The Measure of the Financial Inclusion in the African Countries

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Abstract

The aim of this study is to find out the level in financial inclusion between 41 African countries. To reach to this goal for knowing which countries have the high level or the low level in financial inclusion according to some variables such as Adults with an outstanding mortgage, Using a Formal Account, and Account From a Formal Financial Institutions, a discriminant model analysis was performed. These variables have been underlined by the literature review to be significant in inclusive financing. The data set was the secondary data taken from the Global Findex Database related to the report that Kunt A. and klapper L. wrote in 2012 titled "Measuring Financial Inclusion". The analysis of the results reveals that, out of the 41 total countries 27 have a low level in financial inclusion whereas 14 have a high level. Shortly, this empirical results show that most countries with a low level are low-income countries and those whose level is high, largely remain of middle-income countries. Moreover, according to the high classification accurate rate (92.7%) through the discriminant model, it indicates that this developed model is appropriate and efficient to measure the financial inclusion level in the African countries.

1   Introduction

Africa is now the world's second fastest growing region after Asia, with annual GDP growth rates in excess of 5% over the last decade [1]. Despite this growth, the "Arab Spring" events showed that good economic growth in the continent had not translated into shared prosperity and better livelihoods for the majority. Growth has to be inclusive to be

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socially and politically sustainable. One key component of inclusive development is financial inclusion, an area in which Africa has been lagging behind other continents. Less than one adult out of four in Africa have access to an account at a formal financial institution. Broadening access to financial services will mobilize greater household savings, marshal capital for investment, expand the class of entrepreneurs, and enable more people to invest in themselves and their families. Inclusive financial systems, allowing broad access to financial services, without price or nonprice barriers to their use, are especially likely to benefit poor people and other disadvantaged groups. Without inclusive financial systems, poor people must rely on their own limited savings to invest in their education or become entrepreneurs—and small enterprises must rely on their limited earnings to pursue promising growth opportunities. This can contribute to persistent income inequality and slower economic growth [2].

The aim of this work is to find out the difference between the groups of African countries when based in financial inclusion using some variables. In other words we want to sick for or to measure the level (high/low) of the countries (41) in financial inclusion. In accordance with this objective, the paper consists of four section.1. introduction, 2. Literature review, 3. Data and Methods, 4. Results, 5: Conclusion

2   The Literature Review

The definitions of financial inclusion emphasize several dimensions [3], viz., accessibility, suitability, availability and usage of the financial system. These dimensions together build an inclusive financial system. Another issue that needs to be taken care of is whether to measure access or usage; because in transaction banking and insurance we can find that people do not use it even if they are having access to it. Access dimension implies mere access to services while usage dimension is a broader term requiring examination of aspects like access, suitability, availability and actual usage.

Also distinguishes between those who are '*formally served*' that is those who have access to financial services from a bank and / or other formal providers and those who are '*financially served*' who also include people who use informal providers. In contrast to the other work described above, the term '*financially excluded*' is only used to describe those who have no access at all [4]. This study considers only the formal sector which includes all legally endorsed financial.

The definitions of financial inclusion vary across the geographic regions decided by the concomitant economic development.

Definitions of financial inclusion in literature tend to vary on dimensions such as 'breadth', 'focus' and 'degree' of exclusion [5] The breadth dimension is the broadest of all definitions which defines financial inclusion as a consequence of social inclusion which prevents the poor and the disadvantaged from gaining access to the mainstream financial system.. Some of the definitions of financial inclusion reiterating this view are as follows.

"Financial inclusion" infers accessibility and usage of financial services from formal service providers. The United Nations[6] define financially included as the financial sector that provides 'access' to credit for all 'bankable' people and firms, to insurance for all insurable people and firms and to savings and payments services for everyone. Inclusive finance does not require that everyone who is eligible use each of the services, but they should be able to choose to use them if desired.

The 'degree' dimension is the narrowest of all and defines financial exclusion as exclusion from usage of particular sources of credit and other financial services including insurance, bill payment services and accessible and appropriate deposit accounts. World Bank [4] describes exclusion as a phenomenon where access to key areas such as transaction banking, savings, credit and insurance.

Financial inclusion is characterized primarily as either general access to loans or access to savings accounts [7]. Very few risk management and vulnerability reducing products are available to small holder producers. Financial inclusion cannot be restricted merely to opening savings accounts and/or providing credit for consumption/consumer spending but should also encompass delivering financial products tailor-made to cope with the fluctuating earning pattern of the poor. Rogaly [8] defines financial exclusion in the perspective of exclusion from particular sources of credit and other financial services (including insurance, bill payment services, and accessible and appropriate deposit accounts)"

The review of literature suggests that most of the definitions are context specific, originating from country specific problems related to financial exclusion with regard to the respective socio economic dimensions which assumes importance in the public policy perspective.

On the basis of the above review the following working definition has been accepted with regard to financial inclusion throughout the study

"Financial inclusion may be interpreted poor households' access to basic financial services from formal and semiformal service providers which include savings, loans and insurance and other financial services in a manner that is reasonably convenient and flexible in terms of access and design." In this perspective, the study attempts to measure financial inclusion as a composite measure that takes into consideration access to transaction banking, savings, credit and insurance.

Transaction banking: refers to access to bank's financial services other than savings, credit and insurance.

Savings: Lesser savings leads to lesser capital formation implying lesser development. Not having a savings account can lead to financial exclusion.

Credit: credit is the most valid indicator for assessing the status of financial inclusion. Though other indicators are measured, credit access and indebtedness of a family determines the level of well being achieved. Credit measured as a sole measure of financial inclusion can also be useful that it may provide status of the stakeholder considering aspects like source, cost of borrowing, adequacy, proximity etc.

Insurance: Insurance provides coverage to the accidents/emergencies arising in a society affecting human lives, assets or livelihoods. Recent developments have increased popularity and access to insurance. Also Government has enacted insurance policies for the benefit of sea faring fishers. Insurance inclusion is measured as sub element in the financial inclusion designating appropriate weights.

3   Data and Methods

The data used for this study was the secondary hand data taken from the Global Findex Database related to the report [9] titled "Measuring Financial Inclusion" published on World Bank website [10]. This report has covered 148 countries including 41 African countries using indicators such as *Accounts and payments* (Share with an account at a

formal financial institution All adults*), Saving, credit, and insurance concerning Adults saving in the past year using a formal account, Adults originating a new loan in the past year From a formal financial institution and, Adults with an outstanding mortgage*
This data provides country-level indicators of financial inclusion summarized for all adults and disaggregated by key demographic characteristics—gender, age, education, income, and rural or urban residence [11].
The appropriate and reliable method used for this research is *discrimnant analysis* that enables identifying the most parsimonious way to distinguish or to show differences between groups of countries through some variables such as: *Adults with an Outstanding Mortgage*, *Using A Formal Account*, *From A Formal Financial Institution* (Independent variables), all adults (dependent variable). Discriminant analysis is used with SPSS 20.0

3.1 Discriminant Analysis

Discriminant analysis is used to classify objects/records into two or more groups based on the knowledge of some variables related to them. Discriminant function analysis or Discriminant Analysis is used to classify cases into the values of a categorical dependent, usually a dichotomy. If discriminant function analysis is effective for a set of data, the classification table of correct and incorrect estimates will yield a high percentage correct. Multiple discriminant analysis (MDA) is an extension of discriminant analysis and an extension of multiple analysis of variance (MANOVA), sharing many of the same assumptions and tests. MDA is used to classify a categorical dependent which has more than two categories, using as predictors a number of interval or dummy independent variables. MDA is sometimes also called discriminant factor analysis or canonical discriminant analysis.
There are several purposes for DA and/or MDA:
- To classify cases into groups using a discriminant prediction equation.
- To test theory by observing whether cases are classified as predicted.
- To investigate differences between or among groups.
- To determine the most parsimonious way to distinguish among groups.
- To determine the percent of variance in the dependent variable explained by the independents.
- To determine the percent of variance in the dependent variable explained by the independents over and above the variance accounted for by control variables, using sequential discriminant analysis.
- To assess the relative importance of the independent variables in classifying the dependent variable.
- To discard variables which are little related to group distinctions
- To infer the meaning of MDA dimensions which distinguish groups based on discriminant loadings.

3.1 Discriminant Analysis Equation

$Y = a + k_1x_1 + k_2x_2 + \ldots\ldots + k_nx_n$ w here *Y* is dependent variable; *a* is a constant; x_1, x_2, … x_n are independent variables; k_1, k_2, … k_n are coefficients of the independent variables.

In this specific case, for the development of the model the dependent and independent

variables are as follows: The dependent variable (Y) is all adults concerning Account and payment Share with an account at a formal financial institution. All adults were chosen as a dependent variable because this study on financial inclusion is related only on all adults and the independent variables $(x_1, x_2,...,x_k)$ are Adults With An Outstanding Mortgage , Using A Formal Account, (Adults originating a new loan in the past year) From A Formal Financial Institution. The three variables were chosen among the other variables because they constituted the main variables and have permitted to discriminate correctly the group of countries.

3.1.2 Building the Model

Discriminant Analysis was performed to develop a function to discriminate between high level and low level in financial inclusion and to find the factors which contribute the maximum in discrimination
The discriminant is built as following:

Groups	
1	Low level
2	High level

4 Empirical Findings

To apply discriminant analysis and to get reliable results, it is necessary that an appropriate and real hypothese be used. Financing inclusive variables were taken from the Global Findex Database related to the report [2],[that Kunt A. Ve Llapper L. [2] wrote in 2012 titled Measuring Financial Inclusion . As independent variables, we can mention Adults with an outstanding mortgage, using a formal account and (Adults originating a new loan in the past year) from formal financial institutions. The coefficient of correlation of the three variables, due to its lesser than 0.50, indicates that there is no linear relationship between the three variables. For the independent variables, the value of Skewness, Kurtosis is between -1 and +1. When based on the statistic test of Kolmogorov-Smirnov, the variables were significant. Moreover, the group of variables respects the normality assumption distribution in the data.
To determinate the equality or inequality between the covariance groups, the statistic of Box'M has been (Table1) used. Its value is 11.98. Due the significance value of 0.097, the groups of covariance are equals.

Table 1: Box' M Test

Box's M		11.,928
	Approx.	1.792
F	df1	6
	df2	4495.682
	Sig.	.097

Tests null hypothesis of equal population covariance matrices.
Source: SPSS 20

Box's M test evaluates the homogeneity of dispersion matrices across the subgroups of the dependent variable.   The null hypothesis is that the dispersion matrices are homogenous. If the analysis fails this test, we request the use of separate group dispersion matrices in the classification phase of the discriminant analysis to see if this improves our accuracy rate.   Table 1 shows with sig= 0.097 that the dispersion matrices across the subgroup dependent variables are homogenous. Hence the null hypothese is accepted. In other words, the test of equality of covariance matrices shows that the groups of covariance matrix are homogenous

Table 2: Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
AdultsWithAnOutstandingMortgage	.901	4.290	1	39	.045
UsingAFormalAccount	.546	32.393	1	39	.000
FromAFormalFinancialInstitution	.881	5.268	1	39	.027

Source: SPSS 20

In the Table 2, according to Wilks' Lamda statistic, the variable Adults with an Outstanding Mortgage has highly contributed to the discriminant function.
In the Table 3, due to only the two groups constituted, there was one discriminant fonction and only one eigenvalue.   The explained variance in the discriminant fonction was 100%.   And the canonical correlation was 0.758. In other words; between the group of dependent variable and discriminant function, the relation is 0.758.

Table 3 Eigen values

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1.353[a]	100.0	100.0	.758

Source: SPSS 20

The test of functions column tests the hypothesis that the means of the functions listed are equal across groups. The Wilks" Lambda value is close to 0 which indicates that the null hypothesis of equal means across the function is rejected. The model is clearly discriminating. A chi-square transformation of Wilks' lambda is used along with the degrees of freedom to determine significance. Here the wilks' Lamda account 42.5% of total variance.
If the significance value is small (less than 0.05) this indicates that group means differ. If it is large this indicates that group means do not differ. Table 4 indicates that the group means are different and the significance value is less than 0.05 and it is statistically significant.

Table 4: Wilks'Lamda Test

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.425	32.083	3	.000

Source: SPSS 20

In the table 5, examining the standardized canonical discriminant coefficients in the various groups, the variable that has the high coefficient (1.389) was using a formal account. It has more contributed to discriminant function of the group and stays critical to the discrimination of the groups

Table 5:Standardized Canonical Discriminant Function Coefficients

	Function
	1
AdultsWithAnOutstandingMortgage	.587
UsingAFormalAccount	1.389
FromAFormalFinancialInstitution	-.810

Source: SPSS 20

According to the Table 6, basing on the coefficient of correlation with the discriminant function, the variable that has the high coefficient (0.784) i.e. high relation was using a formal account whereas the one that has the low relation was adults with an outstanding mortgage

Table 6: Structure Matrix

	Function
	1
UsingAFormalAccount	.784
FromAFormalFinancialInstitution	.316
AdultsWithAnOutstandingMortgage	.285

Source: SPSS 20

The unstandardized discriminant function coefficients shown in Table 7 can be applied to the coefficients of the variables in the discriminant function for classification purposes. The unstandardized discriminant function coefficients can be used when calculating their discriminant scores.

Table 7 Canonical Discriminant Function Coefficients

	Function
	1
AdultsWithAnOutstandingMortgage	.287
UsingAFormalAccount	.252
FromAFormalFinancialInstitution	-.273
(Constant)	-1.837

Source: SPSS 20

A discriminant function, also called a canonical root, is a latent variable which is created as a linear combination of discriminating (independent) variables. In the present case there is one function that is the most powerful differentiating dimension. Thus, the linear discriminant function is as follow:

Y=0.278(*Adults With An Outstanding Mortgage*) +0.252(Using A Formal Account)-

0.273(*From A Formal Financial Institution*)-1,837

From Table 8,   the classification results show that out of the total 27 countries that possess a low level in financial inclusion, 25 countries are really low financial inclusion countries. Out of the total 14 countries that have a high level in financial inclusion, 13 are really high financial inclusion countries. According to the results, the correct classification has accounted for 92.7%. This shows   that the   analysis is   successful In discriminant analysis, the success of the analysis depends on the percentage of correct classification The higher the percentage of correct classification, the more successful the analysis

Table 8: Classification Results

Financial Inclusion		Predicted Group Membership		Total
		1	2	
Original Count:	Low	25	2	27
	High	1	13	14
%	Low	92.6	7.4	100,0
	High	7.1	92.9	100.0

a.92.7% of original grouped cases correctly classified
Source: SPSS 20

According to the Table 9, the countries that belong to the first group (27)   are   Benin, Burkina Faso ,Burundi , Cameroon, central African Republic , Chad ,   Comoros , Congo Democratic Republic , Congo Republic, Djibouti, Egypt Arab Republic   ,Gabon , Guinea , Lesotho , Madagascar, Malawi , Mali , Mauritania , Niger, Senegal , Sierra Leone ,Sudan, Tunisia, Uganda, Zambia, Zimbabwe.

The   countries   that   belong   to   the   second   group (14)   are Algeria ,Angola ,Botswana ,Ghana ,Kenya , Liberia , Mauritius , Morocco, Mozambique, Nigeria ,Rwanda ,Somalia, South Africa ,Swaziland, Togo.

According to the discriminant scores, the countries that belong to the first group have the poorest scores (near to zero). This means that those countries have the low level in financing inclusive and the most of them remain the low- income countries whereas those belonging to the second group have the highest scores and their level in financial inclusion is very high. Moreover, the most of those countries are the middle income countries

Table 9: Group of countries and Discriminant scores

Group	Country Name	Discriminant Score
1	Benin	-1.16669
1	Burkina Faso	-.64179
1	Burundi	-1.34078
1	Cameroon	-.12439
1	Central African Republic	-1.31948
1	Chad	.29543
1	Comoros	-.69188
1	Congo Democratic Republic	-2.13128
1	Congo Republic	-1.39718
1	Djibouti	-.73937
1	Egypt Arab Republic	-2.10367
1	Gabon	-.11690
1	Guinea	-1.59258
1	Lesotho	-.35489
1	Madagascar	-1.84438
1	Malawi	-.84586
1	Mali	-1.63518
1	Mauritania	-1.07636
1	Niger	-1.57128
1	Senegal	-1.92208
1	Sierra Leone	.04970
1	Sudan	.09373
1	Tunisia	-1.34828
1	Uganda	-.82338
1	Zambia	.02091
1	Zimbabwe	-.16699
2	Algeria	.61862
2	Angola	1.15471
2	Botswana	.84020
2	Ghana	1.41401
2	Kenya	1.51040
2	Liberia	1.19731
2	Mauritius	3.58000
2	Morocco	1.52681
2	Mozambique	1.09200
2	Nigeria	3.94697
2	Rwanda	1.08451
2	Somalia	2.57660
2	South Africa	2.39240
2	Swaziland	1.13973
2	Togo	.42062

Source: SPSS 20

5   Conclusions

The objective of this study which is to find out or to measure   the level of African countries (41) in financial inclusion using   discriminant analysis reveals good results and shows that the latter is the appropriate   and reliable statistic method used in this study.

The analysis of the results of this study when used discriminant analysis reveals that most countries with low level are low-income countries and those whose level are high are largely of middle-income countries. This research is the first research concerning the measure of the financing inclusive in African countries using discriminant analysis. The classification in high or in low level when based on two clusters and discriminant model has similar results. This research permits to gauge African countries in financial inclusion. Furthermore, this will enable to wake up countries that have a low level in order to develop strategies to enhance their level in the future. Finally, this research can contribute to the literature review and to the future researches handling in the same field.

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