# Financial Inclusion Condition in Africa

**Tough Chinoda[1], Farai Kwenda[2]**

**Abstract:** This study assessed the financial inclusion condition in Africa and its determinants. We used the Financial Inclusion index computed through the Principal Component Analysis to study countries for the period 2004 to 2016. We found wide discrepancies in financial inclusion amongst the 49 African countries under study. Only two countries had an average financial inclusion index above 50 percent, and the majority are below 40 percent validating the argument that the African region need immediate intervention. Hence, we concluded that the African region has financial inclusion gaps and is contestable. We also found a significant positive relationship between financial inclusion and other variables such as its lagged value, financial development, income level, and availability of credit and a negative association with money supply, inflation and population size. As such, we recommended that policy makers should device measures to ensure an ongoing financially inclusive environment while stimulating other variables which acts as barriers to financial inclusion.

**Keywords:** Financial inclusion; Africa; Financial Inclusion index; Principal Component Analysis. Generalised Method of Moment

**JEL Classification:** G21; L10

## 1. Introduction

The last decade has witnessed the international development community and policy makers making renewed efforts towards enhancing financial inclusion. An additional savings of approximately \$157 billion could be generated world-wide if the unbanked channel their informal savings into the formal financial system (Allan, Massu & Svarer, 2013). This has steered more than 50 countries to set formal targets of attaining universal financial access by 2020 and many more countries tasking their supervisory and regulatory agencies with encouraging financial inclusion (Sahay et al., 2015). The African region has progressed well from these efforts, but whether the progress has translated into the much anticipated financially inclusive environment still leaves a lot to be desired. According to Dermiguc Kunt *et al.*, (2015), more than 75 per cent of the adult population in Africa remained unbanked

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in 2014. The region is also characterised by a wide heterogeneity in account ownership across countries. Whilst 82 percent, 75 percent and 70 percent of the adult population in countries like Mauritius, Kenya and South Africa are respectively banked, only 7 percent have a formal bank account in Burundi, Guinea and Niger (Demirgüç-Kunt et al., 2015).

There is scarcity of information on the condition of financial inclusion across the globe. This according to Triki and Faye (2013) has limited the ability of financial service providers and policy makers to locate where opportunities lie, what is working and what is not working, thereby hindering policy. Musau, Muathe and Mwangi (2018) have contended that the aspirations for development in Africa will be unpacked once issues of financial inclusion are addressed. Then the question is, how financial inclusive are African economies? This study adds to the emerging financial inclusion literature by centring on African countries where financial inclusion is predominantly low. Our contribution to literature is three-fold. First, we documented topical financial inclusion trends for 49 African countries by showing the progress from 2004 to 2016. This study diverges from previous studies on financial inclusion as it covers almost the entire continent. Second, we focused on comprehensive indicators of financial inclusion making the study unique. Thirdly, unlike most existing studies, we considered both macro and micro-level factors of financial inclusion. This allows the understanding of their importance as contributing factors of financial inclusion. The rest of the paper is structured as follows. Section 2 reviews theories of financial inclusion and previous empirical literature. The data and methodology of the study is considered in Section 3. Section 4 presents the results of the study. Section 5 presents the conclusions as well as policy implications of the paper.

## 2. Concepts and Measurement of Financial Inclusion

There is no consensus over the definition of financial inclusion as differences emanate from the context wherein the term is used, the state of economic development and geographical location of the area. Sarma (2008) defines financial inclusion as a process of ensuring ease access to, availability, and usage of formal financial systems to all members of an economy. In contrast, Amidžić, Massara and Mialou (2014) and Clamara and Tuesta (2014) define financial inclusion as the process of maximising access and usage while minimising involuntary financial exclusions. The World Bank concurred with Sarma (2008) and defined an inclusive financial system as one that ensures easy access to or use of affordable financial services and products (transactions, credit, savings, payments, and insurance) that meets the necessities of businesses and individuals, conveyed in a responsible and viable manner (World Bank, 2017). Although different definitions of financial inclusion have been put forward, they all seem to concur that financial inclusion

ensures easy access to and usage of formal financial services. This study follows the definition by Sarma (2008) and the World Bank (2017) which includes numerous dimensions such as availability, accessibility, and usage, which can be discussed separately. The definition is also measurable and can be easily incorporated into theoretical and empirical work.

For policy makers to understand the concept of financial inclusion and be able to design policies to improve financial inclusion, they require reliable information on the prevailing state of financial inclusion. The information can be used for monitoring and also to deepen understanding around factors of financial inclusion and successively, the effect of policies (Porteous, 2009). There appears to be no standard method of measuring financial inclusion (Young & Mercado, 2015). The difficulties in differentiating between voluntary and non-voluntary financial exclusion brought challenges in measuring financial inclusion (World Bank, 2008). Voluntary financial exclusion denotes the population that has the capacity to access financial services, but does not do so voluntarily. This population segment needs to be excluded from financial exclusion estimations, posing measurement challenges.

Honohan (2008) constructed estimates of the proportional formally banked households for more than 160 countries using average deposit size, household access and GDP per capita and subsequently compared them to inequality and poverty. He found that Latin America and the Caribbean had the highest mean percentages, but countries in Africa and Eastern Europe and Central Asia had the lowest mean percentages. Each of the indicators used by Honohan (2008) provides useful and important information on financial system outreach of an economy. While used individually, they however fail to offer a comprehensive measure on the inclusiveness of the banking system. The use of singular indicators may correspondingly lead to wrong interpretation of the results on financial inclusion in an economy. A country may be well positioned in one dimension, but not in the other.

To fill the above gap, Sarma (2008) applied an econometric approach to create a financial inclusion measure. He proposed a multidimensional financial inclusion index on the banking sector outreach using macroeconomic data in an effort to combine meaningfully several indicators, such as availability, accessibility and usage of banking services. Sarma (2008) adopted the Human Development Index (HDI) concept and used one usage variable and three accessibility variables to compute a comprehensive financial inclusion index which is easy to compute and is comparable across countries or provinces at a particular point in time. The measure also enforce non-varying weights for each dimension. A number of researchers have also borrowed from Sarma (2008) to compute an index of financial inclusion for specific countries and states and examined how it relates to other social factors such as inequality, urbanisation, income, or even literacy (Sarma & Pais, 2008; Kumar &

Mishra, 2009; Mehrotra et al., 2009; Arora, 2010; Gupte et al., 2012; Sarma, 2010; 2012; Kumar, 2016; Tan, 2017). Pal and Chakravarty (2010) improved upon Sarma's method by employing the axiomatic measurement approach to establish how various factors contribute towards inclusion. Cáamara and Tuesta (2014) measured financial inclusion levels at country level using the supply-and-demand information for eighty-two countries. They used a two stage PCA to compute a composite index of financial inclusion. In addition, the global Findex database which was initiated by the World Bank make available indicators of financial inclusion based on a primary survey conducted 148 countries on 150 000 adults during 2011 (Dermiguc-Kunt & Klapper, 2012). Amidžić, Massara, and Mialou (2014) computed a financial inclusion index as a compound indicator of variables in relation to outreach (demographic and geographic penetration), usage (lending and deposit), and quality (cost of usage, disclosure requirement, and dispute resolution). Following the argument made by Sarma (2008) and Gupte *et al*. (2012), this study constructed a multidimensional index of financial inclusion to measure the level of financial inclusion between countries. The study used several dimensions and current time trend which were omitted in previous studies and tested whether adding more indicators and dimensions to the index makes it more holistic and comprehensive. The index is built across many years (2004–2016) and several countries (49), a time-series estimation, which, to the best of the researcher's knowledge has not been done before. This study also contributed to literature by constructing a unique financial inclusion index and combining the normalised weights from Camara and Tuesta's (2014) principal component analysis with Sarma's (2008) multidimensional approach to address the weaknesses of each methodology.

## 3. Methodology

### 3.1. Model Specification

We computed a new index of financial inclusion by combining Sarma (2008) and Camara and Tuesta (2014) approaches to overcome the weaknesses of each methodology. Like Sarma (2008), the study used usage, access, and availability as dimensions of the financial inclusion index. The study computed the indicator for each dimension as:

$$\wp_{i,d} = \frac{\varkappa_{i} - m_i}{M_{i} - m_i} \qquad (1)$$

Where $\varkappa_i$ is the value of indicator i, $m_i$ is the minimum (lowest) value of indicator $i$, $M_i$ is the maximum (highest) value of dimension $i$. $\wp_{i,d}$ is the standardised value of indicator $i$ with d being the dimension. We followed the footsteps of Camara and Tuesta (2014) in using PCA in aggregating each indicator to a dimension index denoting $\lambda_k$ ($k = 1 \dots p$) as the $k^{th}$ eigenvalue, subscript $k$ is the number of principal

components that also matches with the number of standardised indicators $p$. we assumed that $\lambda_1 > \lambda_2 > \cdots \lambda_p$ and denote $P_l$ ($k = 1 \ldots p$) as the $l^{th}$ principal component. The study derived each dimension index in line with the weighted averages:

$$\mathfrak{H}_d = \frac{\sum_{k,l=1}^{p} \lambda_k P_l}{\sum_{l=1}^{p} \lambda_k} \tag{2}$$

Where $\mathfrak{H}_d$ is dimension $d$ index and $P_l = \mathfrak{R}\lambda_k$ . $\lambda_k$ signifies the variance of the principal component (weights) and $\mathfrak{R}$ is the indicators matrix. Following Camara and Tuesta (2014), we also took into account 100 percent of the total variation in the indices of dimensions to avoid dumping information that could precisely estimate the overall financial inclusion index of a country. Having established the dimension indices, another principal component analysis is run as in Equation 3 below to compute the dimension weights for the overall financial inclusion.

$$FII_i = \frac{\sum_{k,l=1}^{p} \lambda_k P_{li}}{\sum_{l=1}^{p} \lambda_k} \tag{3}$$

Where $FII_i$ is the aggregate financial inclusion index for country $i$. $P_l = \mathfrak{R}\lambda_k$ . $\lambda_k$ is the variance of the $k^{th}$ principal component (weights) and $\mathfrak{R}$ is the dimensions matrix. Decreasing weights were assigned to each component and the financial inclusion index for the sampled size was computed as the weighted average of individual dimensions.

### 3.2. Generalised Method of Moments

The application of the regression of the link between financial inclusion and other determinants in Africa banks is done using the GMM regression. The conventional estimators of dynamic panel data like; pooled OLS, first difference, and generalise least squares are inept in handling dynamic panel bias, thus the proposed use of instrumental variables to alleviate endogeneity issues in the lagged endogenous variables. The GMM is free from normality and has greater assumptions of data generating process and adaptability in the presence of lagged variables. The estimation model is based on Arellano and Bond (1991) and Arellano and Bover (1995) GMM. This allows the application of the economies specific variables that drives financial inclusion while controlling for various macroeconomic variables.

### 3.3. Data

To compute the degree of financial inclusion of African countries, we used a panel of 49 countries from the African region sourced over the period 2004-2016. The choice of period is informed by the availability of data on the World Development Indicators (WDI) Databases, which provides data for 189 countries across the globe thereby facilitating better comparison across countries. We excluded countries with issues on data integrity.

For the purpose of the determinants of financial inclusion in Africa, we used population density, population size, broad money, financial development, income level, and inflation rate and credit availability in line with Beck and Feyen (2013). They argued that changes in these variables changes the ability of individuals and businesses to save, deposit money and insure their products, thus hypothesise a logical link to financial inclusion.

### 3.4. Empirical Results

Table 1 below provides a summary of the indicators of financial inclusion used in this study. The data shows the presence of great discrepancies between various indicators of financial inclusion. For example, the mean number of ATMs per area in Africa is only 12 which differs greatly from East Asia and Pacific and Middle East which have 215 and 125 respectively. This figure is also far from the average World figure of 75, thereby providing evidence why financial exclusion is high in Africa. Generally, the African region ranks lowest on almost all indicators of financial inclusion, except on branches of commercial banks per 1 000 $km^2$ and the number of ATMs per 1000 adults where it is ranked second lowest and also the indicators of financial inclusion in the African region rank far below world average and even when compared to other regions in line with Demirgüç-Kunt, Beck, and Honohan, 2008; Beck *et al*., 2008; Allen *et al*., 2011; and Aterido *et al*., 2013. On average the East Asia and Pacific continent and Europe and Central Asia have recorded the highest levels of financial inclusion over the period under review. Although financial inclusion has been contemplated as a universal challenge, the situation in Africa requires immediate action. These large discrepancies may be as a result of a number of political or socio-economic reasons like regime durability and transition, levels of autocracy, executive and legislative electoral competitiveness, checks and balances, gender, age, bank concentration in rural areas, but it is still interesting to realise that these differences and are widespread in almost all the variables.

### 3.4.1. Pearson Correlation and Multi-collinearity Test

We inspected the pairwise correlation among the indicators of financial inclusion to examine the magnitude and nature of co-movements between them and Table 2 below shows the results. A strong significant correlation exists among the financial inclusion indicators. The 0.96 significant correlation coefficient between ATMs per 1000 $km^2$ and bank branches per 1000 $km^2$ indicates a near perfect multi-collinearity scenario. It simply indicates that ATMs per 1000 km2 and bank branches per 1000 $km^2$ have a 0.96 significant positive relationship. There was a 0.87 and 0.96 significant positive correlation between ATMs per $1000km^2$, outstanding loans as a percentage to GDP and bank branches per area. The variable ATMs per 1000 $km^2$ was dropped to deal with the problem of multicollinearity.

### 3.4.2. Trends in Indicators of Financial Inclusion

Although the African region ranks lowest in all financial inclusion indicators, the data indicates a steady increase over the years, in basically all the indicators as shown in Figure 1 below. There were 7 ATMs per 1 000$km^2$ in 2004; no increase from 2004 to 2005; increased from 7 to 9 in 2009 then to 12 in 2013 before increasing by slightly less than 50 percent to 17 in 2016. There has been a tremendous improvement in increase of ATMs per 100 000 as they increased by 100 percent from 2004 to 2009; no increase from 2009 to 2011 and increased by 70 percent from 2011 to 2016. Access to financial services measured by bank branches per 1 000$km^2$ increased by approximately 150 percent from 4.1 in 2004 to 10.4 in 2016. Bank branches per 100 000 adults improved from 4.3 in 2004 to 9.41 in 2016 an increase of slightly more than 100 percent. The number of commercial bank branches abruptly increased between 2007 and 2008, which is the same period the World Bank published the first global financial inclusion report which gave emphasis to financial inclusion and this could have stirred the need for increased financial inclusion for countries in Africa, as suggested by the data. Generally, all the dimensions show that financial inclusion has been improving from 2004 to 2016.

**Table 1. Summary Statistics-Indicators of Financial Inclusion**

| Variable | World | | | EAP | LAC | ECA | ME | SA | NA | Africa | LICs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Max | Min | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean |
| Outstanding deposits with comm. banks (% of GDP) | 53.9 | 496.3 | 1.2 | 72.2 | 47.7 | 58.4 | 63.6 | 43.8 | 60.3 | 31.5 | **38.1** |
| ATMs per 1 000 km2 | 74.8 | 3963 | 0.01 | 214.2 | 36.9 | 84.1 | 124.2 | 36.0 | 18.4 | 9.7 | **12.0** |
| ATMs per 100 000 adults | 60.0 | 288.6 | 0.01 | 47.2 | 40.9 | 67.6 | 47.6 | 8.3 | 198.3 | 10.2 | **18.6** |
| Branches of commercial banks per 1 000 km2 | 34.8 | 1418 | 0.01 | 73.7 | 19.1 | 54.5 | 53.5 | 31.8 | 5.3 | 6 | **8.6** |
| Commercial banks branches per 100 000 adults | 18.8 | 287.2 | 0.1 | 14.3 | 20.1 | 34.9 | 17.4 | 9.4 | 29.5 | 6.3 | **12.8** |
| Borrowers at commercial banks per 1 000 adults | 198.9 | 1233 | 0.01 | 238.4 | 206.5 | 306.8 | 321.6 | 67.6 | N/A | 52.6 | **80** |
| Deposit accounts per 1 000 adults | 1150 | 7988 | 1.3 | 1515 | 963.8 | 2033 | 1333.2 | 642.6 | N/A | 409.9 | **505** |
| Depositors per 1 000 adults | 673.5 | 3380 | 0.4 | 763 | 679.8 | 1108 | 781.3 | 458 | N/A | 250.7 | **101.1** |
| Commercial banks loan accounts per 1000 adults | 307.9 | 1854 | 0.4 | 266.8 | 411.1 | 601.8 | 402.5 | 83.4 | N/A | 81.5 | **119.3** |
| Number of countries | | 184 | | 24 | 32 | 49 | 20 | 8 | 2 | 49 | **77** |

*Source: Financial Access Survey -International Monetary Fund (2017)*

**Key:** EAP- East Asia and Pacific, ME- Middle East, LAC- Latin America and Caribbean, LICs- Low Income Countries, SA- South Asia, ECA- Europe and Central Asia, NA- North America

**Table 2. Correlation Financial Inclusion Indicators**

| | ATMs per Pop. | ATMs per area | Bank Branches per pop. | Bank Branches per area. | Outstanding Loans(% GDP | Bank Accounts per pop. |
|---|---|---|---|---|---|---|
| **ATMs per pop.** | 1.0000 | | | | | |
| **ATMs per area.** | 0.6899* | 1.0000 | | | | |
| **Bank Branches per pop.** | 0.6432* | 0.3115* | 1.0000 | | | |
| **Bank Branches per area** | 0.5716* | 0.9584* | 0.2427* | 1.0000 | | |
| **Outstanding Loans (% GDP)** | 0.7407* | 0.8756* | 0.5520* | 0.8902* | 1.0000 | |
| **Bank Accounts per pop.** | 0.7676* | 0.6606* | 0.6415* | 0.5490* | 0.7472* | 1.0000 |

*Source: Authors' calculations from World Bank Development Indicators (2017)*

Standard error in parentheses; * $p < 0.05$

As much as penetration is concerned, it is seen that generally the number of deposits accounts with commercial banks have increased by more than 100 percent from 2004 to 2016. From 2004 to 2005, the number of accounts decreased from 322 to 309 but gradually increased between 2005 and 2016. This might have been caused by closure of inactive bank accounts due to requests by central banks regulators. The loan accounts per 1 000 adults which is another indicator of penetration shows an increase of more than 200 percent from 2004 to 2016. Loan accounts only decreased in 2010 possibly due to the global financial crisis and continued to increase until 2016. Unlike Ndlovu (2017) and Yorulmaz (2016), the study included bank accounts per 1000 adults which is another indicator of penetration. Generally, the number of bank accounts has increased by more than 250 percent from 151 in 2004 to 407 in 2016.

Figure 3 below shows the usage of financial services. It is a significant dimension of financial inclusion as it compares outstanding loans and deposits with GDP. In line with Sharma (2016), the indicators reflect an important contribution of commercial banks in Africa to the economic growth as both outstanding loans and deposits with commercial banks have increased from 2004 to 2016.The period 2010 and 2011 saw the number of borrowers largely unchanged compared to a striking element within the same period where a sharp increase in loan accounts was witnessed. This action increases the number of loan accounts without growing the number of borrowers. This may also signal customers' credit kite flying where multiple loan accounts are opened by a single customer. However, the number of loan accounts evens out

between 2011 and 2012 as they remain fairly stable, whilst there was a notable increase in the number of borrowers in the same period, hence reversing the anomaly thus validating the inclusion of both usage and access indicators in capturing financial inclusion. Generally the usage trend is increasing.

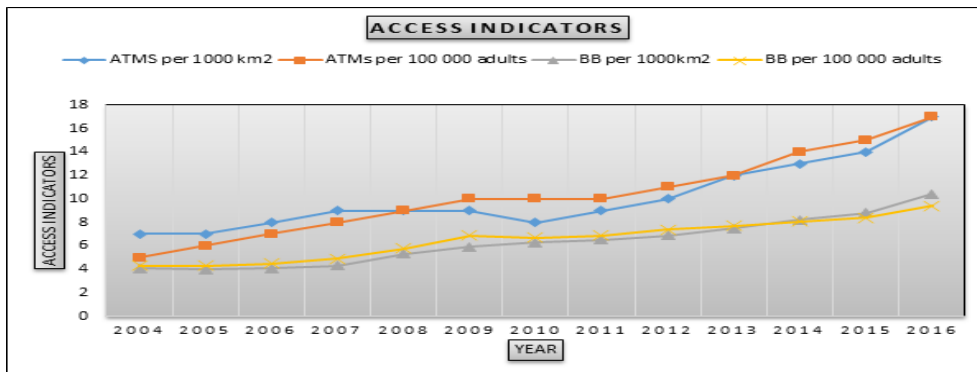### 3.4.2.1. Access Indicators



**Figure 1. Trend in Access to Finance Indicators**

*Source: World Development Indicators Database, World Bank (2017)*
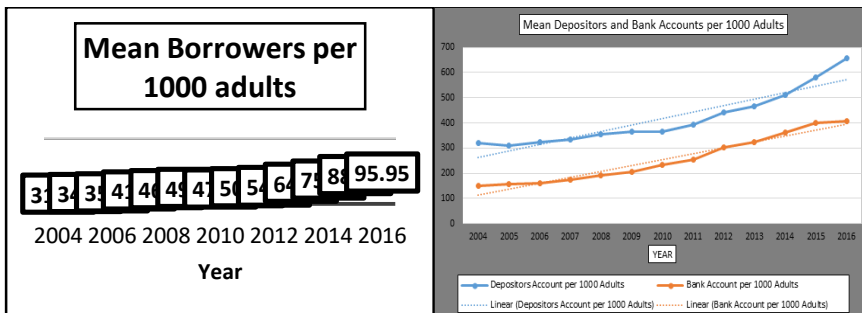
### 3.4.2.2. Penetration Indicators



**Figure 2. Trend in Penetration Indicators**

*Source: World Development Indicators Database, World Bank (2017)*

### 3.4.2.3. Usage Indicators
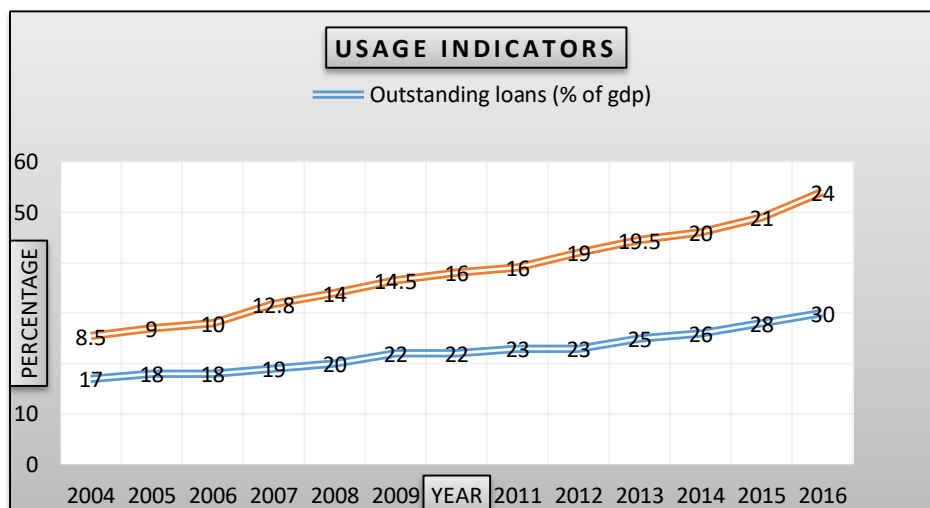


**Figure 3. Trend in Usage Indicators**

*Source: World Development Indicators Database, World Bank (2017)*

### 3.4.2.4. Regional Comparison-Indicators of Financial Inclusion

### (a) Access Indicators

African countries should come up with strategies to overcome the barriers that hinder people from accessing formal financial services. The region has the lowest number of ATMs per area and per capita, with 9.83 ATMs per area and 10.29 ATMs per capita compared to other regions such as East Asia and Pacific with 214 ATMs per area and North America with 199 ATMs per capita (World Bank, 2017).
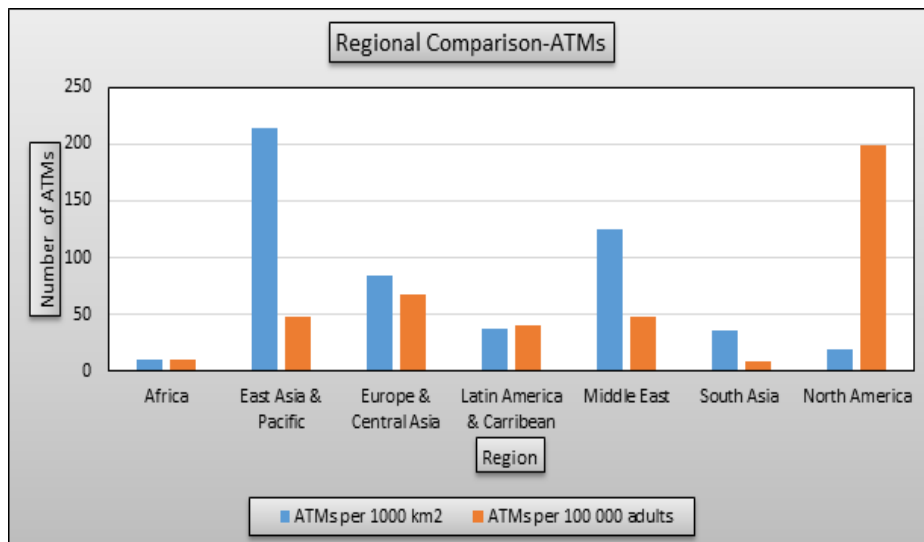
**Figure 4. Trend in Access Indicators (Regional)**

*Source: World Development Indicators Database, World Bank (2017)*

**b) Penetration Indicators**
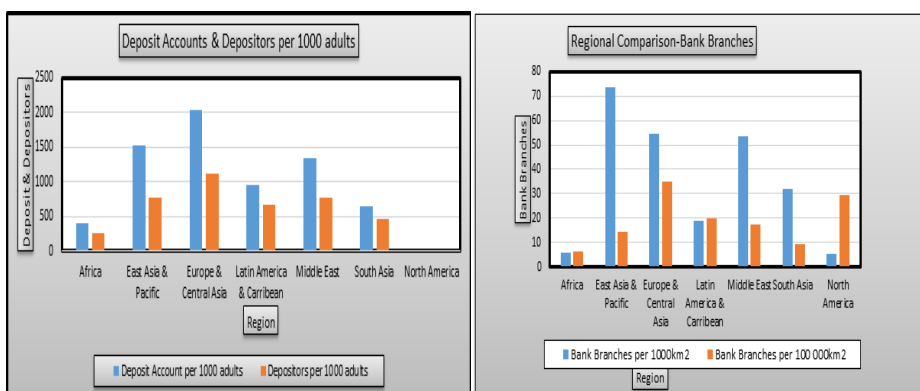


**Figure 5. Trend in Penetration Indicators (Regional)**

*Source: World Development Indicators Database, World Bank (2017)*

The penetration rate in Africa was lowest compared to other regions. The region had 6 bank branches per area and per capita compared to East Asia and Pacific with 74 branches per area and North America with 30 branches per capita. Presumably, the low bank branch penetration in Africa could be due to difficulties in achieving minimum viable scale in low-income areas and sparsely populated areas, though

technological innovations is rising to meet that challenge (Beck & Cull, 2013). The trend is also the same for depositors' accounts and deposits per 1000 adults.

**Usage Indicators**



**Figure 6. Trend in Usage Indicators (Regional)**

*Source: The World Bank-Global Financial Development Database June 2017*

As shown above and below, the region lags behind all global regions, in all dimensions of financial inclusion.

**3.4.3 Financial Inclusion Index Results**

Table 3 below shows the summary statistics of the financial inclusion indices for the African countries for the period 2004-2016. This summary shows some remarkable features of the nature of financial inclusion in the African region. The study found that the average finan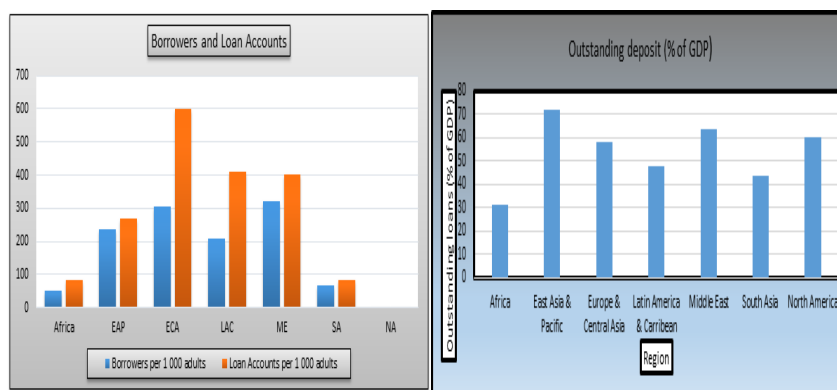cial inclusion in Africa ranging between 0 in 2011-2013 and 0.88 in 2016 as portrayed by the maximum and minimum values. The implication is that despite the fact that some countries have low financial inclusion levels, others have high degrees of financial inclusion supporting the view that Africa is characterised by severe financial inclusion disparities (Ndlovu, 2017). However, despite the existence of large disparities in financial inclusion within Africa, their mean values are close to the standard deviation than to the minimum value. Two possible implications can be construed from this. Firstly, it is implied that there are very few countries with high financial inclusion levels. This is in keeping with literature; using the Boone indicator, the study found that banking sectors in Africa are somehow concentrated. Secondly, the closeness of the means to the standard deviation suggest some kind of financial inclusion within the region as the minimum values are near to zero which meant a financially exclusive region. The standard deviation confirms this suspicion providing credibility to the conclusion of a region characterised by low levels of financial inclusion. The descriptive statistics also show severe gaps between the maximum values and minimum values thereby

confirming the presence of wide variations in all sample indicators across economies. These figures index the existence of severe financial exclusion within the African region.

**Table 3. Financial Inclusion Index Summary Statistics-Africa**

| Year | Mean | Standard Deviation | Maximum | Minimum |
|------|------|--------------------|---------|---------|
| 2004 | 0.13 | 0.16 | 0.80 | 0.01 |
| 2005 | 0.14 | 0.17 | 0.84 | 0.01 |
| 2006 | 0.10 | 0.17 | 0.17 | 0.00 |
| 2007 | 0.14 | 0.18 | 0.82 | 0.01 |
| 2008 | 0.15 | 0.18 | 0.83 | 0.01 |
| 2009 | 0.16 | 0.18 | 0.78 | 0.01 |
| 2010 | 0.16 | 0.18 | 0.77 | 0.01 |
| 2011 | 0.16 | 0.18 | 0.75 | 0.00 |
| 2012 | 0.16 | 0.18 | 0.79 | 0.00 |
| 2013 | 0.16 | 0.19 | 0.86 | 0.00 |
| 2014 | 0.17 | 0.18 | 0.86 | 0.02 |
| 2015 | 0.17 | 0.18 | 0.87 | 0.03 |
| 2016 | 0.17 | 0.19 | 0.88 | 0.02 |
| Average | 0.15 | 0.18 | | |

*Source: Author's Estimation (2018)*

### 3.4.4. Financial Inclusion Analysis

Figure 7, Figure 8, and Table 4 below portrays the financial inclusion index results, giving a picture of the analysis of the financial inclusion trend in the regions between the periods 2004 to 2016. Precisely, Figure 7 indicates the country analysis of financial inclusion providing a pictographic view of the descriptions of financial inclusion. It serves to say that the graph clearly shows wide discrepancies in financial inclusion among the countries of the region, with Chad and Guinea having the least at 0.01 and Seychelles and Cape-Verde with the highest at 0.82 and 0.63 respectively. Over the period 2004 to 2016, only Cape-Verde and Seychelles had an average financial inclusion index above 50 percent as shown in Figure 7, and the majority were below 40 percent. This validates further the argument this study raised earlier that, the African region is characterised by very high levels of financial exclusion and also confirms the argument that most African countries need immediate intervention although financial exclusion is a global concern. These findings are also consistent with those obtained by Ndlovu (2017) who used less indicators and data span in his study. Mauritius was however excluded from the sample due to unavailability of data on bank accounts per 1000 adults; however, it had higher values for the other indicators of financial inclusion. The average index of financial inclusion is 0.15, which would suggest that the average financial

inclusion level is at 15 percent based on the index. Figure 8 portrays the evolution of year-on-year access to finance in the African region from 2004 to 2016. The indices were highest in 2016 at 0.17 and least in 2004 at 0.13. The study noted an upward trend in financial inclusion from the graph over the period as shown by the trend line. This upward movement continued between 2004 and 2016.



**Figure 7. Average African Financial Inclusion Index by Country (2004-2016)**

*Source: Own Calculations from International Monetary Fund - Financial Access Survey (2017)*
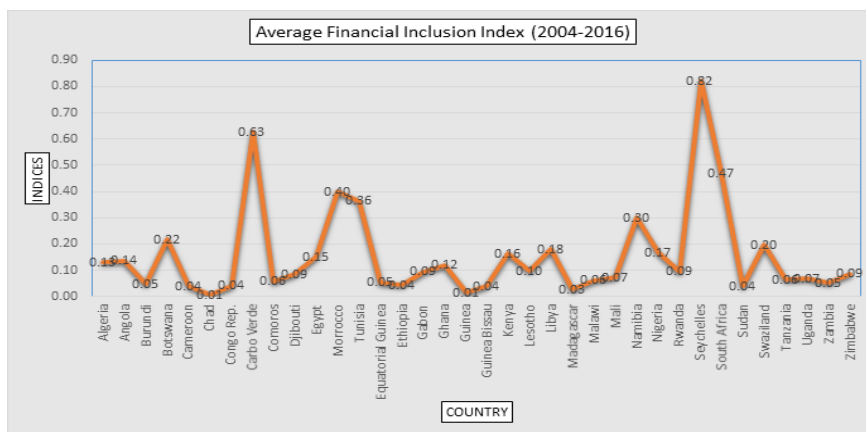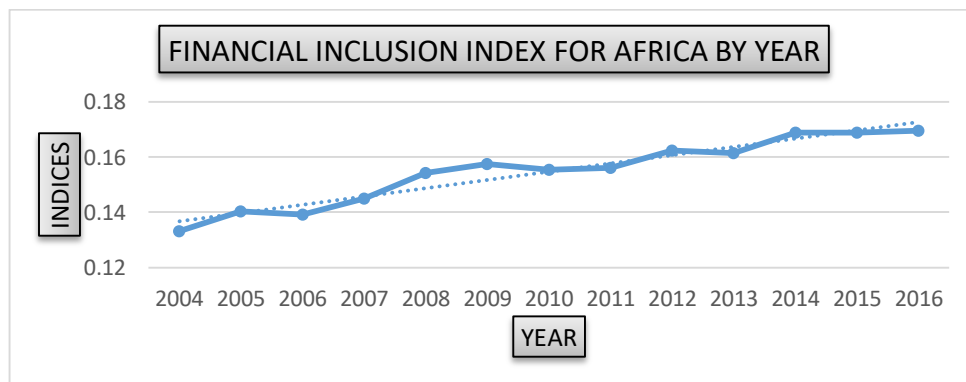


**Figure 8. Average African Financial Inclusion Index by Year (2004-2016)**

*Source: Own Calculations from International Monetary Fund - Financial Access Survey (2017)*

### Table 4. Ranking of Countries according to Financial Inclusion Index

| Country | 2004 | Ranking | 2005 | Ranking | 2006 | Ranking | 2007 | Ranking | 2008 | Ranking | 2009 | Ranking | 2010 | Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Algeria | 0,15 | 19 | 0,14 | 10 | 0,13 | 11 | 0,14 | 11 | 0,13 | 12 | 0,14 | 11 | 0,12 | 12 |
| Angola | 0,03 | 29 | 0,06 | 15 | 0,07 | 15 | 0,09 | 14 | 0,10 | 14 | 0,15 | 10 | 0,14 | 11 |
| Burundi | 0,06 | 26 | 0,05 | 16 | 0,05 | 17 | 0,05 | 18 | 0,05 | 18 | 0,04 | 20 | 0,05 | 17 |
| Botswana | 0,22 | 6 | 0,21 | 7 | 0,21 | 7 | 0,27 | 6 | 0,25 | 5 | 0,24 | 7 | 0,22 | 6 |
| Cameroon | 0,03 | 29 | 0,04 | 17 | 0,04 | 18 | 0,04 | 19 | 0,04 | 19 | 0,04 | 20 | 0,04 | 18 |
| Chad | 0,01 | 31 | 0,01 | 20 | 0,01 | 20 | 0,01 | 21 | 0,01 | 22 | 0,01 | 23 | 0,01 | 20 |
| Congo Rep. | 0,01 | 31 | 0,01 | 20 | 0,01 | 20 | 0,02 | 20 | 0,02 | 21 | 0,02 | 22 | 0,03 | 19 |
| Cape-Verde | 0,46 | 2 | 0,49 | 2 | 0,53 | 2 | 0,59 | 2 | 0,62 | 2 | 0,65 | 2 | 0,69 | 2 |
| Comoros | 0,04 | 27 | 0,03 | 18 | 0,03 | 19 | 0,03 | 20 | 0,03 | 20 | 0,04 | 20 | 0,05 | 17 |
| Djibouti | 0,06 | 26 | 0,05 | 16 | 0,05 | 17 | 0,06 | 17 | 0,06 | 17 | 0,09 | 15 | 0,10 | 13 |
| Egypt | 0,20 | 8 | 0,20 | 8 | 0,17 | 9 | 0,16 | 10 | 0,15 | 10 | 0,13 | 12 | 0,12 | 12 |
| Morocco | 0,29 | 5 | 0,35 | 5 | 0,33 | 5 | 0,36 | 5 | 0,37 | 4 | 0,43 | 4 | 0,43 | 4 |
| Tunisia | 0,37 | 4 | 0,38 | 4 | 0,37 | 4 | 0,38 | 4 | 0,37 | 4 | 0,37 | 5 | 0,38 | 5 |
| Equatorial Guinea | 0,03 | 29 | 0,03 | 18 | 0,04 | 18 | 0,04 | 19 | 0,05 | 18 | 0,05 | 19 | 0,05 | 17 |
| Ethiopia | 0,06 | 26 | 0,06 | 15 | 0,05 | 17 | 0,05 | 18 | 0,05 | 18 | 0,04 | 20 | 0,04 | 18 |
| Gabon | 0,08 | 24 | 0,09 | 13 | 0,08 | 14 | 0,08 | 15 | 0,08 | 15 | 0,08 | 16 | 0,07 | 15 |
| Ghana | 0,11 | 22 | 0,12 | 11 | 0,11 | 12 | 0,12 | 12 | 0,12 | 13 | 0,12 | 13 | 0,10 | 13 |
| Guinea | 0,01 | 31 | 0,01 | 20 | 0,01 | 20 | 0,01 | 21 | 0,01 | 22 | 0,01 | 23 | 0,01 | 20 |
| Guinea Bissau | 0,01 | 31 | 0,01 | 20 | 0,01 | 20 | 0,02 | 20 | 0,03 | 20 | 0,04 | 20 | 0,03 | 19 |
| Kenya | 0,10 | 23 | 0,10 | 12 | 0,10 | 13 | 0,11 | 13 | 0,14 | 11 | 0,15 | 10 | 0,16 | 9 |
| Lesotho | 0,08 | 24 | 0,10 | 12 | 0,10 | 13 | 0,09 | 14 | 0,08 | 15 | 0,08 | 16 | 0,09 | 14 |
| Libya | 0,21 | 7 | 0,19 | 9 | 0,18 | 8 | 0,17 | 9 | 0,16 | 9 | 0,16 | 9 | 0,15 | 10 |
| Madagascar | 0,03 | 29 | 0,03 | 18 | 0,03 | 19 | 0,03 | 20 | 0,03 | 20 | 0,03 | 21 | 0,04 | 18 |
| Malawi | 0,04 | 28 | 0,05 | 16 | 0,05 | 17 | 0,06 | 17 | 0,06 | 17 | 0,07 | 17 | 0,07 | 15 |
| Mali | 0,07 | 25 | 0,07 | 14 | 0,07 | 15 | 0,07 | 16 | 0,07 | 16 | 0,06 | 18 | 0,06 | 16 |
| Namibia | 0,21 | 7 | 0,22 | 6 | 0,22 | 6 | 0,22 | 7 | 0,28 | 6 | 0,30 | 6 | 0,31 | 5 |
| Nigeria | 0,12 | 21 | 0,12 | 11 | 0,11 | 12 | 0,16 | 10 | 0,20 | 8 | 0,24 | 7 | 0,18 | 8 |
| Rwanda | 0,02 | 30 | 0,04 | 17 | 0,03 | 19 | 0,04 | 19 | 0,10 | 13 | 0,10 | 14 | 0,10 | 13 |
| Seychelles | 0,80 | 1 | 0,84 | 1 | 0,82 | 1 | 0,82 | 1 | 0,83 | 1 | 0,78 | 1 | 0,77 | 1 |
| South Africa | 0,41 | 3 | 0,44 | 3 | 0,45 | 3 | 0,47 | 3 | 0,51 | 3 | 0,52 | 3 | 0,50 | 3 |
| Sudan | 0,01 | 31 | 0,02 | 19 | 0,04 | 18 | 0,04 | 18 | 0,04 | 19 | 0,04 | 19 | 0,04 | 18 |
| Swaziland | 0,18 | 18 | 0,21 | 7 | 0,21 | 7 | 0,21 | 8 | 0,22 | 7 | 0,20 | 8 | 0,19 | 7 |
| Tanzania | 0,06 | 26 | 0,06 | 15 | 0,06 | 16 | 0,06 | 17 | 0,07 | 16 | 0,06 | 18 | 0,07 | 15 |
| Uganda | 0,05 | 27 | 0,06 | 15 | 0,06 | 16 | 0,06 | 17 | 0,08 | 15 | 0,07 | 17 | 0,07 | 15 |
| Zambia | 0,03 | 29 | 0,04 | 17 | 0,04 | 18 | 0,05 | 18 | 0,07 | 18 | 0,06 | 18 | 0,05 | 17 |
| Zimbabwe | 0,14 | 20 | 0,14 | 10 | 0,14 | 10 | 0,09 | 14 | 0,08 | 18 | 0,06 | 18 | 0,07 | 15 |

*Source: Own computation from World Development Indicators Database*

| Country | 2011 | Ranking | 2012 | Ranking | 2013 | Ranking | 2014 | Ranking | 2015 | Ranking | 2016 | Ranking | overall | Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Algeria | 0,11 | 12 | 0,11 | 15 | 0,12 | 12 | 0,13 | 12 | 0,15 | 12 | 0,11 | 15 | 0,13 | 11 |
| Angola | 0,14 | 11 | 0,18 | 10 | 0,17 | 9 | 0,17 | 10 | 0,18 | 10 | 0,28 | 8 | 0,13 | 11 |
| Burundi | 0,05 | 17 | 0,05 | 21 | 0,05 | 19 | 0,05 | 17 | 0,04 | 20 | 0,01 | 21 | 0,05 | 17 |
| Botswana | 0,20 | 7 | 0,21 | 7 | 0,21 | 7 | 0,19 | 7 | 0,21 | 8 | 0,43 | 5 | 0,22 | 7 |
| Cameroon | 0,04 | 18 | 0,04 | 22 | 0,04 | 20 | 0,04 | 18 | 0,04 | 20 | 0,05 | 19 | 0,04 | 18 |
| Chad | 0,00 | 22 | 0,00 | 25 | 0,00 | 24 | 0,00 | 20 | 0,01 | 23 | 0,01 | 21 | 0,01 | 19 |
| Congo Rep. | 0,03 | 19 | 0,03 | 23 | 0,04 | 20 | 0,14 | 12 | 0,07 | 17 | 0,11 | 15 | 0,04 | 18 |
| Cape-Verde | 0,69 | 2 | 0,70 | 2 | 0,67 | 2 | 0,65 | 2 | 0,64 | 2 | 0,63 | 4 | 0,61 | 2 |
| Comoros | 0,10 | 13 | 0,08 | 18 | 0,08 | 16 | 0,07 | 15 | 0,07 | 17 | 0,06 | 18 | 0,06 | 16 |
| Djibouti | 0,09 | 14 | 0,09 | 17 | 0,09 | 15 | 0,13 | 13 | 0,10 | 15 | 0,13 | 13 | 0,08 | 14 |
| Egypt | 0,15 | 10 | 0,14 | 12 | 0,14 | 11 | 0,13 | 13 | 0,15 | 12 | 0,21 | 10 | 0,16 | 10 |
| Morocco | 0,43 | 4 | 0,43 | 4 | 0,43 | 4 | 0,42 | 4 | 0,42 | 4 | 0,37 | 7 | 0,39 | 4 |
| Tunisia | 0,39 | 5 | 0,38 | 5 | 0,38 | 5 | 0,18 | 9 | 0,40 | 5 | 0,41 | 6 | 0,37 | 5 |
| Equatorial Guinea | 0,05 | 17 | 0,04 | 22 | 0,04 | 20 | 0,06 | 16 | 0,08 | 16 | 0,12 | 14 | 0,05 | 17 |
| Ethiopia | 0,03 | 19 | 0,04 | 22 | 0,04 | 20 | 0,04 | 18 | 0,04 | 20 | 0,00 | 22 | 0,04 | 18 |
| Gabon | 0,07 | 15 | 0,10 | 16 | 0,11 | 13 | 0,15 | 11 | 0,11 | 14 | 0,20 | 11 | 0,09 | 13 |
| Ghana | 0,10 | 13 | 0,12 | 14 | 0,12 | 12 | 0,13 | 13 | 0,15 | 12 | 0,07 | 17 | 0,12 | 12 |
| Guinea | 0,01 | 21 | 0,01 | 24 | 0,01 | 23 | 0,02 | 19 | 0,03 | 21 | 0,02 | 21 | 0,01 | 19 |
| Guinea Bissau | 0,04 | 18 | 0,04 | 22 | 0,04 | 20 | 0,13 | 13 | 0,05 | 19 | 0,06 | 18 | 0,04 | 18 |
| Kenya | 0,17 | 9 | 0,17 | 11 | 0,19 | 8 | 0,22 | 6 | 0,23 | 7 | 0,12 | 14 | 0,16 | 10 |
| Lesotho | 0,10 | 13 | 0,10 | 16 | 0,10 | 14 | 0,10 | 14 | 0,10 | 15 | 0,21 | 10 | 0,09 | 13 |
| Libya | 0,19 | 8 | 0,20 | 8 | 0,19 | 8 | 0,13 | 13 | 0,23 | 7 | 0,06 | 18 | 0,18 | 9 |
| Madagascar | 0,02 | 20 | 0,02 | 24 | 0,02 | 22 | 0,02 | 19 | 0,02 | 22 | 0,03 | 20 | 0,03 | 19 |
| Malawi | 0,06 | 16 | 0,08 | 18 | 0,07 | 17 | 0,07 | 15 | 0,05 | 19 | 0,07 | 17 | 0,06 | 16 |
| Mali | 0,06 | 16 | 0,07 | 19 | 0,07 | 17 | 0,13 | 13 | 0,08 | 16 | 0,06 | 18 | 0,07 | 15 |
| Namibia | 0,33 | 6 | 0,33 | 6 | 0,33 | 6 | 0,34 | 5 | 0,35 | 6 | 0,90 | 3 | 0,29 | 6 |
| Nigeria | 0,17 | 9 | 0,17 | 11 | 0,16 | 10 | 0,17 | 10 | 0,17 | 11 | 0,23 | 9 | 0,16 | 10 |
| Rwanda | 0,10 | 13 | 0,13 | 13 | 0,12 | 12 | 0,13 | 13 | 0,12 | 13 | 0,07 | 17 | 0,09 | 13 |
| Seychelles | 0,75 | 1 | 0,79 | 1 | 0,86 | 1 | 0,86 | 1 | 0,87 | 1 | 1,00 | 1 | 0,82 | 1 |
| South Africa | 0,48 | 3 | 0,47 | 3 | 0,44 | 3 | 0,46 | 3 | 0,46 | 3 | 0,96 | 2 | 0,47 | 3 |
| Sudan | 0,03 | 19 | 0,03 | 23 | 0,03 | 21 | 0,13 | 13 | 0,02 | 22 | 0,06 | 18 | 0,04 | 18 |
| Swaziland | 0,19 | 8 | 0,19 | 9 | 0,17 | 9 | 0,19 | 8 | 0,19 | 9 | 0,43 | 5 | 0,19 | 8 |
| Tanzania | 0,06 | 16 | 0,06 | 20 | 0,06 | 18 | 0,06 | 16 | 0,07 | 17 | 0,08 | 16 | 0,06 | 16 |
| Uganda | 0,07 | 15 | 0,07 | 19 | 0,06 | 18 | 0,13 | 13 | 0,06 | 18 | 0,05 | 19 | 0,07 | 15 |
| Zambia | 0,05 | 17 | 0,06 | 20 | 0,05 | 19 | 0,05 | 17 | 0,06 | 18 | 0,15 | 12 | 0,05 | 17 |
| Zimbabwe | 0,07 | 15 | 0,07 | 19 | 0,06 | 18 | 0,13 | 13 | 0,06 | 18 | 0,05 | 19 | 0,09 | 13 |

*Source: Own computation from World Development Indicators Database*

More than 95 percent of the African countries falls within the low financial inclusion range thereby justifying the call for immediate action in Africa. The FII values that the study computed across the African countries is consistent with other studies which concluded that financial exclusion is high in Africa (Ndlovu, 2017). The study

computed the mean FII by aggregating the index of financial inclusion values for each country between 2004 and 2016 and dividing by 13 which is the time interval between 2004 and 2016. The ranking of countries is done according to the alphabetical order of the sampled countries.

### 3.4.5. Econometric Analysis

The analysis of the determinants of financial inclusion in the African region is presented in Table 6 below with the correlation between the exogenous and endogenous variables reported in Table 5. We found a generally positive association between financial inclusion and other variables such as financial development, income level, and money supply (M2GDP) and a negative association with inflation and population size. Overall, the correlations suggest that there is no problem of multi-collinearity among the estimation variables employed for estimation.

**Table 2. Cross Correlation between Variables**

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **Financial Inclusion** | 1.000 |  |  |  |  |  |  |  |
| **Fin Development** <br> *p-Value* | 0.546*** <br> 0.000 | 1.000 |  |  |  |  |  |  |
| **Inflation** <br> *p-Value* | -0.017 <br> 0.724 | - <br> 0.092** <br> 0.020 | 1.000 |  |  |  |  |  |
| **Log GDP per capita** <br> *p-Value* | 0.535*** <br> 0.000 | 0.370** <br> * <br> 0.000 | -0.0438 <br> 0.2690 | 1.000 |  |  |  |  |
| **Population Density** <br> *p-Value* | 0.027 <br> 0.582 | 0.247** <br> * <br> 0.000 | -0.0221 <br> 0.5822 | 0.0055 <br> 0.8907 | 1.000 |  |  |  |
| **Log Pop Size** <br> *p-Value* | - <br> 0.361*** <br> 0.000 | -0.064* <br> 0.102 | 0.0156 <br> 0.6927 | - <br> 0.31*** <br> 0.0000 | -0.249* <br> 0.000 | 1.000 |  |  |
| **Money Supply** <br> *p-Value* | 0.597*** <br> 0.000 | 0.740** <br> * <br> 0.000 | - <br> 0.08*** <br> 0.0566 | 0.543** <br> * <br> 0.0000 | 0.21*** <br> 0.000 | - <br> 0.18*** <br> 0.0000 | 1.000 |  |
| **Private-Credit (GDP)** <br> p-Value | 0.681 <br> (0.000) | 0.868 <br> (0.000) | -0.0871 <br> (0.0311) | 0.460 <br> 0.0000 | 0.325 <br> (0.000) | -0.0848 <br> (0.0352) | 0.796 <br> (0.00) | 1.000 |

**Table 6. GMM Regression Result**

| Dependent Variable: FII | Arrelano-Bond GMM Model (FII) | Arrelano-Bover/ Bundell-Bond | Economic Implication- Regression |
|---|---|---|---|
| Lagged FII p-Value | 0.121*** (0.000) | 0.549*** (0.000) | |
| Financial-Development Index p-Value | 0.062*** (0.004) | 0.189*** (0.000) | 0.0426 |
| Money (M2GDP) p-Value | -0.0001 (0.184) | -0.0005 (0.332) | -0.0696 |
| Inflation p-Value | -0.0385*** (0.000) | -0.0426*** (0.000) | -0.3087 |
| Population (log Pop) p-Value | -0.022 (0.149) | -0.101*** (0.000) | -0.4011 |
| Population Density p-Value | 0.0001 (0.184) | -0.00001 (0.617) | -0.0068 |
| Income (log GDP per capita) p-Value | 0.024*** (0.000) | 0.059*** (0.000) | 0.1609 |
| Credit (% GDP) p-Value | 0.003 (0.128) | 0.002 (0.294) | 0.2117 |
| Constant | 0.118 (0.239) | 0.488*** (0.000) | |
| | | | |
| Observations | 360 | 395 | |
| Wald ($Chi^2$) | 6374.99 | 10732.83 | |
| Prob.>$F/Chi^2 =$ | 0.000 | 0.000 | |
| Sargan Test | 0.130 | 0.285 | |
| AB Test | 0.516 | 0.702 | |

*Source: Author's Estimation (2018)*

Standard error; ** $p < 0.05$, *** $p < 0.01$

Contingent to the regression coefficients signs, the values in Table 6 indicate how in percentage one standard deviation increase in the independent variables economically impacts on financial inclusion. A glance at the results showed that the economic implication of the lagged value of financial inclusion (L.FII) is positive and strongly significant indicating that financial inclusion in the past period has a significant effect in certifying financial inclusion in the current period and is persistent over time. Statistically significant lagged FII estimates mean that lagged financial inclusion has a significant impact on contemporary financial inclusion and would hence indicate a "catch-up effect." A zero coefficient implies a full catch-up, and a between zero and one coefficient would denote partial catch-up, which is the case in the models of this study. Since the lagged financial inclusion estimates falls between zero and one, it implies that countries with undersized financial inclusion have a propensity to recover most of any financial inclusion deficit incurred in the past. In fact, the lagged financial inclusion has an impact of up to 0.42 percent on the current financial inclusion of the African continent.

We also found financial development to be positive and strongly related to financial inclusion. In fact, the economic implication indicates that a one standard deviation increase in financial development increases financial inclusion by 4.3 percent in line with Ndlovu (2017) and Lenka and Barik (2018). The economic implication of the outcome of the regression of money supply (M2GDP) and financial inclusion shows that a one standard deviation increase in money supply result in a fall of 7 percent in financial inclusion. This could have been caused by too much money that is circulating in the informal financial system.

We found a significant inverse relationship between inflation and financial inclusion as a one standard deviation increase in inflation significantly reduced financial inclusion by 31 percent. The inverse relationship signifies that economic volatility and price increase lower the level of financial access. Since inflation erodes the time value of money, lenders normally increase interest rates to compensate for the loss. The significant inverse relationship signifies that an increase in financial inclusion reduces inflation which is at times used to proxy the effectiveness of the monetary policy in Africa. This is in keeping with Hung (2016) who found the same results in his study.

Similarly, we found a significant inverse association between population and financial inclusion and also between population density and financial inclusion though the effect was insignificant. This is consistent with Allen *et al*. (2014) despite their coefficient being insignificant. This shows that countries with large population size are not immune to challenges in enhancing financial inclusion. This could be a result of high dependency from the high population, which may be caused by negative externalities like unemployment, reduced savings and poverty, which reduces the demand and supply of financial services. Beck and De la Torre (2007) found that most African countries are characterised by a lower bankable population than the banked. This suggests the implementation of policies aimed at improving financial inclusion by focusing on increasing the bankable population, by either taking advantage of economies of scale or by encouraging banks to expand services to the unbanked or by liberalising the market to increase foreign market and/or non-bank participation.

We also found a significant positive economic impact of the level of income on financial inclusion. This also reiterates the literature rooting for levels of income as the fundamental reasons for financial inclusion (Chithra & Selvam, 2013; Tuesta, et al., 2015; Fungáčová & Weill, 2015). This shows that countries with high income per capita have financial systems which are highly inclusive. Countries with low income levels have comparatively lower literacy rates and poorer connectivity and appear to be more financially exclusive. High income is expected to be correlated with higher usage of formal credit and accounts. It is thus vital for policy makers to craft and implement policies that facilitate productive employment thereby boosting

income and increased use of financial services to spur economic growth. Financial status of people always plays a fundamental role in accessing financial services. Poor people with low income face challenges in accessing financial services. Finally, the economic implication of credit availability on financial inclusion is significant and positive. This was anticipated and could be as a result of variables such as lack of credit information and collateral amongst others which extremely subdue credit in Africa. This result contradicts Chithra and Selvam (2013) who found a significant association between credit and deposit penetration and the level of financial inclusion in India. Policy makers should come up with credit registry or other means of identifying credit worthy customers such as 'know your customer' so as to enhance the distribution of credit. Overall, the results are in agreement with the GMM regression models requirements as shown in Table 6 above. The fitness of the overall result is good as shown by the Wald test probability, and the Hansen J statistics results gives the confidence that the instruments are not over identified and AR(2) confirms the absence of serial correlation.

## 4. Conclusions

We constructed a new index of financial inclusion for 49 African economies using weights derived from principal component analysis in aggregating indicators for access, availability, and usage. Using the World Bank's Global Findex database, we combined Sarma's (2008) multidimensional approach with the normalized weights from principal component analysis of Camara and Tuesta (2014) in deriving our index. The financial inclusion index shows that there exists wide discrepancies in financial inclusion among the 49 African countries, with Chad and Guinea having the least at 0.01 and Seychelles and Cape-Verde with the highest at 0.82 and 0.63 respectively. Over the period 2004 to 2016, only Seychelles and Carbo-Verde had an average financial inclusion index above 50 percent, and the majority are below 40 percent. This validates further the argument that, the African region is characterised by very high levels of financial exclusion and thus needs immediate intervention. We also found that the lagged financial inclusion, financial development, income, credit and inflation are significant factors in explaining financial inclusion. Interestingly, we found an insignificant inverse link between financial inclusion and population density and population size.

We recommend policy makers to device measures to ensure an ongoing financially inclusive environment while stimulating other variables which acts as barriers to financial inclusion. Policy makers should also not just focus on enhancing financial inclusion, without corresponding improvements in financial sector development, income levels and credit availability as they positively contribute to financial inclusion.

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