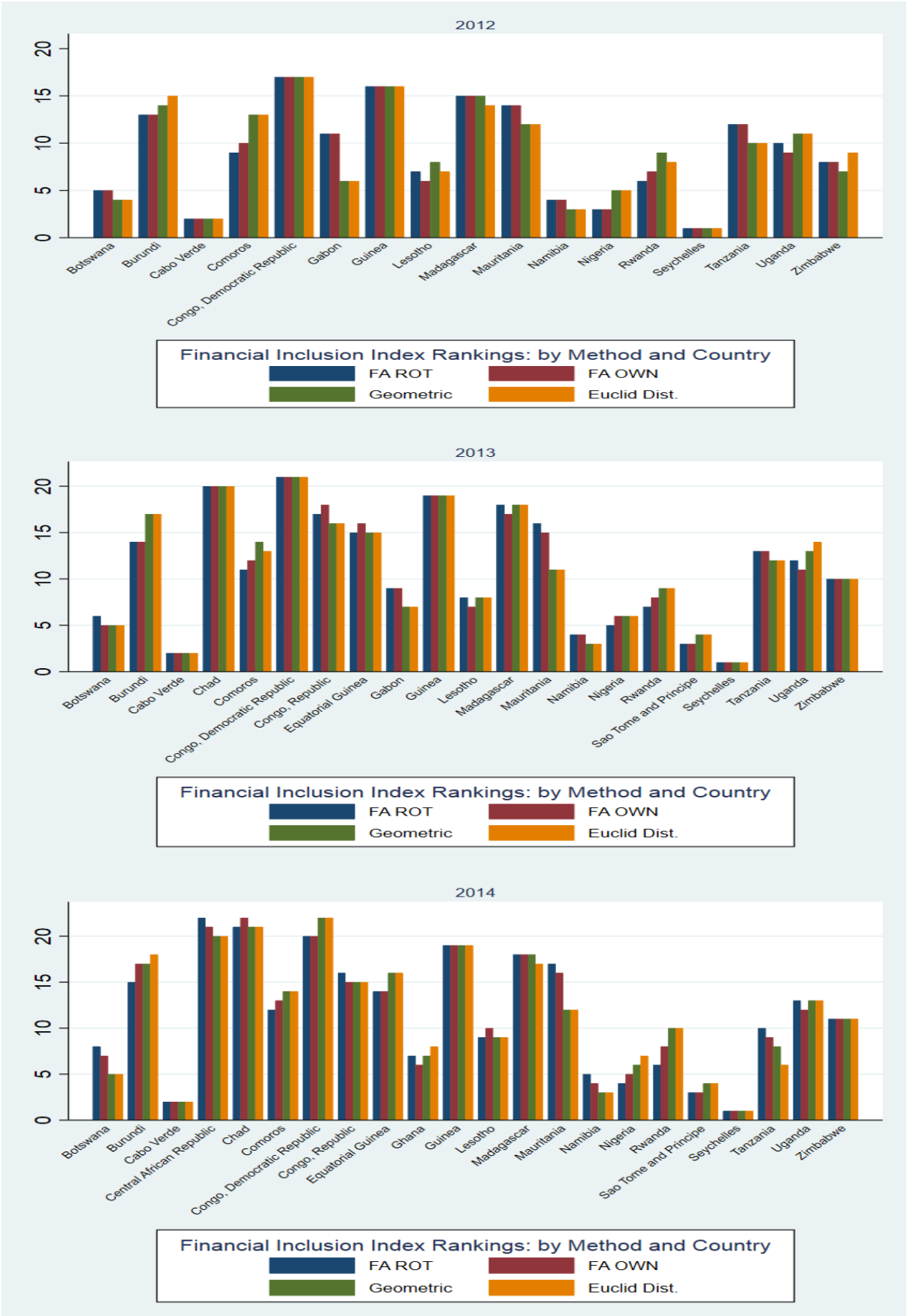
Composite Index: Mean Levels



Appendix 6. Comparative Results from Different Methods of IFI Construction: IFI Ranking (2010 – 2017)



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Congo, Democratic Republic
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Guinea
Lesotho
Madagascar
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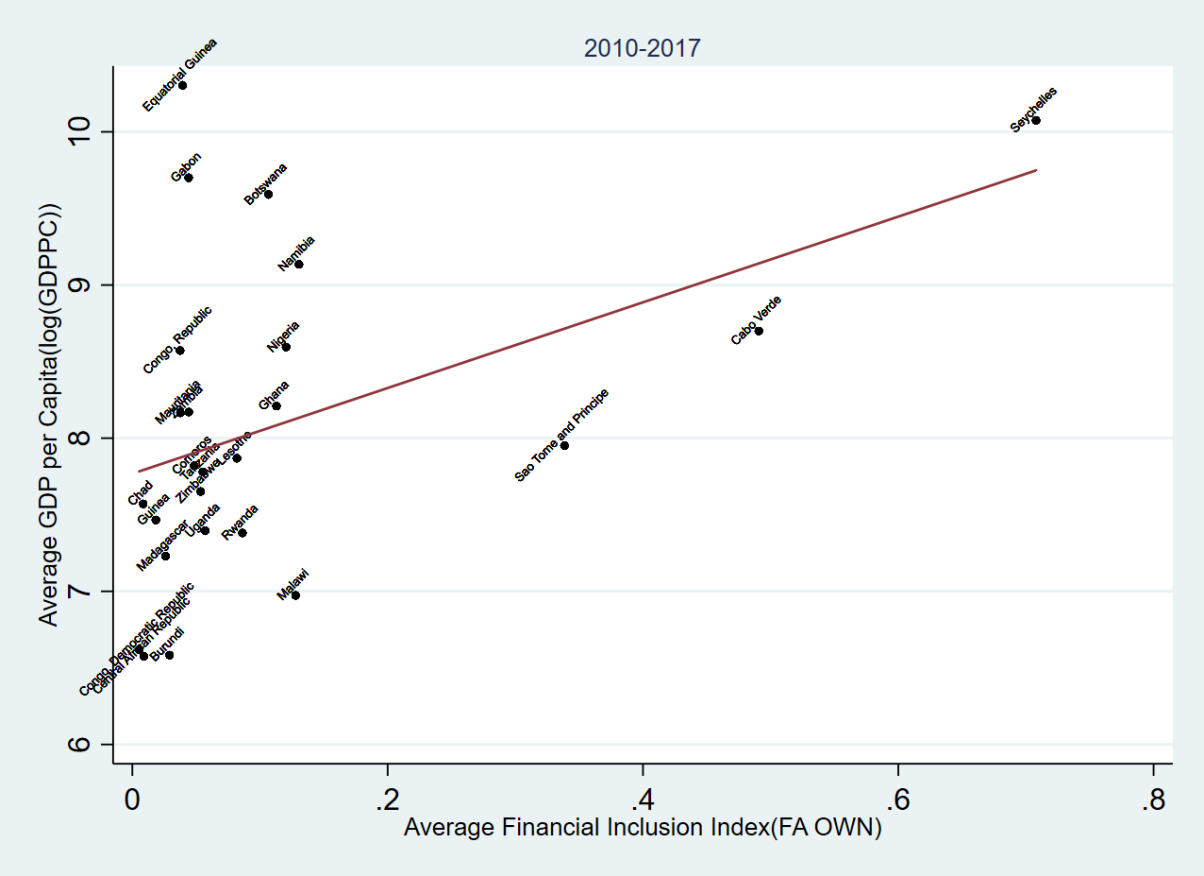
Sao Tome and Principe
Seychelles
Uganda
Zambia
Zimbabwe
Financial Inclusion Index Rankings: by Method and Country
FA ROT
FA OWN
Geometric
Euclid Dist.

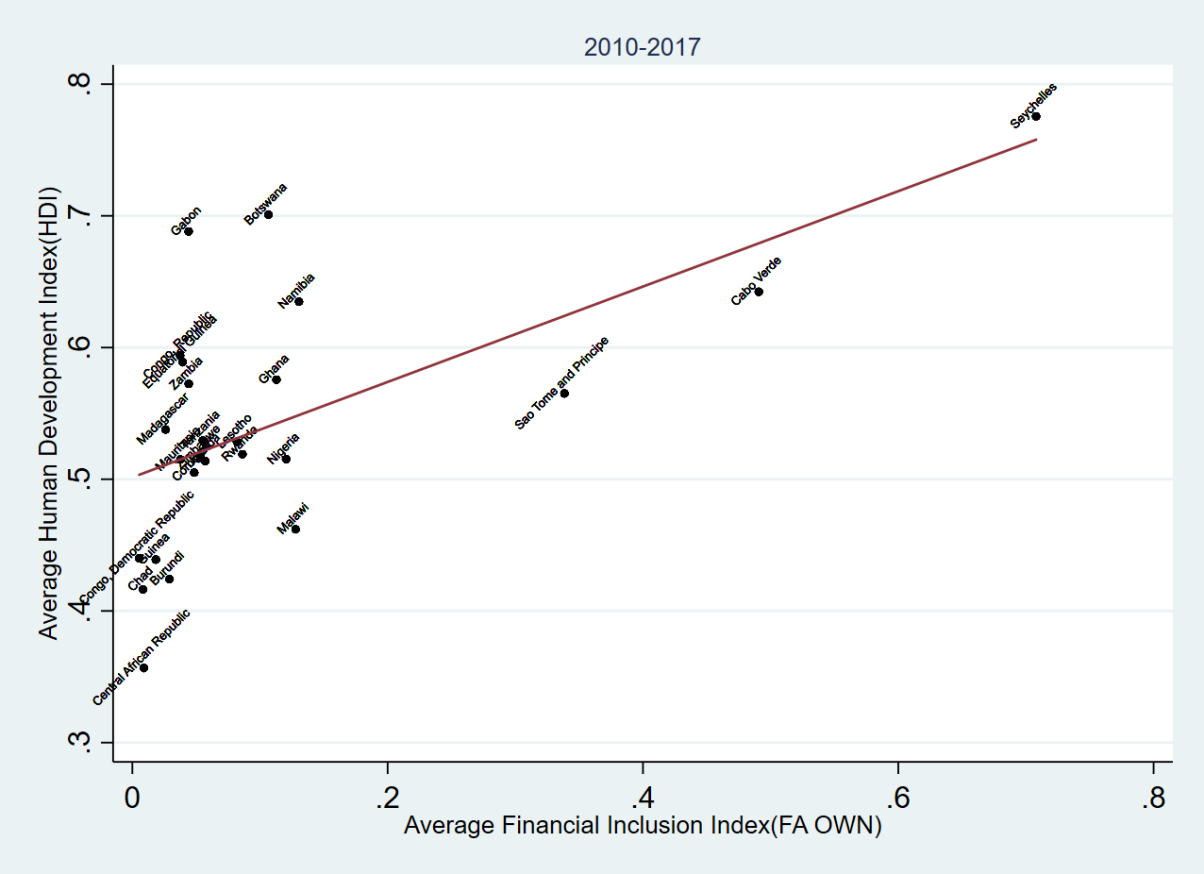
Appendix 7. Results of the Test of the Relationship Between IFI and HDI and GDPPC

Note: All variables in levels

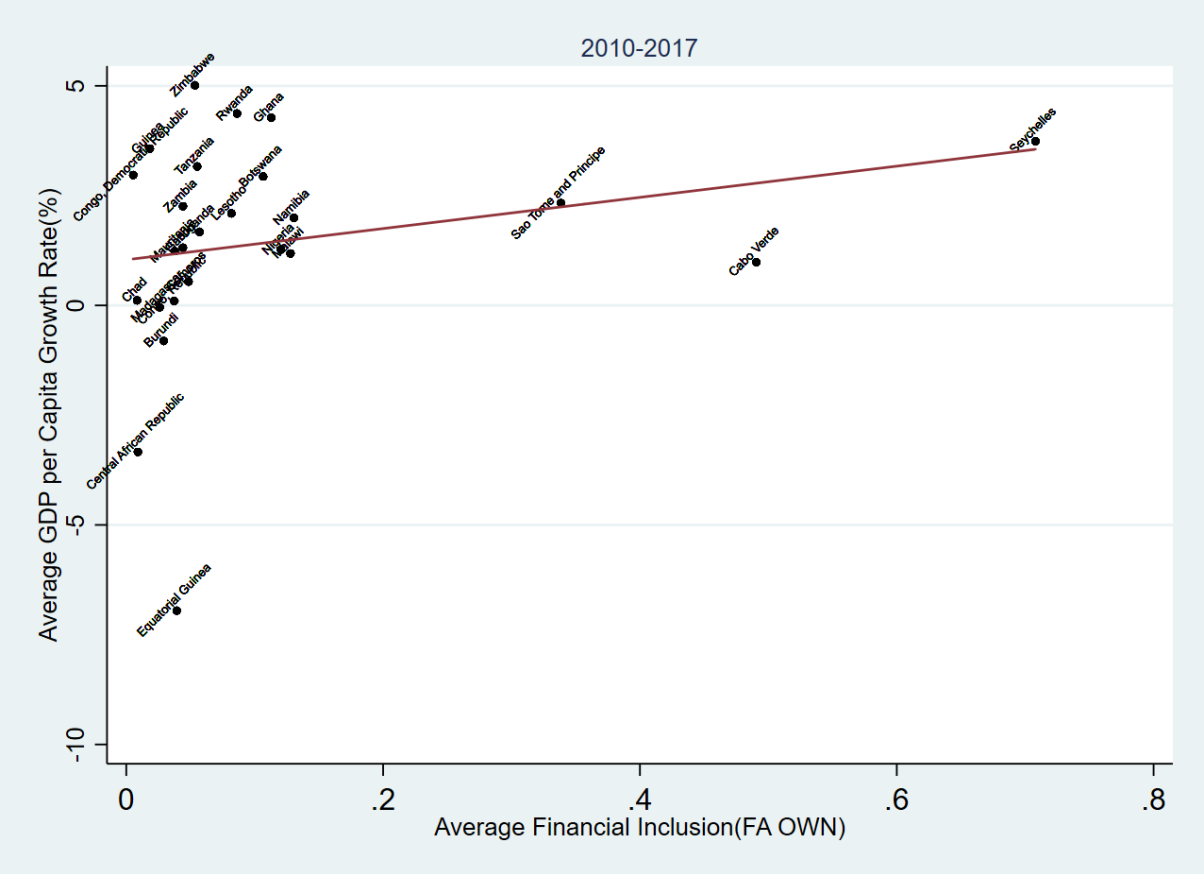
Average GDPPC Versus IFI Cross-Sectional Relationship (2010-2017)



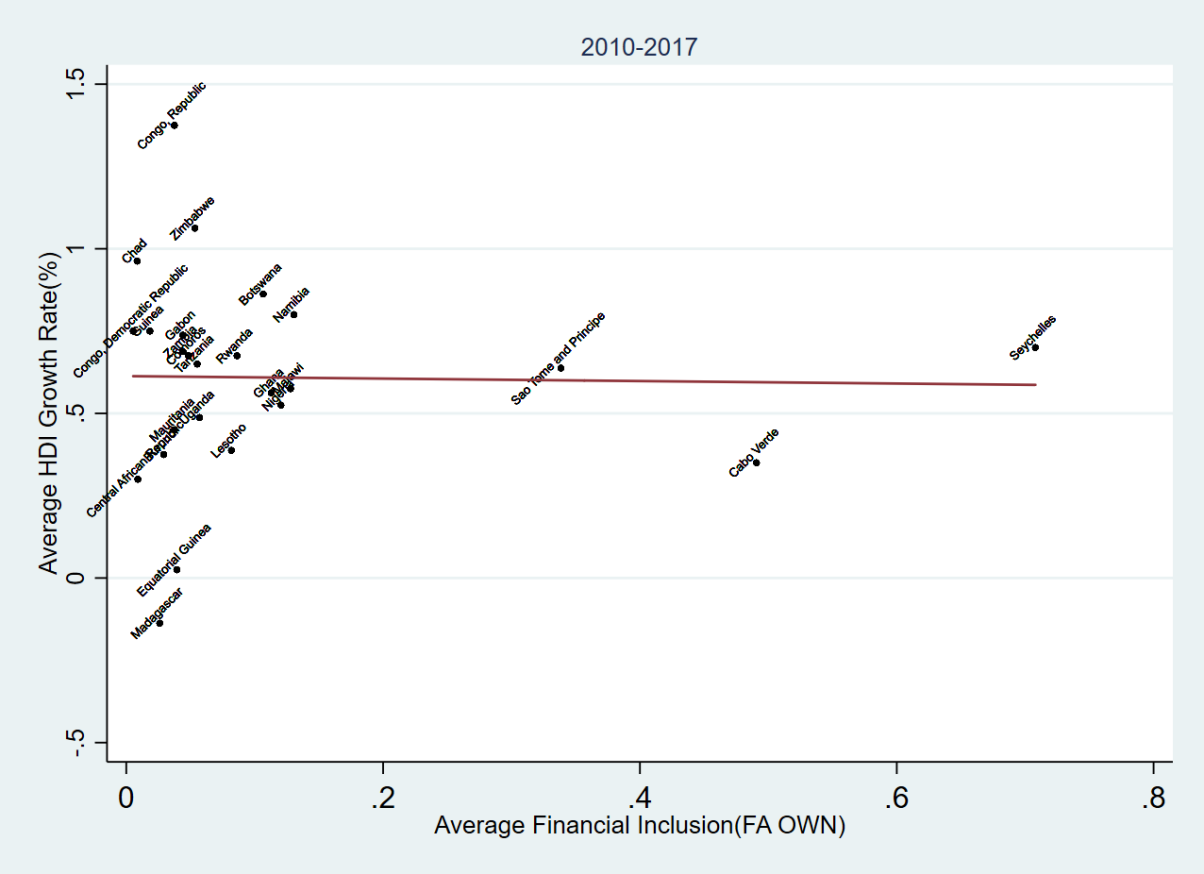
Average HDI Versus IFI Cross-Sectional Relationship (2010-2017)



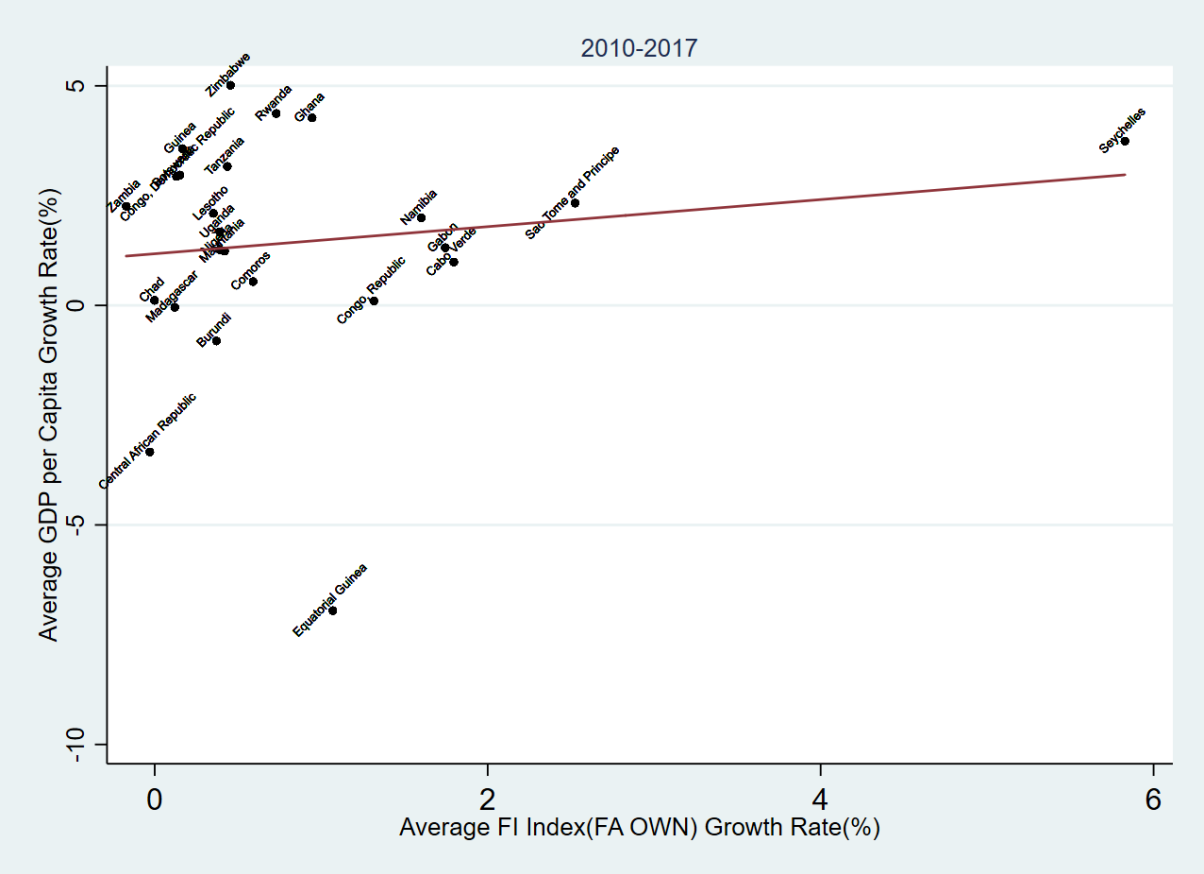
Average GDPPC Versus IFI (Growth - Level): 2010-2017



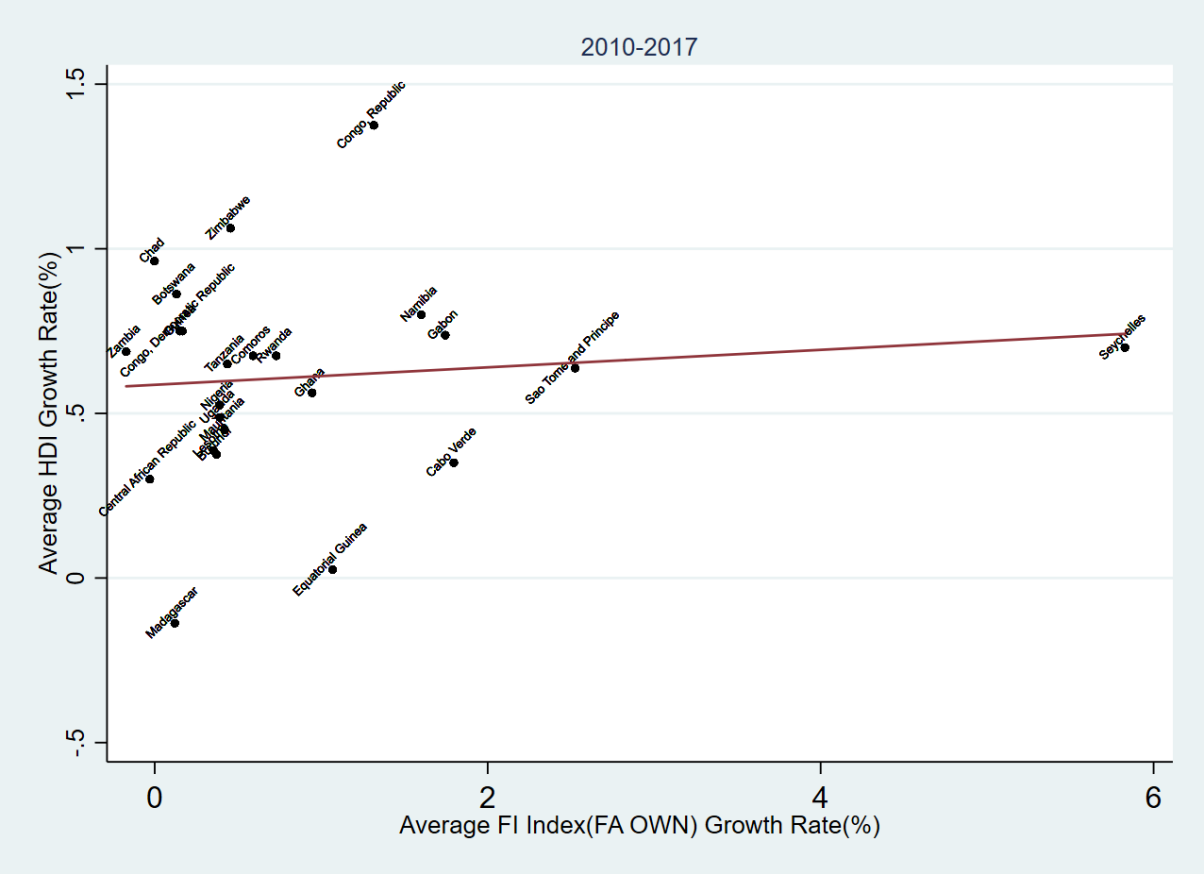
Average HDI Versus IFI (Growth - Level): 2010-2017



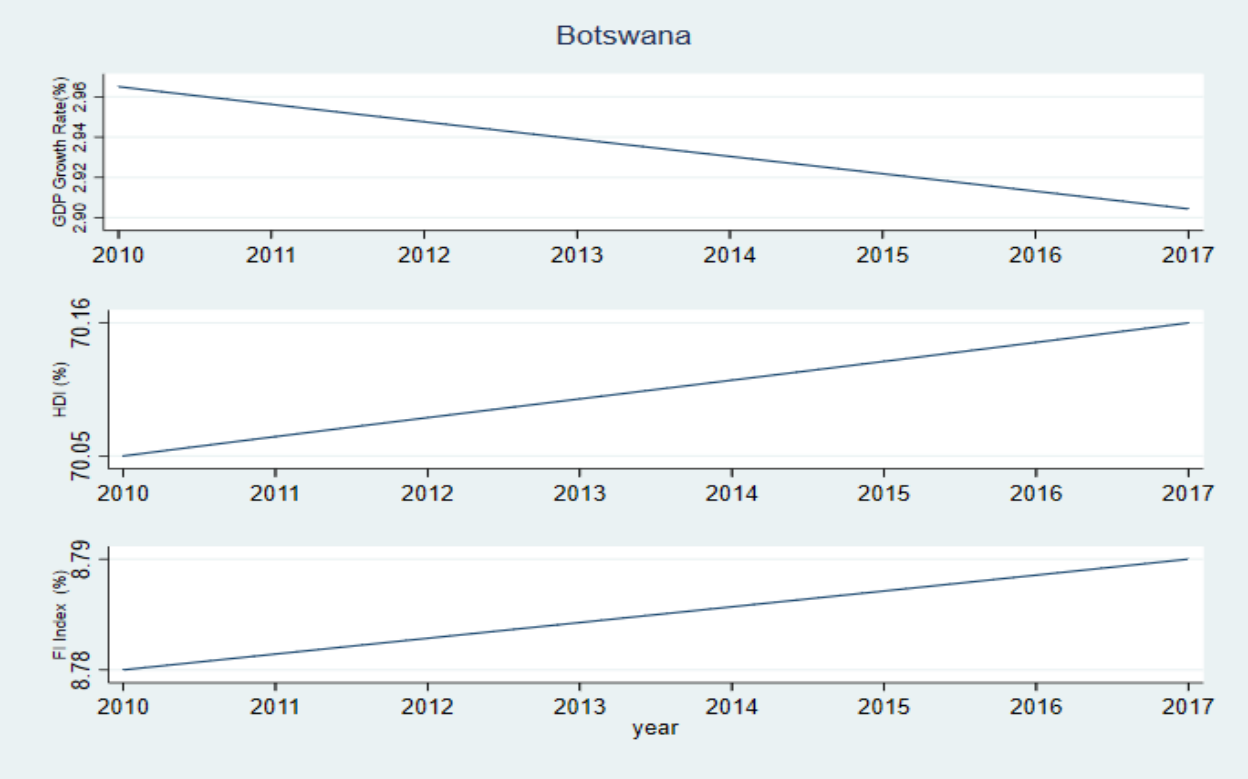
Average GDPPC Versus IFI (Growth - Growth): 2010-2017

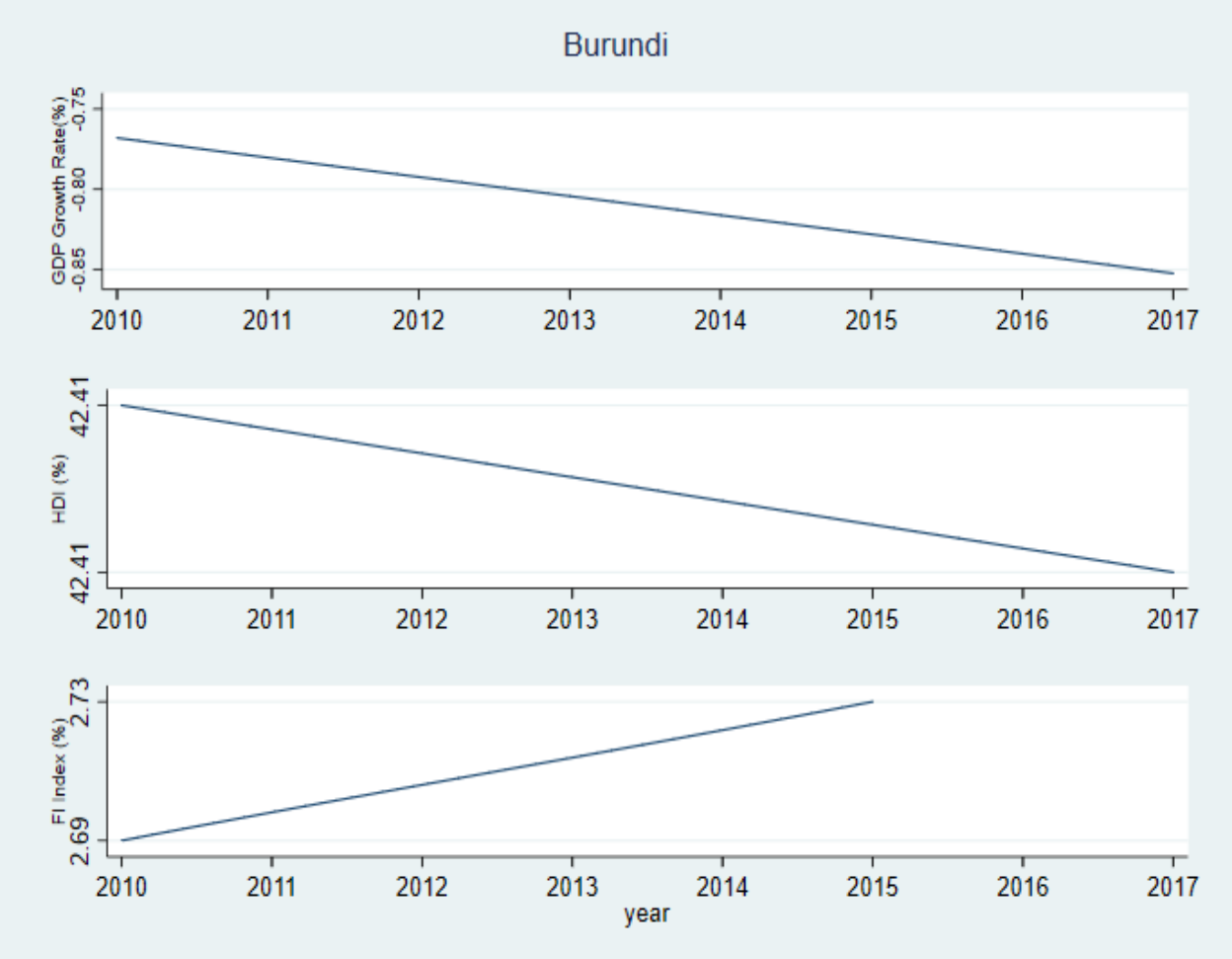


Average HDI Versus IFI (Growth - Growth): 2010-2017

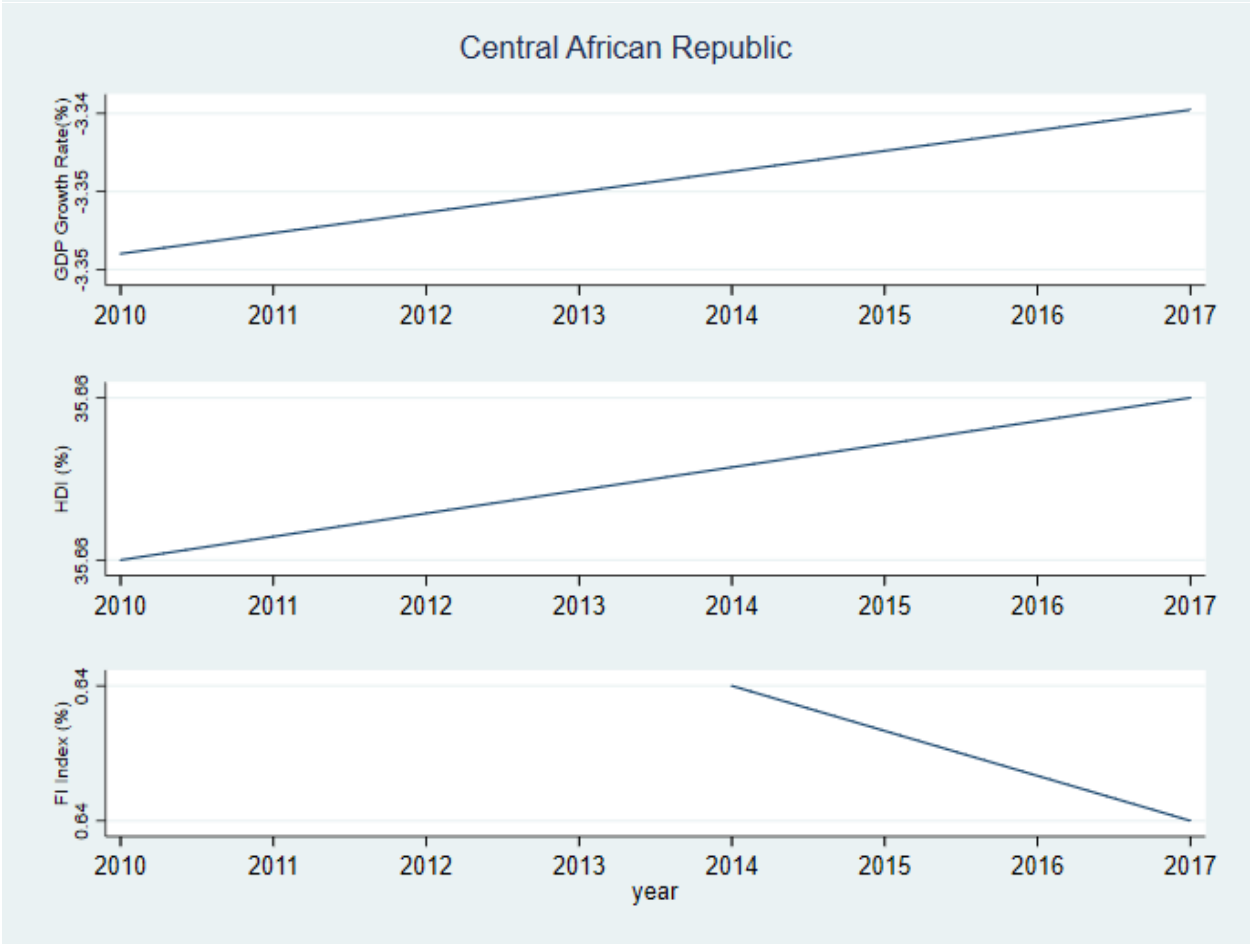

2010-2017
Average HDI Growth Rate(%)
1.5
1
.5
0
-.5
0
2
4
6
Average FI Index(FA OWN) Growth Rate(%)
Congo, Republic
Zimbabwe
Chad
Botswana
Zambia
Namibia
Gabon
Tanzania
Comoros
Rwanda
Ghana
Sao Tome and Principe
Seychelles
Central African Republic
Cabo Verde
Equatorial Guinea
Madagascar

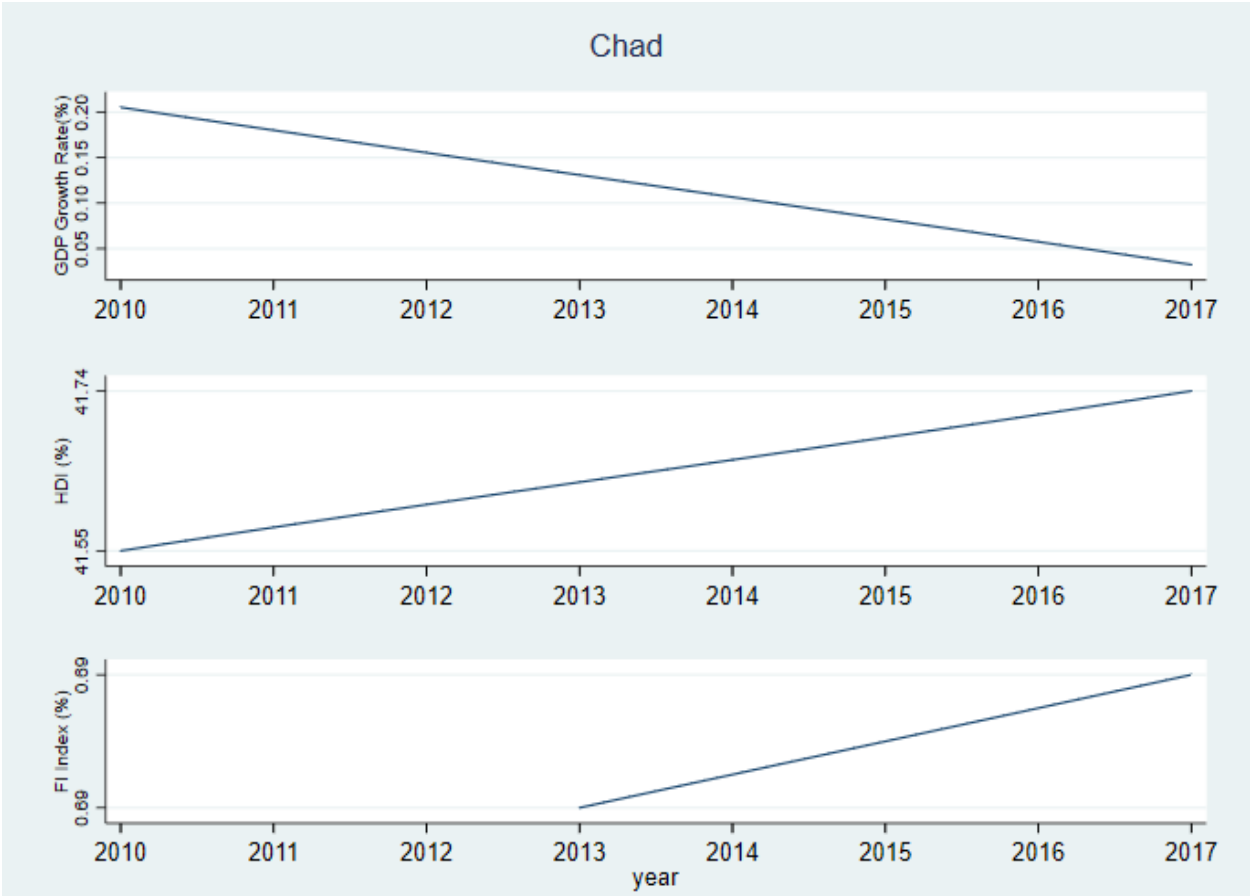
Appendix 8. Country GDPPC, HDI and IFI (Growth): 2010 – 2017

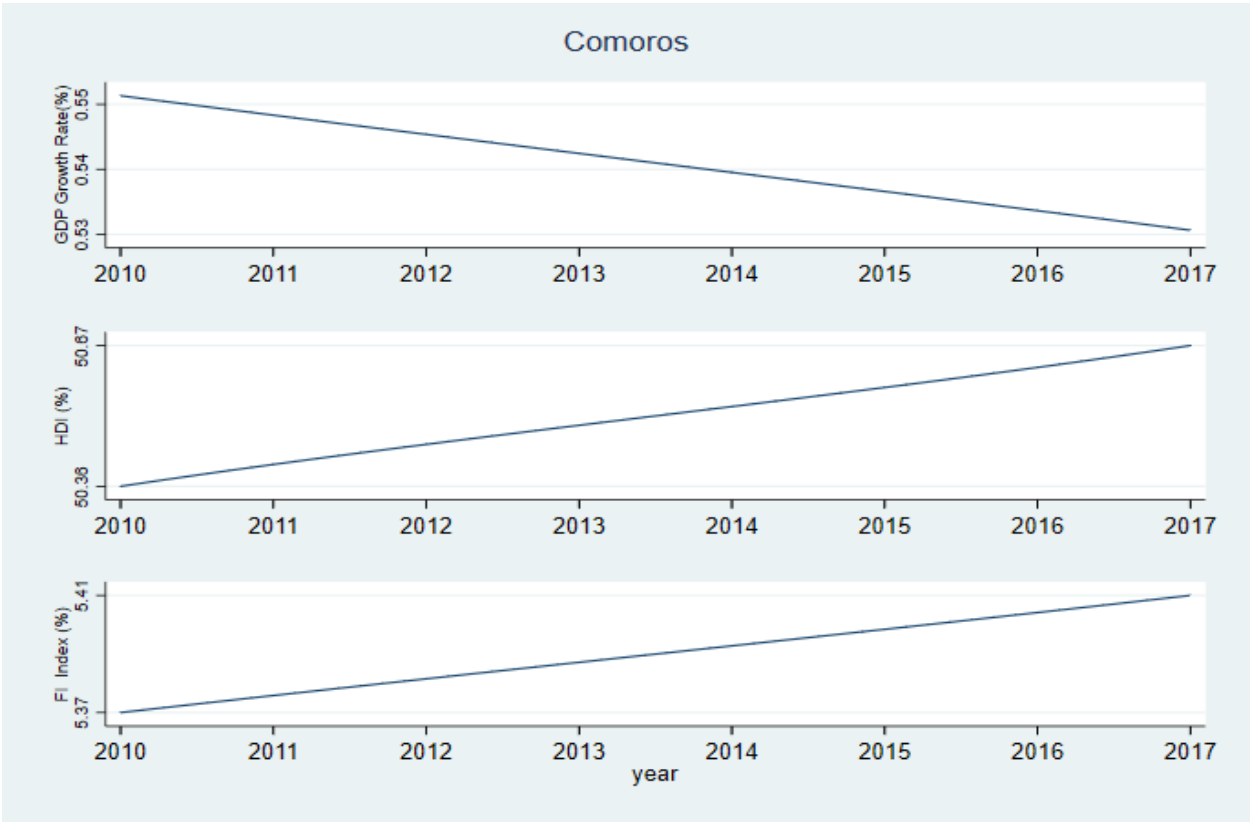


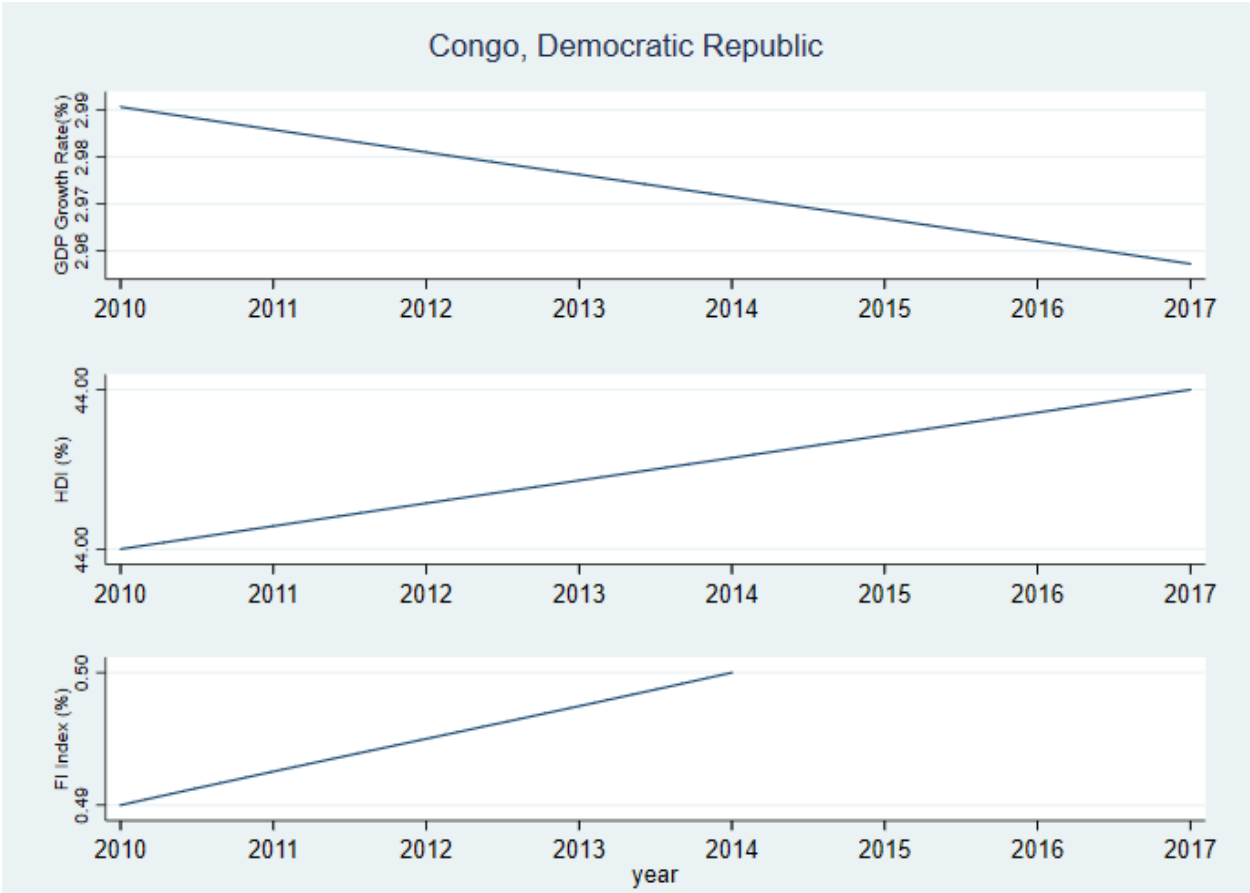


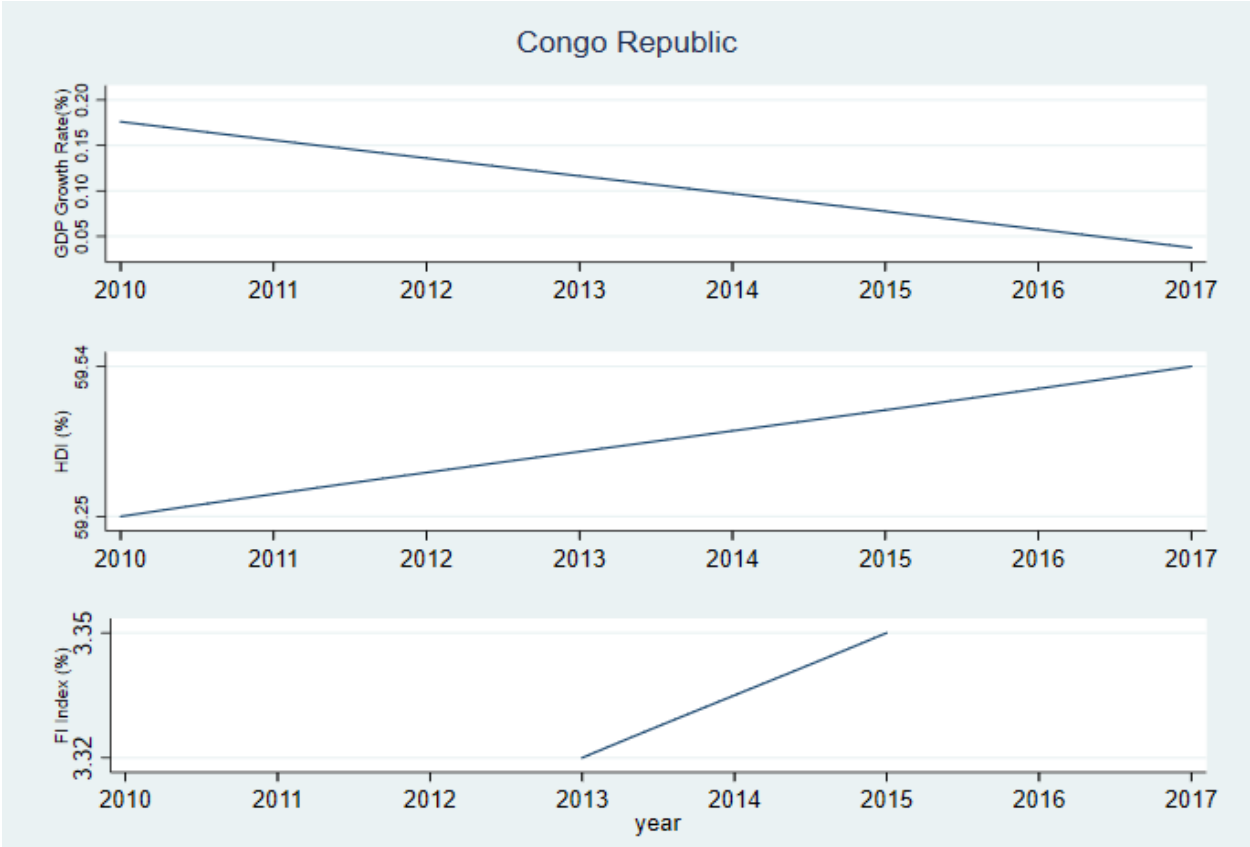

Cabo Verde
GDP Growth Rate(%)
0.98
0.99
0.99
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
64.18
64.31
FI Index (%)
48.31
48.55
year

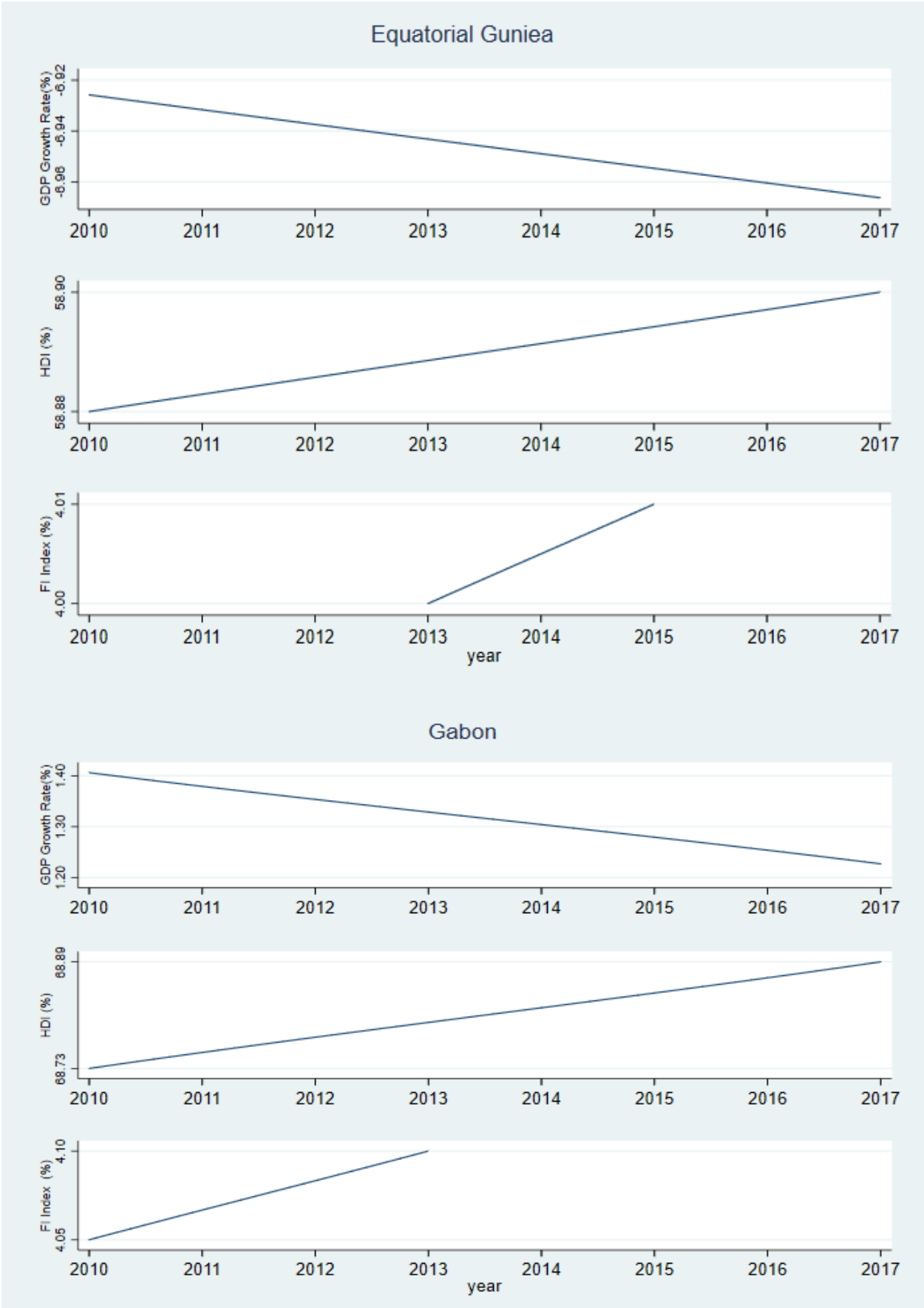

Central African Republic
GDP Growth Rate(%)
-3.35
-3.35
-3.34
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
35.66
35.66
FI Index (%)
0.64
0.64
year

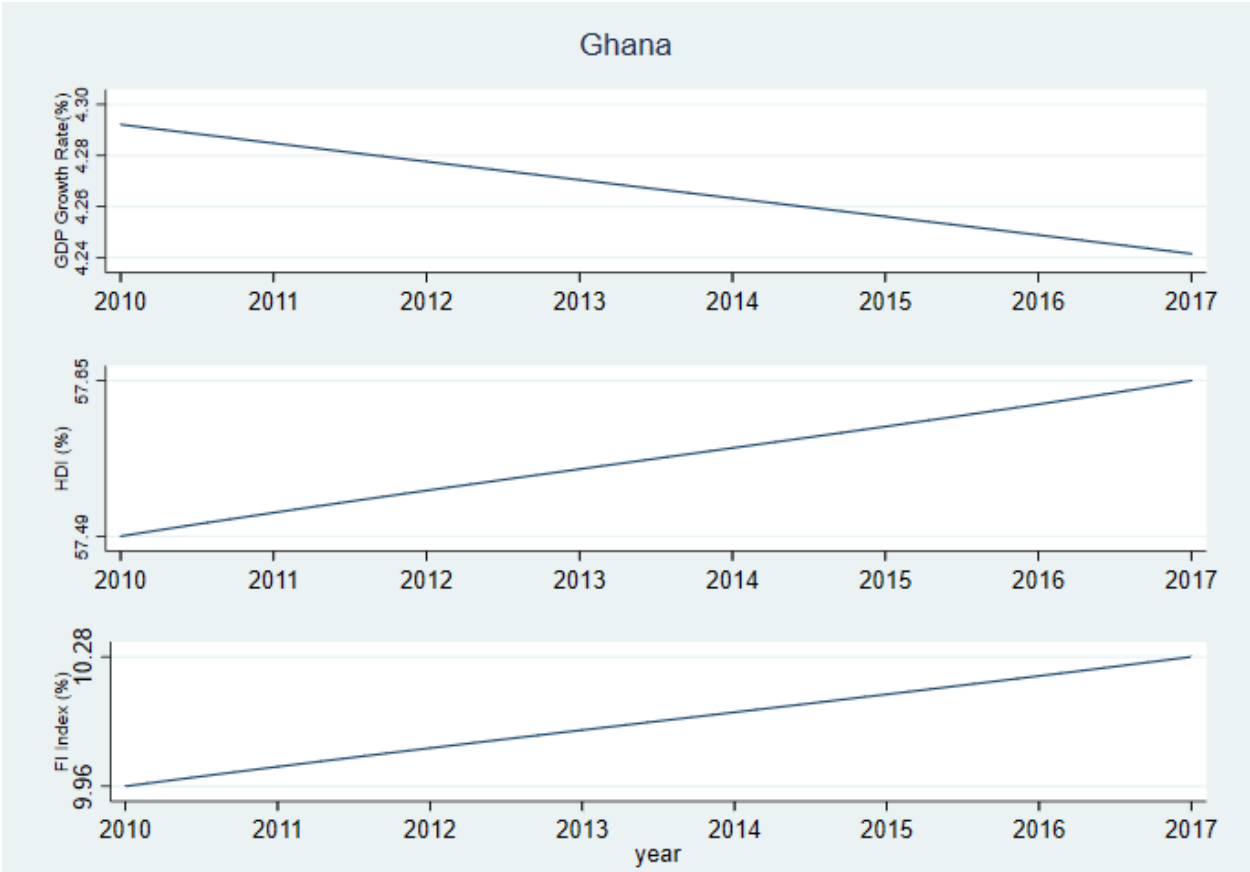

Chad
GDP Growth Rate(%)
0.05
0.10
0.15
0.20
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
41.55
41.74
FI Index (%)
0.69
0.69
year

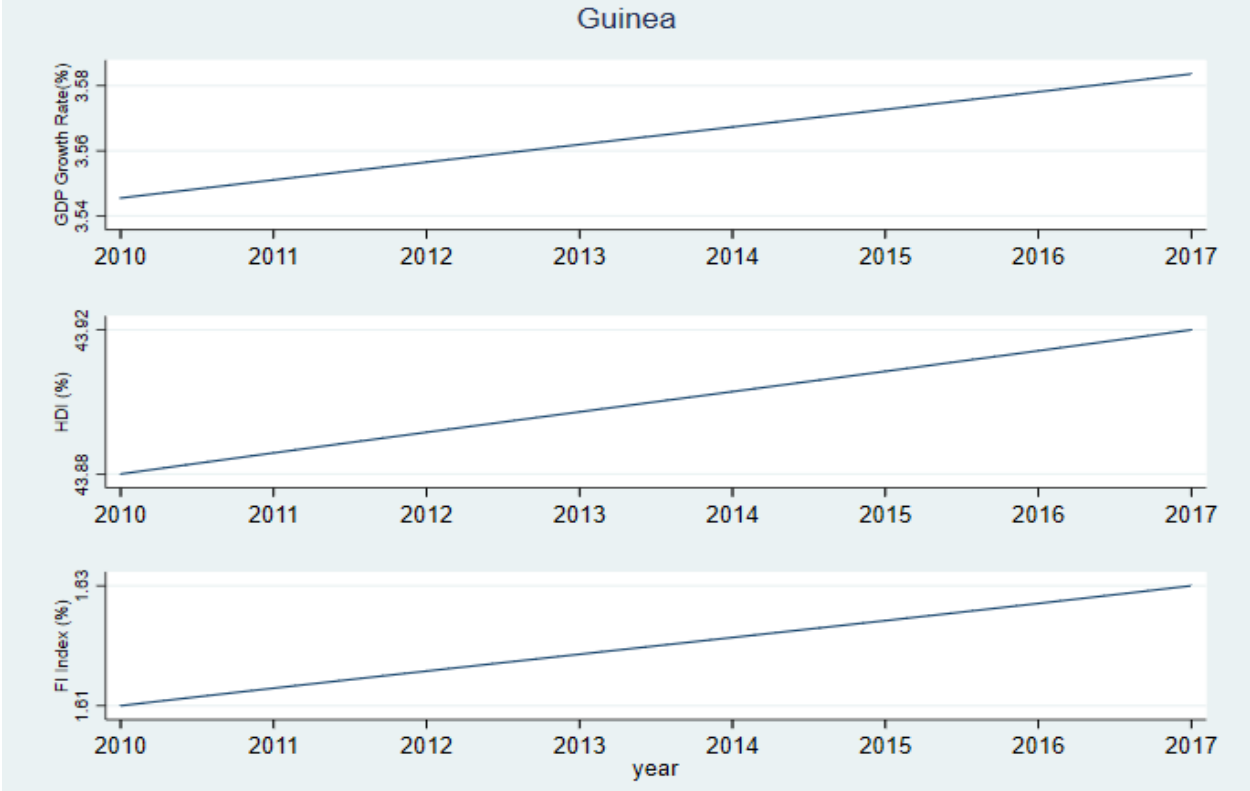

Comoros
GDP Growth Rate(%)
0.53
0.54
0.55
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
50.38
50.87
FI Index (%)
5.37
5.41
year

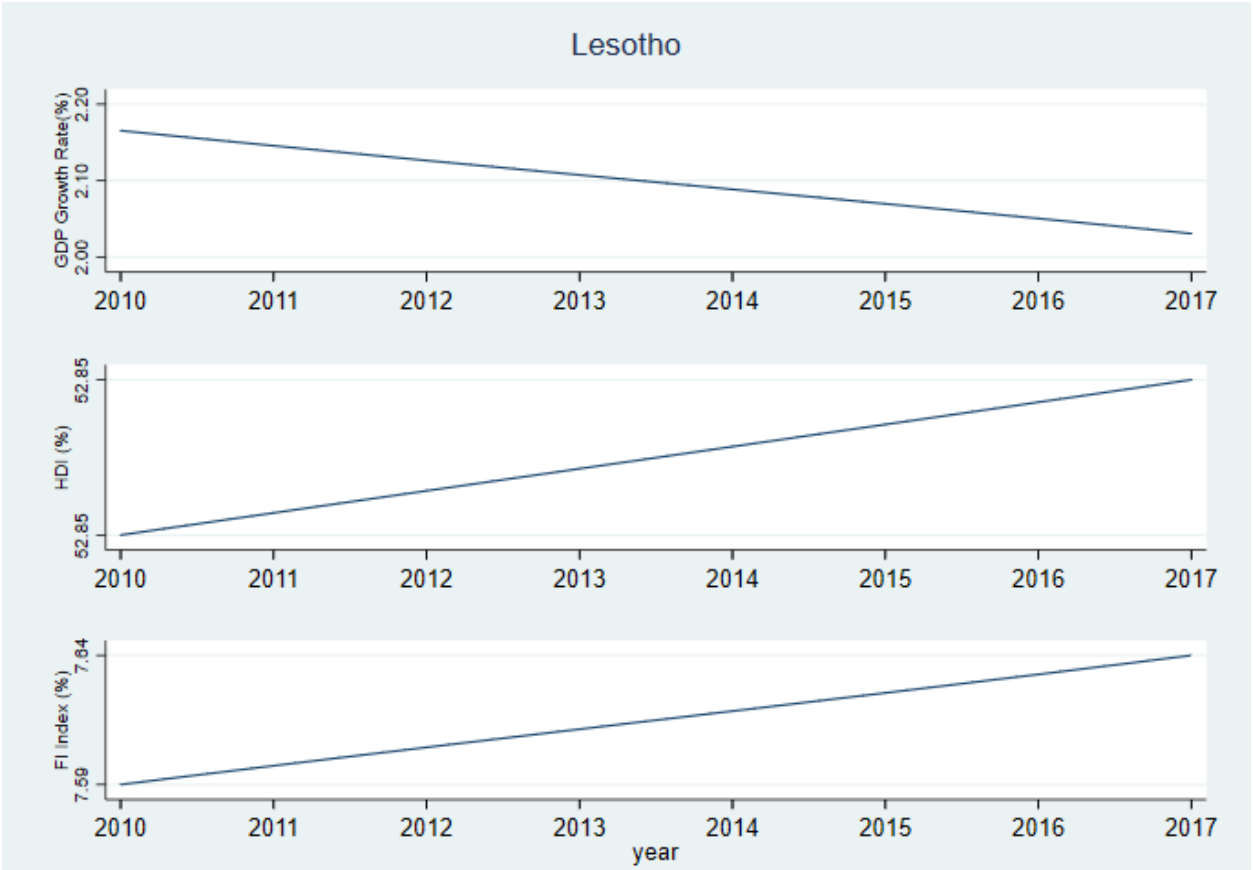

Congo, Democratic Republic
GDP Growth Rate(%)
2.96
2.97
2.98
2.99
HDI (%)
44.00
44.00
FI Index (%)
0.49
0.50
2010
2011
2012
2013
2014
2015
2016
2017
year

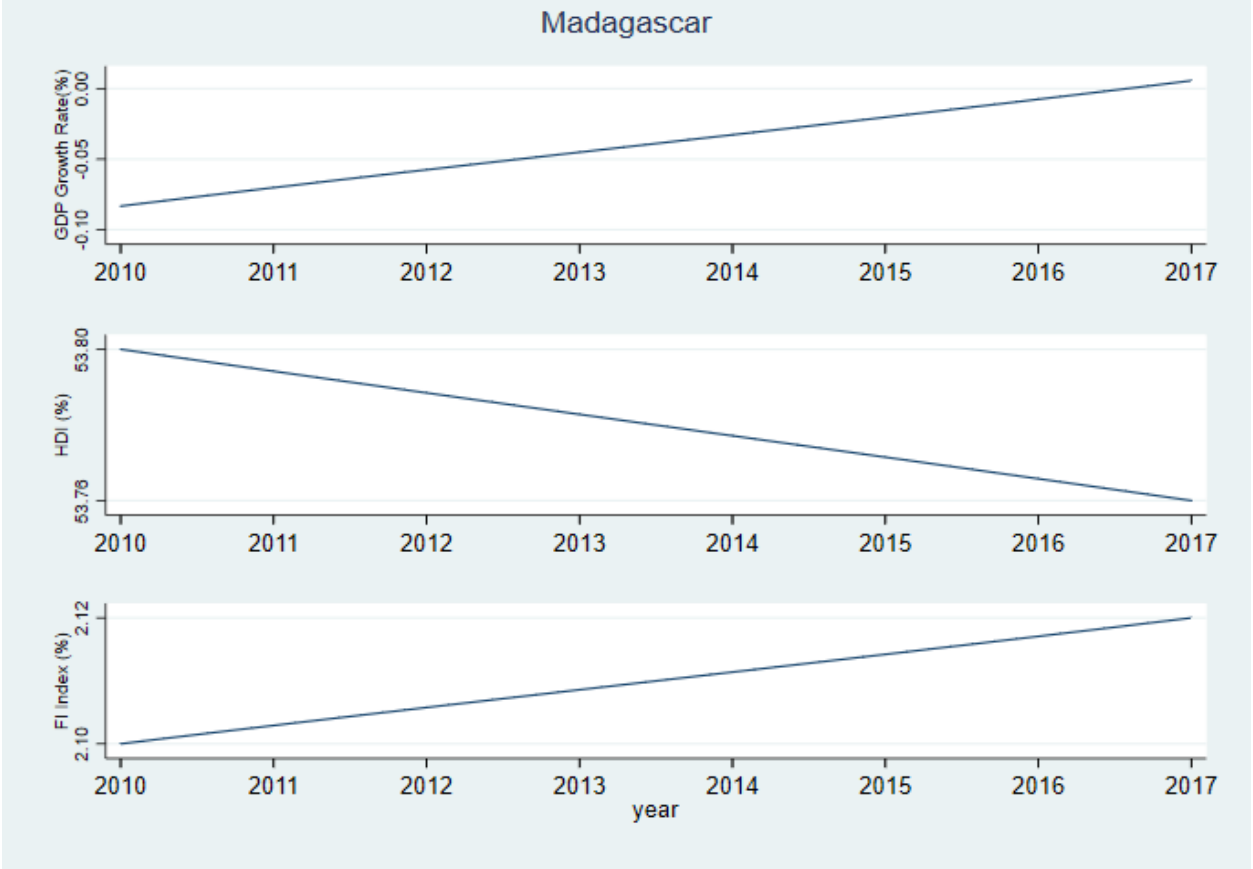

Congo Republic
GDP Growth Rate(%)
0.05
0.10
0.15
0.20
HDI (%)
59.25
59.54
FI Index (%)
3.32
3.35
2010
2011
2012
2013
2014
2015
2016
2017
year

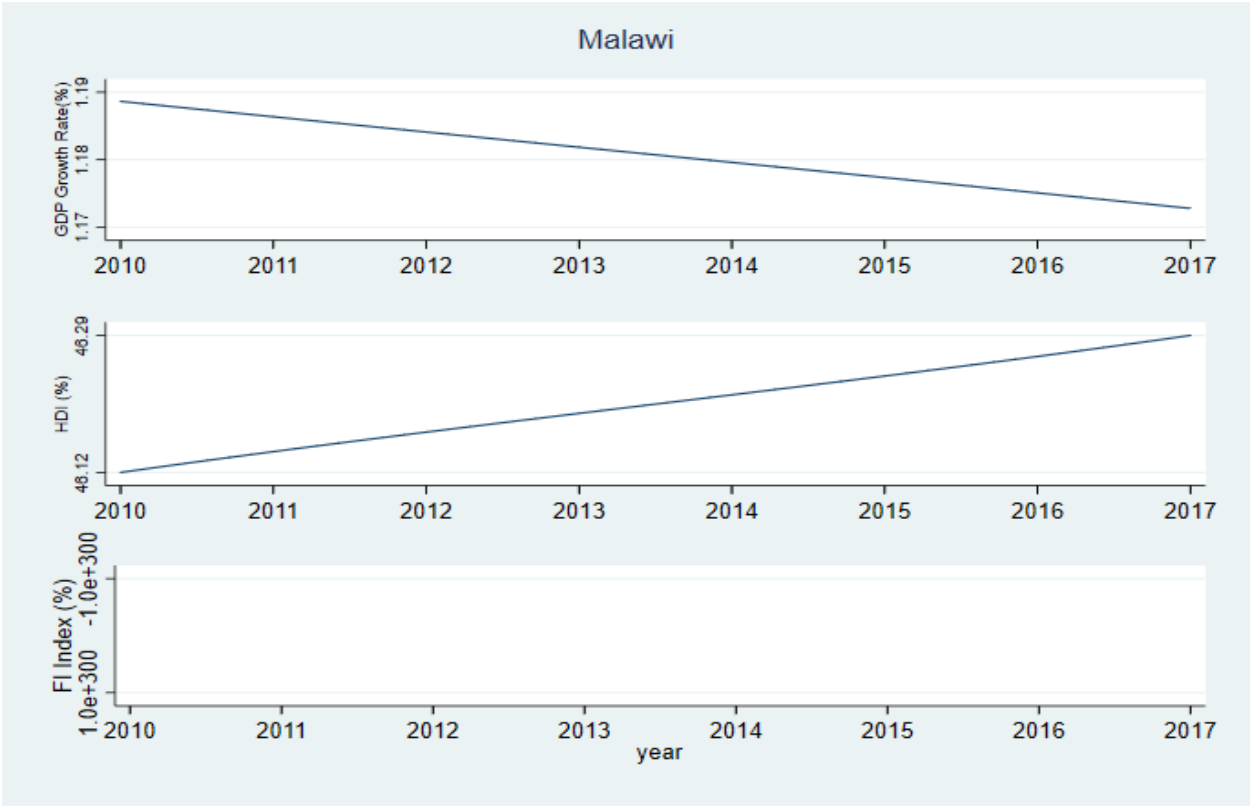

Equatorial Guniea
GDP Growth Rate(%)
-6.82
-6.94
-8.98
HDI (%)
58.90
58.88
FI Index (%)
4.01
4.00
2010
2011
2012
2013
2014
2015
2016
2017
year
Gabon
GDP Growth Rate(%)
1.40
1.30
1.20
HDI (%)
68.89
68.73
FI Index (%)
4.10
4.05
2010
2011
2012
2013
2014
2015
2016
2017
year

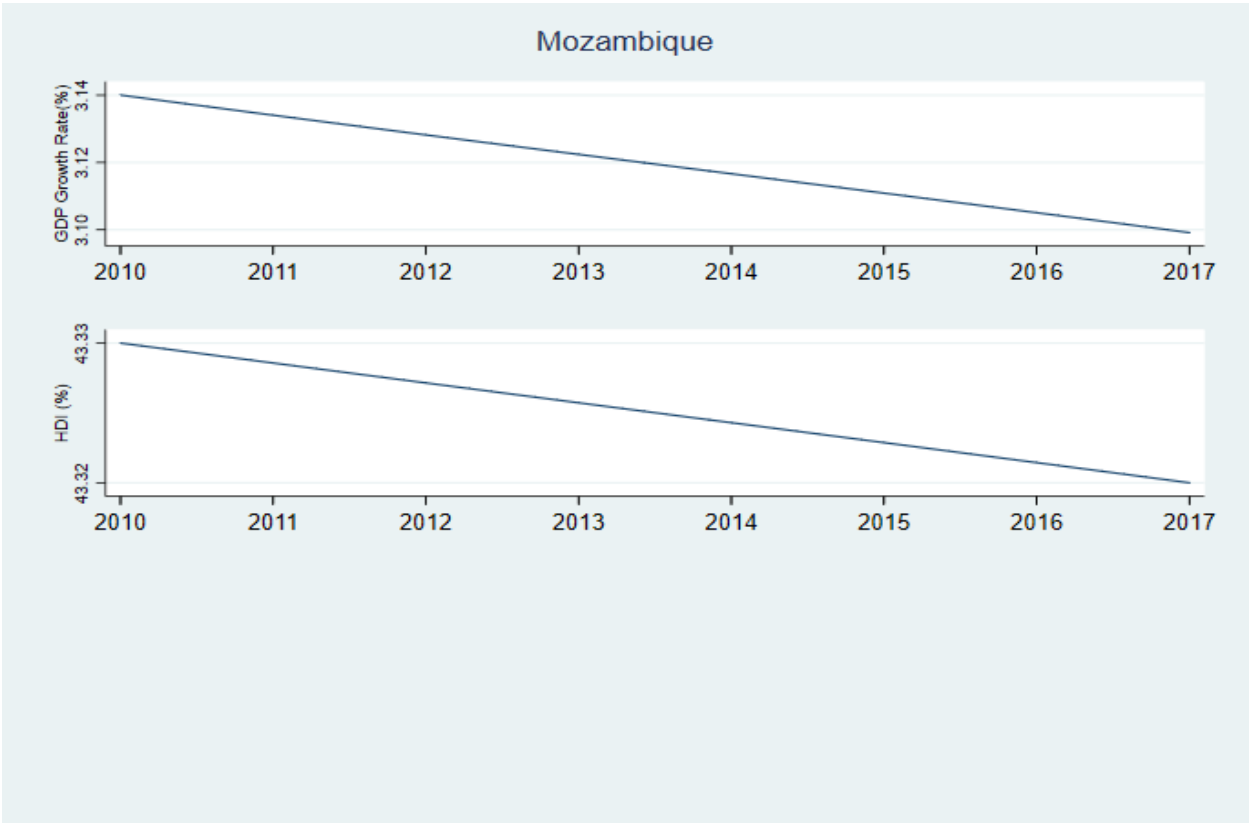

Ghana
GDP Growth Rate(%)
4.24
4.26
4.28
4.30
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
57.49
57.65
FI Index (%)
9.96
10.28
year

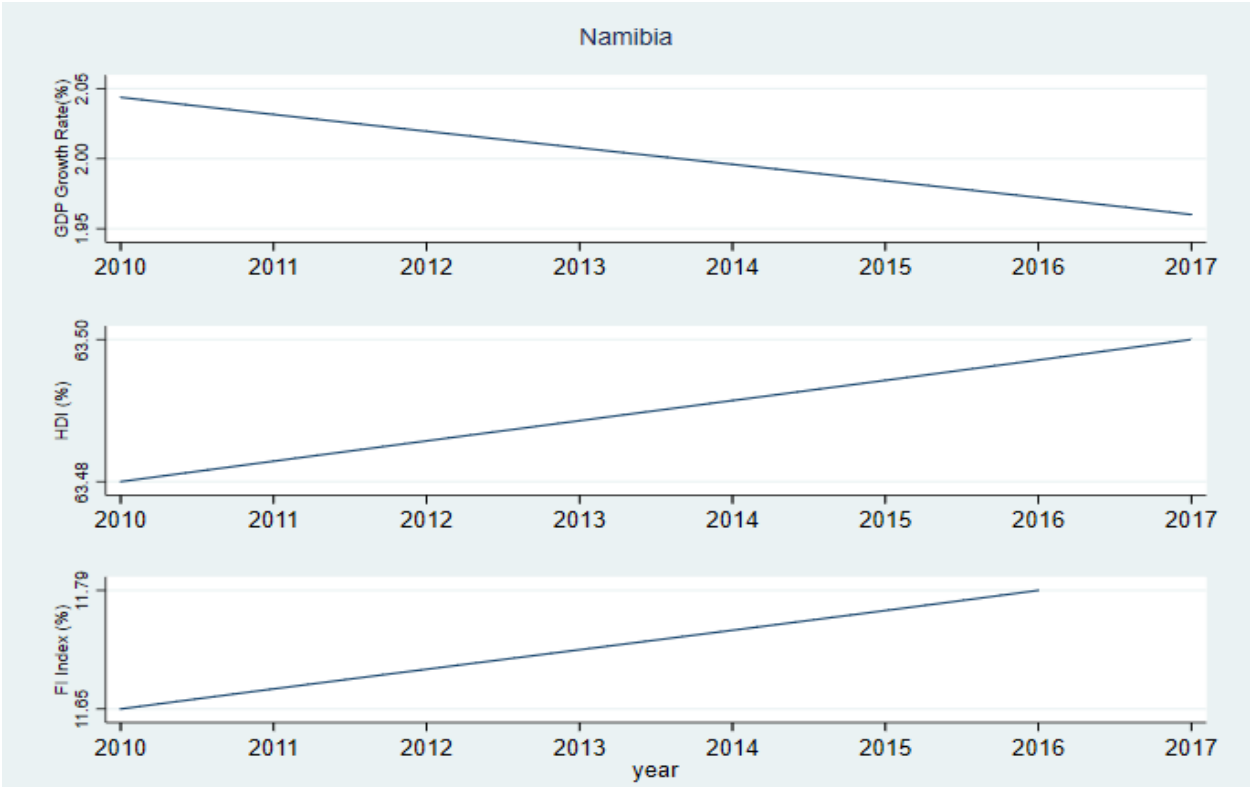

Guinea
GDP Growth Rate(%)
3.54
3.56
3.58
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
43.88
43.92
FI Index (%)
1.61
1.63
year

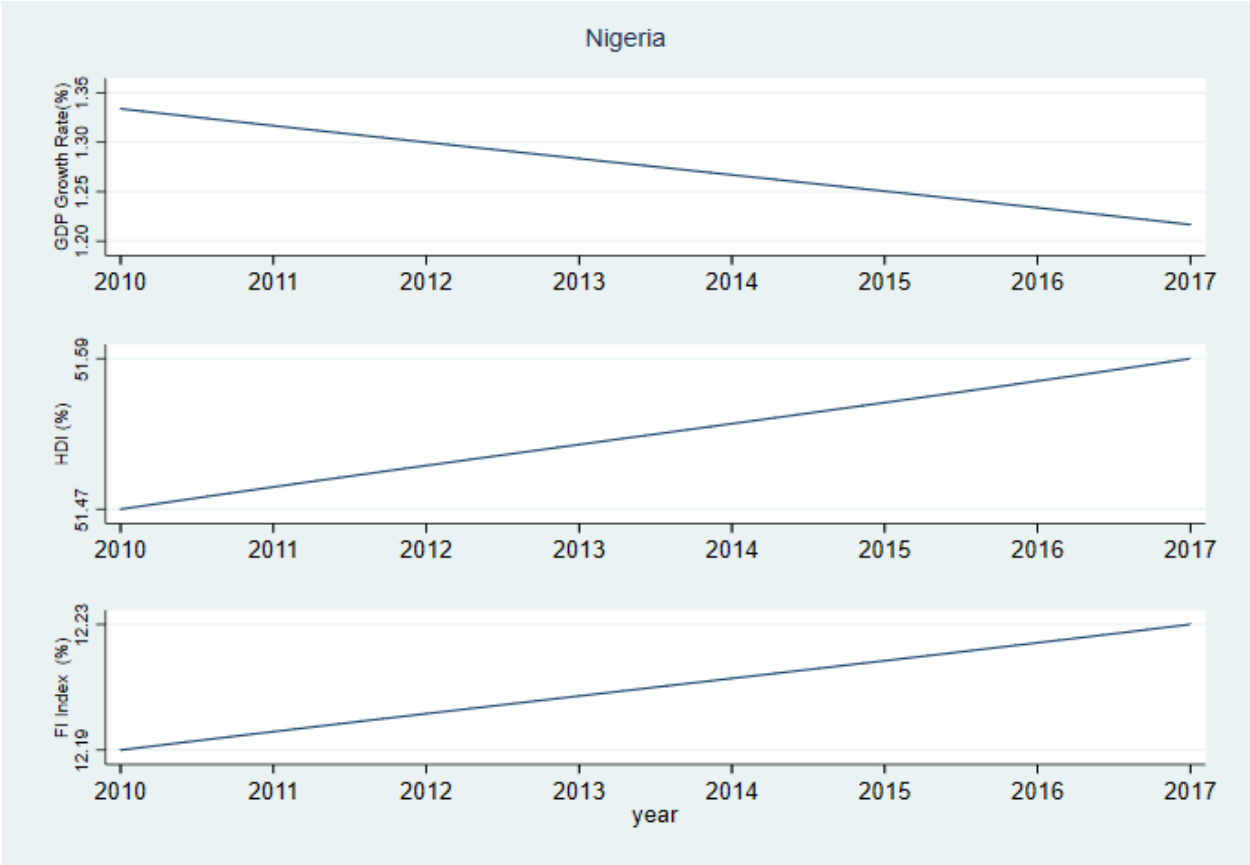

Lesotho
GDP Growth Rate(%)
2.00
2.10
2.20
HDI (%)
52.85
52.85
FI index (%)
7.59
7.64
2010
2011
2012
2013
2014
2015
2016
2017
year

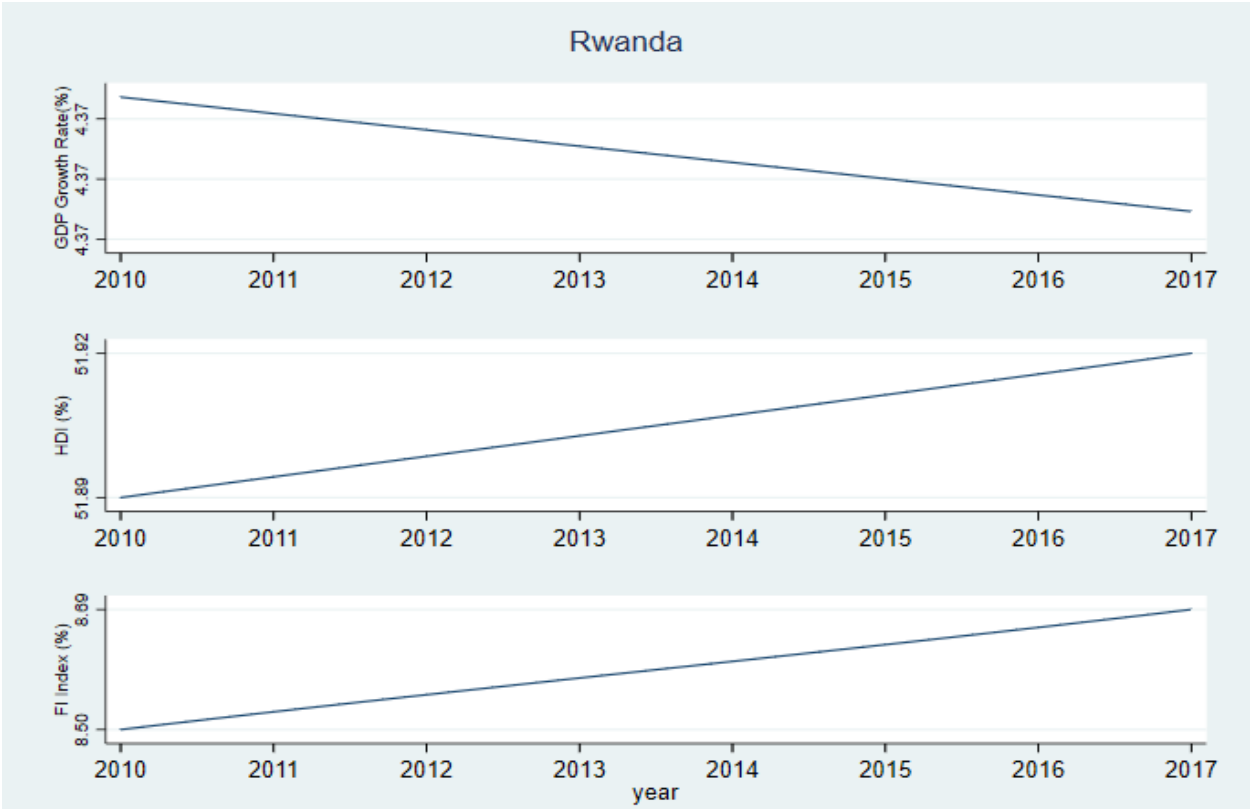

Madagascar
GDP Growth Rate(%)
-0.10
-0.05
0.00
HDI (%)
53.76
53.80
FI index (%)
2.10
2.12
2010
2011
2012
2013
2014
2015
2016
2017
year

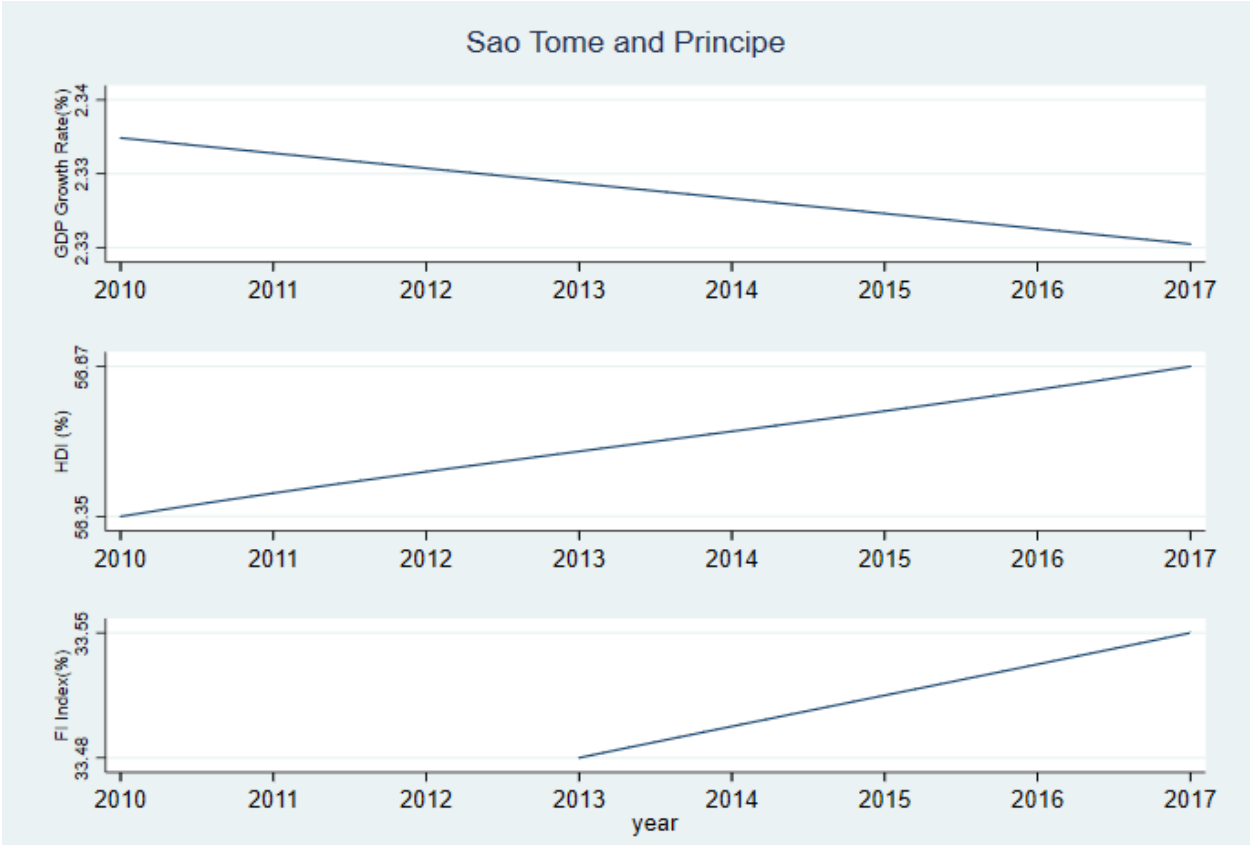

Malawi
GDP Growth Rate(%)
1.17
1.18
1.19
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
48.12
48.29
FI Index (%)
1.0e+300
-1.0e+300
year

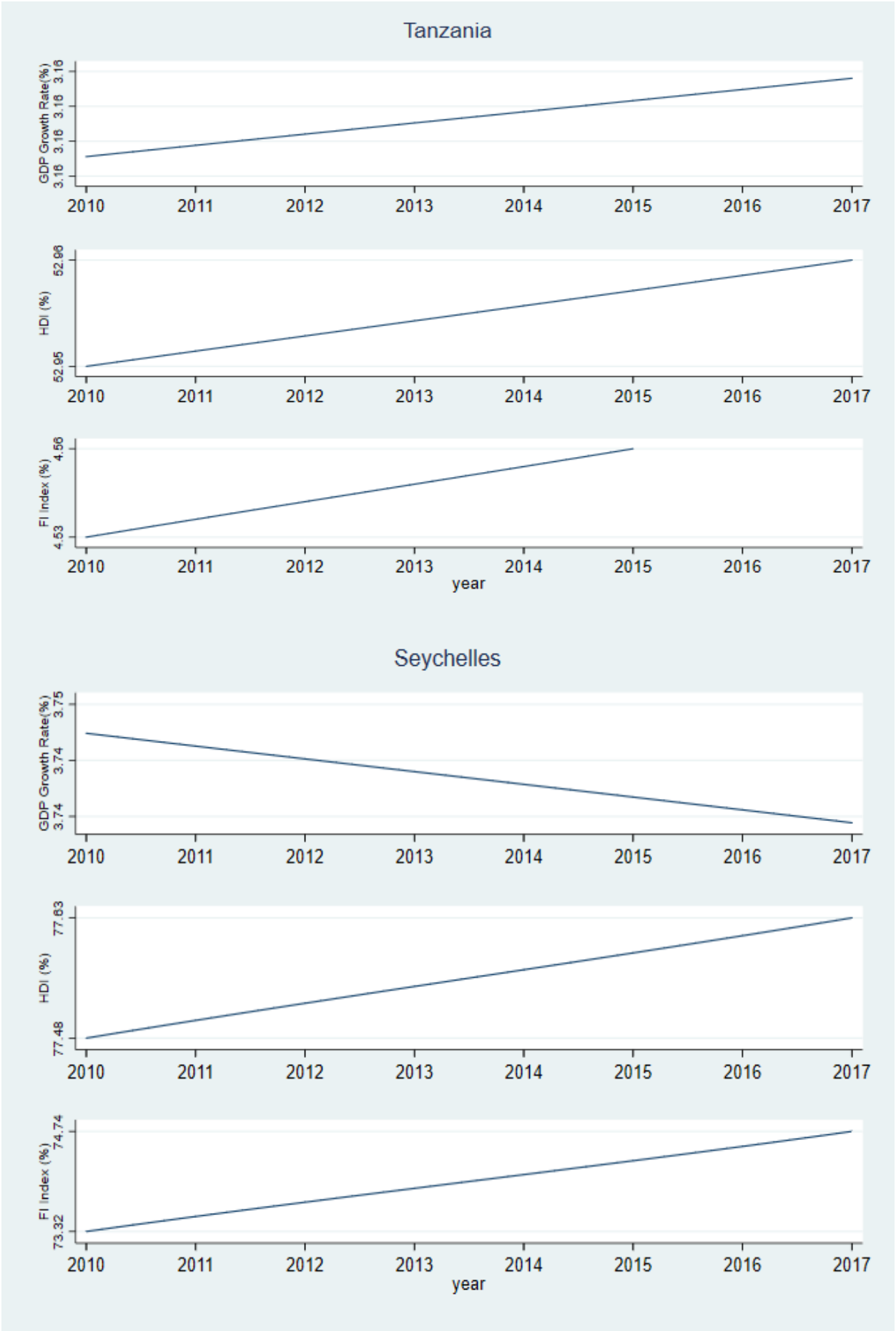

Mozambique
GDP Growth Rate(%)
3.10
3.12
3.14
2010
2011
2012
2013
2014
2015
2016
2017
HDI (%)
43.32
43.33

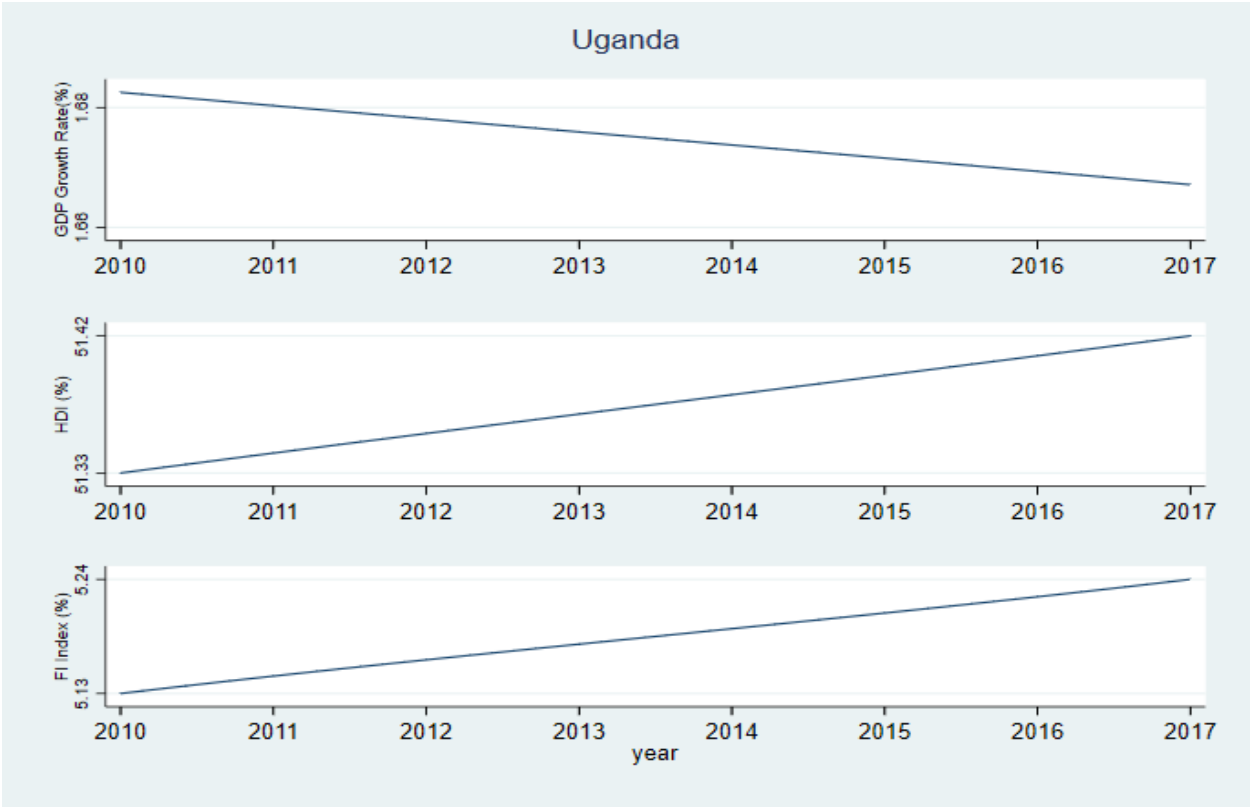

Namibia
GDP Growth Rate(%)
1.95
2.00
2.05
HDI (%)
63.48
63.50
FI Index (%)
11.65
11.79
2010
2011
2012
2013
2014
2015
2016
2017
year

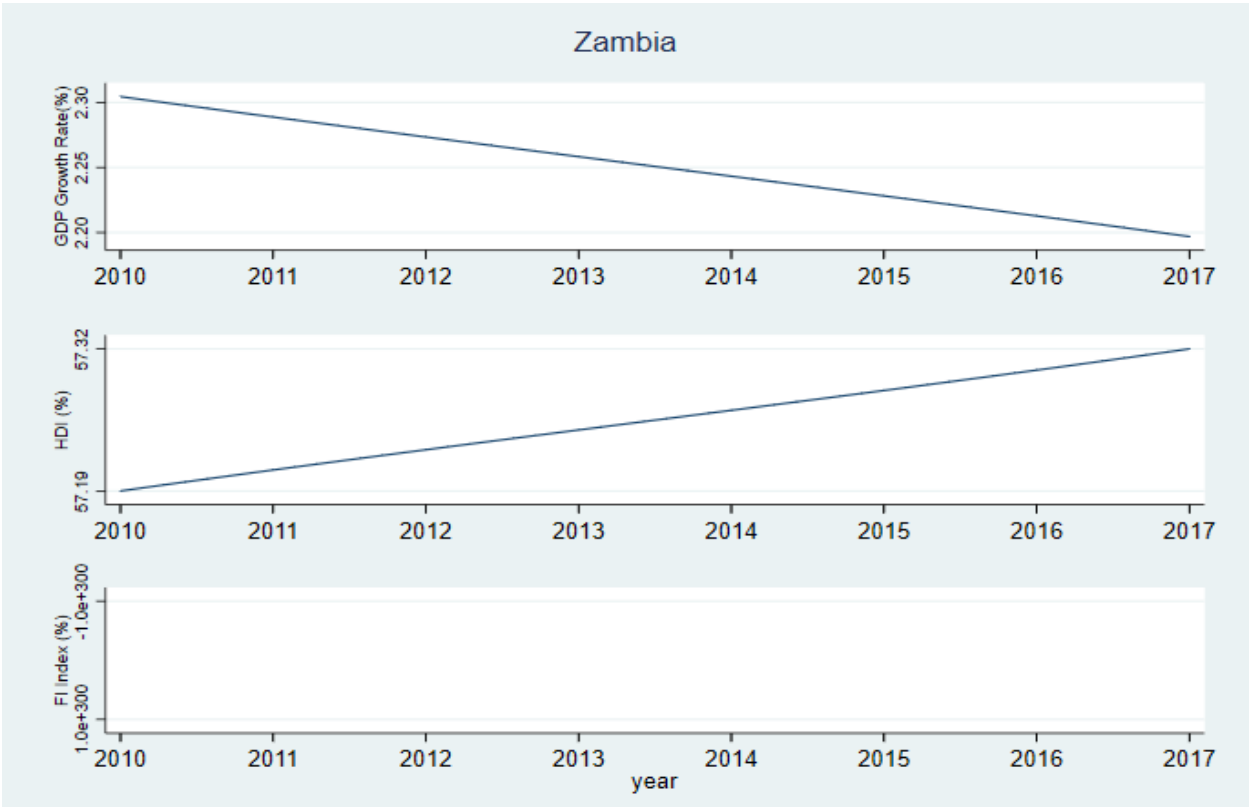

Nigeria
GDP Growth Rate(%)
1.20
1.25
1.30
1.35
HDI (%)
51.47
51.59
FI Index (%)
12.19
12.23
2010
2011
2012
2013
2014
2015
2016
2017
year

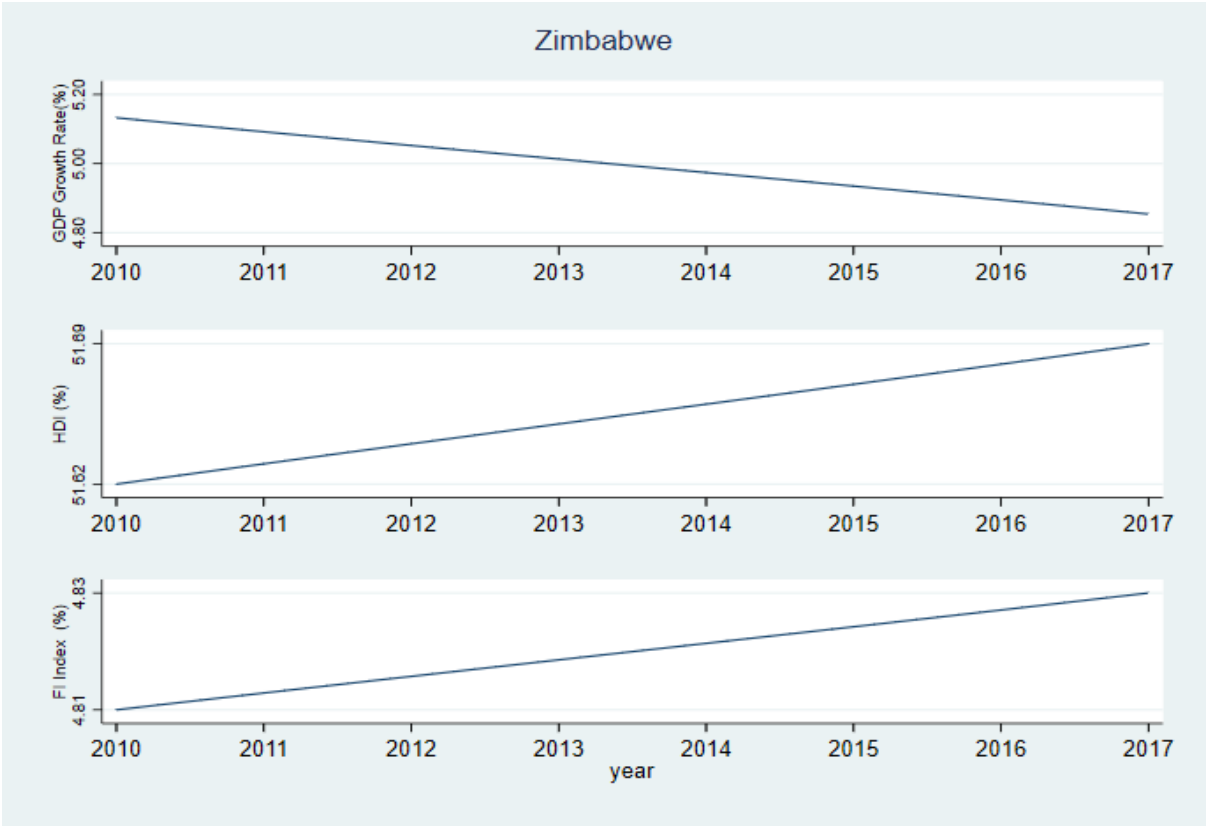

Rwanda
GDP Growth Rate(%)
4.37
4.37
4.37
HDI (%)
51.89
51.92
FI Index (%)
8.50
8.69
2010
2011
2012
2013
2014
2015
2016
2017
year


Sao Tome and Principe
GDP Growth Rate(%)
2.33
2.33
2.34
HDI (%)
56.35
56.87
FI Index(%)
33.48
33.55
2010
2011
2012
2013
2014
2015
2016
2017
year


Tanzania
GDP Growth Rate(%)
3.16
3.16
3.16
3.16
HDI (%)
52.95
52.96
FI index (%)
4.53
4.56
2010
2011
2012
2013
2014
2015
2016
2017
year
Seychelles
GDP Growth Rate(%)
3.74
3.74
3.75
HDI (%)
77.48
77.63
FI index (%)
73.32
74.74
2010
2011
2012
2013
2014
2015
2016
2017
year


Uganda
GDP Growth Rate(%)
1.68
1.68
HDI (%)
51.33
51.42
FI Index (%)
5.13
5.24
2010
2011
2012
2013
2014
2015
2016
2017
year


Zambia
GDP Growth Rate(%)
2.20
2.25
2.30
HDI (%)
57.19
57.32
FI Index (%)
1.0e+300
-1.0e+300
2010
2011
2012
2013
2014
2015
2016
2017
year


Zimbabwe
GDP Growth Rate(%)
5.20
5.00
4.80
HDI (%)
51.69
51.62
FI Index (%)
4.83
4.81
2010
2011
2012
2013
2014
2015
2016
2017
year