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FINANCIAL INCLUSION, INSTITUTIONAL QUALITY, AND POVERTY REDUCTION IN AFRICA

By

Anthony Yaw Nsiah

Doctoral thesis submitted in fulfilment of the requirement for the award of a Doctor of Philosophy

The Graduate School of Business Administration, Wits Business School

University of the Witwatersrand, Johannesburg

Supervisor: Dr. George Tweneboah

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LIST OF PUBLICATIONS

Subsequent to the submission of this thesis, I have made a publication and other portions related to this work have also been published in a peer reviewed journal.

Peer reviewed publications

This is a separate publication.

Nsiah, A.Y., Yusif, H., Tweneboah, G., Agyei, K., & Baidoo, S.T. (2021). The effect of financial inclusion on poverty reduction in Sub-Sahara Africa: Does threshold matter?, *Cogent Social Sciences*, 7:1, DOI: 10.1080/23311886.2021.1903138

Peer reviewed Publication that is part of this thesis

Nsiah, A.Y., & Tweneboah, G. (2023). Determinants of Financial Inclusion in Africa: Is Institutional Quality Relevant? *Cogent Social Sciences*, 9:1, 2184305, DOI: 10.1080/23311886.2023.2184305

Papers as part of this study submitted for peer review.

Nsiah, A.Y., & Tweneboah, G. Threshold effect of financial inclusion on poverty reduction in Africa: Does Institutional Quality play a role? *Journal of African Business* (Revised and Re-submitted)

Nsiah, A.Y., & Tweneboah, G**.** Financial Inclusion, Financial Stability, and Poverty Reduction in Africa. *Economic Notes*

ABSTRACT

Financial inclusion is seen as an enabler to growth in an economy, as such enhance poverty reduction, especially in developing regions like Africa. Poverty levels in Africa are still very high, especially with the advent of the Covid-19 pandemic, despite efforts of governments and development partners to address it. The extant literature has provided some information regarding the financial inclusion and poverty reduction nexus in the continent and elsewhere. However, the exact threshold level of inclusion at which poverty could be altered has not been thoroughly explored. Also, the critical role institutions play in transferring the benefits of financial services to households and firms towards poverty reduction has not been extensively interrogated. This thesis therefore consists of three separate empirical studies which all intend to fill the knowledge gap, using advanced econometric methodologies.

For the first essay, we examined the determinants of financial inclusion in Africa, considering demand, supply as well as infrastructure side factors. Despite the importance of financial inclusion, many factors play a role in one's decision to get involved in the financial sector. Using the GMM technique, the study revealed that GNI per capita (demand-side factor), Domestic credit to private sector (Supply-side factor) and institution quality (infrastructure-side factor) were significantly identified to be determinants of financial inclusion in Africa. It was further revealed that GNI per capita, Money supply and Institutional quality contribute to the minimization of barriers to financial inclusion.

The second essay sought to estimate the threshold level at which financial inclusion, aided by strong institutions, will lead to poverty reduction in Africa. Financial inclusion has been identified as an important concept in fighting poverty due to its ability to increase income level of households. Using the Hansen's threshold estimation method, the study found double threshold values at which financial inclusion would increase household consumption expenditure, leading to poverty reduction. The study also established a certain threshold level beyond which, financial barriers will have a negative

impact on consumption which has the tendency to scare households from participating in the financial sector. The results further indicated that dependency ratio, gross national income, interest rate, inflation, education, and government expenditure contribute significantly to reducing barriers to reduce poverty. Institutional quality was also found to significantly moderate the financial inclusion and poverty reduction relationship.

The last but not the least essay investigated the nature of the relationship between financial inclusion, financial stability, and poverty reduction in Africa. Financial inclusion plays an important role in enhancing stability of the financial system. It has however been argued that some level of financial inclusion has the tendency to destabilize the financial system, thwarting poverty reduction efforts. Using the panel Autoregressive Distributive Lag (ARDL) model, the study found that financial inclusion is positively related to financial stability in both short and long-run, with education, GNI per capita and domestic credit to private sector positively related to financial stability and trade openness negatively related to same, in the long-run. The study further established that financial stability is positively related to consumption as such leads to poverty reduction with trade openness, government expenditure, GNI per capita, education, domestic credit to private sector and institutional quality been positively related to household consumption, as such its effects lead to poverty reduction. This indicates that financial stability plays a complementary role in the financial inclusion drive to fight poverty in Africa. It is recommended that development partners, central banks and governments in the region should consciously implement policies that are aimed at promoting financial inclusion through the strengthening of institution, due to its ability to end poverty as well as take pragmatic measures to minimize barriers to financial inclusion. Despite the financial inclusion drive, regulations must not be taking for granted in order not to compromise stability of the financial system for the joint benefit in the fight against poverty as well as ensure financial stability.

DECLARATION

I, **Anthony Yaw Nsiah**, with student number 2401084, hereby declare that this thesis is my own work, except sections duly acknowledged in the references. This is submitted in fulfilment of the requirements for the award of a Doctor of Philosophy from the University of the Witwatersrand, Johannesburg, South Africa. I further declare that this work has not been submitted to this or any other university for the purposes of examination or award of a degree.



Anthony Yaw Nsiah

Signed on December 06, 2023.

DEDICATION

I dedicate this work to:

My father, Nana Yaw Kumah and my dear sister, Ama Vivian, all blessed memory

And

To my beautiful wife Esther and my lovely children; Aldora, Bethany, and Holea.

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To be grateful is divine and to demonstrate the same is refreshing. I knew I could reach these feet one day, but little did I know it would come at this time. It is worth showing appreciation to all those who made this possible. I want to express my utmost appreciation to God for been with me through my humble beginning to this end. I am graciously thankful to my supervisor, Dr. George Tweneboah for the great mentorship. You took me not just as your student but as a brother. I appreciate the impact you have made in my life both academic and social life, Dr I'm grateful.

My educational life has been greatly impacted by my family and I cannot but mention them. At this twilight stage of my academic career, I eulogize my mother, Cecilia Akua Afrah and my siblings, Isaac, Peter, Simon, Thomas, James and Joyce, and the entire family. I really appreciate your support; you have been my backbone.

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TABLE OF CONTENT

LIST OF PUBLICATIONS ..... **ii**
ABSTRACT ..... **iii**
DECLARATION ..... **v**
DEDICATION ..... **vi**
ACKNOWLEDGEMENT ..... **vii**
TABLE OF CONTENT ..... **viii**
LIST OF TABLES ..... **xii**
LIST OF FIGURES ..... **xiv**
LIST OF ACRONYMS ..... **xv**
CHAPTER ONE **1**
INTRODUCTION **1**
1.1 Background to the Study 1
1.2 Statement of problem 8
1.3 Aim and Objectives of the Research 13
1.4 Research questions 13
1.5 Significance of the study 14
1.6 Scope and Limitations of the thesis 15
1.7 Structure of the thesis 16
CHAPTER TWO **18**
DETERMINANTS OF FINANCIAL INCLUSION IN AFRICA: **18**
IS INSTITUTIONAL QUALITY RELEVANT? **18**
2.0 Introduction 18
2.1 Concept and measurement of financial inclusion 22
2.2 Review of theoretical and empirical literature 24
2.2.1 Theoretical Literature 25
- Financial Intermediation Theory 25
- The neo-institutional theory 26

2.2.2 Empirical Literature 28
- Demand-sided factors that influence financial inclusion. 28
- Supply-sided factors that influence financial inclusion. 31
- Infrastructural factors that influence financial inclusion 34

2.3 Conceptual framework of the study 35

2.4 Data and Methodology 36
2.4.1 Data 36
2.4.2 Estimation Techniques 38
2.4.3 The General Method of Moment (GMM) estimation technique 38
2.4.4 The Ordinary Least Squares (OLS) estimation technique 40
2.5 Description and, measurement of the variables 41
2.5.1 Dependent variable 41
2.5.2 Explanatory variables 46
2.6 Empirical Results Analysis 54
2.7 Stationarity test for the variables 61
2.7.1 Result of the Unit Root Test 62
2.8: Correlation matrix for the panel data 64
2.9 Correlation matrix for the cross-sectional data 65
2.10. Construction of financial inclusion indices using Principal Component Analysis 69
2.11: Analysis of the System- GMM Results 70
2.11.1 Demand factors that influenced financial inclusion 77
2.11.2 Supply factors that influenced financial inclusion 77
2.11.3 Infrastructural factors that influenced financial inclusion 78
2.12 Analysis of the OLS Results on the factors that influence barriers of financial services 80
2.13 Summary, Conclusion, and Recommendations 85
2.13.1 Introduction 85
2.13.2 Summary of Findings 85
2.13.3 Conclusions 86
2.13.4 Recommendations 88
CHAPTER THREE 90
THRESHOLD EFFECT OF FINANCIAL INCLUSION ON POVERTY REDUCTION IN AFRICA: DOES INSTITUTIONAL QUALITY PLAY A ROLE? 90
3.0 Introduction 90
3.1 The Concept and Measurement of Poverty 93
3.2 Financial inclusion, income inequality and poverty reduction 97
3.3 Review of theoretical and empirical literature 101
3.3.1 Theoretical Literature 101
- The Kuznet theory 101
- The neo-institutional theory 103

3.3.2 Review of Empirical Literature 104
3.4 Conceptual framework of the study 108
3.5 Data and Methodology 110
3.5.1 Data 110
3.5.2 Estimation Techniques 111
3.5.2.1 Hansen Threshold estimation technique 111
3.6 Description, Measurement of Variables and A Priori Expectations 115
3.6.1 Dependent Variable 115
3.6.2 Explanatory Variables 116
3.7 Analysis 123
3.8 Stationarity test for the variables 126
3.8.1 Result of the unit root test 126
3.9: Pairwise correlation 128
3.10 Analysis of financial inclusion indexes for the selected countries in Africa 131
3.11 Analysis of the Hansen's threshold estimation results 132
3.12 Threshold effect of the various components of financial inclusion on poverty reduction 141
3.12.1 Threshold effect of financial Access on poverty reduction 141
3.12.2 Threshold effect of financial usage on poverty reduction 143
3.12.3 Threshold effect of Financial Barriers on poverty reduction. 145
3.13 Moderating Effect of Institutional quality and its components on poverty reduction 148
3.13. 1 Moderating effect of institutional quality on financial inclusion impacting poverty reduction. 148
3.13. 2. Moderating effect of institutional quality on financial access and financial usage 151
3.13.3 Moderating Effect of political stability on financial inclusion and poverty reduction 153
3.14 Summary, Conclusion and Recommendations 155
3.14.1 Introduction 155
3.14.2 Summary of Findings 156
3.14.3 Conclusions 157
3.14.4 Recommendations 158
CHAPTER FOUR 160
FINANCIAL INCLUSION, FINANCIAL STABILITY AND POVERTY REDUCTION IN AFRICA. 160
4.0 Introduction 160
4.1 The concept and measurement of financial stability 162

4.2 Interrelationship between financial inclusion and financial stability 164
4.3 Review of theoretical and empirical literature 167
4.3.1 Theoretical Literature 168
- The competition-stability theory. 168
4.3.2 Review of empirical literature 169
4.4 Conceptual framework of the study 172
4.5 Data and Methodology 174
4.5.1 Data 174
4.6 Estimation technique 175
4.6.1 The Panel Autoregressive Distributive Lag (ARDL) method 175
4.7 Description, Measurement of Variables and A Priori Expectations 179
4.7.1 Dependent variable (s) 179
4.7.2 Explanatory Variables 180
4.8 Empirical Results Analysis 185
4.9 Result of the Unit Root Test 187
4.10: Pairwise correlation 189
4.11 Analysis of the panel ARDL Bound test results 191
4.11.1 Analysis of the panel ARDL Bound Test results on the effects of financial inclusion on financial stability in Africa. 192
4.12 Analysis of the panel ARDL Bound Test results on the effects of financial stability on poverty reduction in Africa. 197
4.13 Summary, Conclusions, and Recommendations 203
4.13.1 Introduction 203
4.13.2 Summary of Findings 203
4.13.3 Conclusions 206
4.13.4 Recommendations 208
CHAPTER FIVE 210
SUMMARY, CONCLUSIONS, AND POLICY RECOMMENDATIONS 210
5.1 Introduction 210
5.2. Summary of the research and its findings 210
5.2.1 Institutional quality relevance in determinants of financial inclusion in Africa 211
5.2.2 The role of institutional quality in the threshold effect of financial inclusion on poverty reduction 212
5.2.3 Financial inclusion, financial stability, and Poverty reduction in Africa 212

5.3 Contribution and research implications 213
5.3.1 Research contribution 213
5.3.2 Practical and policy implications 213
5.3.3 Limitation and direction for future studies 215
5.4 Closing statement 216
References 217
Appendix 269

LIST OF TABLES

Table 2.1: Summary Statistics for the panel data 56
Table 2.2: Summary Statistics for the cross-sectional data 60
Table 2.3: Unit root result for Levin-Lin-Chu and Hadri LM tests ... **Error! Bookmark not defined.**
Table 2.4: Correlation matrix for the panel data 64
Table 2.5: Correlation matrix for the cross-sectional data 65
Table 2.6. Ramzy RESET test 66
Table 2.7: Heteroskedasticity and Normality test 66
Table 2.8: Principal Component Analysis (PCA) for financial inclusion 68
Table 2.9a: System-GMM estimates of determinants of financial inclusion in Africa 71
Table 2.9b: System-GMM estimates of determinants of financial inclusion in Africa 73
Table 2.10: OLS estimates on the factors that influence barriers of financial services in Africa 82
Table 3.1: Summary Statistics 124
Table 3.2: Unit root result of Levin-Lin-Chu and Hadri LM tests 127
Table 3.3: Correlation matrix for the panel data 129
Table 3.4: The Hansen threshold estimates 133
Table 3.5: Model estimation results of the effects of financial inclusion on poverty reduction (Dependent Variable: Poverty, 2004-2020) 134

Table 3.6: Threshold effect of financial access on poverty reduction 141
Table 3.7: Model estimation results of the effects of financial access on poverty reduction (Dependent Variable: Poverty, 2004-2020) 142
Table 3.8: Threshold effect of financial usage on poverty reduction 144
Table 3.9: Model estimation results of the effects of financial usage on poverty reduction (Dependent Variable: Poverty, 2004-2020) 145
Table 3.10: Estimates of threshold effect of barriers on poverty reduction.....**Error! Bookmark not defined.**
Table 3.11: The Hansen threshold estimates on institutional quality moderating financial inclusion 148
Table 3.12: Hansen threshold estimates of institutional quality moderating the financial inclusion and poverty reduction nexus (Dependent Variable: Poverty, 2004-2020).....150
Table 3.13: Hansen threshold estimates on institutional quality moderating financial access 151
table 3.14: Hansen threshold estimates of institutional quality moderating the financial access and poverty reduction nexus (Dependent Variable: poverty, 2004-2020).....152
Table 3.15: The Hansen threshold estimates on political stability moderating the financial inclusion and poverty reduction nexus 154
Table 3.16: Hansen threshold estimates of political stability moderating the financial inclusion and Poverty Reduction nexus (Dependent Variable: Poverty, 2004-2020).....155
Table 4.1: Summary Statistics .....**Error! Bookmark not defined.**
Table 4.2: Unit root result of Levin-Lin-Chu and Hadri LM tests ....**Error! Bookmark not defined.**
Table 4.3: Correlation matrix for the variables.....190
Table 4.4: Long run estimates of the effect of financial inclusion on financial stability in Africa..**Error! Bookmark not defined.**
Table 4.5: Short run estimates of the effect of financial inclusion on financial stability in Africa..195

Table 4.6: Long run estimates of the effect of financial stability on poverty reduction in Africa

..... **Error! Bookmark not defined.**

Table 4.7: Short run estimates of the effect of financial stability on poverty reduction in Africa ..201

LIST OF FIGURES

Figure 2.1: Conceptual framework on Determinants of financial inclusion……..35

Figure 2.2: CUSUM test……..…66

Figure 2.3: CUSUM of squares test…….……..66

Figure 3.1: Scatter plot matrix on the relationship between financial inclusion and poverty reduction…….98

Figure 3.2. Conceptual framework on the effect of threshold level of financial inclusion on poverty reduction in Africa……....107

Figure 3.3: Financial inclusion index for the selected countries in Africa……....130

Figure 4.1: Relationship between financial inclusion and financial stability……...165

Figure 4.2: Conceptual framework on financial inclusion, financial stability, and poverty reduction……...…171

LIST OF ACRONYMS

AfDB	African Development Bank
UNCTAD	United Nations Conference on Trade and Development
GDP	Gross Domestic Product
SDG	Sustainable Development Goals
DFID	Department for International Development
WJP	World Justice Project
CGAP	Consultative Group to Assist the Poor
PCA	Principal Component Analysis
CFA	Common Factor Analysis
WB	World Bank
WBG	World Bank Group
ADFI	Africa Digital Financial Inclusion Facility
IBRD	International Bank for Reconstruction and Development
S3IDF	Small-Scale Sustainable Infrastructure and Development Fund
UK	United Kingdom
GMM	Generalize Method of Moments
ANP	Analytic Network Process
ARDL	Autoregressive Distributive Lag
ATM	Automated Teller Machine
SSA	Sub-Saharan Africa
ECM	Error Correction Model

WDI	World Development Indicators
OLS	Ordinary Least Square
FAS	Financial Access Survey
IMF	International Monetary Fund
OECD	Organization for Economic Co-operation and Development
GNI	Gross National Income
WTO	World Trade Organization
BLUE	Best Linear Unbiased Estimator
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
ESIC	The Economic and Social Inclusion Corporation
NGOs	Non-governmental Organizations
UNDP	United Nations Development Programme
HPI	Human Poverty Index
MPI	Multi-dimensional Poverty Index
PVAR	Panel Vector Autoregression
PSTR	Panel Smooth Transition Regression
MENA	Middle East and North America
ASEAN	Association of Southeast Asian Nations
PPP	Purchasing Power Parity
RSS	Sum Of Squares of The Residuals
AIC	Alkaike Information Criteria
DFID	Federation for International Development
ROA	Return on Assets
ROE	Return on Equity

NPL	Non-Performing Loans
SME	Small and Medium Enterprises
FGLS	Feasible Generalized Least Squares
FMOLS	Fully Modified Least Squares

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Africa undoubtedly belongs to the league of continents in the world with the richest resources, both human and material, but it unfortunately harbors the poorest people due to unequal growth and development in the continent. According to a report by Triki and Fay (2013), the development of humanity is about ensuring that there is real progress in the lives of persons across society. The report further mentions that there is an extensive income inequality in Africa, which prevents growth as well as poverty reduction across the continent. Growth in the economy in the region in 2019 was slightly stable at 3.4 percent, which is estimated to improve to 3.9 percent in 2020. This growth, according to African Development Bank (AfDB) is encouraging since there is evidence of a further move from private consumption towards investment and exports (AfDB, 2020), which shows that the region has experienced some impressive growth. This unprecedented growth in the economy for more than two decades, in both monetary and nonmonetary variables, has led to some significant benefits in terms of poverty reduction.

Despite the gains in the fight against poverty, it is still a challenge that is confronting the world today According to the United Nations Conference on Trade and Development (UNCTAD), as much as 34% of people living in Africa still live in extreme poverty as at 2019 (UNCTAD, 2021). This shows that Africa has overtaken Asia as most individuals living in extreme poverty (Emife & Emeka, 2020). Notwithstanding the alarming rate, there has been some successes in the fight against poverty in the region since extreme poverty rates in Africa have greatly reduced from 54% in 1990 to 40% in 2018 (Beegle & Christiaensen, 2019), however, the rate of poverty in the continent is forecasted to only decline by 23% by 2030. This indicates that by 2030, if drastic decisions are not taken to end extreme poverty in Africa, poverty rates in the world would be driven by only Africans since fast-growing

number of Africans living in extreme poverty continues to rise (Beegle et al., 2016). Beegle and Christiaensen (2019) further indicated that in Africa, 82% of the people who live in extreme poverty are resident in rural areas, who earn less income basically from farming, which, among others, is due to lack of education, conflict, and inequality in rural Africa, which has made the fight against poverty in the continent a bit more complicated.

The poverty reduction efforts in Africa are further thwarted with the advent of the corona virus pandemic which hit the world, including Africa, with both demand and supply-sided effects. This involves impacts on consumption, trade, investment, and travel, including destructions in workforce because of closure of businesses and increase in the cost of transactions (World Bank, 2020), which has led to an estimated shrunk of the economy in Africa by 2.1% in 2020 (AfDB, 2021). The World Bank had forecasted a drop in the economy of Sub-Saharan countries by 3.3% due to the pandemic, indicating a possible recession in 25 years (World Bank, 2020). The report further indicates that the downward economic growth as result of the pandemic will cost the sub region, in terms of output losses, by more than $115 billion (6% contraction of GDP per capita growth), due to the low domestic consumption and investment.

In the light of the above, the contraction of the GDP of African countries by 10% in nominal terms in 2020 have further exacerbated the standard of living of African citizens, which has resulted in an estimated surge in the population living in extreme poverty by 4% (AfDB, 2021). Lakner et al. (2021) indicates that under both the baseline and downside scenarios, the pandemic is projected to increase the global poor by 6.7% and 7% respectively by 2030. The region has been striving to achieve the first goal of the Sustainable Development Goals (SDG 1), which enjoins all member countries to end extreme poverty by 2030. Meanwhile, it is estimated that some 30 million people in Africa, because of the pandemic, would be pushed to poverty by 2030, with low level educators and informal sector workers been the worse hit (AfDB, 2021). This outlook therefore suggests that the world will miss

the 2030 target of ending poverty globally. The pandemic and its attendant effects are further forecasted to erase more than five years success in the fight against extreme poverty.

Reducing poverty entails inclusive growth, which ensures equitable distribution of the gains chopped from such growth among the people (AfDB, 2015). It is therefore important to have an all-inclusive economy to enroll the vulnerable people in society to the financial sector to enhance daily payment of goods and services. Economic growth has, in fact, been empirically proven to be a critical factor in the reduction of poverty and enhancement of the quality of life proven in emerging economies, especially in Africa and Asia (Zhu et al., 2022; Beegle & Christiaensen, 2019; Fuente, 2016; Anyanwu, 2013). A report by the Department for International Development [DFID] (2008) indicates that an all-inclusive growth creates employment opportunities which results in income generation, leading to a virtuous circle of prosperity and opportunities. This will for instance, encourage parents to educate their children and as such create a future of a strong and entrepreneurial society, which will lead to improvement in human development and subsequently stimulate economic growth. It therefore suggests that involvement of the poor in the economic growth process has a role to play in impacting poverty reduction. There must thus be deliberate policies such as labor market liberalization, promotion of gender equality, promotion of financial inclusion, among others, to bring a synergy between economic-promoting policies with policies that permit the poor to participate fully in the opportunities provided to impact the growth process (DFID, 2008).

According to Demirguc-Kunt et al. (2022) reveal that about 1.4 billion adults globally are excluded from the financial sector, signifying that this population do not own or operate any financial product. There are many reasons why Africa still wallows in poverty; paramount among these is inequality and low consumption. Abebe and Quaicoe (2014) posit that the low consumption rate in the continent is due to low-income levels and unequal resources allocation.

To promote economic growth of nations to reduce income inequality of its citizenry, easy access to financial products is essential in social development. The economic lives of the poor are enhanced when they access and utilize financial services, through income generation and as such make them a participant in the financial sector. According to Devarajan and Fengler (2013), the lack of financial inclusion is to blame for the inadequate performance of the sub region with regards to reduction in poverty and the resulting broadening of income disparities, making the inclusive finance agenda a critical tool for reducing poverty and accelerating development. Financial inclusion also enables poor people to leverage their consumption to provide insurance against economic liabilities, in times of illness and accidents (World Bank, 2012). It also makes it easier for these poor but active people to secure loans, which they may use to invest in any business that would generate revenue for them. Schmied and Marr (2016) maintained that financial inclusion is a crucial enabler to poverty reduction since it facilitates the release of the economic potential of the people because of investments in human capital and innovations. To get everyone enrolled in the financial sector does not only solve households' current poverty needs, but it also has the tendency to prevent exposure of households to future poverty, especially the least fortunate in rural sections of society, as well as young people and women (Koomson et al., 2020).

Financial inclusion has therefore gained eminence lately in the light of the above-mentioned importance which has therefore made it a policy tool in alleviating poverty. For example, the World Bank in 2018 recognizes inclusion of all in the financial space as a channel of achieving 7 out of the 17 Sustainable Development Goals (SDGs). These include SDG 1 (eliminating extreme poverty), SDG 2 (reducing hunger and promoting security of food), SDG 3 (achieving good health and well-being), SDG 4 (fostering quality education), SDG 5 (promoting gender equality), SDG 8 (promoting shared economic growth), SDG 9 (promoting innovation).

International or regional agencies like the International Bank for Reconstruction and Development (IBRD), African Development Bank and the G20 leaders have demonstrated their willingness in getting everyone enrolled in the financial system by removing the necessary barriers to improve investments as well as reduce gender inequality (Aguera, 2015). According to Sahay et al. (2015), more than 50 countries in the world, following the call of the WBG, have been estimated to reach this universal financial access by 2020, led by the various regulatory bodies, through the National Financial Inclusion Strategy, which provided the action plan for enrolling everyone into the financial landscape (WBG, 2018). Due to the call by all countries and regions to develop their home-grown measures to promote financial inclusion, African countries were supported by the World Bank and International Monetary Fund (IMF) to equip individual member countries for the needed support in a bid to ensure economic growth of these countries to win the fight against poverty (IMF, 2015a; World Bank, 2014)

After this, the African Development Bank in 2019, launched the Africa Digital Financial Inclusion facility (ADFI), which was intended to provide a loan facility purposely to promote digital financial inclusion to increase access to the financial system in Africa. Regardless of these efforts, there remain a gap in terms of meeting the financial inclusion drive strategies, probably because of over ambition, inappropriate strategies, and poor implementation due to the persistent increase in the exclusion rate (Abubakar et al., 2020; Le et al., 2019b), since about 1.7 billion people in the world do not own an account (Demirgnt-Kunt, 2018). Demigne-Kunt et al. (2015) indicated that Africa is noted for its huge heterogeneity in account ownership and usage; as Mauritius, Kenya and South Africa have respectively 82, 75 and 70 percent of its adults banked, but regrettably only 7 percent of Burundi, Niger and Guinea are banked. Financial inclusion has indeed been useful to individuals through their usage of the various financial products. Despite this remarkable milestone, Ulwodi and Muriu (2017)

indicated that low-income earners, proximity to a financial services provider, affordability and illiteracy are still some barriers to people, which make them not been able to operate formal accounts.

The low levels of income in emerging economies like Africa, has led to the involuntary exclusion of some millions of individuals from the financial system. This has denied the financial sector of funds and wealth creation. With financial inclusion, income level of households would be improved, who would then increase savings and investments, leading to increase in consumption and economic growth at the micro and macro levels respectively. It is against this background of relevance of financial institutions that unlimited efforts have been made by countries toward financial inclusion. In Africa for instance, according to Groupe Speciale Mobile Association (GSMA) the expansion of the mobile money market promotes financial inclusion, since mobile money accounts have increased to 23% in value terms as at the year 2020 (GSMA, 2021). As of 2019, the mobile money market in Africa has registered 50 million new accounts, which represents a 12% rise from 2018, with 469 million users and 181 million of them being active users. Specifically, there is a 33% level of usage of mobile money services in sub-Saharan Africa, making it the lead driver of financial inclusion in the sub region (GSMA, 2021). According to Creemers et al. (2020), Africa is the second largest mobile money market in the World after China, being led by Kenya and Ghana with their volume of transactions increasing to 87% and 82% of GDP, respectively.

Globally, after Asia, Africa is seen as the second fastest growing continent in the World. This is because the continent's GDP growth rate is more than 5% (Triki & Faye, 2013). Despite the region's spectacular growth over the last decade, the benefits of such exceptional macroeconomic growth have not been equitably spread across all countries in the continent (Triki & Faye, 2013). This is because this great stride of growth in the economy appears to have benefited mainly a few wealthy and privileged individuals since income inequality and its attendant poverty in the sub region is still high and remains in ascendancy. This shows that though the poverty rate in Africa has gone down slightly,

poverty levels continue to increase (Beegle et al., 2016), which phenomenon according to critics, is due to lack of financial inclusion (Tita & Jesse, 2017).

The rate of adult population globally that have bank accounts in any recognized institution (banks, microfinance institutions, credit unions or mobile money account) stands at 76% in 2021. This represents 71% in developing economies and 55% in sub-Sahara Africa (Demirguc-Kunt et al., 2022). Unfortunately, this success chopped by the continent in financial inclusion only benefits some few rich individuals. According to Fomum and Jesse (2017), the current pace of financial inclusion and economic growth only favors some few wealthy individuals. Access to financial services is therefore critical and continues to be relevant in eliminating poverty in Africa.

Institutional quality is significant at both individual and economy level in transferring the benefits one derives from financial access to households and firms, in terms of the trust the public repose in the financial institutions as a driver for financial inclusion (Nkoa & Song, 2020; Xu, 2020). Innovations in the advancement of the financial infrastructure and enhancing the quality of institutions are key in championing inclusive finance in Africa. This is corroborated by Loo (2019) who argued that control of corruption and financial access for vulnerable people is phenomenal in enrolling them into the financial sector. Notwithstanding the above, World Justice Project (WJP) rule of law report (2020) presents that Africa has consistently scored low marks in the index of rule of law, indicating that there is low reception of the legal system in both civil and commercial litigations. This supposed that the financial system in the continent operates in a fragile institutional framework (Anayiotoa & Toroyan, 2009). Creane et al. (2004) buttressed the point that the region is associated with a weak legal system, unnecessary bureaucratic system, poor adherence to law and order as well as weak property rights regime. It is therefore imperative for this study to interrogate how the current institutional framework in the African continent promotes or otherwise financial inclusion and the ultimate reduction in poverty. For this work, the following components would be used to evaluate

institutional quality as proposed in the World Governance Indicators; Rule of Law, Political Stability and Absence of Violence/Terrorism, Regulatory Quality, Control of Corruption and Voice, Government Effectiveness and Accountability. This work would therefore test the moderating effect of these indicators as financial inclusion stimulates poverty reduction.

1.2 Statement of problem

Despite some efforts made by countries in economic growth, the quest to end poverty in the world by 2030 as stated by the United Nations, through the Sustainable Development Goals, has not made enough progress. In Africa, poverty thrives due to low levels of income as well as inadequate dispersal of wealth. This is because the continent still harbors the poorest people, especially due to the corona virus that hit the region, since the extreme poor population have increased to over 30 million in 2020, which is expected to increase to 39 million in 2021 (AfDB, 2021). This means that the continent remains the only area globally where the overall population of extremely poor people (those earning below $1.90 a day) is increasing instead of decreasing, contrary to the global rates, which but for the pandemic have reduced significantly (World Bank, 2020). Page and Abebe (2015) emphasizes that the mismatch between poverty reduction and economic growth in Africa is because growth is not fully connected to areas of the economy that relate to reduction in poverty and job creation. Tita and Jesse (2017) added that the state of poverty is not going down in Africa as expected due to income inequality and limited access and/or usage of financial services. The problem statement is further presented according to the research objectives as discussed below.

It is worth exploring the factors that influence one's choice of using a financial product(s) by way of getting included in the financial sector. Empirically, it is established that access to financial products such as reduced cost of banking, having convenient documentations in accessing banking services and proximity to a bank branch has direct relationship with financial inclusion whilst low income and

rural residence are inversely related to financial inclusion (Camara et al., 2014). For instance, Osei-Assibey (2009) indicated that the quest for account opening is influenced by factors like employment, inability to read or write, dependency ratio, richness status of the applicant and nearness to a banking premise. It is also worth to determine how easily or otherwise that enterprises get access to financial services like credits due to its impact in expanding businesses, which has the tendency to lead to employment creation, income generation and profit maximization (Kwamega et al, 2015; Ehikioya & Ismailia, 2014; Banu, 2013). The quest to ascertain factors that influence financial inclusion in this study is essential in the sense that the literature only shows the demand and/or supply- side determinants of financial inclusion (Adil & Jalil, 2020; Vaid et al., 2020; Mhlanga & Denhere, 2020; Le et al., 2019; Zins & Weill, 2016). The combined effect of infrastructural-side determinants, which reveals how institutions influence one's decision to participate in the financial sector, and demand and supply-side factors is not extensively explored in the literature. That is determining the demand, supply and infrastructural side factors that influence financial inclusion. The specific role institutions (infrastructural factor) play in promoting all-inclusiveness, leading to promotion of financial inclusion in all economies, especially Africa, has been established in the extant works (Muriu, 2020; Eldomiaty et al., 2020; Nguyen & Ha, 2021; Ajide et al., 2020). It therefore suggests that the essence of institutions mediating the financial products transfer to households and firms cannot be underestimated. This study therefore aims at determining the demand, supply and infrastructural sided factors that simultaneously affect financial inclusion in a single study. Factors that influence barriers to utilization of financial services in Africa were also examined in this study, which is not expressly investigated in the literature. This consequently presents a knowledge gap with respect to the reasons that influence financial inclusion in the continent and hence legitimizes this study. This will therefore provide some knowledge on a comprehensive way of determining what influences one's decision to be involved in the financial system in Africa, with demand, supply, and

infrastructural factors in perspective and what prevent one from involuntarily participating in the financial sector, which is an improvement in the existing literature.

Financial inclusion is proven to be very paramount when it comes to reducing poverty in all forms, ensures economic growth and foster prosperity, which led to the enactment of a vision of ensuring Universal Financial Access by the year 2020 by the World Bank. This was done by bringing together financial sector regulators, telecommunication networks and other market players. Undoubtedly it is obvious that if poor people can easily access financial products it leads to increment in their savings and investments. This will in turn empower the poor, especially women to be able to take productive financial and insurance decisions that would deliver their households from poverty. Unfortunately, according to Demirgüç-Kunt (2014) the desired benefit that the poor and small businesses should have derived from access to finance is not achieved. It is expected that when a country is financially included, it leads to improvement in income, better education, risk mitigation, employment, among others, for the beneficiaries, especially the poor. This is further supported by the inequality-reducing theory and the neoclassicals, who argued that financial development aids inclusion of households into the financial sector for its income boosting benefits, leading to poverty reduction (Hamori & Hashiguchi, 2012; Mookerjee & Kalipioni, 2010; Demirguc-kunt & Levine, 2008).

It has subsequently been empirically proven that financial inclusion is inversely related to poverty reduction in all economies (Jiang & Liu, 2022; Barik & Lenka, 2021; Koomson et al., 2020; Donou-Adonsou & Sylvester, 2016; Mookerjee & Kalipioni, 2010; Akhter & Daly, 2009), signifying that access to financial services leads to poverty reduction. The literature also presents some dissenting arguments to the effect that financial inclusion does not have any effect on poverty reduction (Balliester Reis, 2020; Kaidi et al., 2018; Mader, 2017), due to cost that is associated with accessing financial services, especially loans in developing regions like Africa, others contending that developed economies benefit more than developing economies (Wang & Guan, 2017), whiles others

conclude that the effect is not automatic (Singh & Huang, 2015). This presents a nonlinear relationship between financial inclusion and poverty reduction and as such demonstrations that the benefits of financial inclusion would only be felt at a certain point. This suggests that for financial inclusion to have its expected maximum effects on poverty reduction for most of the citizenry, a certain level of inclusion must be attained to realize the poverty reduction effect.

The institutions facilitating the impact of financial inclusion also play a role in how the effect of the inclusion would be felt. Rule of law, for instance, is seen as an essential ingredient for ensuring inclusive finance (Muriu, 2020) due to the level of confidence and trust households' repose in the financial sector when rule of law is upheld in the country, same can be said about all the indicators of institutional quality. The existing literature only reveal the relationship and its direction involving financial inclusion and poverty reduction without revealing the exact point of inclusion that the benefit would be felt, with moderative effect of institutional quality, which legitimizes the quest to address this in this study. This therefore necessitates the study of financial inclusion in Africa, as well as the threshold level at which the continent would truly achieve some success in poverty reduction, so that policies may be implemented to help countries accomplish that goal. This study did not only confirm that there exists an adverse connection in the poverty and financial inclusion nexus but has provided the current and actual inclusion level that would lead to a drop in poverty levels in Africa, aided by strong institutions.

Access to financial services has been found to contribute significantly to the stability of the financial system due to its ability to boost deposits, which improves liquidity in the banking system. Despite the importance of access to finance, stability of the financial system is equally contingent on how the financial system is well regulated and supervised. A well- developed financial landscape is positively related to growth of the economy due to its ability to promote businesses and create employment, thereby increasing output and gross domestic product, leading to a reduction in inequality and

poverty. Financial development does not only lead to stability and poverty reduction directly, it also indirectly impacts on job creation. This is evident in the sense that deregulation of the banking system, aimed at ensuring financial inclusion, does not only promote competition in the banking sector, but it also improves on income of the poor. This means that financial inclusion does not only impact on income and poverty directly, but it also closes the inequality gap as well as ensures stability of the financial system. Prasad (2010) has indicated that through financial inclusion, more households and firms participate in the financial system, leading to increase in domestic savings and investments, which provides safe loanable funds for banks as such ensures stability of the system. The Consultative Group to Assist the Poor [CGAP] indicates that growth in the clientele base of banks, because of the financial inclusion drive efforts, has positive impact on the financial system, leading to more resilient financial system, capable to withstand any shock (CGAP, 2012).

The literature focused basically on the impact of financial development (inclusion) on inequality and poverty reduction (Singh and Jha, 2021; Destek et al., 2020; Zhang & Naceur, 2019). The relationship between financial inclusion and financial stability in relation to poverty reduction has not been extensively explored in the literature, especially with regards to African countries, where poverty is rife. This thesis therefore seeks to fill this gap by investigating the long and short run relationship between financial inclusion, financial stability, and poverty reduction in Africa, which will influence policy by enrolling more people into the financial sector and adoption of robust regulatory framework that will ensure stability of the financial system as such ensure poverty reduction.

This presents a gap in the literature in the areas of determinants of financial inclusion with demand, supply as well as infrastructural side factors that affect financial inclusion in Africa. Also, the exact level of financial inclusion that will lead to poverty reduction as well as the role quality of institutions play in this relationship needs attention. Furthermore, the call for all to be included in the financial

sector to impact on poverty reduction, should be done within the context of financial stability, which has not been explored in the literature, legitimizing this study, and filling the gaps as presented.

1.3 Aim and Objectives of the Research

This study seeks to estimate the relationship between financial inclusion, institutional quality, and poverty reduction in Africa. The study would specifically seek to.

1. Examine the determinants of financial inclusion in Africa, interrogating the relevance of institutional quality.
2. Estimate the threshold effect of financial inclusion on poverty reduction in Africa, with moderative role of institutional quality.
3. Examine the relationship between financial inclusion, financial stability, and Poverty reduction in Africa.

1.4 Research questions

Following from the problem statement, the study shall attempt to find solution to the appended research questions.

- What are the determinants of financial inclusion in Africa, with the relevance of institutional quality?
- What is the threshold effect of financial inclusion that leads to reduction in poverty in Africa with the moderative effect of institutional quality?
- What is the relationship between financial inclusion, financial stability, and Poverty reduction in Africa?

1.5 Significance of the study

The study of previous and comparable work in Africa and elsewhere revealed a mixture of relationships. The following studies show an adverse correlation between financial inclusion and poverty reduction, signifying some inclusiveness in the financial space, which enhances reduction in poverty (Park & Mercado, 2015; Omar & Inaba, 2020; Koomson et al., 2020; Barik & Lenka, 2021; Amri & Nazamuddin, 2018). Other studies also showed that developed economies benefits more from financial inclusion than emerging economies (Wang & Guan, 2017), others suggesting that the poor do not benefits, only the rich do (Singh & Huang, 2015) whilst others also claim financial inclusion has no effect at all on poverty reduction (Mader, 2017). It was also argued by Claessens and Perotti (2007) that the effect of finance on poverty reduction is not automatic. This reveals a nonlinear relationship between financial inclusion and poverty reduction, suggesting that the benefit of financial inclusion in terms of poverty reduction can only be felt at a certain threshold level, indication an inconclusive debate in the financial inclusion and poverty reduction nexus. This thesis therefore filled this gap by estimating the exact level of inclusion that will stimulate poverty reduction. For the financial system to play its poverty reduction role efficiently, stability of the system must be given the needed attention, through effective participation of strong institutions.

This research first uncovered the elements that drive financial inclusion in Africa, considering both demand and supply as well as infrastructural factors. This makes this work different from other writers in the literature, since other authors used either demand or supply factors or both, but excluding infrastructural factors, which has been identified in the literature as having a critical impact on the financial inclusion. This therefore reveals a knowledge gap which this work admits to close by simultaneously determining the supply, demand as well infrastructure factors that influence financial inclusion in a single model.

In addition, this write-up examined the threshold effect of financial inclusion on poverty reduction in the region, moderated by quality of institutions. That is, at what threshold level would the expected effect of inclusive finance be felt in reducing poverty in Africa, through the catalytic effect of institutional quality, which is absent in the literature. Lastly, to estimate the cointegration effect among financial inclusion, financial stability, and poverty reduction in Africa, also makes this work unique compared to others. To add on to the uniqueness, this study employed the Principal Component Analysis (PCA) method to determine a composite financial inclusion and institutional quality indexes, which makes the indexes robust as compared to studies like Sarma (2008) and Parks and Mercado (2015), who determined the indexes using nonparametric approach. This study would thus be beneficial to policy holders and development partners in the sense that it would assist in modeling policies that would specifically complement the financial inclusion drive efforts that would lead to poverty reduction. It would also provide literature for researchers to build upon in their efforts to research into the relationship that exists between financial inclusion and poverty reduction as well as ensure stability of the financial system.

1.6 Scope and Limitations of the thesis

The study focusses on the effect of financial inclusion on financial stability and poverty reduction in the African context, with the influence of quality of institutions. For the purpose of this study, financial inclusion was measured following Camara and Tuesta (2017), which comprise the following; number of Automated Teller Machines (ATM) per 100,000 adult population, branches of banks and agents per 100,000 population, having a savings account, having at least one financial product and holding a loan account in a financial organization as well as barriers to financial inclusion which is measured on distance, trust, affordability and documentation. For the institutional quality, Rule of law, Control of Corruption, Regulatory Quality, Governance Effectiveness, Political Stability

and Absence of Violence/Terrorism and Voice and Accountability was used. Due to nonavailability of poverty data on most countries in Africa, especially the countries used, the study used data on Household Consumption Expenditure as a proxy for poverty, which is supported by the literature. To measure financial stability, Bank Z-score, percentage of Bank Credit to Bank deposit and percentage of Liquid assets to deposits and short-term funding were used.

The study is limited in the sense that not all African countries could be used for the study due to data availability, hence may not be generalized for the continent.

1.7 Structure of the thesis

This write-up is arranged in relation to the specific objectives, as presented below:

Chapter Two: This section of the thesis investigated the determinants of financial inclusion in Africa using the GMM technique. The GMM method is appropriate for this estimation due to its ability to correct the problem of endogeneity, which is associated with financial inclusion data because of the lag component in the measurement of financial inclusion. This study will enrich the literature since it has presented demand, supply and infrastructural-sided factors that impact financial inclusion in Africa, which would be beneficial to governments, central banks and development partners in modeling what influences one's decision to participate in the financial sector in Africa. This is an improvement on previous studies in the continent, since they only presented either demand and/or supply-side determinants of financial inclusion, without the infrastructural side. The study also revealed the factors that influence barriers that inhibit one from participating in the financial sector in Africa.

Chapter Three: This study estimated the threshold level at which financial inclusion would stimulate poverty reduction in Africa, moderated by institutional quality. It is imperative to ascertain the exact level at which financial inclusion would result in poverty reduction in Africa and how institutional

involvement affect such impact. Using the Hansen threshold estimation method, the study presents knowledge on the nonlinear relationship between financial inclusion and poverty reduction, by precisely revealing the exact level where financial inclusion would result in poverty reduction. This study would be beneficial to governments and central banks in formulating policies that would promote financial inclusion, which would lead to a reduction in poverty in the region.

Chapter Four: This chapter looked at the relationship among financial inclusion, financial stability, and poverty reduction. This objective was estimated using the panel Autoregressive Distributive Lag (ARDL) model, since it could determine simultaneously, the short-run and long-run effects among the dependent and independent variables. This would go a long way to inform stakeholders on how to promote financial inclusion such that stability of the financial system would not be compromised to derive its poverty reduction benefits.

Chapter Five: This chapter presents the summary, conclusions, and recommendations of the thesis as well as suggestions for further studies.

CHAPTER TWO

DETERMINANTS OF FINANCIAL INCLUSION IN AFRICA:

IS INSTITUTIONAL QUALITY RELEVANT?

2.0 Introduction

At the global level, financial inclusion is seen as one of the most talked-about systems that can help improve the living standards of the people. According to the World Bank, financial inclusion has to do with households and firms having access to financial services that meet their needs, that they can afford, which is offered in a way that is responsible and sustainable (WBG, 2022). Mhlanga et al. (2020) indicated that due to the importance of financial inclusion, through the influence of governments and other development partners, it has gained interest in using it to stimulate growth and reduction in poverty. To further give this call an international backing, the World Bank group (WBG) adopted universal financial access as a key element in tackling inequality and improvement in the livelihood of the people (Demirguc-Kunt et al., 2018).

Inequality and unemployment coupled with its attendant low income is eminent in Africa. Financial inclusion is seen as one of the measures to achieve the fight against inequality and unemployment since it would empower the people through accumulation of wealth. Financial inclusion is considered globally as an enabler to employment creation, increase in investments, improvement in income generation, which will eventually lead to a reduction in poverty. If the financial sector is developed, with unfettered access to financial services, it enhances the livelihoods of the people, boosts economic development and as such leads to a reduction in poverty (WBG, 2022).

It is estimated that with access to finance Africa, which is one of the poorest continents in the world, would be able to get to its development pedestal (Musau et al., 2018). Furthermore, financial inclusion is considered as an important instrument that can boost financial development, stimulate economic growth, deals with the problem of inequality in all its forms and most importantly, improve

upon the poverty status of households (Demiguc-kunt et al., 2018; Chibba, 2009). Camara and Tuesta (2018) indicated that financial inclusion has both direct and indirect ways through which one could benefit; having access to cash for the day-to-day transactional needs of households and subsequently leads to smoothening of consumption and the ability to withstand destructions in the economy. Financial inclusion has the tendency to empower households/and firms so that they can withstand global developmental challenges that affect prosperity of the people since it is not only useful in economic growth but also critical in closing the income inequality gap (Mhlanga & Dunga, 2020; Beck et al., 2005).

It is estimated that a well-coordinated financial system encourages the creation of new businesses and the growth of existing ones, which will go a long way to strengthen participants in the financial sector. Women and the youth who face socio-cultural/or religious impediments in getting involved in the financial space are liberated to have access to financial services, since this category of households are unfortunately most affected when they are financially excluded (Demirgnt-Kunt & Levine, 2008; Handriks, 2019; Siddik, 2017)

It is important to improve on the factors that impede one's access to financial services because of poverty, unemployment, low income, loss of job, high cost of funds, proximity to a financial service provider, unfavorable economic conditions, lack of trust in the financial institutions and product as well as religious and socio-cultural barriers. These reasons, among others, even affect those who operate accounts to the extent that their accounts remain inactive. According to the global Findex database, 25 percent of accounts held in banks in developing countries have not been active or remained dormant in terms of deposit or withdrawal for the past one year (Bull, 2017). It is imperative to identify factors that leads to this non usage of accounts and avoidance of the financial system, and what promotes one's involvement in the financial sector since the consequences of involuntary exclusion in detrimental to the growth and poverty reduction of such persons. It will specifically

lower the self-esteem of the people, expose them to more expensive and harsh economic conditions and, unsteady and traumatic lifestyle. Inability to participate in the financial sector due to unfavorable factors could also deny the people some benefits in the form of discount associated with bank account ownership because of cashless or online services usage in the account. Insurance as well as pensions also elude this category of involuntarily excluded persons and as such, they get impoverished more during tragedies and old age. The global Findex database indicates that 25 percent of accounts held in developing countries have not been active or remained dormant in terms of deposit or withdrawal for the past one year (Bull, 2017).

It is empirically proven by Dupas and Jonathan (2013) that when households have access to financial products like savings, credits, and payments, it impacts positively on their lives through improvement in education and/ businesses boost. Mhlanga and Denhere (2020) stated that finance is so important to the extent that the least amount of financial access provides the user with an enabler to stand any shocks in the economy. Despite the importance of financial inclusion and the acceptance of the concept globally, there are factors both locally and globally that inhibit one's involvement in the financial sector. Wokabi and Fatoki (2019) investigated the determinants of financial inclusion in the east African countries, comprising Uganda, Tanzania, Kenya, Burundi, and Rwanda, which revealed that income level and rural inhabitation are significant factors that influences ones' involvement in the financial sector. Mhlanga and Dunga (2020) and Prymostka et al. (2020) all investigated the determinant of financial inclusion in Zimbabwe and Ukraine respectively. Both studies revealed that income, financial literacy, educational level, distance, age of head of household, lack of trust in the financial institutions and unfavorable policies of the financial institutions are some of the factors that prevent one from participating in the financial sector.

The World Bank states that exclusion of households from the financial sector is prevalent in emerging and developing economies like Africa, due to the huge gap in access, usage, quality of savings,

availability of credit and indemnity services (World Bank Group, 2015; Demirguc-kunt et al., 2015). Achugamonu et al. (2020) mention that about 80%, representing 325 million adults, in sub–Saharan Africa are unbanked due to varied unfavorable factors. It is therefore essential to reduce or eliminate factors that prevent one from participating in the financial sector. This study therefore empirically identifies factors that determine one's involvement in the financial system in Africa which will inform policy makers in designing measures that will promote enabling factors that ensure financial inclusiveness' thrive to eliminate the barriers.

Institutional involvement (endogenous and/ exogenous) plays an indispensable role in the financial sector in promoting trust the public repose in financial institutions in encouraging financial inclusiveness. Nkoa and Song (2020) indicated that Africa harbors fragile institutions which makes the fight against poverty and inequality difficult. Chu et al. (2019) posits that institutional quality enhances the inclusion of households into the financial sector. Anthony-Orji et al. (2019) also confirms the stimulative effect of institutional quality by indicating that involvement of quality institutions is positively related to financial inclusion in Nigeria.

The specific role of institutions in promoting financial inclusiveness has been established in the extant works (Muriu, 2020; Eldomiaty et al., 2020; Nguyen & Ha, 2021; Ajide et al., 2020). It therefore suggests that the nature of institutions mediating the financial products transfer to households and firms cannot be underestimated. The infrastructural-side factors, which represents institutional quality, despite its significance in promoting financial inclusion cooperatively with demand and supply sided factors, has not been explored extensively in the literature, i.e., determining the demand, supply, and infrastructural factors simultaneously in a single study. Factors that influence barriers to utilization of financial services in Africa was also investigated in this study which was not adequately investigated in the African literature. This consequently presents a knowledge gap with respect to the reasons that influence financial inclusion in the continent and hence legitimizes this study of

determining how demand, supply and infrastructural-side factors would in a single model, influence the inclusion of households in Africa into the financial landscape and to determine contributing factors that inhibits one's access to financial services. This will therefore provide some knowledge on a comprehensive way to determine what influences one's decision to be involved in the financial system in Africa and what prevent one from participating in the financial sector, which is an improvement in the existing literature.

2.1 Concept and measurement of financial inclusion

Financial inclusion has been a critical factor globally in ensuring sustainable development of countries. Subbarao (2009), buttressed this assessment by indicating that economic fortunes are in fact directly related to access to financial services, especially for the poor. Measurement of financial inclusion according to Sarma (2016) is the first most important step in discovering what constitutes financial inclusion. Due to economic circumstances of countries and geographical arrangements, there is no straight forward and globally accepted measure of financial inclusion, which has raised a debate on how it should be measured. To have a universally approved measure of financial inclusion is very important to assess how the various interventions are impacting on the people and on the concept.

Honoham (2008) historically started the measurement of financial inclusion who measured estimates from households with banking experience and compared them with households with inequality and poverty, with the use of mean deposit size, GDP per capita and household access to determine estimates of over 160 countries globally. The study revealed that the Caribbean and Latin American countries had the largest mean percentages but countries in eastern Europe, Africa and Central Asia had the smallest mean percentages. These indicators gave useful and essential information about the

financial system and its penetration but failed to provide a comprehensive measurement of the extent of financial inclusiveness, due to the usage of a single indicator.

To improve upon Honoham's measurement, Sarma (2008) suggested a more comprehensive measure of financial inclusion with the use of macro-economic data, purposely to add several indicators, including availability, accessibility and usage of services rendered by banks. This approach is robust and comparable across nations and can be used to monitor initiatives of financial inclusion progress over time (Beck et al., 2007; Honohan, 2008), which has been the basis for other researchers to determine country specific indexes. According to Sarma (2008), financial inclusion has to do with the access, availability, and usage of formal financial services to all manner of persons in an economy. Subsequently, Chekravarty and Pal (2010) improved upon Sarma's approach to ascertain how other factors affect financial inclusion. Similarly, Sharma (2016) and Camara and Tuesta (2014) also define financial inclusion as the access and usage of financial services as well as minimizing the barriers to the access and utilization of financial services, considering both demand-side and supply-side of access to finance. The World Bank also defines financial inclusion as access and usage of financial services such as savings, credits, transactions, insurance, and various payments, that are affordable to the consumer (World Bank, 2017).

The advent of mobile money, through the high usage of mobile phones, has made mobile banking prevalent in all economies and as such has been incorporated in the measurement of financial inclusion (Chauvet & Jacolin, 2017). This has therefore influenced the usage of the measure by Camara as Tuesta (2014) since they consider the usage of mobile money in their measure of financial inclusion. It is appropriate to choose this approach since the mobile money market in Africa for instance, has grown massively, as a result, placed second in the world and making a lot of impact in the financial space, especially in rural areas, where traditional banks do not and would not ordinarily open a branch. Shirono et al. (2021) corroborates this by stating that mobile money transactions have

become an essential part of financial transactions in many households today, especially in emerging economies. Financial services in insurance, microfinance, pension, services from other financial institutions and Fintech have all been considered lately in the measurement of financial inclusion.

Lenka and Barik (2018) mention that policy holders need to have sufficient information and understanding of the concept of financial inclusion to monitor the factors that influences its penetration. The World Bank indicates that the challenges researchers and policy agents face in measuring financial inclusion have to do with how to differentiate between people who voluntarily or involuntarily exclude themselves from the financial sector.

In a more parametric approach, Camara and Tuesta (2014, 2017) used the PCA method to determine a composite index of financial inclusion with the use of both supply and demand side information which this thesis builds upon by including the role institutional quality (infrastructure factors) play in enrolling households and firms into the financial space.

2.2 Review of theoretical and empirical literature

The concept of financial inclusion as well as factors that determine inclusiveness rests on economic theories. These theories have been empirically tested by modeling many factors, both general and country/regional specific, that inform one's inclusion in the financial sector. Despite the literature on this subject, much still needs to be done due to the emerging nature of the subject. This section therefore presents theoretical and empirical literature that underpins this study.

2.2.1 Theoretical Literature

- **Financial Intermediation Theory**

According to the financial intermediation theory, financial institutions play a major role in holding cash for the surplus public and channel same to the deficit market participant, through the concept of intermediation. Financial intermediation, simply put, is the process by which financial institutions (deposit money banks, insurance companies, investment banks, pension funds, banking agents, among others) mediates between providers of cash and users of financial capital by transferring money from those who have excess to those who need them in a financial market (Kwakye, 2012). The theory of financial intermediation was started by Gurley and Shaw (1960), which takes its background on the concept of asymmetric information and transaction cost. Information asymmetry deals with the concept where parties in a transaction have imbalance information. The famous Arrow-Debreu perfect market hypothesis is where players in the market leave in perfect system and as such every information concerning market participants are readily available and as such there would not be the need for intermediation, which does not happen in reality because of imperfections in the market. Financial intermediaries overcome the problem of information asymmetry by playing the role as delegated monitors and distribution of information to market players (Boot et al., 2020). The information asymmetry problem that intermediaries fit in to solve calls for regulations of the financial market so that they would continue to play the mediating role effectively.

Transaction cost is also critical in the concept of financial intermediation, which is the cost incurred by market participants in their dealings in the financial sector (Scholtens & Van Wensveen, 2003). Financial intermediation can substantially reduce the cost savers and borrowers incur in financial transactions, involving time and money spent during exchange of goods and services (Hamdouni, 2011). Financial intermediaries have control over cost because they are large and have the expertise and as such have an advantage of economies of scale, as compared to individual households. Financial

intermediaries are also able to effectively reduce the risk that investors bear on their investments by sharing the risk between all market players.

As part of the study, this work proposed to identify the determinants of financial inclusion to complement the effort to get everyone involved in the financial sector. This theory is therefore linked to this study in the sense that when market information is imbalanced, it has the tendency to scare households or discourage them from participating in the financial sector. Similarly, the cost of financial transactions also plays a role in the participation of households and businesses in the financial sector. The lesser the cost of assessing or using financial products, the more people participate, and hence more households and firms are included in the financial system and vice versa. Lastly, when the financial sector is not well regulated and highly risky, it discourages the citizenry from getting involved in the financial space. This therefore makes this theory apt as a background for this study.

- **The neo-institutional theory**

The neo-institutional theory, propounded by Douglass North, also underpins this study. The theory states that for systems in an economy to function effectively, it depends on how quality the institutions in the system operate (North, 1990). According to the theory, institutions consist of constraints in the political, economic, and social coexistence that are fueled by the human component. This can be both formal (laws, constitution, property, and human rights) and informal (customs, taboos, traditions, code of conduct). Institutional quality can be considered as inclusive or extractive; extractive institutional setting has to do with few powerful individuals exercising political power and inclusive institutional system has to do with evenly usage of political power (Acemoglu & Robinson, 2012).

The extractive political system is associated with corruption, which might cause barriers in the benefits one would derive from financial inclusion (Mauro, 1995; Johnson et al., 2002; Mcmillan &

Woodruff, 2002). An inclusive system, on the other hand, yields a lot of benefits since every member of the economy operates freely under good policy and politically stable environment which has a greater tendency to lead to poverty reduction due to its ability to increase savings and investment, which can lead to an improvement in income levels and guide against risk (Parks & Mercado, 2015; Beck et al., 2007). This means that to always ensure inclusion is important since the extractive system has debilitating effects on the economy. It is an undeniable fact that the main factors that enhance economic prosperity, which will subsequently lead to poverty reduction, is the quality of the institutions operating within the economy (Easterly & Levine, 2003; Tebaldi & Mohan, 2010). It is empirically proven that financial services are rendered effectively when institutions operate freely and professionally (Gani & Al-muharrami, 2015; Ndikumana, 2006). For instance, if the granting of credit is done according to regulations, due diligence would have been done such that the credit would be granted to deserving clients which will guarantee pay- back since the client would be aware of the consequences, should he/she default. This will engender trust in the financial system and as such improve the financial inclusion drive and its attendant benefits. Similarly, corrupt officials and governments lead to loss of credibility which pushes away potential investors, which has the tendency to mare the promotion of financial inclusion and the fight against poverty (Law & Azman-saini, 2008). This theory similarly fits this study in the sense that when the various structures within the economy functions well as spelt out in the institutional quality indicators, it promotes confidence in the financial sector and as such lead to more people participating in the sector, hence promotes inclusion. This study therefore seeks to investigate how institutional quality will ease the poverty reduction fight through the promotion of financial inclusion.

2.2.2 Empirical Literature

Demand-sided obstacles and supply related constraints, coupled with other factors, play an important role in championing the course of financial inclusion. This section is therefore categorized under demand, supply, and infrastructure side determinants of financial inclusion.

- **Demand-sided factors that influence financial inclusion.**

It is important to ascertain how demand-related factors contribute to the inclusion of households and firms into the financial sector. That is to assess the literature on determinants of financial inclusion from the point of view of users of financial services.

To ascertain demand-driven factors that influence financial inclusion across countries, Bekele (2022) comparatively analyzed the determinants of financial inclusion in Kenya and Ethiopia with macro and micro level variables in perspective. Using the Generalized linear model, the study revealed that gender, age, employment status and ownership of a mobile phone significantly influence financial inclusion. Financial inclusion plays a role in financial freedom and financial capability. Tinta et al. (2022) studied the micro level factors that encourage financial inclusion and financial resilience in Africa. It was revealed that for one to open a formal account or mobile money account, it is dependent on individual characteristics, financial literacy and stringent or otherwise of the requirement to the account opening. The study further revealed that women, youth, and rural residents are associated with informal savings whilst the men, urban residents and the elderly are associated with formal savings with the usage of formal savings linked to highly educated and high-income households. Furthermore, marriage, innovation and financial literacy were identified to promote financial resilience. In a similar vein, Senon and Manda (2022) investigated how access to funding impacts on the ability of the youth to be entrepreneur in Benin. With the increase in the youth population, coupled with increasing unemployment in developing countries, it is important to make funds available to the

youth to create their own businesses by removing any barriers to sourcing of funds. Using the endogenous stretching regression technique, together with propensity score matching, the study revealed that age, poverty level, education, experience, and presence of a bank branch influences the youth's access to finance in Benin. The study further shows that there is a 15.2% likelihood that a youth with access to funds will be an entrepreneur. Ndanshau and Njau (2021) empirically examined demand-side factors that influence financial inclusion in Tanzania. Employing the probit model, the study found that a male, middle aged, gainfully employed, residing in an urban area, having multiple streams of income and highly educated persons are more likely to be included in the financial sector in Tanzania. Ndoya and Tsala (2021) investigated the effect of gender in promoting financial inclusion in Cameron. With access and usage variables, the study found that there is a gender gap in the access and usage of financial products in favor of men, since men are mostly more resourced than women, with the largest contributor been income. With regards to financial services provision, education was seen as the major contributing factor. Financial inclusion has been identified as one of the enablers in fighting poverty in Namibia. Mhlanga and Denhere (2020) investigated what determines one's involvement in the financial sector in the southern African region, with south Africa as a case study. With the use of the logit model, race, income, marital status, and gender were found to be the major drivers of financial inclusion in the sub region. Asuming et al. (2018) comparatively analyzed the determinants of financial inclusion in sub-Saharan Africa using data from the Global Findex database. With the use of the probit model, the study revealed that age, education, wealth, and gender are significant factors that influence financial inclusion in the sub region. Mndolwa and Alhassan (2020) also examined determinants of gender disparities in the financial inclusion space in Tanzania. The results show that there is a disparity of 21.5% savings, 10.6% formal account opening and 9.4% mobile money account. The result further revealed that there is a 17.1% lower chance for female owning a savings account but 2% more likely to source formal credit from a financial institution. These differences according to the author is due to lower levels of education, over-reliance

of women or men and income levels. Amoah et al. (2020) examine what influences once choice of using mobile money in the greater Accra region of Ghana. It is imperative to note that psychological and socio-cultural factors influence the use of financial services. Using a logit model, the study revealed that educational level and income constitutes the main factors that influence mobile money usage in Ghana. Iyambo (2020) investigated the determinants of financial inclusion in the Khomas and Oshana regions in Namibia. Using a binary logistics regression model, the study found that income level, operating a bank account, educational attainment, savings ability, age, credit, and distance are the key determinants of financial inclusion in Namibia.

Yangdol and Sarma (2019) reveal that individual characteristics and the prevailing economic conditions significantly play a role in individuals getting involved in the financial sector. The study specifically revealed that less educated, being a woman, the unemployed and being poor are negatively related to financial inclusion. This suggests that improved income level and advanced in education increase the likelihood of households to participate in the financial sector.

The attitude towards access to finance has a role to play in one's quest to be an entrepreneur. Koloma (2021) examined the willingness of the youth to go into entrepreneurship in relation to their level of financial inclusiveness. With the use of logit model and the propensity score matching, it was revealed that for a youth to be more included in the financial sector, it depends on how educated the person is, their employment status, family status and at least a family member having an account. The cost of accessing financial services, perceptions associated with financial services and low income also contribute to entrepreneurial development. Savings and loans were also identified to play a major role in the wiliness of the youth to venture into entrepreneurship. The study specifically showed that when the youth is offered a loan, it is more likely for them to go into agribusiness. Le et al. (2019) and Grohmann et al. (2018) in different comparative studies involving Asian Countries, examined the determinants of financial inclusion using the Random effects model. Financial inclusion has been

proven to be a means to improve financial access, improve capacity as well as equality. The study shows that financial inclusion levels are higher in countries with high income levels because of stronger economic growth since the more income/resources, the more likely to patronize financial services. Financial literacy has also been found to have a direct relationship with financial inclusion since the more knowledgeable one is, the more he/she uses financial products. Unemployment rates have, however, been identified to have a negative effect on financial inclusion. Infrastructure also has effects on the ability of people to access financial services, the study posits.

Dar and Ahmed (2020) examined the drivers of financial inclusion and the determinants of obstacles to financial inclusion in India. With the help of the probit model, the study revealed that gender, education, age, and income level are significant contributing factors in one's involvement in the financial sector. In a related study, Badar et al. (2020) explored the determinants of financial inclusion in India, Pakistan, and Bangladesh. With the use of a multinomial logistic regression the study shows that a male, educated, employed and rich as well as owning a mobile phone is more likely to be included in the financial sector in the selected countries.

- **Supply-sided factors that influence financial inclusion.**

The providers of financial services are as important as the users. This section presents empirical literature on factors that determine financial inclusion on the point of view of financial institutions that provide financial services to households and firms.

Financial inclusion has country specific determinants as well as worldwide reasons that influence one's involvement in the sector, in terms of the financial institutions delivering the financial service. Mossie (2022) examined the factors that influence financial inclusion among adults in Ethiopia. With the use of the logit model, the study found that distance to financial access point, documentation requirements and affordability were the supply side factors that influences financial inclusion in

Ethiopia. Mose and Thomi (2021) explored the supply side determinants of financial inclusion due to its ability to complement efforts put up by government and financial institutions in making available financial services for use by households and firms. Using the OLS method, the study found that the number of internet usage and economic growth have a significant effect on patronage of households and firms in the financial sector. In a related study, Eze and Dumani (2020) investigated determinants of financial inclusion in Nigeria. Supply-side data from the World Development Indicators (WDI) spanning from 2000 to 2018, was employed. With the use of OLS technique, the study revealed that commercial bank branches and deposit interest rates are negativity related to financial inclusion whilst domestic credit to private sector (% GDP), lending interest rate and ratio of rural deposits to loans are directly related to financial inclusion. Edo et al. (2019) explored how adoption of internet promotes development of finance in Nigeria and Kenya using the dynamic Least Square method and the error correction model. The study showed that internet usage together with financial openness are positively related. This suggests that in Sub-Saharan Africa (SSA), internet use for financial services enhances financial inclusion. Oyelami et al. (2017) examined determinants of financial inclusion in sub-Saharan Africa. With the use of panel Autoregressive Distributive Lag (ARDL) method, the study revealed that financial inclusion is significantly influenced by interest rates and bank innovation which is proxied with ATM usage. Abel et al. (2018) reviewed determinants of financial inclusion in Zimbabwe using the logit model. The study revealed that documentary requirements to open an account with a financial institution and distance to the nearest financial outlet play a role in one's involvement in the financial sector in Zimbabwe. Okoroafor et al. (2018) examined the determinants of financial inclusion in Nigeria. As a time- series study, the work employed Error correction model (ECM) and revealed that the availability of credit and internet access are significant determinant of financial inclusion in Nigeria.

Chinoda and Kwenda (2019) investigated the impact of mobile phones, economic growth, bank competition and stability on financial inclusion. With data from 49 countries from 2004-2016, the study was analyzed using five-variable panel structural vector autoregressive model. It was revealed that financial inclusion is significantly and positively related to shocks emanating from banking competition, mobile phones, economic growth, and bank stability.

Stakic et al. (2021) investigated the key determinants of financial inclusion in the Western Balkan countries (Albania, Bosnia & Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia). With the use of a pool panel data regression model, the study revealed that economic growth, internet usage and mobile phone ownership and usage are positively and significantly related to financial inclusion in the countries. The study, however, revealed a negative relationship between interest rate and financial inclusion. This therefore suggests that economic growth, internet usage, mobile phone usage and interest rates are determinants of financial inclusion in the Western Balkan countries. Kandari et al. (2021) explored the determinants of financial inclusion in India from socio-economic and demographic perspective. With data from 780 rural households using binary logistic regression model, the study revealed that bank account ownership, availability of credit facilities and mobile banking access were seen to be the main predictors of financial inclusion in rural India. Ali et al. (2020) investigated determinants of financial inclusion in Indonesia from the Islamic perspective. With the use of the Analytic Network Process (ANP) to generate opinions of experts in academia, regulators, and practitioners on what influences a Muslim to be involved in the financial sector, the study revealed that on the scale of preference, human capital, product and services, infrastructure as well as policies and regulations determines one's decision to use financial services in Indonesia.

Adil and Jahil (2020) studied the supply-side determinants of financial inclusion in the banking sector of Pakistan. Employing an autoregressive distribution lag method, the study found that for the banking sector of Pakistan to have a greater impact, it is dependent on geographics, the size and

demographic representation of the bank. The study further opined that increase in consumer credit and small-sized advances can also promote financial inclusion.

Uddin et al. (2017) examined the determinant of financial inclusion in Bangladesh from two broad perspectives, bank specific factors and macroeconomic factors. Using the General Method of Moment technique (GMM) and quantile regression models, the study revealed that bank size, efficiency of the bank and interest rates banks charge are directly related to financial inclusion.

- **Infrastructural factors that influence financial inclusion**

Aside from financial institutions offering financial services, quality of institutions operating within the economy also plays an important role in promoting the trust households and firms have on the products and services of financial institutions. This section explores the contribution of institutional quality in promoting financial inclusion.

Muriu (2021) explored whether institutional quality matters for financial inclusion, using deposit account ownership as a benchmark. With annual data covering 120 countries, both developed and emerging countries, covering a period of 2004-2019, analyzed using the Fixed Effects Panel Estimation model, revealed that rule of law and regulatory quality are significant and contributes immensely towards inclusive finance, especially in Africa, where their legal and regulatory institutions are not quite strong. In a related study, Aracil et al. (2021) interrogated the role institutional quality play in financial inclusion in facilitating the poverty reduction fight using 75 developing and developed countries over the period of 2004-2017. With the Quintile Regression analysis method, it was found that the quality of institutions accelerates the importance of inclusive finance on poverty reduction. The work emphasizes that this positive effect institutional quality has on financial inclusion and poverty reduction is more prominent in developing countries than advanced countries.

Yousaf (2021) explored the impact of institutions in promoting financial inclusion in Pakistan. Using 2SLS, DOLS and FMOLS models, the study established that legal and political systems have significant effect on the level of financial inclusion across countries. Similarly, Syofyan et al. (2021) investigated the role institutions play in financial inclusion in Indonesia and found that both physical and technological institutional factors significantly affect financial inclusion. Eldomiaty et al. (2020) investigated institutional determinants of financial inclusion from global economies using the Global Findex Database, with GMM estimation technique. The study established that control of corruption, government effectiveness, voice and accountability, and political stability significantly influence financial inclusion. Zulkhibri (2017) examined the relationship between institutions and financial inclusion in Muslim developing countries. It was found that governance significantly has a positive effect on account ownership. This study is limited in the sense that it is a simple cross-sectional study that forbids any casual interpretations.

2.3 Conceptual framework of the study

The literature extensively discussed the determinants of financial inclusion in the world, including Africa. The extant literature basically examined demand and/or supply side factors that determine one's inclusion in the financial sector. This study therefore includes infrastructural side factors (institutional quality) that influence financial inclusion in Africa. It has become necessary to include this variable due to the impact of institutional quality in promoting inclusive finance due to its ability to promote trust and confidence of households and firms in the financial sector. This is diagrammatically represented in Figure 2.1

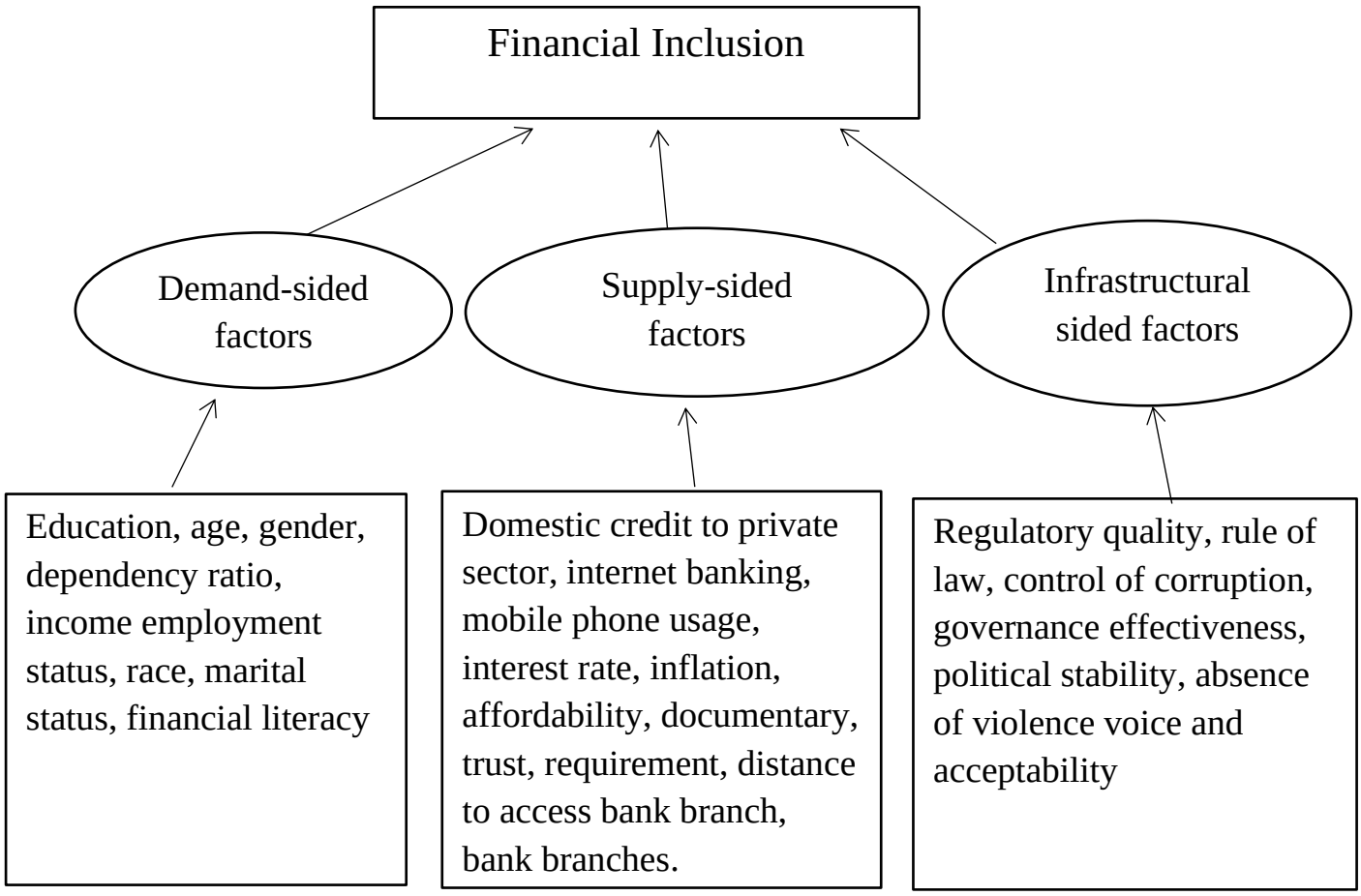


Figure 2.1: Conceptual framework of Determinants of financial inclusion

Source: Author's own construct, 2023

2.4 Data and Methodology

2.4.1 Data

This study is quantitative research that gathered data from secondary sources, with a period that span from 2004 to 2020, which period was selected due to data availability. It must be noted that the measurement of the data as compiled by the data sources measured up to 2020 as at 2022 when the study was conducted. The starting year (2004) was also chosen because that was the year measurement of most of the variables, especially the financial inclusion variables, used in the study started. Data covering the following variables: number of Automated Teller Machines (ATM) per 100,000 adult population, branches of banks and agents per 100,000 population, having a savings

account, having at least one financial product, and holding a loan account in a financial organization, which was generated from the World Development Indicators (WDI) database was used to construct the financial inclusion index. For the barriers of financial services, a cross-sectional data on the following variables were used; distance, trust, affordability, and documentation, which was generated from the Financial Access survey (FAS) compiled by the International Monetary Fund (IMF). A cross-sectional approach was adopted for the barriers since the data on the barriers' indicators are compiled every three years. The years 2017 and 2021, the two current years, were therefore chosen for the study to separately explore factors that influence barriers to financial services utilization in those years. For the institutional quality, data on Rule of law, Control of Corruption, Regulatory Quality, Governance Effectiveness, Political Stability and Absence of Violence/Terrorism and Voice and Accountability, compiled by the World Governance Indicators (WGI), was used. The data for the control variables (Domestic credit to private sector, GDP growth, money supply, inflation, gross national income per capita, education, dependency ratio, Trade openness, interest rate, government expenditure) was sourced from the WDI. The WGI compiles observations on governance from experienced individuals through surveys across countries. The WGI data is modelled on three pillars: independence, accountability, and scope of action. Many empirical studies used the WGI database for their research; Nguyen and Ha (2021), Muriu (2021), Eldomiaty et al. (2020) and Zulkhibri and Ghazal (2017). As a result of data availability, 20 African countries were used in the study (Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo DR, Egypt, Ghana, Lesotho, Madagascar, Namibia, Nigeria, Rwanda, Sierra Leone, South Sudan, Tanzania, Togo, Uganda, and Mozambique).

2.4.2 Estimation Techniques

This section discusses the techniques that were used in estimating the variables, purposefully to find the determinants of financial inclusion as well as factors that influence barriers to financial services utilization in Africa.

The General Method of Moment model (GMM) and Ordinary Least Square (OLS) methods were employed to model factors that determine one's involvement in the financial sector in Africa and factors that influence barriers to financial inclusion, respectively. The factors (determinants) are categorized under demand (dependency ratio, gross national income per capita, education and inflation), supply (domestic credit to private sector) and infrastructural (which represents the institutional quality indicators, as mentioned earlier), together with the control variables as well as the variables used in accessing the barriers and some control variables.

2.4.3 The General Method of Moment (GMM) estimation technique

The GMM method is more efficient in estimating factors that determine one's inclusion in the financial sector, because it gives more accurate estimations and the fact that this approach is appropriate for large cross-country analysis (Roodman 2009). The panel dynamic generalized method of moment (GMM) estimator as proposed by Arellano and Bond (1991) was used to estimate the dynamic panel model by taking the first differences of each model to eliminate fixed effect biases in the estimates. The GMM estimator optimally deals with all the linear moment restrictions that accompany the assumption of no serial correlation in the error term with the level of lagged variables as the instruments for estimating the first-difference explanatory variables (Arellano and Bond 1991). The GMM method also seeks to produce efficient estimates which have the tendency to correct any arbitrary heteroscedasticity in the estimates.

Before estimating the GMM model, we first estimate the static models (random and fixed effects panel models). Using panel approach in estimating economic variables allows for individual

dynamics and provides information on time ordering of events which makes it easy to collate data on many countries. Certain individual country-specific features that are invariant with time that may affect the financial inclusion data are also handled efficiently when using the panel approach. The panel data was adopted since it gives more information about the data, less correlation among the variables, more variability, higher degree of freedom and more efficiency of the estimates (Gujarati, 2004). The generalized method of moments estimator is very convenient since this study is a dynamic panel type. Also due to the lagged dependent variable which will also be used as an explanatory variable, GMM comes in handy in estimating such data to handle the potential endogeneity problem. This is because the lag of financial inclusion will influence the current financial inclusion level, thus creating the problem of endogeneity. The study uses the GMM to obtain consistent parameter estimates for a finite number of time periods to overcome this problem. The presence of lagged dependent variable in the empirical models (2.1, 2.2 and 2.3), specifically in the financial inclusion variable, shows that there is a correlation between the estimators and the error term. The selection of the estimator was solely to deliver country specific effects and its simultaneity bias. When assessing biases due to omitted variables, endogenous right-hand-side, and measurement errors, the GMM approach is also useful. The Arellano and Bond (1991) technique is said to be based on instrumental variables, which do not account for all the information in the sample. More efficient estimates of the dynamic panel data model can be produced using the GMM technique. There are two sorts of GMM approaches: Arellano and Bond (1991) (The Differenced GMM) and Arellano and Bover (1995) & Blundell and Bond (1998) (The System GMM), each with its own set of benefits and usage criteria. In using the GMM, it was assumed that data available contain x parameters $\{Y_x\}\, x = 1, \ldots, X$ where each observation Y_x is an n-dimensional multivariate random variable. We assume that the data used is taking from a certain statistical model, which is defined up to n unknown parameter $\alpha \in \beta$. Estimating a model is to determine the true value of the parameter, α_o or reasonably estimate a parameter that is close. The econometric model to estimate the GMM technique would be specified

following Demirguc-Kunt et al. (2014), Honohan (2008) and Zhaung (2017). Equations 2.1 and 2.2 represent the random and fixed effect models respectively, which are the static panel models and equation 2.3 represent the GMM, which is the dynamic panel model to be estimated.

$$Fii_{it} = \gamma_0 + \beta_1 \mathrm{DCP}_{it} + \beta_2 \mathrm{DPR}_{it} + \beta_3 \mathrm{GNI}_{it} + \beta_4 \mathrm{EDU}_{it} + \beta_5 \mathrm{IFR}_{it} + \beta_6 \mathrm{GDP}_{it} + \beta_7 \mathrm{INF}_{it} + u_{it} + \varepsilon_{it} \quad [2.1]$$

$$Fii_{it} = \alpha_i + \gamma_0 + \beta_1 \mathrm{DCP}_{it} + \beta_2 \mathrm{DPR}_{it} + \beta_3 \mathrm{GNI}_{it} + \beta_4 \mathrm{EDU}_{it} + \beta_5 \mathrm{IFR}_{it} + \beta_6 \mathrm{GDP}_{it} + \beta_7 \mathrm{INF}_{it} + u_{it} + \varepsilon_{it} \quad [2.2]$$

$$Fii_{it} = Fii_{it-1} + \gamma_0 + \beta_1 \mathrm{DCP}_{it} + \beta_2 \mathrm{DPR}_{it} + \beta_3 \mathrm{GNI}_{it} + \beta_4 \mathrm{EDU}_{it} + \beta_5 \mathrm{IFR}_{it} + \beta_6 \mathrm{GDP}_{it} + \beta_7 \mathrm{INF}_{it} + \varepsilon_{it} \quad [2.3]$$

Where Fii_{it}, Fii_{it-1}, DCP_{it}, DPR_{it}, GNI_{it}, EDU_{it}, IFR_{it}, GDP_{it}, and INF_{it} represents Financial Inclusion, Financial Inclusion lag, Domestic Credit Provided to the Private Sector, Dependency Ratio, GNI per capita, Education, Infrastructural factors (institutional quality), GDP growth and Inflation respectively. Also, $u_{it}, \varepsilon_{it}, i, t$ represent fixed effect by country, error term, country index and time index (years) respectively.

2.4.4 The Ordinary Least Squares (OLS) estimation technique

To estimate the barriers that influence financial service utilization, the study used the OLS technique. This is a form of the least square method used in estimating linear models. This is done by minimizing the sum of squares of the variations between the dependent and independent variables. The choice of this technique is premised on the Gauss-Markov theorem which portends that the least squares technique is the Best Linear Unbiased Estimator (BLUE) with which a straight-line trend equation

could be estimated (Gujarati and Porter, 2009). The model is stated following Chikalipah (2017) and presented below.

$$BAR_i = \alpha_0 + \alpha_1 DCP_i + \alpha_2 GNI_i + \alpha_3 EDU_i + \alpha_4 GXP_i + \alpha_5 TOP_i + \alpha_6 MSP_i + \alpha_7 IQI_i + \varepsilon_1 \quad [2.4]$$

Where BAR_i, DCP_i, GNI_i, EDU_i, GXP_i, TOP_i, MSP_i and IQI_i represents Barriers to financial inclusion at country i, Domestic Credit to Private Sector at country i, Gross National Income per capita at country i, Education at country i, Government expenditure at country i, Trade openness at country i, Money supply at country i and Institutional quality at country i, respectively.

2.5 Description and measurement of the variables

This section presents each variable and explanations of its economic intuition and its expected impact in promoting financial inclusion in Africa.

2.5.1 Dependent variable

For financial inclusion, dimensions covering access, usage and barriers were used to construct the financial inclusion index. Access and Usage data was used to construct a single index and barriers used to construct a separate index. This is due to the non-availability of data on the barrier indicators covering all the years. Panel data on the access and usage indicators were therefore used to construct a financial inclusion index and cross-sectional data used to construct another index using the barrier indicators. The access, usage and barriers components used in the study are explained below.

The "access" dimension

For households to use financial services, such services must be available first at the disposal of the intended population. To construct this dimension, the following indicators were used; Automated Teller Machine (ATMs) per 100, 000 population, universal bank branches and agents per 100,000

population. These access points comprise commercial banks, deposit-taking microfinance institutions, savings and credit cooperatives, rural banks, and all other deposit-taking institutions. The agents are non-financial service providers (supermarkets, post offices, pharmacies, gas stations, etc) that render basic financial services, facilitating easy access to the formal financial system.

The "usage" dimension

It is imperative to note that having a bank account does not necessarily translate into any meaningful impact in the life of the holder. An individual must use the account, either through savings, to secure credit or for any other transactional purpose before it can have the expected impact in the life of the account holder. To gather data for this dimension, operating at least one account in a financial set up, operating a savings account, and accessing a credit facility in a formal financial organization were the variables used. The savings and loans component of the measure looks at proportion of adults who save in a recognized financial organization and takes credit from same, whiles bank account holders also comprise people who hold mobile money wallets and those who have debit or credit cards and not operate a bank account. Individuals who do not have bank accounts but use an account belonging to a family member are also considered banked as people who use financial services indirectly, and hence included as users of financial products.

The "barriers" dimension

This dimension looks at individuals who are involuntarily excluded from the financial sector due to certain obstacles. Access, usage, and quality of financial services are impeded by several other factors, which may be both financial and non-financial. A number of these obstacles are sparsely populated areas, low income, inability to access the services because of limited opportunities and minority groups, which can be both demand and supply driven (Shankar, 2013). The demand side barriers, among others, comprise culture, psychology, financial education, and the supply side

barriers include non-suitable financial products, documentations, and physical barriers. For the purposes of this study, indicators such as distance, burdensome documentations requirements, lack of trust in a financial system and affordability of financial services are measures used to construct the barrier dimension.

The Principal Component Analysis (PCA) indexing method

Financial inclusion is a complex measure that cannot be determined using a single and direct means but using several variables and their interactions. It is therefore important to ascertain the contribution (weights) of each of the components used in measuring the financial inclusion index, since standardized regression techniques are not possible to be used to estimate the variables. There are two methods of assigning the weights: the Principal Component Analysis (PCA) and the Common Factor Analysis (CFA). The PCA is ideal over the CFA since the latter only uses a few supply-side data at the country level (Steiger, 1979). Using the PCA, the weights of the various sub-indices are estimated separately first and then the weight of the overall dimensions are subsequently determined as explanatory variables. The financial inclusion index, the index of institutional quality and the index of the barriers to financial inclusion were then determined through the Principal Component Analysis (PCA) method, following Camara and Tuesta (2017).

Furthermore, the multidimensional index as suggested by Caamara and Tuesta (2017) is robust in many respects.

a) The problem of assigning weights to the dimensions arbitrarily, as seen by some authors (Chakravarty and Pal, 2010; Sarma, 2008), is avoided since parametric method is used in the weight assignment.
b) Demand- side and supply-side data from both banked and unbanked population was used, which makes it more comprehensive. This is an improvement on the existing literature since other authors like Demirguc-Kunt and Klapper (2013), Chakravarty and Pal, 2010; Sarma

(2008, 2012) and Honohan (2007) used either supply side data only or demand-side data only in constructing their financial inclusion index. Authors who used nonparametric means, as cited above, are problematic since the weights are determined by the author's own intuition. Meanwhile, according to Lockwood (2004), assigning weights using the author's own discretion is challenging since a slight change can affect the entire results.

This therefore makes the choice of the PCA for this study to be more robust and more detailed method of constructing the indexes as compared to what has been sighted in the literature.

The PCA method is expressed in the linear equation below.

$$FI_i = w_1 Y_i^a + w_2 Y_i^u + e_i \quad [2.5]$$

Where i, Y_i^a and Y_i^u represent country, access, and usage dimensions respectively.

The dimensions are estimated separately by

$$Y_i^a = \alpha_1 ATM_{popi} + \alpha_2 branches_{popi} + u_i \quad [2.6]$$

$$Y_i^u = \beta_1 account_i + \beta_2 savings_i + \beta_3 loans_i + \epsilon_i \quad [2.7]$$

These equations representing the two dimensions, would be estimated using principal components of the explanatory variables, with joint estimation of the unobserved endogenous variables $\alpha \; and \; \beta$.

We define $R_p(pxp)$ as the correlation matrix of the P standardize indicators for each of the two dimensions. $\lambda_j (j = 1,2 \dots p)$ denote the $j-th$ eigenvalue, where j is the number of principal components, which also represents the number of indicators of P

$\delta_j(px1)$ is the eigenvector of the correlation matrix. It is further assumed that $\lambda_1 > \lambda_2 > \cdots \lambda_p$, which represent $P_k(k = 1, 2 \dots P)$ as the $k-th$ principal component.

The following weighted averages represent the estimator of each dimension.

$$Y_i^a = \frac{\sum_{j,k=1}^{p} \lambda_j^a P_{ki}^a}{\sum_{j=1}^{p} \lambda_j^a} \quad [2.8]$$

$$Y_i^u = \frac{\sum_{j,k=1}^{p} \lambda_j^u P_{ki}^u}{\sum_{j=1}^{p} \lambda_j^u} \quad [2.9]$$

Where

$P_k = X\lambda_j$; λ_j is the variance of the $k-th$ weight ; X is the indicator matrix.

We compute the overall financial inclusion index by combining all the separate indexes into (3) to estimate the parameter λ. i.e

$$FI_i = \frac{\sum_{j=1}^{p} \lambda_j P_{ki}}{\sum_{j=1}^{p} \lambda_j} \quad [2.10]$$

Each component P_{ki} is written as a linear combination of the two dimensions and the respective eigenvectors of the correlation matrices is presented as follows.

$$P_{1i} = \pi_{11} Y_i^a + \pi_{12} Y_i^u \quad [2.11]$$

$$P_{2i} = \pi_{21} Y_i^a + \pi_{22} Y_i^u \quad [2.12]$$

By substituting the P_{ki} as expressed in (2.11), (2.12) and into (2.13), we get the financial inclusion index.

$$FI_i = \frac{\sum_{j=1}^{2} \lambda_j (\pi_{j1} Y_i^a + \pi_{j2} Y_i^u)}{\sum_{j=1}^{2} \lambda_j} \quad [2.13]$$

Equation 2.13 can therefore be expressed linearly as the overall weighted average of financial inclusion index as represented in (2.14)

$$FI_i = w_1 Y_i^a + w_2 Y_i^u + e_i \quad [2.14]$$

where

$w_k = \frac{\sum_{j=1}^{2} \lambda_j \pi_{jk}}{\sum_{j=1}^{2} \lambda_j}$; w_k is the relative weight of each dimension in the final financial inclusion index.

2.5.2 Explanatory variables

- **Institutional quality**

Institutional quality (extractive or inclusive) has an effect of economic growth. For this study, the six indicators that was used as a measure of institutional quality are Rule of law, Control of Corruption, Regulatory Quality, Governance Effectiveness, Political Stability and Absence of Violence/Terrorism and Voice and Accountability (World Bank, 2010). These governance indicators, according to the World Bank are standard and globally recognized way to measure institutional quality, which legitimized the choice of these indicators for the study. According to Kaufmann et al. (2011) these indicators cover aspects that fully show how institutions function effectively in a country, as suggested by the neo-institutional theory of North (1990). According to Aracil et al. (2021), institutional quality has a direct effect on financial inclusion in terms of leading to a reduction in poverty. It is therefore expected that institutional quality will have a positive impact in both financial inclusions. This indicates that when institutions function very well, it promotes trust in the financial sector, leading to an increase in financial inclusion. These indicators and their individual and collective impact on financial inclusion is presented below.

***Rule of law*:** A robust legal system in a country contributes immensely towards strengthening of the financial system, since it helps to do away with a major constraint in the sector (Xiaochuan, 2004; Wurgler, 2000). That is, when a country's legal system is fair and transparent, individuals and firms develop confidence in getting involved in the financial landscape. Multinational institutions and/ local firms who have excess funds to inject more into the financial system and other productive sectors are free to do so since they are confident their investments would be protected in case of an adversity when the judicial system is fair.

***Regulatory quality*:** There has been an emergence of new financial services outlets in recent years in the form of agency banking, mobile and electronic banking. Even though these introductions promote financial inclusion, it calls for friendlier regulation to keep the market safe without comprising growth. To liberalize the financial landscape to get everyone included in the sector, regulation of the sector needs to be strengthened and/relaxed when need be. Countries such as Pakistan, had to circumvent its official regulations to push through the agenda of financial inclusion (Johnson and Williams, 2016). Some countries also have unfriendly regulatory regimes that limit competition in a bit to favor some institutions at the detriment of growth in the financial sector (Haber et al., 2003; Acemoglu et al. 2001), which can also lead to costly financial services (Demirgut-kant et al., 2004). Mobile money usage, which is one of the fastest growing financial outlets, is getting more people included in the financial sector because of a regulatory intervention. Kenya, which is the highest (60%) mobile money (M-PESA) used economy, achieved this success because of relaxed banking policies (Ouma, et al., 2017). Prudent regulations have played an important role in shaping the financial sector of some countries. According to Chen and Divanbeigi (2019) of the World Bank, Ghana and Mozambique respectively adopted a guideline on E-money in 2015 which permitted both banks and non-bank financial institutions to issue and control electronic money and allowed agents to provide a lot of financial services like cash deposits and withdrawals, bill payments and transfers. Tanzania also promulgated regulations to streamline the activities of microfinance institutions in the country.

***Political Stability and Absence of Violence/Terrorism**:* Political stability is also paramount in facilitating financial inclusion leading to poverty reduction. When a country is politically unstable, it leads to financial backwardness (Roe and Siegel, 2011). For a political regime to be unstable means that there is politically motivated agitations and protests that has the tendency to overthrow the government or makes the nation ungovernable, which when continued for a long time, can destruct

economic activities, and draws back the development of the nation. These protests, according to the Global State of Democracy Report (2021) [IDEA, 2021], are because of governments that have the appetite to stay long in power, which is common with the Middle East and North African countries. In these regimes where authorities do not want to leave power, their influence in the states resources and institutions is so pervasive that it deters both local and international investors from patronizing the economy. This would have a negative effect on the financial services of the nation since policies of the government will only target certain privileged individuals who are allied to the powers that be.

***Government effectiveness*:** Effective governance system is an important ingredient in promoting financial inclusion. Empirically, effective government and financial inclusion nexus shows that sound governance is positively related to the desire of households and firms to open and operate formal accounts. This is confirmed by Chinoda and Kwenda (2019) who argued that good governance has a direct relationship with financial inclusion in Africa. Zulkhibri and Ghazal (2017) also reiterated that good governance is critical in promoting financial inclusion among the poor especially, and that good governance is positively related to opening of bank accounts and savings culture in financial institutions.

***Control of Corruption*:** To curtail corruption in both public and private sectors instill confidence in people when transacting businesses. Nations where they have better laws, competent judiciary and good financial systems are empirically proven to be less corrupt (Kimbro, 2002). Ajide et al. (2020) suggested that to control corruption in Africa, financial inclusion performs an important role. This is because when the financial system is liberalized enough to the extent that households and firms could access financial services at their own convenience without middlemen, it saves them from corruption and from being corrupted. Cooray and Schneider (2016) also argued that corruption is one of the social cancers that affects every fabric of human life, particularly, economic development, due to its adverse effects on poverty, employment, and financial system. Corruption has a debilitating effect in

the business environment and economic growth of the world, especially Africa and as such when banks increase credit to the private sector, it reduces corruption in the economy (Ajide and Olayiwola, 2021; Altunbas and Thornton, 2012).

***Voice and Accountability*:** This has to do with the rate at which citizens of a country participate in the governance of the state and how the state stands accountable to the people, through the utilization of the state resources. It is established that when the people have a say in what happens in the governance of the state, it has a direct benefit in terms of development in the financial sector, through credit expansion and reduction in the cost of credit to households and firms (Menaldo and Yoo, 2015). Similarly, Asongu (2014) posited that there is a positive relationship between democracy and financial development in Africa.

- **GDP growth**

Economic growth is a significant macroeconomic term that is measured by the yearly rate of gross domestic product (GDP), which is determined by the market prices using a continual local currency, which aggregates are benchmarked on a constant 2010 U.S dollars. It is determined by excluding deductions for depreciation or degraded natural resources. Economic growth is expected to improve the economic life of households as such encourages them to participate in the financial sector. It is therefore expected that economic growth, all things been equal, will ensure an increase in financial inclusion (World Bank, 2005*;* Adams, 2002*).*

- **Inflation**

Inflation is defined as the persistent rise in the price of goods and services over time. It is derived using the consumer price index, which indicates the percentage change in the average cost of a basket of goods and services over time at predefined intervals. Inflation has a detrimental influence on the

income of households, which changes over time. When inflation increases, it leads to a rise in lending rates which discourages households and firms from accessing credit, and vice versa. Batayneh et al. (2021) argues that inflation has an inverse relationship with financial development, indicating that as inflation increases, it dampens the financial inclusion drive efforts and vice versa. Low level of inflation is therefore anticipated to promote the level of financial inclusion due to its ability to improve on disposable income of households.

- **Dependency ratio**

The share of dependents in the populace relative to the number of the active work force is known as the dependency ratio. The World Bank defines dependency ratio as the proportion of senior citizens (65+) to working-age citizens (15-64) multiplied by a hundred. The dependency ratio has a negative effect on the income of households. This means that if a person is overburdened with many dependents, he or she will have less money to save and so will be unable to engage in the financial sector. Theoretical research backs up the claim that a larger dependency ratio leads to a lower savings rate (Salman and Zaib, 2017). This is also in line with Park and Mercado (2015) findings who indicated that a higher dependency ratio lowers financial inclusion. The dependency ratio is expected to reveal a negative relationship with financial inclusion since the less dependents one has the more, they have income to participate in the financial sector.

- **Education**

Education, the training of human capital, is an important component of economic success. Educational background is expressed as a ratio of gross school enrolment and the total population, regardless of age. Education is regarded as a crucial instrument in the enrolment of households into the financial sector due to the knowledge gained and its effect on higher pay (Awan et al, 2011). It is therefore expected that improvement in the level of education will have a positive relationship with

financial inclusion. Also, education level is expected to eliminate the barrier that inhibit households from participating in the financial sector since the educated will for instance understand the need to provide certain documentations needed to operate an account and will comply accordingly. Cassimon et al. (2022) mentioned that low levels of education have been found to contribute to the low inclusion of households into the financial sector (OECD, 2022)

- **Domestic credit to the private sector**

This refers to the financial resources like loans, trade credits, purchases of nonequity securities, account receivables that establishes claim for payments, that are advanced to the private sector by financial institutions (monetary authorities, deposit money banks, microfinance institutions as well as cooperatives). The private sector is regarded as an engine of

growth in an economy, especially developing economies like Africa, due to their role in income/revenue generation through creation of employment and payment of taxes. Unfortunately, in Africa most private enterprises suffer crowding out effects due to competition with international corporations and/government for the limited domestic funding (Obeng-Amponsah, 2019). Olowofeso et al. (2015) and Obeng-Amponsah et al. (2019) have all established that there is a positive relationship between growth in credit to private sector and economic growth in Nigeria and Ghana, respectively. This suggests that as the private sector accesses more funds, it increases their output, creates employment and as such improves income generation and wealth creation. The increase in income will therefore lead to elimination of the barriers to financial inclusion, resulting in an increase in financial inclusion because of the increase in income generation which is one of the important determinants of financial inclusion. Domestic credit to the private sector is therefore expected to have a direct positive relationship with financial inclusion.

- **Gross National Income per capita (GNI)**

This is the sum of value added by all resident producers together with any product taxes that are not included in the valuation of output in addition to net receipts of primary income from abroad. GNI per capita is the gross national income divided by the midyear population. It is used to measure the wealth of every country from year to year. As GNI grows, it means that the income of the citizenry grows which is a function of one's ability to patronize the financial sector. Growth in income meant that the affordability barrier would have been overcome as such leads to increase in financial inclusion. GNI per capita has been identified to possess positive impact on financial inclusion in all economies (Tsouli, 2022; Alenoghena, 2017)

- **Trade Openness**

The Comparative Advantage theory and the Heckscher-Ohlin theory all state that if a country want to trade with another, that country shall produce in large quantities, commodities which it has relative advantage in. This will increase exports in that country and as such increase foreign exchange in the economy, which will subsequently enhance economic growth. It is measured as the total of exports and imports of goods and services, which is expressed as a percentage of GDP. According to Keho (2017), countries with higher degree of trade openness benefits more than countries with lower level of openness in terms of economic growth since they can benefit from technologies transfer from developed economies. According to the World Trade Organization [WTO] (2018), trade among and within nations is a key enabler to growth in income, leading to elimination of barriers to financial services utilization, hence influence the inclusion of the people in the financial sector.

- **Government expenditure**

There are two schools of thoughts that economists share when it comes to the effects of government expenditure on economic growth. The neo-classical economists argue that government investment

increases public debt and interest rates, through the crowding out effect, which has the potential to limit the role of the private sector in the economy and as such lowers output. The Keynesian economists, on the other hand, support the argument that through the multiplier effect theory, government expenditure has stimulating effect in an economy, both in terms of infrastructure financing and/transfers. This is because Government investment has a significant effect on economic growth, which subsequently benefits the poor, especially those in rural areas (Fan, Hazell & Thorat, 1998). It is measured as the government's final consumption expenditure/transfers as a percentage of GDP. This is because when governments invest in productive sectors like agriculture, infrastructure, among others, it has employment creation effects on the populace and subsequent increase in output in the economy. This will increase the income of households and as such better their living condition. Government expenditure in productive sectors of the economy is therefore expected to reduce the bottlenecks in the financial sector, leading to financial inclusion, due to its economic growth prospects (Kakar, 2011).

- **Money supply**

Money supply is the total amount of money in circulation in a particular economy. It is determined by the fraction of broad money, which is the total amount of money held outside of banks and demand deposits, excluding government bonds. Apart from the central government, it also includes indigenes' savings, foreign currency deposits and time. If money supply in the economy increases, it means that there is more money being used in the economy. As a result of increasing consumer purchasing power, an increase in the money supply directly leads to increased expenditure on goods and services. This will ensure improvement in the rate of employment because of the need to produce more to meet the economy's demand. The enhancement in income levels because of the employment opportunities created reduces barriers associated with financial inclusion as such promotes financial inclusion. Arshad et al. (2021) avowed the point that an increase in money supply reduced interest rate, leading

to an increase in investment, improves aggregate demand, reduced financial barriers, and enhance financial inclusion.

The above discussed variables of the study, their economic implications and the sources of the data are presented in the appendix.

2.6 Empirical Results Analysis

This section first provides summary statistics of the of the variables used for the analysis of determinants of financial inclusion in Africa for both the panel and cross-sectional data. To enhance significance and reliability of the results, all the variables, aside those that are not statistically or mathematically possible, were all logged. The results are presented in Tables 2.1 and 2.2

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
FII	340	0.1927	0.1589	0.0177	0.7484
ATM	340	7.5974	12.6869	0	72.4460
BBA	340	0.9302	0.8512	-1.1975	2.7376
SAV	340	4.9500	1.4543	-0.7550	7.6903
FIN	340	3.0136	0.7530	1.1942	4.4813
LON	340	2.8984	1.5200	-3.9120	5.5795
DCP	340	2.4487	0.9614	-4.9030	4.1007
DPR	340	4.9098	0.1515	4.0778	4.6826
GNI	340	6.9133	0.7762	5.6842	8.8561
EDU	340	4.6502	0.1869	3.9867	5.0060
TOP	340	4.0932	0.4265	3.0312	5.1063

GXP	340	2.5470	0.5336	1.2775	4.3716
INT	340	1.7255	0.7697	-2.8114	2.9857
IQI	340	0.0857	1.0302	-2.5001	2.4135

Table 1.1: Summary Statistics for the panel data

Source: Author's own compilation, 2023

From Table 1.1, it can be observed that the financial inclusion index (FII) has an average of 0.1927 with a standard deviation of 0.1589. The minimum and the maximum values are 0.0177 and 0.7484 respectively, which falls within the range of normalized financial inclusion index. The mean value shows that on average, the selected countries in Africa have a low financial inclusion index.

Automated Teller Machine (ATM) has an average of 7.5974 per 100, 000 people and a standard deviation of 12.6869, with a minimum and maximum values of 0 and 72.4460, respectively. A higher standard deviation value compared to the mean value means that there is high variation in terms of ATM usage in the selected countries. According to The Global Economy, the region is lagging when it comes to ATM availability since the world average stands at 51.89% as at 2021, indicating many efforts need to be put in place to increase ATM visibility in Africa. Bank branches and agents (BBA) have a mean value of 0.9302 per every 100,000 population and a standard deviation of 0.8512, indicating a stable variable since the mean is higher than the standard deviation. The minimum value is -1.1975 and a maximum value is 2.7376. Savings (SAV) has a mean of $4.9500 and a standard deviation of $1.4543, indicating that the savings variable is unstable. The minimum and maximum values of the savings variable were also found to be -0.7550 and 7.6903 respectively. According to the United Nations University World Institute for Development Economics Research [UNU-WIDER] (2023), savings rate (as a percentage of GDP) in sub–Saharan Africa for instance, has declined from 30% to about 20% between the years 2000 to 2020, revealing a low savings rate in the region.

Financial products (FIN) have a mean value of 3.0136 and a standard deviation value of 0.7530, with a minimum value of 1.1942 and a maximum value of 4.4813. With the mean value greater than the standard deviation indicates that the variable is stable. This confirms the revelation of the Consultative Group to Assist the Poor (CGAP), which indicates that the Findex database, avers that sub-Saharan Africa, despite the impressive performance in terms of account ownership and usage, still falls part of the bottom three regions with the lowest account ownership and usage globally

(Chalwe-Mulenga & Coetzee (2022). The loan account (LON) was found to have a mean value of 2.8984 per 1,000 adults and a standard deviation of 1.5200. The minimum and maximum values are -3.9120 and 5.5795 respectively. The standard deviation value indicates that the variable is relatively stable. The mean of Domestic Credit to Private Sector (DCP) was found to be 2.4487 percentage of GDP and a standard deviation of 0.9614, indicating a stable variable. This is below the regional average of 25.2% and below the world average of 60.26% compared to the selected countries. The minimum and maximum values respectively were found to be 0.0074 and 60. 3846. The mean value of the Dependency ratio (DPR) is 4.9098 as a percentage of the working age population and a standard deviation of 0.1515, indicating a stable variable, with minimum and maximum values of 4.0778 and 4.6826 respectively. Gross National Income per capita (GNI) has a mean value of $6.9133 and a standard deviation of $0.7762, and a minimum value of 5.6842 and a maximum value of 8.8561. The standard deviation value indicates that there are variations in the GNI of the selected countries in Africa. Education (EDU) has a mean value of 4.6502 primary enrolment as a percentage of gross enrolment and a standard deviation of 0.1869 with a minimum and maximum values of 3.9867 and 5.0060 respectively. The mean value indicates that the variable is very stable. Trade openness (TOP) has a mean value of $4.0932 and a standard deviation of 0.4265. The minimum value is 3.0312 and a maximum value of 5.1063. The standard deviation value indicates that trade is stable in the selected countries. The mean value of Government Expenditure (GXP) is $2.5470 percent and a standard deviation of 0.5336, indicating a stable government expenditure pattern. The minimum value is 3.5875 and a maximum value of 0.0601. Interest rates (INT) have a mean value of 1.7255 and standard deviation of 0.7697, indicating a stable variable, with a minimum and maximum values of -2.8114 and 2.9857, respectively.

Institutional quality index (IQI) has a mean value of 0.0857 and a standard deviation of 1.0302, with a minimum value of -2.5001 and a maximum value of 2.4135. This means that the variable is unstable,

indicating variations in the institutional quality index. This indicates that there is low reception of the various institutional quality indicators in Africa.

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
DIS	32	-1.9481	0.8190	-4.6052	-0.7550
TRU	32	-2.3536	0.7063	-4.6052	-1.4697
AFD	32	-1.7288	0.6266	-3.5066	-0.7340
DOC	32	-1.7783	0.6187	-3.2189	-0.7765
DCP	32	2.9057	0.8014	0.5252	4.6283
GNI	32	7.2040	0.8625	6.0436	9.2981
EDU	32	4.6243	0.1763	4.2759	4.9641
GXP	32	2.6334	0.5649	1.4645	4.0181
TOP	32	4.0730	0.3684	3.2714	4.9764
MSP	32	3.5045	0.5618	2.5395	4.7823
IQI	32	0.0303	0.9121	-1.6626	2.1180

Table 2.1: Summary statistics for the cross-sectional data

Source: Author's own compilation, 2023

It can be deduced from Table 2.1 that Distance (DIS) has a mean value of -1.9481 and a standard deviation of 0.8190 with the minimum and the maximum values of -4.6052 and -0.7550 respectively, indicating an unstable variable since the mean is less than the standard deviation.

Trust (TRU) has an average of -2.3536 and a standard deviation of 0.7063, with a minimum and maximum values of -4.6052 and -1.4697, respectively indicating an unstable variable.

Affordability (AFD) has a mean value of -1.7288 and a standard deviation of 0.6266, indicating an unstable variable since the mean is less than the standard deviation. The minimum value is -3.5066 and a maximum value is -0.7340. Document (DOC) has a mean of -1.7783 and a standard deviation of 0.6187 indicating that the document variable is unstable. The minimum and maximum values of the Document variable were also found to be -3.2189 and -0.7765 respectively.

The mean of Domestic credit to private sector (DCP) was found to be 2.9057 percent of gross domestic product (GDP) and a standard deviation of 0.8014, indicating a stable variable. The minimum and maximum values respectively were found to be 0.5252 and 4.6283.

Gross national income (GIN) per capita has a mean value of $7.2040 and a standard deviation of $0.8625, with a minimum value of 6.0436 and a maximum value of 9.2981. The standard deviation value indicates that there are variations in the GNI of the selected countries in Africa.

Education (EDU) has a mean value of 4.6243 primary enrolment as a percentage of gross enrolment and a standard deviation of 0.1763 with a minimum and maximum values of 4.2759 and 4.9641 respectively, with the mean value indicating that the variable is very stable. Government expenditure (GXP) has a mean value of 2.6334 percent and a standard deviation of 0.5649, indicating a stable outlook, with a minimum value of 1.4645 and a maximum value of 4.0181 The mean value of trade openness (TOP) is 4.0730 percent and a standard deviation of 0.3684, indicating a stable variable. The minimum value is 3.2714 and a maximum value of 4.9764. Money supply (MSP) was found with a mean value of 3.5045 and a standard deviation of 0.5618, indicating a very stable variable. The minimum and maximum variables are 2.5395 and 4.7823 respectively.

Institutional quality index (IQI) has a mean of 0.0303 and a standard deviation of 0.9122, with a minimum and maximum values of -1.6626 and 2.1180 respectively. The mean and standard deviation values means that the variable is unstable, indicating variations in the institutional quality index.

2.7 Stationarity test for the variables

It is necessary to ascertain whether the variables are stable to ensure that the properties of the data do not change over time, which can lead to spurious results. According to Bond et al. (2005), a variable must be stationary at level to be estimated using the GMM model as is the case in this study. The variables in the study were therefore tested to find out whether they are stationary or otherwise; thus,

finding out the presence of unit roots in both the dependent and independent variables used in the study. The study employed the Levin-Lin-Chu and Hadri LM tests of stationarity to ensure robustness.

2.7.1 Result of the Unit Root Test

Table 2.3 below shows results of the unit root tests for the variables for ascertaining determinants of financial inclusion.

	Levin-Lin-Chu	Hadri LM test
Variable	Level	Level
FII	-3.6063***	37.8564***
DCP	-5.1428***	32.8410***
DPR	-1.7134*	21.3323***
GNI	-3.6469***	36.2449***
NTR	-3.4096***	21.6494***
EDU	-3.1584***	28.2755***
TOP	-2.0256**	18.8555***
GXP	-3.4965***	18.9069***
IQI	-3.0322***	28.0954***

Table 2.3: Unit root results for Levin-Lin-Chu and Hadri LM stationarity tests

Source: Author's own compilations, 2023

It is imperative to ascertain the stationarity of the variables in the analysis to be sure the variables do not change over time. The result of the Levin-Lin-Chu and Hadri LM unit root tests shows that the variables (DCP, DPR, GNI, NTR, EDU, TOP, GXP and IQI) are all stationary at the level (I (0)) and

are therefore valid for the data estimation, indicating there would not be any spurious results so far as stationarity of the data is concern. The choice of these two panel unit root tests is because they possess the advantage that their asymptotic distribution is normal. Furthermore, the power of these panel unit root tests is based on the overall variation in the number of observations and their variations. It presents a more robust measure as compared to the standard time-series unit root tests since the individual counties reveal variations across time showing a more accurate estimates of the parameter.

2.8: Correlation matrix for the panel data

This section describes how the various variables correlate with the dependent variable as well as the intercorrelation between the independent variables. Table 2.4 contains the correlation matrix.

	FII	DCPS	DPR	GNI	EDU	TOP	GDP	NTR	IQI
FII	1.0000								
DCP	0.6580	1.0000							
DPR	-0.5943	-0.4701	1.0000						
GNI	0.7174	0.4274	-0.7056	1.0000					
EDU	0.2254	0.3082	-0.3103	-0.0058	1.0000				
TOP	0.2814	0.1107	-0.3020	0.1413	0.2032	1.0000			
GXP	0.3664	0.2778	-0.4665	0.2303	0.2590	0.5187	1.0000		
NTR	0.0856	0.2378	0.1365	-0.1645	0.2699	-0.1348	-0.2860	1.000	
IQI	0.4727	0.3421	-0.4641	0.4907	0.1259	0.2935	0.2490	0.2128	1.0000

Table 2.4: Correlation matrix for the panel data

Source: Author's own compilations, 2023

Comparing DCP with financial inclusion, it could be observed that there is a positive correlation between the two variables. Since the correlation coefficient exceeds 0.5, there is a strong positive correlation between domestic credit to private sector and financial inclusion. DPR is negatively correlated to the financial inclusion. The coefficient indicates that there is a strong negative correlation between dependency ratio and financial inclusion. GNI is positively correlated to financial inclusion. The coefficient of correlation indicates that there is a strong positive relationship between GNI and financial inclusion. EDU and financial inclusion are positively correlated, although the degree of correlation is weak. Empirically, educational attainment has the ability for one to earn higher income, hence encourage them to participate in the financial sector, confirming the positive relationship. TOP is positively related to financial inclusion. The positive correlation with financial

inclusion shows that as trade increases, it impacts on income, all things been equal, as such encourage more people to participate in the financial sector. GXP is found to exhibit positive correlation with financial inclusion, confirming the Keynesian theory that argues that government expenditure promotes businesses as such stimulates the financial sector. IQI is positively related to financial inclusion, although the relationship is a weak one. Quality institutions can promote trust in the financial system, encouraging participation of households and firms in the financial sector, confirming the positive relationship. It can be observed that since none of the variables' correlation with the dependent variable and to themselves, there is no problem of multicollinearity in the data (Shrestha, 2020; Kim, 2019).

2.9 Correlation matrix for the cross-sectional data

This section describes how the various variables of the cross-sectional data correlate with the dependent variable as well as intercorrelation between the independent variables. Table 2.5 contains the correlation matrix among the variables of the study.

	BAR	DCPS	GNI	EDU	GXP	TOP	MSP	IQI
BAR	1.0000							
DCP	-0.5939	1.0000						
GNI	-0.7324	0.6300	1.0000					
EDU	-0.0243	0.1909	0.0127	1.0000				
GXP	-0.1116	0.1482	0.1887	0.0514	1.000			
TOP	0.0104	0.0295	0.0240	0.2678	0.4417	1.000		
MSP	-0.6365	0.7636	0.7203	0.1708	0.4101	0.1280	1.0000	
IQI	-0.6182	0.6742	0.5388	0.3118	0.2831	0.2374	0.4903	1.0000

Table 2.5: Correlation matrix for the cross-sectional data

Source: Author's own compilations, 2023

Domestic credit to the private sector (DCP), in relation to financial barriers (BAR) is negatively correlated, with the correlation coefficient indicating a medium correlation. Gross national income (GNI) is equally negatively correlated to financial barriers with strong correlation. Education (EDU) and financial barriers are positively correlated, though the degree of correlation is weak. Government expenditure (GXP) is negatively related to financial barriers. The coefficient shows that the correlation is a weak one. Trade openness (TOP) is also found to be negatively related to financial barriers. The correlation coefficient indicates that there is a weak relationship between Trade openness and financial barriers. Money supply (MSP) equally shows a strong negative correlation with financial barriers. Institutional quality (IQI) is negatively correlated with financial barriers. The coefficient shows that there is a strong negative correlation between the variables.

From the tables 2.5 and 2.6, it could be observed that there is weak correlation between the variables since none of the variables has a correlation coefficient above 0.8, satisfying the decision rule by Donald and Gluaber (1967), which indicates that correlation between independent variables should be less than 0.8. This means that that there would not be any problem of multicollinearity as such enhance reliability of the results.

2.10 Diagnostics tests

The study performed Heteroskedasticity and Normality tests as well as Ramzy RESET, CUSUM and CUSUM squares tests to ascertain the level of reliability of the results. The tests show that the model is normally distributed, well specified, homoscedastic, stable, and does not suffer from autocorrelation as well as showing a linear relationship between the dependent and independent variables. The results are presented in tables 2.6 and 2.7 and figures 2.2.and 2. 3

Test	Estimate	Df	Probability
T-Statistic	1.6615	23	0.1102
F-Statistic	2.7607	(1,23)	0.1102
Likelihood	3.6274	1	0.0568

Table 2.6. Ramsey RESET Test

	Heteroskedasticity			
Variable	**Breusch-Pagan-Godfrey**	**Probability**	**Arch**	**Probability**
F-statistic	1.8613	0.1213	0.0567	0.8134
Obs. *R-Squared	11.2595	0.1277	0.0605	0.8057
	Normality Test	0.8488		

Table 2.7. Heteroskedasticity and Normality tests

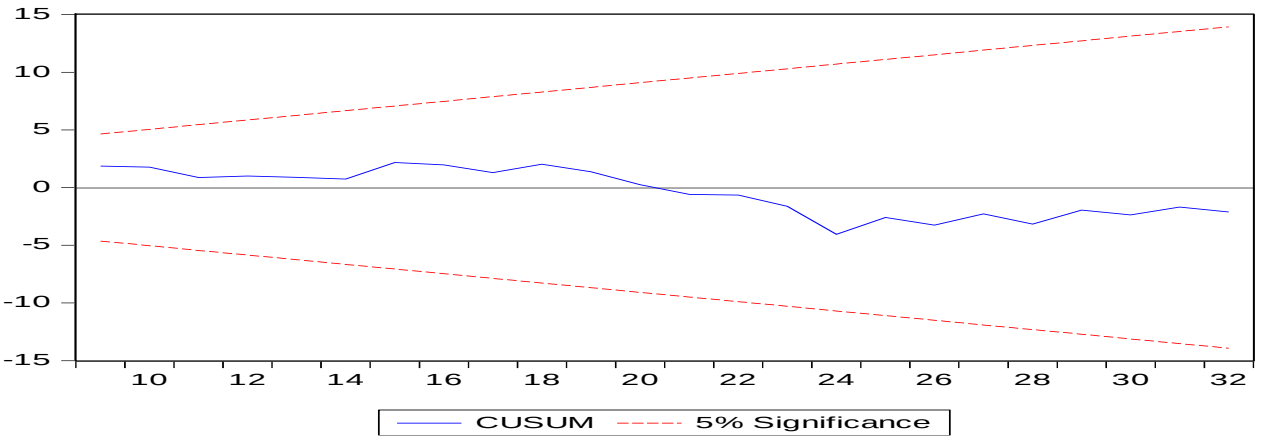


Figure 2.2: CUSUM test

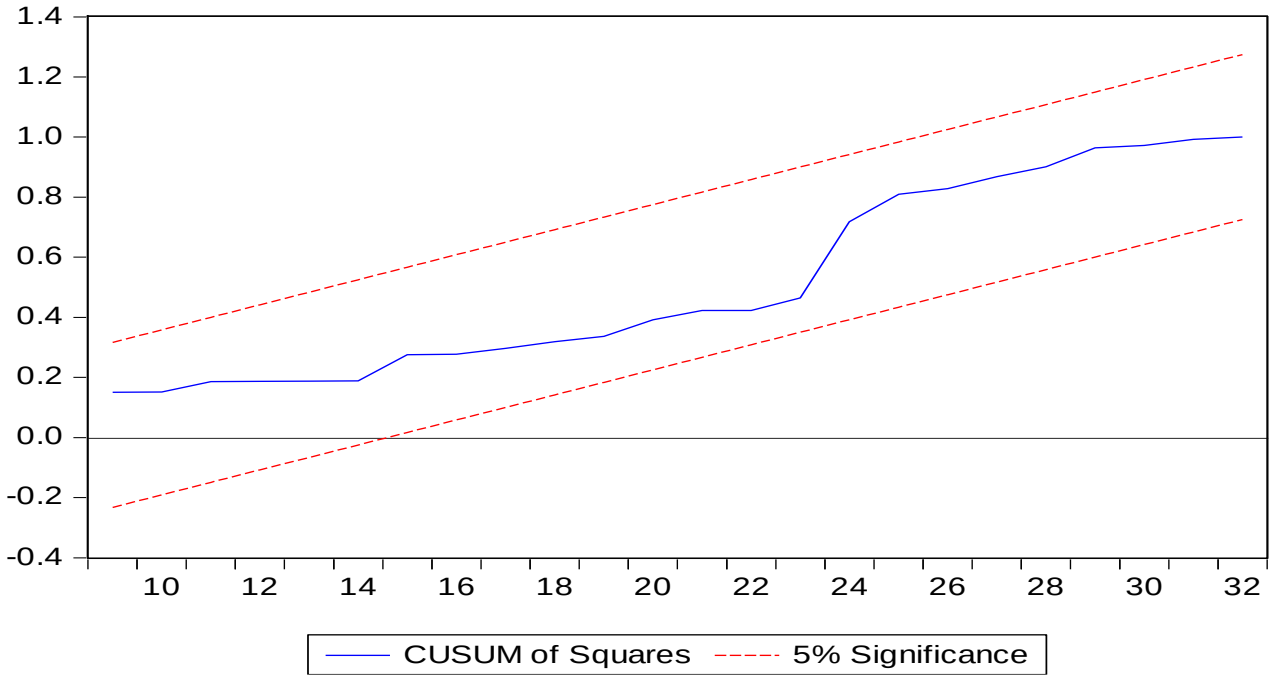


Figure 2.3. CUSUM of squares test

2.11. Construction of financial inclusion indices using Principal Component Analysis

The Principal Component Analysis (PCA) was employed to construct a composite index of financial inclusion for access and usage dimensions. For the access dimension, ATMs per 100,000 adults (ATM), and Bank branches and agents per 100,000 adults (BAG) were used while holding Savings account (SAV), operating at least one account in any financial institution (FPR), and access to loan from any financial organization (LAC) forms the usage dimension. The PCA method is essential in reducing high correlation series into minute units of uncorrelated revelation whereas the original information of the data is not compromised. This has the tendency to correct high correlation contained in the different means of measuring financial inclusion. To put is in another way, PCA is a procedure that is used to reduce the indicators used to analyze the observed variables that reveal the small number of components in relative terms, which corrects the variance in the variables (Sricharoen and Buchenrieder, 2005).

Principal Component	Component Matrix							
	ATM	BAG	FPR	SAV	LAC	Proportion	Cumulative Proportion	Eigen Value
PC 1 (Access)	0.7071	0.7071	-	-	-	0.9112	0.9112	1.8225
PC 2	0.7071	-0.7071	-	-	-	0.0888	1.0000	0.1776
PC 3 (Usage)	-	-	0.7133	0.0122	-0.7007	0.3377	0.7928	1.0132
PC 4	-	-	0.4000	0.8139	0.4214	0.4551	0.4551	1.3652
PC 5	-	-	0.5755	-0.5809	0.5757	0.2072	1.0000	0.6216

Table 2.8. Principal Component Analysis (PCA) for financial inclusion

Source: Author's own compilations, 2023.

According to Jolliffe (2002) criterion, the eigenvalues, as presented on Table 2.8, are calculated for every component to maintain the common factors, when the eigenvalue is greater than one. From the table, the index calculated from the access principal components explains more than 91% of the total variance in the dataset with 1.8225 eigen value. For the usage, it explains more than 79% of the total variance of the dataset with an eigen value of 1.0132. The above approach was equally used to construct the institutional quality and barriers indices as used in this study.

2.12: Analysis of the System- GMM Results

The section presents the regression results on determinants of financial inclusion based on the System-GMM estimator. Aside determining the factors that influence financial inclusion with regards to the overall institutional quality index, the individual components of institutional quality were also tested to find their individual influence in the determinants of financial inclusion.

To solve the possible problem of heteroskedasticity and autocorrelation, the study employed the robust form of *estabond2* as suggested by Roodman (2009), which indicates that the test is robust in controlling the two potential problems associated with panel data analysis. The Sargen and Hansen tests were also performed, and it was revealed that there is no problem of overidentification of variables, hence confirming the validity of the instruments used. It was imperative to consider the lag form of the dependent variable in the model to ascertain whether the financial inclusion index of the current year is influenced by index of the previous year, hence the employment of *estabond2*. The chi-square statistic value indicates a statistical significance level of 1%. This shows that domestic credit to private sector, dependency ratio, GNI per capita, education, trade openness, government expenditure, interest rates, and institutional quality index (IQI) are jointly significant. The findings are consistent with the financial intermediation theory that underpinned the study. The system-GMM estimates are shown in Table 2.9a.

To ensure robustness, the study further employed the measure of financial inclusion according to Sarma (2008, 2012), by constructing a new financial inclusion index. The measures used by Sarma include Automated teller machines (ATMs) per 100,000 adult, Commercial bank branches per 100, 000 adults, Borrowers from commercial banks per 1,000 adults, Domestic credit to GDP ratio, and Depositors with commercial banks per 1,000 adults. The estimates of the analysis using the new measure of financial inclusion are contained in table 2.9b. Despite similar results been obtained, the study adopted the measure by Camara and Tuesta (2017) since it provided the means to consider barriers to financial services utilization (which is absent in Sarma's measure), but prevalent in the study region and forms part of the purpose of the study, hence the study will rely on the output in Table 2.9a. It should be noted that to ensure maximum significance level of the variables, the lag form of the independent variables was tested but none of them proved significant to the model except the dependent variable.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Financial inclusion index (-1)	0.9187***	0.9166***	0.9187***	0.9192***	0.9182 ***	0.9191***	0.9186***
	(20.54)	(19.94)	(20.54)	(20.69)	(20.56)	(20.56)	(20.31)
Domestic credit to private sector	0.0075**	0.0071**	0.0075**	0.0076**	0.0075**	0.0072**	0.0074***
	(2.41)	(2.25)	(2.41)	(2.44)	(2.41)	(2.36)	(2.36)
Dependency ratio	0.0165	0.0198	0.0165	0.0166	0.0148	0.0137	0.0191
	(1.20)	(1.22)	(1.20)	(1.19)	(1.19)	(1.08)	(1.29)
GNI per capita	0.0151**	0.0163*	0.1513**	0.0150**	0.0153*	0.0149***	0.0140***
	(2.07)	(1.93)	(2.07)	(2.08)	(2.04)	(2.01)	(2.07)
Education	0.0103	0.0107	0. 0103	0.0098	0.0093	0.0099	0.0114
	(1.10)	(1.18)	(1.10)	(1.05)	(1.03)	(1.09)	(1.23)
Trade openness	0.0079	0.0078	0.0079	0.0081	0.0079	0.0075	0.0069
	(1.79)	(1.85)	(1.79)	(1.78)	(1.83)	(1.78)	(1.69)
Government expenditure	0.0020	0.0028	0.0020	0.0023	0.0024	0.0021	0.0015
	(0.79)	(0.91)	(0.79)	(0.88)	(0.88)	(0.80)	(0.56)
Interest rates	0.0010**	0.0010**	0.0010**	0.0010***			
	(2.46)	(2.34)	(2.46)	(2.55)			
Institutional quality index	0.0017**						
	(2.30)						
Political Stability		0.0023**					

		(2.43)					
Governance effectiveness			-0.0026				
			(-1.26)				
Regulatory quality				-0.0036			
				(-1.46)			
Rule of law					-0.0036		
					(-1.17)		
Control of corruption						-0.0030	
						(-1.22)	
Voice and accountability							0.0009
							(0.36)
Constant	-0.2637	-0.2810	-0.2660	-0.2651	-0.2568	-0.2471	-0.2654
	(-1.86)	(-1.78)	(-1.86)	(-1.87)	(-1.88)	(-0.58)	(-1.86)
Sargen test	12.46						
	(0.330)						
Hansen test	6.50						
	(0.838)						

Table 2.9 a: System-GMM Estimates of Determinants of Financial Inclusion in Africa

Note: Model 1: Determinants of financial inclusion with the effect of overall Institutional quality index; Model 2: Determinants of financial inclusion with the effect of political stability indicator; Model 3: Determinants of financial inclusion with the effect of Governance effectiveness indicator; Model 4: Determinants of financial inclusion with the effect of Regulatory

quality indicator; Model 5: Determinants of financial inclusion with the effect of Rule of Law indicator; Model 6: Determinants of financial inclusion with the effect of Control of corruption indicator; Model 7: Determinants of financial inclusion with the effect of Voice and accountability indicator.

Source: Author's own compilations, 2023 Notes: Values is bracket are t-starts. *, ** and *** denote significance at 10, 5 and 1% respectively

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Financial inclusion index (-1)	0.9759***	0.9768***	0.9759***	0.9759***	0.9763***	0.9761***	0.9742***
	(59.10)	(59.46)	(59.10)	(59.90)	(61.88)	(61.23)	(57.36)
Domestic credit to private sector	0.0037***	0.0039**	0.0037***	0.0037***	0.0037***	0.0038***	0.0040***
	(2.76)	(3.19)	(2.76)	(2.69)	(2.71)	(2.97)	(3.03)
Dependency ratio	0.0197	0.0181	0.0197	0.0191	0.0191	0.0200	0.0213
	(1.71)	(1.47)	(1.71)	(1.64)	(1.75)	(1.87)	(1.85)
GNI per capita	0.0094**	0.0088**	0.094***	0.0097***	0.0097***	0.0096***	0.0093***
	(2.07)	(2.85)	(3.16)	(3.36)	(3.09)	(3.24)	(3.42)
Education	0.0094	0.0092	0. 0094	0.0094	0.0093	0.0094	0.0120
	(1.19)	(1.14)	(1.19)	(1.16)	(1.17)	(1.19)	(1.41)
Trade openness	0.0032	0.0032	0.0032	0.0034	0.0036	0.0035	0.0033
	(1.06)	(1.17)	(1.06)	(1.12)	(1.18)	(1.19)	(1.27)
Government expenditure	0.0025	0.0022	0.0025	0.0025	0.0026	0.0025	0.0016
	(1.87)	(1.53)	(1.87)	(1.84)	(1.18)	(1.86)	(1.11)
Interest rates	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0003
	(1.45)	(1.71)	(1.45)	(1.60)	(1.69)	(1.79)	(1.43)
Institutional quality index	0.0017						
	(0.68)						
Political Stability		0.0012**					
		(1.43)					

Governance effectiveness			0.0013				
			(0.68)				
Regulatory quality				0.0007			
				(0.34)			
Rule of law					0.0004		
					(0.15)		
Control of corruption						0.0008	
						(0.38)	
Voice and accountability							0.0031***
							(2.35)
Constant	-0.2015	-0.2134	-0.2140	-0.2146	-0.2146	-0.2181	-0.2233
	(-1.97)	(-2.16)	(-2.18)	(-2.23)	(-2.23)	(-2.35)	(-2.30)

Table 2.9 b: System-GMM Estimates of Determinants of Financial Inclusion in Africa

Note: Model 1: Determinants of financial inclusion with the effect of overall Institutional quality index; Model 2: Determinants of financial inclusion with the effect of political stability indicator. Model 3: Determinants of financial inclusion with the effect of Governance effectiveness indicator; Model 4: Determinants of financial inclusion with the effect of Regulatory quality indicator; Model 5: Determinants of financial inclusion with the effect of Rule of Law indicator; Model 6: Determinants of financial inclusion with the effect of Control of corruption indicator; Model 7: Determinants of financial inclusion with the effect of Voice and accountability indicator.

Source: Author's own compilations, 2023 Notes: Values is bracket are t-starts. *, ** and *** denote significance at 10, 5 and 1% respective

2.12.1 Demand factors that influenced financial inclusion

Gross national income per capita was found to be significant at 1% level of significance. The sign and the magnitude indicate that an increase in the per capita income by a dollar will result in an increase in the index of financial inclusion by 0.0075. When the GNI per capita of a country increase, it means that the income levels of the citizenry improve all things being equal. This will enable them to save, invest and position themselves against any risk and as such encourage them to participate in the financial sector. Improvement in income increases demand for goods and services within the economy. This promotes businesses since industry must produce more to meet the aggregate demand, which leads to employment creation, more income and as such promote participation of households and firms in the financial sector. This helps to overcome the challenge of transaction cost and improves information asymmetry, confirming the financial intermediation theory that underpinned the study. This finding is consistent with the findings Park and Mercado (2018), Fungacova and Weill (2015), Olaniyi and Alenoghena (2017) and Honohan (2008).

Dependency ratio (DPR), Education (EDU), GDP growth (GDP) and Inflation (INF) were however found to insignificant even at 10% level of significance, indicating that per the study, these variables do not influence financial inclusion in the selected countries in Africa.

2.12.2 Supply factors that influenced financial inclusion

Domestic credit to the private sector was found to be significant at the 1% level of significance. The sign and magnitude of the variable indicate that a percentage point increase in domestic credit to private sector provided by domestic banks will result in an increase in the index of financial inclusion by 0.0151. Credit provided to the private sector will enable households and firms to produce more, which will improve their profit margins and encourage them to save and invest as well as position themselves well to withstand any risk. Improvement in income because of the increase in productivity

will also lead to employment creation. This will enable the beneficiaries to get included in the financial sector because of the earned income from the employment generated, as such overcome cost related challenge of partaking in the financial sector. Empirically, it is evident that when households and firms have access to financial services like credit, savings, and payments, it has the potential to promote financial inclusion. This finding is consistent with Nsiah et al. (2021); OECD (2020)

The interest rate was also found to be significant at 5% level of significance. This implies that a percentage point increase in interest rates will increase the financial inclusion index by 0.0010. When interest rates increase through policy initiatives of the monetary authority, it has varied effects on financial inclusion. For instance, when interest rates increase, it becomes an incentive for households and firms to patronize financial services, through investments, among others, thereby increasing bank deposits. This is consistent with Ozili (2023) who argues that an increase in monetary policy and its attendant increase in interest rates promotes financial inclusion.

2.12.3 Infrastructural factors that influenced financial inclusion

Institutional quality was also found to be significant at 10% level of significance. The sign and magnitude indicate that a unit change in the index of institutional quality will result in an improvement in the financial inclusion index by 0.0017. This means that as institutions operating within the economy function effectively it promotes confidence and trust of households and firms in the financial sector and as such encourages them to participate, leading to improvement in financial inclusion. According to Anthony-Orji et al. (2019), institutions play an indispensable role in facilitating financial inclusion through the ease of restrictions in accessing financial services and benefits from same. This is done through increased access to banks, microfinance institutions and financial agents as well as ensures protection of rights on both institutions and customers. Quality of

institutions operating within the economy improves the confidence of institutions in diversifying their products as such more households can subscribe to the various financial products which leads to a more resilient financial sector which will subsequently ensure a stable economy, confirming the neo institutional theory (Ali et al., 2016; Chinoda and Kwenda, 2019). This finding is consistent with Olanrewaju, et al. (2019), Nkoa and Song (2020), Nguyen and Ha (2021), Muriu (2021), Ali et al. (2022), Abaidoo and Agyapong (2022), Aracil et al. (2022), Ouechtati (2022), who indicated that institutional quality is essential in encouraging both households and firms as well as financial service providers in smooth participation in the financial sector.

It is important to investigate how the various components of the institutional quality index will individually impact financial inclusion. As indicated earlier, the index of institutional quality comprises of six different indicators who collectively revealed statistical significance in promoting financial inclusion. Aside from the political stability component, no other indicator was found to be significant even at 10% level of significance.

As contained in Table 2.9a, the political stability component was found to be significant at 5% level of significance. The magnitude and sign indicate that a unit increase in the political stability component of the institutional quality index will increase the index of financial inclusion by 0.0023. The stability of the political regime is very key because it promotes peace and ensures trust of the citizenry in the entire stability of the economy. Political stability is a critical element of economic growth and prosperity of a country since a consistent political system is a function of efficient system of governance. Investors, both foreign and local, are always concerned about the future of their investments and will therefore reduce or discontinue their investments in a politically unstable country due to the uncertainty, which would ultimately affect economic growth. Politically unstable economy also affects demand for goods and services, productivity as well as expenditure in productive sectors of the economy, which is unhealthy for the economy (Asteriou and Prince, 2001).

A stable political system and productive economy leads to a growth in the income level of households and firms since growth of the economy basically depends on consistent implementation and running of government policies (Barro, 2013) which would then promote participation of all in the financial system and as such increase financial inclusion. This finding is consistent with Allen et al. (2016), Mustafa et al. (2017), Alhassan et al. (2019), who all indicated that political stability promotes financial development (inclusion).

2.13 Analysis of the OLS Results on the factors that influence barriers of financial services

Barriers to financial services accessibility and usage are very key in promoting financial inclusion. The study investigated the factors that influence barriers to financial services utilization. Due to non-availability of data for many years on the components used in the measure of the barriers to financial services usage (measured every two years), the study used a cross-sectional approach to analyze the data. Cross-sectional data covering the two recent years (2017 and 2021) was therefore employed in a separate analysis. This serves as a robustness check for the results obtained in the two separate years. It must be noted that similar results were obtained for the two separate years. The result for 2017 was subsequently used for the analysis as presented in Table 2.10 and the result for 2021 is presented in the appendix. The Dabin-Watson test of 1.99876 as presented in the appendix confirms that there is no problem of autocorrelation in the analysis.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Domestic credit to private sector	0.1262737	-0.0504054	0.1996359	0.0366324	0.0662432	0.1262735	-0.1185201
	(0.96)	(-0.37)	(1.16)	(0.23)	(0.44)	(0.96)	(-0.86)
GNI per capita	-0.1716868 *	-0.2513657**	-0.1176285	-0.2308326**	-0.1892495	-0.1716868*	-0.2853483
	(-1.74)	(-2.20)	(-0.98)	(-2.14)	(-1.67)	(-1.74)	(-2.72)
Education	0.3518557	0.1503061	0.2756284	0.1242393	0.1905085	0.3518559	0.0960995
	(1.05)	(0.37)	(0.80)	(0.35)	(0.54)	(1.05)	(0.27)
Government expenditure	0.1632424	0.073734	0.0885638	0.0768707	0.081354	0.1632424	0.0685688
	(1.32)	(0.55)	(0.72)	(0.59)	(0.63)	(1.32)	(0.52)
Trade openness	0.0676302	0.0291933	0.0135294	0.0420556	0.029397	0.0676301	-0.0285473
	(0.40)	(0.15)	(0.08)	(0.23)	(0.16)	(0.40)	(-0.15)
Money supply	-0.3539749*	-0.190369	-0.4027752*	-0.2579051	-0.2888351	-0.3539748*	-0.1250342
	(-1.76)	(-0.84)	(-1.77)	(-1.13)	(-1.31)	(-1.76)	(-0.58)
Institutional quality index	-0.2383465**						
	(-2.57)						
Political Stability		-0.0359236					
		(-0.33)					
Governance effectiveness			-0.367948**				
			(-2.06)				

Regulatory quality				-0.1533135			
				(-0.98)			
Rule of law					-0.2260403		
					(-.2260403)		
Control of corruption						-0.3610586***	
						(-2.57)	
Voice and accountability							0.0777554
							(0.67)
Constant	0.5913111	2.396374	0.6675196	2.22434	1.63722	0.3710032	3.169792
	(0.34)	(1.06)	(0.35)	(1.23)	(0.88)	(0.21)	(1.81)

Table 2.10: OLS estimates on the factors that influence barriers of financial services in Africa.

Note: Model 1: Factors that influence barriers to financial service usage with the effect of overall Institutional quality index; Model 2: Factors that influence barriers to financial service usage with the effect of political stability indicator; Model 3: Factors that influence barriers to financial service usage with the effect of Governance effectiveness indicator; Model 4: : Factors that influence barriers to financial service usage with the effect of Regulatory quality indicator; Model 5: Factors that influence barriers to financial service usage with the effect of Rule of Law indicator; Model 6: Factors that influence barriers to financial service usage with the effect of Control of corruption indicator; Model 7: Factors that influence barriers to financial service usage with the effect of Voice and accountability indicator.

Source: Author's own compilations, 2023; Note: Values is bracket are t-starts. *, ** and *** denote significance levels at 10, 5 and 1% respectively

The result of the study is in line with the financial intermediation theory that suggests that information asymmetry and transaction cost have the tendency to improve/reduce the interest of the public in the financial sector. From Table 2.10, GNI was found to be significant at 10% level of significance. The sign and magnitude indicate that a one dollar increase in the per capita income of the citizenry will lead to a decline in the index of the barriers to financial inclusion by 0.170080. This suggests that as the income of households and/firms increase, they are financially empowered to overcome the obstacles associated with accessing financial services and hence participate fully in the financial sector. Affordability, as one of the barriers, has been considered in this study. Increase in income will partly help to overcome this barrier, leading to improvement in financial inclusion. This is consistent with a study by Zins and Weill (2016) who indicated that low income is the highest barrier to financial inclusion in Africa and as such improvement of one's income will promote financial inclusiveness.

Money supply was also found to be significant at the 10% level of significance. The sign and magnitude indicate that when the broad money to GDP ratio is increased by a percentage point, the barriers to financial inclusion reduce by 0.3539749. As money supply increases, it lowers interest rates and makes financial services affordable, which therefore encourage households and firms to borrow from financial institutions resulting in high level of investment, profitability, and consumption as well as employment creation because of the reduction in the cost of accessing financial services. This is consistent with the monetarists' argument that money supply impacts on economic activities since it affects interest rates and credit systems. Ajayi and Ojo (2006) and Fah et al. (2012) also indicated that variations in the quantity of money influence interest rates which increases liquidity and as such makes financial services affordable, leading to promotion of financial inclusion.

The institutional quality index was found to be significant at 5% level of significance. The sign and magnitude show that a unit increase in the index of institutional quality will lead to a reduction of barriers to financial inclusion by 0.2383465. This indicates that as institutions operating within the economy function well, it will promote trust for instance, which is one of the barriers considered in this study and as such barrier to financial services utilization reduces. This confirms the neo institutional theory that states that for an economy to function well, the quality of institutions operating within the economy plays a major role. This is empirically consistent with the work of Xu (2020) who posits that trust is a significant contributing factor in enrolling households/firms to the financial sector. On the individual components of institutional quality, only government effectiveness and control of corruption were found to be significant at 5% and 1% respectively. The magnitude and sign indicate that a unit increase in the governance effectiveness will reduce barriers to financial inclusion by 0.367948. Also, unit increase in improvement in the control of corruption indicator will stimulate a reduction in the barriers index by 0.3610586. When corruption is eminent, it discourages households and firms from participating in the financial sector and hence bringing it under control eliminates or minimizes the barrier and as such inspires households to participate in the financial sector. This is consistent with the work by Yekini et al. (2019) who revealed that controlling the level of corruption can reduce barriers that lead to involuntary exclusion of households from the financial sector in Africa. Additionally, the study by Zulkhibri and Ghazal (2017) supports the finding that government effectiveness significantly reduces barriers to financial inclusion and as such promotes financial inclusiveness.

Political stability, regulatory quality, rule of law, voice and accountability were found to be insignificant even at 10% significant level, meaning they do not individually contribute to the removal of financial barriers in Africa.

2.14 Summary, Conclusion, and Recommendations

2.14.1 Introduction

This paper sought to estimate the determinants of financial inclusion in Africa with demand, supply, and infrastructure factors in perspective. The section is sub divided into the following: summary of findings, conclusions, and recommendations.

2.14.2 Summary of Findings

To determine factors that influence financial inclusion in Africa, the following variables were considered under demand, supply and infrastructure, domestic credit to the private sector, dependency ratio, inflation, gross national income per capita, education, GDP growth and institutional quality. The study found that domestic credit to private sector (DCPS), significantly influences financial inclusion. This means that when credit is advanced to the private sector, it stimulates productivity and subsequent profit levels, which would enable households and firms to save or invest so that they would be able to withstand any risk. This will then ensure inclusion of households and firms into the financial sector and hence increase financial inclusion.

GNI per capita was also found to be significant. This shows that as economic activities increase within the economy and its attendant increase in the income of the people, their standard of living is improved and as such encourages them to participate in the financial sector.

Finally, institutional quality was found to be significant, indicating that when institutions operating within the economy do so impartially and dispassionately, it encourages the citizenry to participate in economic activities in the continent due to the build-up of trust and confidence in institutions and economic agents, as such increase productivity and economic growth. This will then promote participation of the people in the financial sector and as such increase financial inclusion. Political

stability, as a component of the institutional quality index was also found to contribute significantly to promoting institutional quality and subsequently financial inclusion. This implies that as the political system is stable, it promotes equity, discourages corruption, and builds up confidence in the economy, which will promote investments and employment creation. The significant factors indicate that both demand and supply as well as infrastructure factors influence households and firms' inclusion into the financial sector in Africa.

Dependency ratio, GDP growth, education and inflation were however found not to be statistically significant. This means that these variables, according to the study, do not contribute to financial inclusion in Africa.

In another vein, GNI per capita, Money supply and institutional quality were found to contribute to the elimination of barriers that inhibit participation of households and firms in the financial sector in the continent. This indicates that as money supply increases, it lowers lending rates and as such encourages more people to borrow and/ invest. GNI per capita was similarly established to be significant in eliminating barriers to financial inclusion in Africa. This shows that as the income of households and firms increases, it prevents involuntary financial exclusion of beneficiaries. Domestic credit to private sector, dependency ratio, government expenditure and trade openness were however found to be insignificant in influencing barriers to financial inclusion in Africa.

2.14.3 Conclusions

The study pursued factors that determine financial inclusion in Africa. Financial inclusion data and data on the control variables were sourced from the World Development Indicators, Global Findex Database and World Governance Indicators covering seventeen-year period (2004-2020).

System-GMM and Ordinary Least Square (OLS) methods were employed to find out determinants of financial inclusion in the region and factors that influence barriers to financial inclusion, respectively.

It is important to ascertain what influences financial inclusion from demand, supply and infrastructure perspective in a single model as well as investigating the barriers that inhibit financial inclusion in Africa.

To estimate the determinants of financial inclusion, domestic credit to private sector, GNI per capita, inflation, GDP growth, age dependency ratio, education and institutional quality were investigated using twenty (because of data availability) countries in Africa.

The result of the study shows that domestic credit to private sector significantly affects financial inclusion. It could therefore be deduced that households and firms with access to credit would increase their output and profit levels, which would enable them to save or invest, which ensure their inclusion in the financial sector.

GNI per capita was also found to be significant. It could then be concluded that an increase in per capita income of households promotes their inclusion in the financial sector and as such improves financial inclusion. Institutional quality was found to be significant, which can then be concluded that institutional quality plays an important role in promoting financial inclusion due to its ability to promote trust, discourage corruption and ensure safe financial landscape.

For the contribution of barriers to financial exclusion, GNI per capita, money supply and institutional quality were found to play a stimulating role in overcoming barriers to financial service utilization. It can therefore be concluded that when money supply increases coupled with an increment in per capita income within the environment of quality institutions, barriers that constrain financial services usage are eliminated or minimized.

2.14.4 Recommendations

Relative to the findings, the following recommendations were made for both policymaking and for future research.

Income level of households play a significant role in promoting financial inclusion, which is rooted in the literature and confirmed in this study. First, governments in Africa should institute holistic financial inclusion frameworks that would seek to get majority of the citizenry to be involved in the financial sector since financial inclusion is generally low in Africa, by improving income levels of households through job creation by the government and the provision of congenial atmosphere for the private sector to thrive. This should be done by supporting firms with interest-free or low interest funding to promising companies to promote job creation and income generation. Governments in Africa must therefore ensure improvement in the level of financial inclusion by formulating a financial inclusion policy that would focus on ensuring that financial institutions make their products accessible, user friendly, quality and less expensive for the usage of households and firms, without compromising on financial stability. This policy should also contain a portion that would vigorously educate the masses on financial literacy by encouraging them to form co-operatives to easily facilitate accessibility by financial institutions. This would also help resolve voluntary exclusion of the people from the financial sector.

The private sector has been found to be an engine of growth. Efforts should therefore be made by development partners and financial institutions to offer affordable and properly supervised loan schemes (other than grants), to the private sector through governments of member countries since the average loan advanced to the private sector was found to fall below the regional and world average. These loans will instill some level of responsibility in the beneficiaries which will go a long way to improving their businesses and increase their income levels. Entrepreneurship should be encouraged especially among the youth, as the government of Ghana is doing through the

Youstart programme that is intended to equip the youth with financial and technical assistance to create wealth. This will ensure a reduction in overdependence on government for employment and resources, which will lead to growth in the financial sector and the economy.

Institutional quality has been identified both theoretically and empirically to contribute to efficient function of the economy, especially the financial system. Efforts must be made by member countries and with technical assistance from development partners, to strengthen their institutions other than personalities so that they can sanities provision of goods and services in the continent.

Central banks in Africa should also provide the microfinance sub sector with the necessary regulatory support and direct them to focus their services towards the involuntarily excluded people to enroll everyone into the financial sector. Central banks should explore quantitative easing to stimulate their economies by supporting some selected value-addition sectors of the economy, like the agricultural and production sectors, with a specific task of producing some quantity of goods at a specific timeline. In this way, the injection of money into the economy will not have any inflationary consequences and will help job creation and income generation.

It is recommended for further studies that the determinants of financial inclusion should be investigated using the various countries income classification levels, i.e., lower-income, middle-income and upper-income in African countries.

CHAPTER THREE

THRESHOLD EFFECT OF FINANCIAL INCLUSION ON POVERTY REDUCTION IN AFRICA: DOES INSTITUTIONAL QUALITY PLAY A ROLE?

3.0 Introduction

Poverty is the most important policy relevance of most economies; hence its eradication is a major concern for many. This necessitated the formulation of the sustainable Development Goals (SDGs), which enjoins all member countries to end all forms of poverty by 2030 (Makarenko et al., 2022; UN DESA, 2022). This call is more profound in Africa where poverty is rife due to high degree of poverty in the continent. Even though some strides have been made in the fight against poverty, though Africa has not achieved much, the gains has been derailed with the advent of the Covid-19 pandemic and the Russia-Ukraine war.

Several policy interventions have been suggested to fight poverty and financial development (financial inclusion) which happens to be the globally accepted means to end global poverty. This is evident in the neoclassical and developing economics theories that suggest that financial development stimulates economic growth, which will in turn lead to poverty reduction (Erlando et al., 2020; Odhiambo et al., 2009; Majid et al., 2019; Dhrifi, 2015). That is, when credit or any form of financial support is provided especially to the productive sector, it leads to improvement in output which will translate into employment, income generation and ultimately lead to poverty reduction (Dewi et al., 2018). Furthermore, through the "trickle-down effect", economic growth leads to an increase in income of poor households which goes a long way to close the inequality gap and subsequently lead to a reduction in poverty (Zhou et al., 2021).

The inequality-reducing theory hypothesis that financial development leads to inclusion of everyone, especially those who were earlier excluded, into the financial sector, thereby benefiting from the financial access in terms of increase in income levels and subsequently lead to poverty reduction (Hamori & Hashiguchi, 2012; Jalil & Feridun, 2011; Mookerjee & Kalipioni, 2010). The neoclassicals buttressed this position by indicating that financial development and poverty reduction is negatively related (Demirguc-kunt and Levine, 2008; World Bank, 2001), which means that the more one is financially included, the more the level of poverty reduces.

The empirical literature has further supported the poverty-reducing effect of financial inclusion in all economies (Jiang and Liu, 2022; Barik and Lenka, 2021; Koomson et al., 2020; Donou-Adonsou and Sylvester, 2016; Mookerjee and Kalipioni, 2010; Akhter and Daly, 2009; Burgess and Pande, 2005). Financial development does not only benefit developing countries but developed economies also benefit due to the spillover effect of development in the financial sector (Bolarinwa et al., 2021). The extant literature also presents some conflicting effects of financial inclusion on poverty reduction, with others contending that financial inclusion does not have any effect on poverty reduction (Mader, 2017; Kaidi et al., 2018), others indicating that developed economies benefit more than developing economies (Wang and Guan, 2016), whiles others say the effect is not automatic (Singh and Huang, 2015). This shows that the effect of financial inclusion on poverty reduction is nonlinear and as such the benefits would be felt at a certain threshold level.

Institutions play a very key role when it comes to transferring benefits of financial services to households. The low number of bank branches and ATMs in Africa is evidenced that the continent has not performed well when it comes to financial penetration, leading to a low level of financial inclusion (Asongu & Asongo, 2018). Most households in Africa access financial services through

informal means as demonstrated that bank penetration is less than 10% in some countries in Africa (Ajide et al., 2020; Andrianaivo and Kpodar, 2011). This reveals that there are weak role institutions play in the financial intermediation process, which has been confirmed in the literature, indicating a gap in the institutional infrastructure in the region (Ajide et al., 2020). Meanwhile, Chang (2011) indicates that since 1990, institutions have been proven to play a central role in economic development, legitimizing its feature in policy. Demetriades and Law (2006) argues that financial intermediation does not stimulate the needed impact in economic growth and poverty reduction when there is weak institutional framework. Financial market drivers have largely been influenced by policies through effective legal and regulatory frameworks. This suggests that to achieve efficiency in the financial market, there must be corresponding effective policy interventions through effective institutional framework to boost confidence of investors (Ajide et al., 2020).

The quality of institutions that operate in an economy is seen as the focal point for societal advancement and most importantly, poverty reduction (Asadullah and Savoia, 2018). This institutional quality role in an economy is endogenous to developments of the financial sector and growth of the economy, which is therefore seen as the factor responsible for both inter and intra country growth variations over time (La Porta et al., 1999; Kebede and Takyi, 2017). Simply put, institutional quality is seen as the main determinant in the relationship between finance and economic growth.

Some theoretical stands hold different views that institutions in developing countries cannot harbor quality of institutions to have a positive effect on financial inclusion (Durlauf, et al., 2005; Rodrik, 2008). Despite the dissenting view with regards to effect of institutions, failure of institutions in an economy has been proven to cause market inefficiencies, market exclusion and misallocation

of resources, resulting in increase in poverty (Bastiaensen et al., 2005; Grindle, 2004). Quality of institutions strengthens how financial institutions play the poverty reduction role (Aracil et al., 2022). Several empirical literature also add to the fact that institutional quality in positively related to economic growth, income generation and as such lead to poverty reduction (Pande & Udry, 2005; Aghion et al., 2005; Altunbaş, &Thornton, 2020; Easterly & Levine, 2003; Klasen, 2008). Quality of institutions also affect poverty reduction directly through good governance, which ensures prudent utilization of resources and efficient productivity of labor and capital as well as reduction in corruption and promotion of rule of law (Grindle, 2004; Tebaldi and Mohan, 2010). The moderative role of institutional quality in the financial inclusion- poverty reduction nexus has not been extensively studied especially in the context of the nonlinear relationship between the variables, which influenced the inclusion of institutional infrastructure in this study to examine how institutional quality impact the financial inclusion and poverty reduction relationship. It cannot be said that once an individual uses a financial service, its effect is guaranteed, perpetual in nature, or changes over time, indicating a nonlinear relationship between the variables, hence the need to estimate the threshold level at which financial inclusion will lead to poverty reduction in Africa, through the moderative role of quality institutional infrastructure.

3.1 The Concept and Measurement of Poverty

Poverty is largely related to income and its dynamics. Poverty has gone through various stages of eradication in the World. The Poverty and Shared Prosperity Report (2018) shows that poverty is changing and presents improved ways to monitor the efforts of ending it. Poverty is said to be a dynamic phenomenon since individuals are not poor or going to be always poor as well as economic dimensions of it in relation to income is equally dynamic (Yaqub, 2000). Poverty has

been seen as a multidimensional concept in terms of its definition. The Economic and Social Inclusion Corporation (ESIC) defines poverty as not having money to meet the needs of an individual (ESIC, 2008). The concept of poverty must be viewed from both absolute and relative terms. Absolute poverty is defined by the United Nation as a condition where there is severe insufficiency of fundamental human needs like food, health, safe drinking water, clean sanitation, shelter, education, and credible information (UN, 1995). Relative poverty, on the other hand, is the inability of households to meet certain needs apart from the basic needs, which is subject to economic conditions within a certain economy. This means that with relative poverty, the individual has some income but not sufficient to meet everything the person desires. In whatever form, poverty is an economic phenomenon, whose eradication must be seen as such.

Several efforts have been made by governments and non-governmental organizations (NGOs) all over the world especially Africa, the World Bank (WB) and the International Monetary Fund (IMF) to alleviate poverty in the region by developing poverty reduction strategies (Chakravarty & D'Ambrosio, 2013). The World Bank, through the Global Poverty Monitoring Technical Note revealed that as at 2021, households in sub- Saharan Africa (that drive poverty rates in Africa) who live below the $ 1.90 poverty line stands at 41.2% (which is up from 34% pre-Covid), representing about 433 million people in the sub region living below the poverty line. According to the Institute for Security Studies (2022), about 30 million of this poor Africans were push to extreme poverty because of the Covid-19 outbreak, which has further worsened the poverty fight in the region, making it almost impossible to meet the 2030 UN target of ending extreme poverty.

The means to end poverty encapsulates three strategic areas. These are opportunity, empowerment, and security. Giving opportunity to people requires that jobs, schools, credit, electricity, roads, markets, water, sanitation, health services, among others, are provided to poor people. To achieve

security, reducing vulnerabilities to economic shocks, ill health, natural disasters, disability, and personal violence should be promoted. The chance for the poor to participate in the process leads to their empowerment. Creating human capital, through provision of financial assets to the poor, will go a long way to increase their spending on essential social and economic services. Giving the poor support through human capital formation affects income of the poor and hence leads to reduction in poverty.

Poverty is measured from the perspective of both absolute and relative poverty. To measure poverty from the absolute poverty perspective is to measure it from the situation where an individual/household cannot afford their necessities (i.e., food, housing, and clothes). Measuring absolute poverty is, however, extremely difficult, if not impossible. The criterion classifies all poor people all over the world with the same measure.

Relative poverty, which is analogous to inequality, however, is where an individual is considered poor when they are in an evidently deprived condition, either financially or socially, in relation to other people in their environment. Under relative poverty, the difference between people who are poor and those who are not rests on the extent of development of the communities under consideration and cannot be said of another society.

Poverty headcount, H, is another method that is used to measure poverty, thus those whose incomes fall below the absolute poverty threshold. The headcount ratio measures poverty as a portion of the population is under the poverty line. The UNDP in 2006 used the Human Poverty Index (HPI) as a measurement of poverty. It measures poverty in three areas of deficiency/deprivation: life, basic education, and economic provisions. The UNDP (2006) states that there is an indication of poverty when one dies before age forty (40). For basic education, the report defines the measure

as the fraction of adults who are illiterate and measures poverty economically as the fraction of people without access to safe water and the fraction of underweight children.

Another concept of measuring poverty is the multi-dimensional poverty index (MPI), which has to do with the deprivation that is closely related to social exclusion, i.e., the inability to access some goods and services that are necessities for humanity, whether a basic need or not. It measures poverty in three levels (health, education and living standards) just like the Human Poverty Index (HPI). While the HPI uses aggregate level data, MPI uses an individual level data.

Another way of measuring poverty is through Income and expenditure, which is used to form poverty lines signifying the availability of money (cash) in living standard approaches to determine the degree and composition of poverty respectively. To measure poverty rates, the common way has been to consider the population of individuals whose household income is under a certain threshold level (Eurostat, 2017). In most developed countries, scholars have mostly used household income when assessing households' economic well-being. Notwithstanding, for theoretical and practical purposes, it has been claimed that expenditure may be a better indicator of longer-term financial conditions and should therefore be used when measuring living standards (Brewer & O'Dea, 2017). For the purposes of this study, the household consumption expenditure method is used as a measure of poverty. It is worth noting that Poverty evolves. The National Statistical Institute confirms this by intimating that poverty is not a fixed occurrence since one's situation may change to either direction with time. This therefore reveal that it is essential to carry out dynamic investigations into poverty that consider changes and transitions to interrogate a population over an adequately long period of time.

3.2 Financial inclusion, income inequality and poverty reduction

Poverty is an income-driven phenomenon. The main aim of poverty reduction is to enable the unbanked accessibility to formal banking services so that their standard of living would be improved through income generation. Notwithstanding the actual outcome of financial inclusion on income inequality the study of the relationship of the variables remains inconclusive. Beck et. al. (2007) suggests that inclusive finance has a robust consequence on an individual by improving poverty and inequality.

There have also been conflicting arguments in the theory with regards to the actual role financial development plays in poverty reduction. Theoretically, financial development impacts households from two main perspectives; the inequality- widening and the inequality-reducing theories. For the inequality-widening proponents, they argue that financial development increases the already existing gap between the rich and the poor since the poor are unable to provide the requirements necessary to open an account, hence continue to be excluded (Rajan & Zingales, 2003). This means that financial development does not really benefit the poor, which is hypothesized by Stiglitz and Weiss (1981) and Jalilian and Kirkpatrick (2001), that financial development increases poverty levels in emerging economies. This is based on the background that in developing countries, their economies are bedeviled with market failures because of problems of adverse selection, information asymmetry and moral hazards. Due to the market failure and imperfections, poor households are not able to access financial products like credit, which could have been invested for its maximum benefits as such unable to affect poverty levels regardless of the development in the financial space (World Bank, 2014; Law et al., 2014; Banerjee and Newman, 1993). Financial development is expected to relax some of the restrictions in the financial sector and as such makes access to credit by especially the poor, easy which will further enhance their income level and lead

to poverty reduction (Aghion and Bolton, 1997; Galor and Moav, 2004; Rashid and Intartaglia, 2017) but unfortunately the poor are not able to derive these benefits since they are not able to overcome these restrictions. This suggests that despite liberalization of the market the poor are unable to benefit from the financial sector and as such continue to widen the gap between the rich and the poor. It is therefore apparent that when the poor have access to financial services, it provides a lifetime opportunity for them to invest in their businesses and education, which put more value on themselves for improvement in income levels which will lead to poverty reduction.

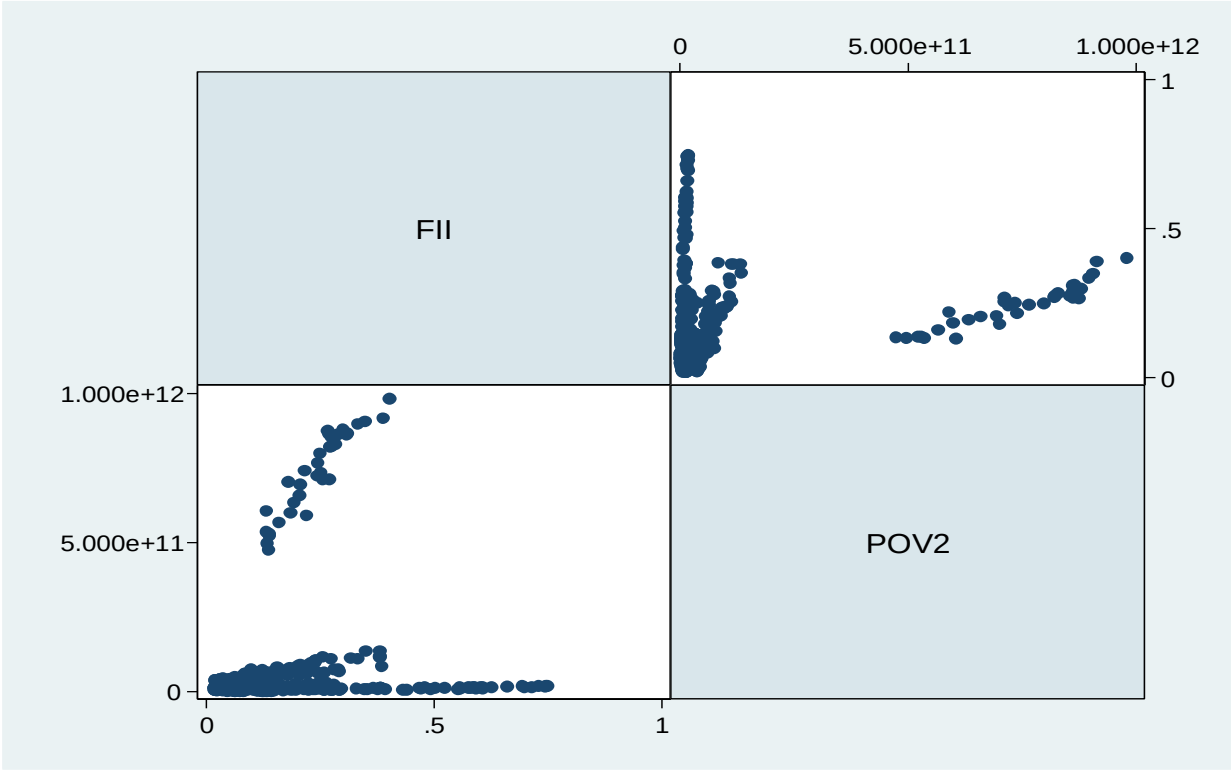
The inequality-reducing theory therefore opined that financial development leads to inclusion of everyone, especially those who were earlier excluded, into the financial sector, thereby benefiting from the financial access in terms of increase in income levels and subsequently result to poverty reduction (Hamori & Hashiguchi, 2012; Jalil & Feridun, 2011; Mookerjee & Kalipioni, 2010). It is also proven empirically that when the poor has access to financial inclusion, it has the tendency to reduce income inequality considerably (Park and Mercado 2018; Turégano and Herrero, 2018) There is also a significant adverse relationship between households having access to finance and income inequality, which goes a long way to close the inequality gap in society (Honohan, 2007; Park and Mercado, 2018; Turégano and Herrero, 2018). The effect of financial inclusion on income inequality varies across countries and regions but throughout all sub regions in Africa, the empirical literature has been consistent that financial inclusion will reduce income inequality which will subsequently reduce poverty (Tita and Aziakpono 2017; Neaime and Gaysset 2018) Some models also suggest that there is a non-linear relationship between financial inclusion and inequality. Greenwood and Jovanovic (1990), for instance, presented a Kuznets-type correlation between inclusive finance and the level of economic development. The Kuznets theory explains that financial inclusion is more beneficial at higher level of economic growth since it is only the

rich that benefits from improved finance at the early stages of economic development to the neglect of the low-income earners. Townsend and Ueda (2006) argued that there is a transient nonlinear effect of financial inclusion with changing inequality and economic growth. There are a set of models that suggest that causality between income inequality and financial inclusion move in the opposite direction. Although there is a theoretical underpinning on the causality among inclusive finance and income inequality, a more efficient labor and product market has greater effect on the poor than direct financial inclusion. Also, according to the calibrated general equilibrium models, the direct result of financial inclusion on income inequality emanates from a bigger portion of the people being captured in the formal sector and higher incomes (World Bank, 2008).

Omar and Inaba (2020) investigated the role of financial inclusion in reducing income inequality and subsequently reduce poverty in developing countries and revealed that financial inclusion is significantly influenced by the level of income inequality and vice versa. This is apparent that considerable level of financial inclusion in an economy, especially developing countries, will reduce income inequality and poverty in developing countries. Tita and Aziakpono (2017) argued that there are three ways to view the relationship between financial inclusion and inequality. That is, account use for business, electronic payments and formal savings are positively related to income inequality. This was attributed to information asymmetry and moral hazards since account holders were mostly first-time users and have no history of transaction cost as well as banks holding excess liquidity because of interest rate caps and underdeveloped interbank and capital markets. Also, the widening case of income inequality in Africa was attributed to limited financial inclusion. Park & Mercado (2015) revealed that financial inclusion significantly reduces poverty and income inequality in developing Asia. It is suggested that measures should be instituted to handle financial exclusion in groups with low income to tackle increasing income inequality in the

region which will also enhance poverty reduction efforts. Dabla-Norris et al. (2015) found that greater inclusive finance lowers income inequality when it only focuses on increased accessibility or reduction in cost for the poor but policies that reduce credit constraints can benefit the rich to the detriment of the poor thereby increasing income inequality. Thus, empirical studies suggest a positive significant impact of financial inclusion on poverty and income inequality. This is mostly experienced in the short run. However, factors such as increased productivity of labor, lower transaction costs, improving information asymmetry and moral hazard through credit history and distribution of entrepreneurial ability, can in the long-run influence income inequality.

Figure 3.1: Scatter plot matrix on the relationship between financial inclusion and poverty reduction



Source: Author's own construct, 2023

From figure 3.1, it is apparent that the relationship between financial inclusion and poverty is not a direct one, confirming the nonlinear relationship between the variables.

3.3 Review of theoretical and empirical literature

The exact impact of financial inclusion on poverty reduction is rooted in economic theories. These theories have further been empirically investigated both generally and country/regional specific. This section therefore presents theoretical and empirical literature that underpins this study.

3.3.1 Theoretical Literature

- **The Kuznet theory**

For this study, it is reiterated that financial inclusion and reduction in poverty nexus is linked to the connection involving inclusion in the financial space and poverty reduction. Theoretical literature establishes that financial inclusion has both direct and indirect nexus with poverty reduction. This suggests a nonlinear relationship between poverty reduction and financial inclusion. There is therefore a theoretical gap in the aspect of the non-linearity between poverty reduction and financial inclusion since the theory has not revealed the exact level at which poverty declines because one's involvement in the financial system. This work subsequently draws inspiration from the Kuznet's hypothesis to establish the non-linear association comprising financial inclusion and reduction in poverty. Kuznet (1995) shows the long-term behavior comprising changes in the distribution of personal income, which is the surest way of dealing with poverty. The theory revealed how income inequality is linked with economic growth. That is, it shows the direction of inequality in an economy when there is an improvement in economic growth. Specifically, Kuznet hypothesizes that on the onset of economic development, inequality

as well as income distribution, favors few individuals until the economy approaches its peak before the impacts of the economic growth would be felt by all, leading to an inverted U-curve relationship. In the same vein, in the early stages of financial utilization, it will increase poverty and benefits only the rich in the short-term, but it will ensure that inequality in income will be reduced in the long run, which will empower the poor and as such lead to poverty reduction. This is because, at the initial stages of financial inclusion, the rich could for instance, provide the necessary documentations and collaterals to secure financial products from financial establishments, which makes the poor prone to exploitation by these institutions and the rich, and as such they get poorer. However, beyond the peak of the financial inclusion drive, the financial sector is anticipated to be liberalized to the extent that most of the barriers to capital accessibility that limit the poor from participating in the financial sector would be removed and as such they would be able to access and use any financial service they so wish to, which would then lead to eradication of the income inequality and poverty. For example, financial inclusion empowers entrepreneurs since they would have easy access to capital through credit accumulation, which would enable them to expand their businesses and employ more people. This will ensure an improvement in the income of both the entrepreneur and the employees, which will ultimately improve their standard of living because of the reduction in poverty. To evaluate the threshold level at which financial inclusion could stimulate poverty reduction, this research modifies the extant theoretical work to include the non-linearity involving financial inclusion and reduction in poverty.

- **The neo-institutional theory**

The neo-institutional theory, propounded by Douglass North, states that for systems in an economy to function effectively, it depends on how quality the institutions in the system operate (North, 1990). According to the theory, institutions consist of constraints in the political, economic, and social coexistence that are fueled by the human component. This can be both formal (laws, constitution, property, and human rights) and informal (customs, taboos, traditions, code of conduct). Institutional quality can be considered as inclusive or extractive; extractive institutional setting has to do with few powerful individuals exercising political power and inclusive institutional system has to do with evenly usage of political power (Acemoglu & Robinson, 2012). The extractive political system is associated with corruption, which might cause barriers in the benefits one would derive from financial inclusion (Mauro, 1995; Mcmillan & Woodruff, 2002). An inclusive system, on the other hand, yields a lot of benefits since every member of the economy operates freely under good policy and politically stable environment which has a greater tendency to lead to poverty reduction due to its ability to increase savings and investment, which can result in an improvement in income levels and guide against risk (Parks & Mercado, 2015; Beck et al., 2007). This means that to ensure inclusion is always important since the extractive system has debilitating effects on the economy. It is an undeniable fact that the main factor that enhances economic prosperity, which will subsequently lead to poverty reduction, is the quality of the institutions operating in the economy (Easterly & Levine, 2003; Tebaldi & Mohan, 2010). It is empirically proven that financial services are rendered effectively when institutions operate freely and professionally (Gani & Al-muharrami, 2015; Ndikumana, 2006). That is, for instance, if the granting of credit is done according to regulations, due diligence would have been done such that the credit would be granted to deserving clients, which will guarantee pay- back since the client would be aware of the consequences, should they default. This will engender trust in the financial

system and as such improve the financial inclusion drive and its attendant benefits. On the other hand, corrupt officials and governments lead to loss of credibility which pushes away potential investors, as such has the tendency to mare the fight against poverty (Law & Azman-saini, 2008). This theory fits this study in the sense that when the various structures within the economy functions well as spelt out in the institutional quality indicators, it promotes confidence in the financial sector and as such lead to more people participating in the sector, hence promotes inclusion. This study therefore seeks to investigate how institutional quality will ease the poverty reduction fight through the promotion of financial inclusion.

3.3.2 Review of Empirical Literature

In the financial environment, less is done to ascertain the micro and macro effects of financial inclusiveness. The identified extant studies have focused on the relationships amongst access to finance and poverty, growth in finance and poverty reduction and micro financing.

To investigate the nonlinear connectedness with regards to financial inclusion, economic growth, inequality and poverty reduction in China, Chen et al. (2022) purposed to test the short and long-term benefit of the variables on poverty reduction. Using the Panel Vector Autoregression model (PVAR), the study established a bidirectional relationship among the variables. The study specifically revealed that financial inclusion presents a long-term poverty reduction impact in China. It was further revealed that there is a U-shaped relationship between financial inclusion and poverty reduction with more focus on income inequality, confirming the nonlinear connectedness between the variables.

Zungu (2022) examined the nonlinear relationship between finance and growth, in a bit to validate the U-curve hypothesis and to check whether a threshold exist between the variables. Using the

Panel Smooth Transition Regression (PSTR) model due to its ability to correct any problem of endogeneity and heterogeneity, the study found that there exists a nonlinear relationship between financial development and growth, confirming the U-curve relationship, with a 60.5% of GDP being the threshold level beyond which financial development will stimulate economic growth. Nsiah et al. (2021) explored the threshold level of financial inclusion that affects reduction in poverty in sub-Saharan Africa. Using the Hansen threshold estimation method, the study revealed that for financial inclusion to affect poverty reduction in the sub region, the level of inclusion must be above 0.365. Tran and Le (2021) studied how financial inclusiveness impacts poverty in the event of the Covid-19 pandemic, which had led to many job losses and collapse of business. Using the Principal Component Analysis (PCA) for constructing index of financial inclusion and a two-stage least square and GMM methods, the study revealed that financial inclusion is negatively correlated with poverty reduction.

Bolarinwa and Akinlo (2021) analyzed the nonlinear relationship that exists between financial development and inequality in Africa. With the use of 40 high, middle, and low-income, African countries, the results confirmed that there exists a threshold level of development in finance on inequality within those selected countries in all the income groupings. To contribute to this debate on how financial inclusion affects income inequality as well as poverty reduction in developing countries, Ouechtati (2020), using 53 developing countries between 2004 to 2017 supported the argument that financial inclusion and poverty are negatively correlated with the effect been fueled by credit availability, access, and utilization of deposit accounts with commercial banks. The study further affirmed the accession that having access to finance, through financial development, is critical in reducing poverty and improvement in welfare of households, through improvements in money supply.

Emara and Mohieldin (2020) analyzed how financial inclusion impacts extreme poverty for 34 countries from 1990 to 2017. Using a system GMM dynamic panel technique, revealed that access to finance is positively vital in falling levels of poverty in the MENA states. Mhlang et al. (2020) investigated how inclusive finance impacts on poverty among Zimbabwean peasant farmers using simple linear regression. The research demonstrated a strong adverse connection between poverty reduction and financial inclusion among peasant farmers. It was further revealed that for the poor to truly benefit from the financial sector, they must be active participants in the sector through the operation of functional savings accounts, access to credit and insurance. It has been revealed copiously in the literature that inclusive finance has a direct and adverse effect on poverty reduction. For finance to penetrate through for maximum benefit, the transmission is done through a medium (institutions) and therefore the genuineness and impartial delivery of this mandate has significant effects. Zahonogo (2016) examined the effect of financial development on poverty reduction involving 42 sub-Saharan African countries within the period of 1980 to 2012. Using the system GMM method, the study revealed a U-curve relationship between the variables as such showed that there exists a threshold level beyond which financial development will exhibit poverty reduction benefits, confirming the nonlinear relationship between financial development and poverty reduction.

On the moderative effect of institutional quality on the financial inclusion and poverty reduction nexus, in a related study, Ouechtati (2022) empirically investigated the moderative effect of political and economic institutions in promoting financial inclusion, thereby reducing inequality. With 110 countries within a period from 2004-2018, the study revealed that having access to financial services are strongly influenced by quality of institutions, signifying those weaker institutions thwarts the financial inclusion efforts. It was also revealed that financial access, with

effect from political and economic institutions have positive impact on income inequality, leading to poverty reduction. Nguyen and Ha (2021) investigated how financial inclusion is facilitated by institutional quality in the ASEAN countries. Six governance indicators as presented by the World Governance index were used with data from 2008-2019 and the PCA method to determine a comprehensive index of financial inclusion. Using the GMM method, the research found that a direct association exists between institutional quality and financial inclusion.

Similarly, Muriu (2021) explored whether institutional quality matters for financial inclusion, using deposit account ownership as a benchmark. With annual data covering 120 countries, both developed and emerging countries, covering a period of 2004-2019, analyzed using the fixed effects panel estimation model, revealed that rule of law and regulatory quality are significant and contributes immensely towards inclusive finance, especially in Africa, where their legal and regulatory institutions are not quite strong. In a related study, Aracil et al. (2021) interrogated the role institutional quality play in financial inclusion in facilitating the poverty reduction fight using 75 developing and developed countries over the period of 2004-2017. With the use of quintile regression analysis method, it was found that the quality of institutions quickens the importance of inclusive finance on poverty reduction. The work emphasizes that this positive effect institutional quality has on poverty reduction is more prominent in developing countries than advanced countries.

3.4 Conceptual framework of the study

Extant literature has provided evidence to suggest that financial inclusion has positive or negative impact on poverty reduction. Whiles others argue the effect is not automatic, as developed economies benefit more than developing countries and others intimate that financial inclusion has no effect at all on poverty reduction. This indicates that financial inclusion has a nonlinear relationship with poverty reduction, averring that the effect of financial inclusion on poverty reduction can only be felt at a certain threshold level, especially in the context of institutional involvement. This study therefore investigated extensively the impact of financial inclusion on poverty reduction in Africa by revealing the exact level at which this effect could be felt with the impact of quality of institutions. This is diagrammatically represented in Figure 3.2

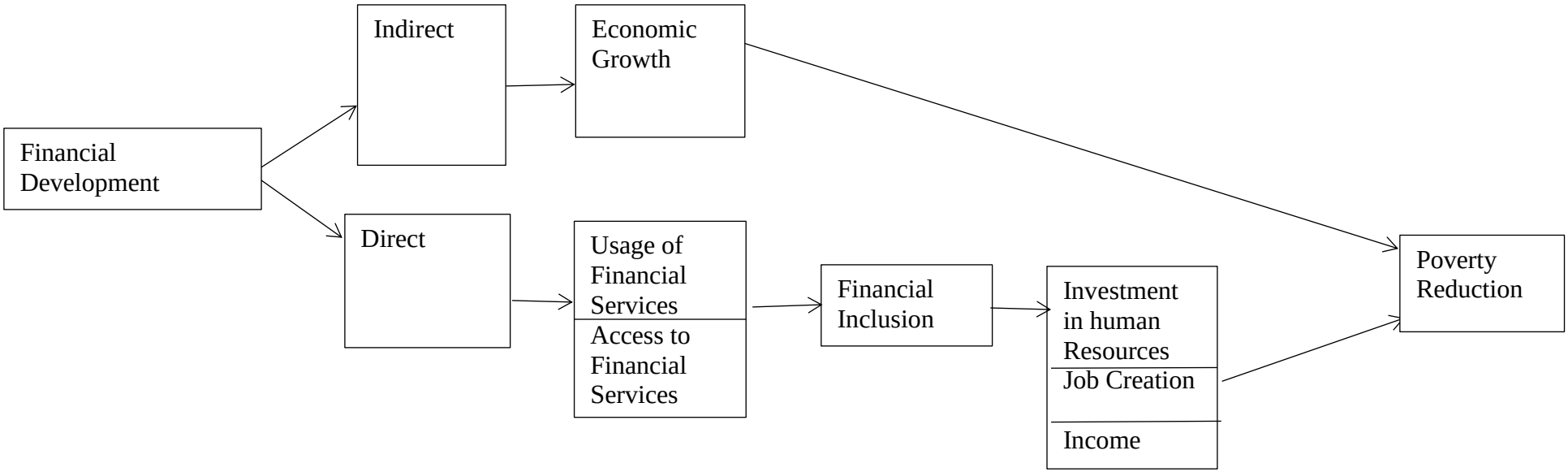


Figure 3.2 Conceptual framework on the effect of threshold level of financial inclusion on poverty reduction in Africa.

Source: Author's own construct, 2023

3.5 Data and Methodology

3.5.1 Data

This study is quantitative research that gathered data from secondary sources, with a period that span from 2004 to 2020, which period was selected due to data availability. It must be indicated that the measurement of the data as compiled by the data sources measured up to 2020 as at 2022 when the study was conducted. The starting year (2004) was chosen because that was the year measurement of most of the variables in the study started. Data covering the following variables: number of Automated Teller Machines (ATM) per 100,000 adult population, branches of banks and agents per 100,000 population, having a savings account, having at least one financial product, and holding a loan account in a financial organization, which was generated from the World Development Indicators (WDI) database was used to construct the financial inclusion index. To ensure robustness check the study also calculated a financial inclusion index according to Sarma (2008, 2012), which comprise the following components Automated teller machines (ATMs) per 100,000 adult, Commercial bank branches per 100, 000 adults, Borrowers from commercial banks per 1,000 adults, Domestic credit to GDP ratio, and Depositors with commercial banks per 1,000, which is compiled from the World Development Indicators (WDI) database. The data on Household Consumption Expenditure together with the control variables (Domestic credit to private sector, GDP growth, money supply, inflation, gross national income per capita, education, dependency ratio, Trade openness, interest rate, government expenditure) was sourced from the WDI. For the barriers of financial services, a cross-sectional data on the following variables were used; distance, trust, affordability, and documentation, which was generated from the Financial Access survey (FAS) compiled by the International Monetary Fund (IMF). A cross-sectional approach was adopted for the barriers since the data on the barriers' indicators are compiled every three years.

The year 2017 was therefore arbitrarily chosen for the study to explore factors that influence barriers to financial services utilization. For the institutional quality, data on Rule of law, Control of Corruption, Regulatory Quality, Governance Effectiveness, Political Stability and Absence of Violence/Terrorism and Voice and Accountability, compiled by the World Governance Indicators (WGI), was used. The WGI compiles observations on governance from experienced individuals through surveys across countries. The WGI data is modelled on three pillars: independence, accountability, and scope of action. Many empirical studies used the WGI database for their research; Nguyen and Ha (2021), Muriu (2021), Eldomiaty et al. (2020) and Zulkhibri and Ghazal (2017). As a result of data availability, 20 African countries were used in the study (Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo DR, Egypt, Ghana, Lesotho, Madagascar, Namibia, Nigeria, Rwanda, Sierra Leone, South Sudan, Tanzania, Togo, Uganda, and Mozambique). The study sought to involve all countries in Africa for the analysis but only 20 countries have the full complement of the data on the variables used.

3.5.2 Estimation Techniques

This section discusses the technique that was used in estimating the threshold level at which financial inclusion will lead to poverty reduction in Africa using the Hansen Threshold Estimation Technique.

3.5.2.1 Hansen Threshold estimation technique

To estimate the threshold level at which financial inclusion will stimulate poverty reduction, Hansen's threshold method was used, by following the empirical model as formulated by Omar and Inaba (2020) and Park and Mercado (2015). This is illustrated in the following equations.

$$\mathrm{Pov_{it}} = f(\mathrm{fii_{it}},\ \mathrm{IQ_{it}}, \mathrm{X_{it}}) \quad [3.1]$$

where

$\mathrm{Pov_{it}}, fii_{it}, \mathrm{IQ_{it}}$ and $\mathrm{X_{it}}$ represents level of poverty variable at time t for country i, financial inclusion variables at time t for country i, institutional quality variable at time t for country i and any other control variables that contributes to poverty reduction other than financial inclusion at time t for country i, respectively.

In the light of the above, domestic credit provided by the private sector (DCP), economic growth (GDP), money supply (MSP), interest rate (INT), inflation rates (INF), gross national income (GNI) per capita, education (EDU), dependency ratio (DPR), government expenditure (GXP) and trade openness (TOP) are therefore included in the equation as control variables. This is illustrated in equation 3.2.

$$\mathrm{Pov_{it}} = \mathrm{f}(\mathrm{fii_{it}}, \mathrm{IQI_{it}}, \mathrm{DCP_{it}}, \mathrm{INF_{it}}, \mathrm{MSP_{it}}, \mathrm{INT_{it}}, \mathrm{GDP_{it}}, \mathrm{GNI_{it}}, \mathrm{EDU_{it}},\ \mathrm{GXP_{it}}, \mathrm{DPR}_{it}, \mathrm{TOP}_{it}) \quad [3.2]$$

where

$\mathrm{Pov_{it}}, \mathrm{fii_{it}}, \mathrm{IQI_{it}}, \mathrm{DCP_{it}}, \mathrm{INF_{it}}, \mathrm{MSP_{it}}, \mathrm{INT_{it}}, \mathrm{GDP_{it}}, \mathrm{GNI_{it}}, \mathrm{EDU_{it}},\ \mathrm{GXP_{it}}, \mathrm{DPR}_{it}, \mathrm{TOP}_{it}$ represents poverty level variable at time t for country i, financial inclusion variables at time t for country i, institutional quality variable at time t for country i, domestic credit to private sector variable at time t for country i, inflation rate at time at time t for country i, money supply at time t for country i, interest rate variable at time t for country i, gross national income at time t for country i, educational level at time t for country i, government expenditure at time t for country i, dependency ratio at time t for country i and trade openness at time t for country i, respectively

The specific functional form of (3.1) is illustrated in (3.2)

$$\mathrm{Pov_{it}} = \alpha_0 + \alpha_1 \mathrm{fii_{it}} + \alpha_2 \mathrm{IQI_{it}} + \alpha_3 \mathrm{DCP_{it}} + \alpha_4 \mathrm{INF_{it}} + \alpha_5 \mathrm{GDP_{it}} + \alpha_6 \mathrm{MSP_{it}} + \alpha_7 \mathrm{GNI_{it}} + \alpha_8 \mathrm{EDU_{it}} + \alpha_9 \mathrm{DPR}_{it} + \alpha_{10} \mathrm{GXP_{it}}, + \alpha_{11} \mathrm{INT_{it}} + \alpha_{12} \mathrm{TOP}_{it} + \varepsilon_{it} \quad [3.3]$$

i and t represent countries included in the study and time factors respectively, which spans from 2004-2020.

The study modifies the model by including a threshold effect of financial inclusion and reduction in poverty. Following the methodology of Hansen (2000), the study adjusts equation (3.3) to account for the threshold effect. The threshold estimation econometric model is therefore specified in (3.4) and (3.5)

Let the control variables be denoted by

$\mathrm{X}\ (\mathrm{X} = \ \mathrm{DCP}, \mathrm{GDP}, \mathrm{MSP}, \mathrm{INF}, \mathrm{INT}, \mathrm{GNI}, \mathrm{EDU}, \mathrm{DPR}, \mathrm{GXP}, \mathrm{TOP})$. Thus,

$$\mathrm{Pov_{it}} = \beta_0 + \beta_1 \mathrm{fii_{it}} + \beta_2 \mathrm{IQI_{it}} + \beta_3 \mathrm{X} + \varepsilon_{\mathrm{it}}, \mathrm{q_i} \leq \gamma \qquad [3.4]$$

$$\mathrm{Pov_{it}} = \phi_0 + \phi_1 \mathrm{fii_{it}} + \phi_2 \mathrm{IQI_{it}} + \phi_3 \mathrm{X} + \mathrm{v_{it}}, q_i > \gamma \qquad [3.5]$$

Where $\mathrm{q_i}$ is the variable representing the threshold, which divides the data into two halves.

To have a single equation, we define a dummy variable $d_i(\gamma) = \{q_i \leq \gamma\}$where $\{.\}$ is the indicator function which set $\mathrm{fii_{it}}(\gamma) = \mathrm{fii_{it}}(\gamma)\mathrm{d_i}(\gamma)$, so that (3.4) – (3.5) becomes.

$$\mathrm{Pov_{it}} = \alpha_0 + \alpha_1 \mathrm{I}(\mathrm{fii_{it}} \leq \gamma) + \alpha_2 \mathrm{I}(\mathrm{fii_{it}} > \gamma) + \alpha_3(\mathrm{X}) + \alpha_4 \mathrm{IQI_{it}} + \varepsilon_{\mathrm{it}} \qquad [3.6]$$

Where I is an indicator function for the two regimes, which is related to the magnitude of financial inclusion. Equation (3.6) permits all the regressed parameters to switch between the regimes.

To moderate the institutional quality effect, we interact the institutional quality variable and the financial inclusion variable with the poverty variable (Hansen, 1999) as presented in equation [3.7]

$$\mathrm{Pov_{it}} = \beta_0 + \beta_1 \mathrm{fii_{it}} \mathrm{I}(\mathrm{IQI_{it}} \leq \gamma) + \beta_2 \mathrm{fii_{it}} \mathrm{I}(\mathrm{IQI_{it}} > \gamma) + \beta_3(\mathrm{X}) + \beta_4 \mathrm{IQI_{it}} + \varepsilon_{\mathrm{it}} \qquad [3.7]$$

The threshold model allows the parameters that have been regressed to vary pursuant to the value of q_i as presented in (3.7). This shows that the technique permits formal confirmation of the number of merging clubs in the cross-section. Hansen (2000) suggests a useful and straight forward approach to determine γ using OLS method, which also helps to construct a usable confidence interval for γ, employing an F-test to check the effects of the threshold. A hypothesis test $H_0: \gamma = \gamma_0$ is constructed using the likelihood test (γ), treating the number and the size of the threshold as unknown. Moreover, the threshold effect was tested to see whether it is statistically significant. It is important to ascertain whether the work has single or multiple thresholds; hence it was tested (Bai, 1999).

To model the nonlinearity among the variables, the approach will be used to evaluate equations (3.6) and (3.7) using a Two-Stage Least Square method to calculate the sum of squares of the residuals (RSS) and Alkaike Information Criteria (AIC) concerning a particular threshold of the various control variables. The threshold value for the various control variables is then established by choosing the threshold level that minimizes the RSS and AIC and so optimizes R2.

The Hansen estimation method is robust and justified to be used for this study for varied reasons. Other studies like Rioja and Valev (2004), and Rousseau and Wachtel (2002) used the author's experience to split the samples aimed at determining threshold values to test for nonlinearity between economic variables. This brings about subjectivity in the determination of the threshold values, leading to a biased result. The Hansen threshold estimation method therefore comes in handy by providing endogenous way of identifying the threshold values, which eliminates the deterministic process by using systematic approach, as compared to the linear methods of sample-splitting and threshold level specification.

Furthermore, the Hansen estimation method permits the parameters to switch discretely across regimes, which handles the challenges of the quadratic methods of analysis in the financial inclusion-poverty reduction nexus, which assumes a smooth function between the variables. The method also permits the threshold value to be statistically investigated and the relationship validated as non-linear. The approach also allows for the classification of the observations with regards to whether they exceed the threshold values or not to ascertain the exact effect of financial inclusion on poverty reduction at the level when the respective countries' level of financial inclusion is below or above the threshold value, makes the Hansen method more robust.

3.6 Description and Measurement of Variables

This section presents each variable and explanations of its economic intuition and its expected impact in promoting financial inclusion and poverty reduction in Africa.

3.6.1 Dependent Variable

- **Household consumption expenditure**

Household consumption expenditure is used as a proxy for poverty levels in this study. This is because poverty data is not available in the countries selected. Akanksha and Mohanty (2010) affirmed the use of household consumption expenditure as a proxy for poverty level, who indicated that to practically measure poverty levels, household consumption expenditure and household income are the most common indicators used. Deaton (1980) theoretically justified the usage of household consumption expenditure as a measure of poverty, which is confirmed by Beegle et al. (2012); Meyer and Sullivan (2003). Empirically, the following studies have used household consumption expenditure in measurement of poverty levels; Nsiah et al. (2021); Adeleye et al. (2020); Bikorimana et al. (2018); Garza-Rodriguez (2018); Faroh (2013). The household

consumption expenditure data is gathered through a survey of a single cross-section for a countrywide representative sample, using the household as the unit of observation, which comprises data on consumption and/or income. Eurostat (2017) buttressed this by mentioning that a common way to measure poverty levels has been to look at individuals whose household income levels are below a certain threshold. To ensure price convergence with respect to the various countries, the household consumption expenditure values were deflated with the purchasing power parity (PPP) of the various countries. This therefore brings the household consumption expenditure values of the various countries to the same level in US Dollar terms. The following studies used the household consumption expenditure as a proxy for poverty levels; Jiang and Liu (2022), Nsiah et al. (2021), Lai et al. (2020) and Mallick and Zhang (2019).

3.6.2 Explanatory Variables

- **Financial inclusion**

Financial has been identified to affect many aspects of an economy positively. Specifically, financial inclusion has been identified to achieve 7 of the sustainable development goals. Many studies have established that financial inclusion leads to poverty reduction in all economies, especially in Africa; Khan et al., 2022; Tsouli, 2022; Nsiah et al., 2021; Polloni-Silva et al., 2021; Omar and Inaba, 2020; Koomson et al., 2020. Further information on the financial inclusion variable could be obtained from sector 2.6.1

- **Institutional quality**

It has been proven both theoretically and empirically that institutional quality is significantly related positively to financial inclusion and poverty reduction (Aracil et al., 2021; Muriu, 2021). Details on this variable could be obtained in section 2.6.2

- **Economic growth**

Economic growth is a significant macroeconomic term that is measured by the yearly rate of gross domestic product (GDP), which is determined by the market prices using a continual local currency, which aggregates are benchmarked on a constant 2010 U.S dollars. It is determined by excluding deductions for depreciation or degraded natural resources. The Federation for International Development (DFID) indicates that economic growth is the most influential way of ending poverty and promotes the quality of life of developing countries, which promotes human development. Economic growth is expected to improve the economic life of households since it encourages them to participate in the financial sector. It is therefore expected that economic growth, all things been equal, will ensure an increase in financial inclusion and poverty reduction (Han and Melecky, 2013).

- **Inflation**

Inflation is defined as the persistent rise in the price of goods and services over time. It is derived using the consumer price index, which indicates the percentage change in the average cost of a basket of goods and services over time at predefined intervals. Inflation has a detrimental influence on the income of the poor, which changes over time. In the short term, an increase in unanticipated inflation will reduce unemployment, which will benefit the vulnerable. Nonetheless, in the long run, increases in inflation cannot reduce unemployment, therefore it cannot lead to poverty reduction. Easterly and Fischer (2001), support the argument that in the long run, low levels of inflation increase the income levels of the poor. This happens through the influence of interest rates because of a change in inflation. When inflation increases, it leads to a rise in lending rates which

discourages households and firms from accessing credit, and vice versa. It is therefore expected that a change in inflation will have a dual direction on financial inclusion and poverty reduction.

- **Interest rate**

Interest rate is the amount charged by a lender to a borrower per period or the interest earned by a depositor. The rate is subject to the amount of money borrowed or invested, the period or the prevailing economic circumstances. A risky borrower pays a higher interest rate whilst a less risky borrower pays less rate. It is measured as an annual percentage of the amount outstanding. When interest rates are high, it is less incentive to borrow since consumers would not want to pay high rates. On the other hand, lower interest rates encourage households to borrow and invest which has the potential to contribute to job creation and overall growth in GDP. Job creation means that income would be improved and hence lead to poverty reduction. Higher interest rates also lead to a fall in bond prices and vice versa. This suggest that interest rate is directly related to the rate of investments within an economy (Wuhan et al., 2015), hence low interest rate is expected to promote financial inclusion and lead to a reduction in poverty.

- **Dependency ratio**

The share of dependents in the populace relative to the number of the active work force is known as the dependency ratio. The World Bank defines dependency ratio as the proportion of senior citizens (65+) to working-age citizens (15-64) multiplied by a hundred. Low level of dependency ratio has a favorable association with poverty reduction, according to both empirical and theoretical data (Vijayakumar, 2013). This means that if a person is overburdened with many dependents, he or she will have less money to save and so will be unable to engage in the financial sector.

Theoretical research backs up the claim that a larger dependency ratio leads to a lower savings rate (Salman and Zaib, 2012). This is also in line with Park and Mercado (2015) findings, who indicated that a higher dependency ratio lowers financial inclusion and so worsens poverty. Dependency ratio is expected to reveal a negative relationship with financial inclusion since the less dependents one has, the more they have income to participate in the financial sector, leading to a reduction in poverty.

- **Education**

Education, the training of human capital, is an important component of economic success. The more educated one is, the more financially literate the person is, making it easier for such an individual to participate in the financial sector. Education is also regarded as a crucial instrument in the fight against poverty since poverty and education are inversely related, as a higher level of education decreases the number of destitute individuals due to the information learned and the effect on higher pay (Awan et al, 2011). Educational background is expressed as a ratio of gross school enrolment and the total population, regardless of age. It is therefore expected that improvement in the level of education will have a positive relationship with financial inclusion and negatively related to poverty reduction.

- **Domestic credit to the private sector**

This refers to the financial resources like loans, trade credits, purchases of nonequity securities, account receivables that establishes claim for payments, that are advanced to the private sector by financial institutions (monetary authorities, deposit money banks, microfinance institutions as well as cooperatives). The private sector is regarded as an engine of growth in an economy, especially

developing economies like Africa, due to their role in income/revenue generation through creation of employment and payment of taxes. Unfortunately, in Africa most private enterprises suffer crowding out effects due to competition with international corporations and/government for the limited domestic funding (Obeng-Amponsah, 2019). Olowofeso et al. (2015) have established that there is a positive relationship between growth in credit to private sector and economic growth in Nigeria and Ghana. This suggests that as the private sector accesses more funds, it increases their output, creates employment and as such improves income generation and wealth creation. This will then lead to an increase in financial inclusion because of the increase in income generation which is one of the important determinants of financial inclusion and as such lead to poverty reduction. Domestic credit to the private sector is therefore expected to have a direct positive relationship with financial inclusion and an inverse relationship with poverty reduction.

- **Gross National Income per capita (GNI)**

This is the sum of value added by all resident producers together with any product taxes that are not included in the valuation of output in addition to net receipts of primary income from abroad. GNI per capita is the gross national income divided by the midyear population. It is used to measure the wealth of every country from year to year. As GNI grows, it means that the income of the citizenry grows which is a function of one's ability to patronize the financial sector. The increase in the GNI measures economic growth better due to its ability to improve the standard of living of the people and as such leads to poverty reduction (Majid, 2003). A growth in GNI per capita therefore has positive impact in financial inclusion and negative relation with poverty reduction.

- **Trade Openness**

The Comparative Advantage theory and the Heckscher-Ohlin theory all state that if a country wants to trade with another, that country shall produce in large quantities, commodities which it has relative advantage in. This will increase exports in that country and as such increase foreign exchange in the economy, which will subsequently enhance economic growth. It is measured as the total of exports and imports of goods and services, which is expressed as a percentage of GDP. According to Keho (2017), countries with higher degree of trade openness benefits more than countries with lower level of openness in terms of economic growth since they can benefit from technologies transfer from developed economies. According to the World Trade Organization (2018), trade among and within nations is a key enabler to growth in the world and reduction in poverty, since there is evidence that an open economy has opened greater opportunities for millions of people worldwide which has led to a reduction in extreme poverty.

- **Government expenditure**

There are two schools of thoughts that economists share when it comes to the effects of government expenditure on economic growth. The neo-classical economists argue that government investment increases public debt and interest rates, through the crowding out effect, which has the potential to limit the role of the private sector in the economy and as such lowers output. The Keynesian economists, on the other hand, support the argument that through the multiplier effect theory, government expenditure has stimulating effect in an economy, both in terms of infrastructure financing and/transfers. This is because Government investment has a significant effect on economic growth, which subsequently benefits the poor, especially those in rural areas (Fan et al., 1998). This is because when governments invest in productive sectors like agriculture,

infrastructure, among others, it has employment creation effects on the populace and subsequent increase in output in the economy. This will increase the income of households and as such better living conditions. It is measured as the government's final consumption expenditure/transfers as a percentage of GDP. Government expenditure in productive sectors of the economy is therefore expected to reduce poverty, due to its economic growth prospects (Kakar, 2011).

- **Money supply**

Money supply is the total amount of money in circulation in a particular economy. It is determined by the fraction of broad money, which is the total amount of money held outside of banks and demand deposits, excluding government bonds. Apart from the central government, it also includes indigenes' savings, foreign currency deposits and time. If money supply in the economy increases, it means that there is more money being used in the economy. As a result of increasing consumer purchasing power, an increase in the money supply directly leads to increased expenditure on goods and services. Increased liquidity similarly leads to a reduction in interest rates which can make access to credit less costly, hence households and firms can easily borrow and invest. This will ensure improvement in the rate of employment because of the need to produce more to meet the economy's demand. The enhancement in income levels because of the employment opportunities created also increases the purchasing power of households, which subsequently leads to economic growth and poverty reduction (Goshit and Longduut, 2016).

Expected signs of the various independent variables relative to the dependent variable are presented in appendix.

3.7 Analysis

This section presents the summary statistics of all variables used to estimate the threshold level at which financial inclusion will lead to poverty reduction in Africa.

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
FII	340	0.1927	0.1589	0.0177	0.7484
DCP	340	2.4487	0.9614	-4.9030	4.1007
DPR	340	4.4098	0.1515	4.0778	4.6826
GNI	340	6.9133	0.7762	5.6842	8.8561
INT	340	1.7255	0.7697	-2.8114	2.9857
EDU	340	4.6502	0.1869	3.9867	5.0060
INF	340	9.2820	24.2198	-8.9747	379.999
GDP	340	4.159874	5.58404	-46.0821	33.6294
TOP	340	4.0932	0.4265	3.0312	5.1063
GXP	340	2.5470	0.5565	1.2775	4.3716
MSP	340	3.2021	0.5565	1.5108	4.5864
IQI	340	-0.00061	0.97804	-1.96173	2.68144

POV	340	23.8790	1.5484	20.5947	27.6125

Table 3.1: Summary Statistics

Source: Author's own calculations, 2023.

From Table 3.1, it can be observed that the financial inclusion index has an average of 0.1927 with a standard deviation of 0.1589. The minimum and the maximum values are 0.0177 and 0.7484 respectively. The low mean value shows that on the average, there is low financial inclusion level in the selected countries in Africa as confirmed by Ferrer et al. (2023) who revealed that only 55% of adults in sub-Saharan Africa holds bank accounts as compared to 96% in developed countries. The mean of Domestic credit to private sector (DCP) was found to be 2.4487 percent of GDP and a standard deviation of 0.9614, indicating a stable variable. The mean shows a value that is below the regional average of 25.2% and below the world average of 60.26% compared to the selected countries. The minimum and maximum values respectively were found to be -4.9030 and 4.1007. The mean value of Dependency ratio (DPR) is 4.4098 as a percentage of the working age population and a standard deviation of 0.1515, indicating a stable variable, with minimum and maximum values of 4.0778 and 4.6826 respectively. Gross national income (GNI) has a mean value of $6.9133 and a standard deviation of $0.7762, with a minimum value of 5.6842 and a maximum value of 8.8561. The standard deviation value indicates that there are variations in the GNI of the selected countries in Africa.

Education (EDU) has a mean value of 4.6502 primary enrolment as a percentage of gross enrolment and a standard deviation of 0.1869, with a minimum and maximum values of 3.9867 and 5.0060 respectively. The mean value, relative to the standard deviation, indicates a very stable variable. Kaledzi (2022) argued that according to the United Nations Education, Scientific and Cultural Organization (UNESCO), more than one-fifth of children in Africa between 6 and 11 years do not go to school and almost 60% between the ages of 15 and 17 are out of school.

Inflation (INF) has a mean value of 9.2820 percent and a standard deviation of 24.2198. The minimum value is -8.9747 and a maximum value of 379.999. The standard deviation value indicates that there are variations in the variable, meaning that inflation rate is not stable in the continent. The mean value of GDP growth (GDP) is 4.1599 percent and a standard deviation of 5.5840, indicating an unstable variable. The minimum value is -46.0821 and a maximum value of 33.6294. Trade openness (TOP) has a mean value of 4.0932 and a standard deviation of 0.4265. The minimum and maximum values are 3.0312 and 5.1063 respectively. The mean value, relative to the standard deviation value, shows that the variable is very stable.

The mean and standard deviation values of Money supply (MSP) are 3.2021 and 0.5565 respectively, signifying a stable variable. The minimum value is 1.5108 and the maximum value is 4.5864.

Government expenditure was found with a mean value of 2.5470 and a standard deviation of 0.5565, indicating a very stable variable, with the minimum and maximum values as 1.2775 and 4.3716 respectively. Institutional quality index (IQI) has a mean of -0.0006 and a standard deviation of 0.9780, with a minimum value of -1.9617 and a maximum value of 2.6814. This means that the variable is unstable, indicating variations in the institutional quality index.

The poverty (POV) level was found to have a mean of 23.8790 and a standard deviation of 1.5484, indicating a stable variable. The minimum and maximum values are 20.5947 and 27.6125 respectively.

3.8 Stationarity test of the variables

It is necessary to ascertain whether the variables are stable or not so that no spurious result is produced. The variables in the study were therefore tested to find out whether they are stationary; thus, finding out the presence of unit roots in all the variables used in the study.

3.8.1 Result of the unit root test

Table 3.2 below shows results of the unite root test for the variables according to Levin-Lin-Chu and Hadri LM tests for determining threshold level of financial inclusion that will lead to poverty reduction.

Variable	Levin-Lin-Chu	Hadri LM
FII	-3.6063***	37.8564***
DCP	-5.1428***	16.6470***
DPR	-1.89697**	21.3753***
GNI	-3.6469***	31.1341***
INT	-3.4096***	28.3941***

EDU	-3.1584***	28.9643***
INF	-7.3059***	9.5708***
GDP	-4.35678***	4.1053***
TOP	-2.0256**	20.0116***
GXP	-3.4965***	19.3939***
MSP	-1.8085*	27.6968***
IQI	-3.0322***	28.0954***
POV	-2.5259***	28.9266

Table 3.2: Unit root result of Levin-Lin-Chu and Hadri LM tests

Source: Author's own compilations, 2023

The result for the tests indicates that all the variables (domestic credit to private sector, dependency ratio, GNI per capita, education, inflation, GDP growth and institutional quality index) used for the estimation are stationary at level, hence fit for the analysis, indicating that there would not be any spurious results so far as stationarity of the data is concern.

3.9: Pairwise correlation

This section describes how the various variables correlate with the dependent variable as well as the intercorrelation between the independent variables. Table 3.3 contains the correlation matrix.

	FII	DCP	DPR	GNI	INT	EDU	INF	GDP	TO	GXP	MSP	IQI	POV
FII	1.0000												
DCP	0.7895	1.0000											
DPR	-0.5859	-0.5506	1.0000										
GNI	0.7922	0.6506	-0.6561	1.0000									
INT	0.0075	-0.0278	0.1451	-0.1656	1.0000								
EDU	0.1966	0.2158	-0.3058	-0.0023	0.2159	1.0000							
INF	-0.1023	-0.1308	-0.0146	-0.0187	-0.0656	-0.1555	1.0000						
GDP	-0.0395	-0.0256	0.1338	-0.0562	0.2476	0.0516	-0.2358	1.0000					

TOP	0.2954	0.2725	-0.3294	0.2274	-0.1547	0.1812	-0.0094	-0.0362	1.0000				
GXP	0.2943	0.2897	-0.4143	0.2532	-0.2863	0.1403	0.3908	-0.2558	0.5899	1.0000			
MSP	0.5869	0.7992	-0.6291	0.5984	-0.0124	0.1086	0.0877	-0.0897	0.2250	0.3116	1.0000		
IQI	0.4727	0.3381	-0.4657	0.5173	0.1917	0.1082	-0.0092	0.0412	0.3053	0.2089	0.3797	1.0000	
POV	0.1319	0.1521	-0.2013	0.3111	0.1772	-0.1724	0.0285	0.0263	-0.3136	-0.2482	0.4122	0.2886	1.0000

Table 3.3: Correlation matrix for the panel data

Source: Author's own compilations, 2023

From Table 3.3, it could be observed that there is a strong positive correlation between Domestic credit to private sector and financial inclusion. Dependency ratio is negatively correlated to financial inclusion, with the coefficient indicating that there is a strong negative correlation between dependency ratio and financial inclusion. Gross national income is positively correlated to financial inclusion. The coefficient of correlation indicates that there is a strong positive relationship between GNI and financial inclusion. Interest rate is weakly positively correlated with financial inclusion. Education and financial inclusion are positively correlated, although the degree of correlation is weak. Inflation is negatively related to financial inclusion with the coefficient showing that the correlation is a weak one. GDP growth is also found to correlate negatively with financial inclusion. The correlation coefficient indicates that there is a weak relationship between GDP growth and financial inclusion. Trade openness was found to have a positive relationship with financial inclusion with a weak relationship. Government expenditure was also found to positively and weakly correlate with financial inclusion. Money supply was equally found to correlate with financial inclusion. The coefficient indicates that there is a strong positive correlation between the variables. Institution quality index is positively correlated with financial inclusion with the degree of correlation been a weak one. Lastly, household consumption expenditure (poverty) was found to correlate positively with financial inclusion, but the level of correlation is a weak one. From the table, it could be observed that there is weak correlation between the variables since none of the variables has a correlation coefficient above 0.8. According to decision rule by Donald and Gluaber (2005), correlation between independent variables should be less than 0.8, hence the study satisfies this rule. This means that that there would not be any problem of multicollinearity as such enhance reliability of the results.

3.10 Analysis of financial inclusion indexes for the selected countries in Africa

To start with, there is the need to ascertain the level of financial inclusion in the region with respect to the individual countries. This section therefore presents the financial inclusion indexes of the various countries as suggested by Sarma (2008). All the countries in the region could not be used since some of the countries were not having all the full complement of the data required to compute the indexes. In assessing the efforts of the individual countries in the financial inclusion drive, their average inclusion indexes over the period under study are computed and presented in Figure 3.3

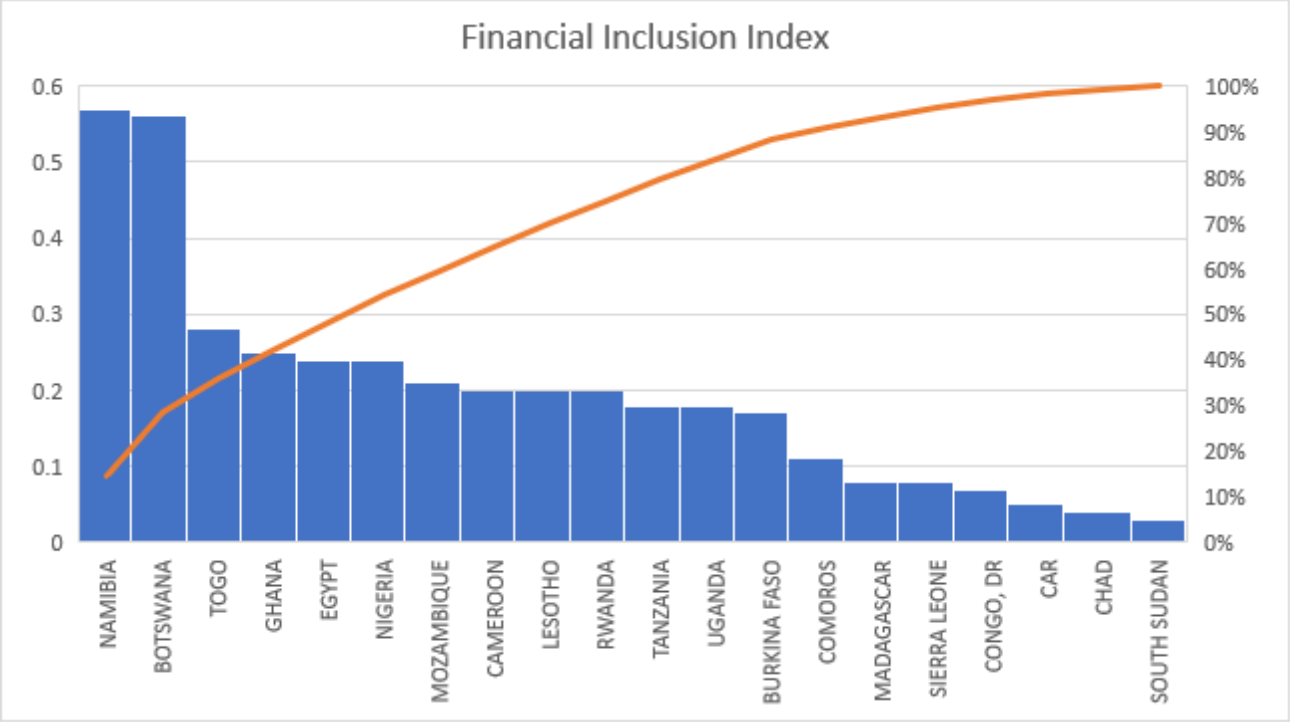


Figure 3.3: Financial inclusion index for the selected countries in Africa

Source: Author's own construct, 2023

According to Sarma (2008), countries are classified under high, medium, or low financial inclusive economy depending on the country's financial inclusion index. Countries with a financial inclusion index of $0.5 < FII \leq 1$ are described as high financial inclusion economy, $0.3 \leq FII < 0.5$ are described as medium financially included economy and $0 \leq FII < 0.3$ are described as low financially included economy.

These groupings therefore show that, in relation to the average financial inclusion indexes as presented in Figure 3.3, only Namibia and Botswana are in the highly inclusive bracket. Togo, Ghana, Egypt, Nigeria, Mozambique, Cameroon, Lesotho, Rwanda, Tanzania, Uganda, Burkina Faso, Comoros, Madagascar, Sierra Leon, Congo Dr, Central African Republic, Chad, and South Sudan are all in the low financial inclusion bracket. This therefore suggests that most of the selected countries in Africa are within the low financially included bracket.

3.11 Analysis of the Hansen's threshold estimation results

This section presents Hansen's threshold estimate of the effects of financial inclusion on poverty reduction in Africa. According to Hansen, countries are classified from 0 to 1 inclusive**,** indicating that the higher a country's financial inclusion index, in relation to the threshold estimate, the more financially inclusive the country. As indicated earlier, this study uses the measure of financial inclusion index according to Camara and Tuesta (2017). To ensure robustness of the results, the study further used the measure of financial inclusion index according to Sarma (2008, 2012) to compare the results of the two approaches. The results according to Camara and Tuesta (2017) is recorded in Tables 3.4a and 3.5a and that of Sarma (2008,2012) is recorded in Tables 3.4b and 3.5b. The analysis and discussions for this study will however be based on Table 3.4a and Table 3.5a since the measurement of the inclusion index according to Camara and Tuesta included barriers to financial services utilization, which this thesis prevalent in the Africa and considered in

this study. The study intended to also use a different measure of poverty in a similar analysis but to no avail due to data availability.

	Model 1: Threshold Effect of financial inclusion on poverty reduction				
Model	Threshold	Lower	Upper	F-statistic	P-value
Threshold 1	0.0534	0.0519	0.0535	21.66	0.0567
Threshold 2	0.3141	0.3119	0.3152	11.22	0.0567

Table 3.4a: The Hansen Threshold Estimates

Source: Author's own calculations, 2023

Explanatory Variables	**Coefficient**	**Standard Error**	**T**
Domestic credit to private sector	0.0216	0.0179	1.21
Dependency ratio	-0.4397**	0.1999	-2.20
Gross national income	0.7360***	0.0746	9.86
Interest rate	-0.1062***	0.0226	-4.69
Inflation	-0.0012*	0.0004	-2.79
Education	0.1757*	0.0919	1.91
Economic growth	0.0006	0.0016	0.39
Trade openness	0.0371	0.0453	0.82
Money supply	0.0218	0.0480	0.45
Government expenditure	-0.2265***	0.4432	-5.11
Institutional Quality Index	-0.0157	0.0308	-0.51
FII (0)	2.5528**	1.0510	2.43
FII (1)	-2. 5772***	0.8776	-2.94
FII (2)	1.6502***	0.1861	8.87

Constant	20.1163	1.0818	18.59
No. of Observations	320	320	320
No. of Groups	20	20	20

Table 3.5a: Model Estimation Results of the Effects of financial inclusion on poverty reduction (Dependent Variable: Poverty, 2004-2020

Source: Author's own calculations, 2023. Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

	Model 1: Threshold Effect of financial inclusion on poverty reduction				
Model	Threshold	Lower	Upper	F-statistic	P-value
Threshold 1	0.0442	0.0412	0.0444	14.43	0.000
Threshold 2	0.0455	0.0454	0.0455	231.70	0.000

Table 3.4b: The Hansen Threshold Estimates

Source: Author's own calculations, 2023

Explanatory Variables	**Coefficient**	**Standard Error**	**T**
Domestic credit to private sector	0.0255	0.0142	1.79
Dependency ratio	-0.7269***	0.1573	-4.62
Gross national income	0.7852***	0.0586	13.39
Interest rate	-0.0384***	0.0181	-2.12
Inflation	-0.0031***	0.0003	-9.06
Education	0.0580	0.0701	0.82
Economic growth	-0.0007	0.0013	-0.57
Trade openness	-0.0949***	0.0360	-2.64

Money supply	0.1248***	0.0379	3.29
Government expenditure	-0.0884***	0.0375	-2.36
Institutional Quality Index	0.0552**	0.0251	2.20
FII (0)	2.4874***	0.8082	3.08
FII (1)	-41.8918***	2.9109	-14.39
FII (2)	1.4739***	0.1527	9.65
Constant	21.3621	0.8466	25.23
No. of Observations	340	340	340
No. of Groups	20	20	20

Table 3.5b: Model Estimation Results of the Effects of financial inclusion on poverty reduction (Dependent Variable: Poverty, 2004-2020)

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

From Tables 3.4a and 3.5a as well as Tables 3.4b and 3.5b, it is evident that both analyses, i.e., according to Camara and Tuesta (2017) and Sarma (2008,2012), produce similar results, indicating the robustness of the analysis.

The study found a double threshold estimate in the financial inclusion and poverty reduction nexus. This was done by estimating the double-threshold model whose value indicates that an increase in this ratio may have an effect in poverty reduction in Africa. The threshold values of financial inclusion were found to be 0.0534 and 0.3141 as indicated in table 3.4a.

The effect of the threshold values in relation to poverty reduction is contained in Table 3.5a. FII (0), FII (1) and FII (2), represents the first and second threshold values with FII (0) representing effects below the first threshold value (0.0534), FII (1) represent effects between the first and

second threshold values (0.0534 and 0.3141) and FII (2) represent effects above the second threshold value (0.3141).

This shows that a financial inclusion value below 0.0534 would increase household consumption expenditure and as such lead to poverty reduction. However, inclusion values between 0.0534 and 0.3141 have a negative impact on poverty reduction in Africa. Furthermore, beyond a threshold value of 0.3141, financial inclusion will improve household consumption and as such reduces poverty.

From Table 3.5a, the results further indicate that when the financial inclusion index (FII) is below 0.0534, a unit increase in FII will increase consumption expenditure by 2.55%. However, when FII is between 0.341 and 0.0534, a unit increase in FII will reduce consumption expenditure by 2.58%. Additionally, when FII is beyond 0.3141, a unit increase in FII will increase consumption by 1.65%. This indicates that although theoretically a higher level of inclusion is desired, at the onset on the inclusion drive, low level of financial inclusion according to the study stimulates household consumption expenditure and subsequently impact on poverty reduction while a moderate inclusion index of financial inclusion reduces household consumption expenditure. Furthermore, a higher level of financial inclusion, as expected, will increase household consumption expenditure and as such leads to poverty reduction. This implies that at the onset of the call for all to be included in the financial sector, few people who take advantage and get included will derive maximum benefits, even though the level of inclusion is low relatively, which happens through the trickling down effect. That is, if the few who benefit open businesses which creates employment within the economy, it will lead to income growth, hence the positive impact on poverty. However, as regulations are introduced to make the system robust in order not to compromise the stability of the financial system, it has the tendency to affect some of those

included and potential ones, hence the negative impact. At higher level of inclusion, where those included have been able to overcome those challenges resulting from the possible industry policies and those lately included due to the sustained call for inclusion over the period, turn to derive the intended benefits of those regulations and the resultant robust financial system, leading to positive impact on poverty reduction. This will also enable beneficiaries to overcome any potential cost and information asymmetry, confirming the theories that underpinned the study. A higher level of inclusion is therefore desired through the enrollment of more households into the financial sector in Africa to win the fight against poverty. This is consistent with the study by Nsiah et al. (2021) who established that a higher threshold level, relative to the inclusion index, will increase financial inclusion and subsequently lead to poverty reduction. Similarly, Bolarinwa and Akinlo (2021) confirmed the existence of a threshold level at which financial development (inclusion) influences income inequality, which will eventually benefit the poor.

Additionally, the results reveal that dependency ratio has negative significant effect on financial inclusion at 5% level of significance. The sign and the magnitude suggest that when dependency ratio increases by a percentage point, household consumption expenditure will reduce by 0.4397 Cent. This implies that when an individual is overburdened with a lot of dependents, expenditure of the household as well as overall transaction cost will increase to an unbearable level. Theoretical literature supports this argument that higher dependency ratio will induce lower saving rate and reduction in standard of living (Coale and Hoover, 1958). This is also consistent with the findings of Cruz and Ahmed (2018) who indicated that a reduction in child dependency ratio is found to be associated with an increase in gross domestic product per capita growth, which will subsequently ensure poverty reduction.

Gross national income was also found to be significant at 1% level of significance. The sign and magnitude indicate that a percentage point increase in the per capita income by a dollar will result in an increase in household consumption expenditure by 0.7360 Cents. When the GNI per capita of a country increase, it means that all things being equal, the income levels of the citizenry will improve. This will increase their purchasing power and the ability to save, invest and position themselves against any risk and as such have the capacity to fight poverty as such overcome any potential cost of transaction and information asymmetry. According to the United Nation's Development programme (2004), an increase in per capita income of households lead to a substantial reduction in poverty. This is also consistent with the following theoretical conclusions by the World Bank (1990) and Fields (1989), who posited that increase in the income level of households is inversely related to their poverty levels. Ravallion and Chen (1997) specifically established that a percentage increase in per capita income of households leads to a 3.1 percent reduction in the proportion of people living below the conventional poverty line in developing countries. Ibrahim and Aliero (2020), Park and Mercado (2015), Bergstrom (2020) have all indicated that income has significant impact on financial inclusion and poverty reduction in all economies.

Interest rate was also found to be significant at 1% level of significance. The sign and magnitude mean that a unit increase in interest rates will reduce household consumption expenditure by 0.1062 Cents. This indicates that when interest rates increase, it discourages households and firms from borrowing which would have been invested to increase their income and subsequently reduce poverty. An increase in interest rates also means that the overall transaction cost of financial transactions will increase, discouraging households and firms from accessing financial services. This is in line with the findings of Farooq (2012), Yannick and Ekobena (2012) and Saeed (2020)

who all avowed that a high interest rate is positively related to poverty reduction in the sense that as interest rates increases, poverty levels increase as well.

Inflation was found to be significant at the 10% level of significance. The sign and the magnitude indicate that a unit increase in inflation would reduce household consumption expenditure by 0.001233 Cent. This shows that as the prices of goods and services within an economy increase consistently, it reduces the quantity of goods one could purchase. Additionally, upwards adjustments in inflation will lead to a higher cost in accessing credit, for instance, from financial institutions, increasing the overall cost of financial transactions. This will then reduce consumption expenditure per household and subsequently lead to an increase in the level of poverty. This finding is in line with the opinions of Cardoso (1992), Siyan et al. (2016), Rehman et al. (2022) and Talukdar (2012) who all argued that the reason for a rise in poverty, among others, is inflation since it has a direct relationship with poverty reduction in terms of reduction in the purchasing power of households.

Education was also identified to portray a 10% level of significance. The sign and magnitude show that a percentage increase in the number of educational enrollments will lead to an increase in household consumption expenditure by 0.175733 Cents. When an individual is educated, they get empowered and improve their income levels, which makes them save and invest, which will then increase their disposable income. This enables them to overcome any potential cost of transactions and information asymmetry, because households are being enlightened. This will lead to a drop in the level of poverty of the people. Awan et al. (2011) confirms this by establishing that experience and educational achievement is negatively related to poverty reduction. Omoniyi (2013) also affirms that education plays an important role in securing economic and social progress through improvement in income and subsequent poverty reduction. Majumder and Biswas (2017)

also supports the argument that higher educational attainment has the probability of reducing poverty in poor households.

Government expenditure was found to be significant at 1% level of significance. The sign and the magnitude show that a percentage increase in general government expenditure will reduce household consumption expenditure by 0.2265 Cents. This shows that as government expenditure increases, especially if it is not channeled to productive sectors, it can lead to crowding out of firms that would have employed households and as such affect their income levels. This may also come about because of wasteful expenditure, especially towards areas that have direct impact on the poor. The neoclassical theory supports this by arguing that public spending negatively affects economic growth in the sense that public spending creates budget deficit that is detrimental to the growth of the private sector through the crowding out effect. This happens when an increase in public spending creates appetite for public goods as against private ones which results in reduction of private expenditure on other goods and services (Suleiman and Aamer, 2006). Anderson et al. (2017) concludes this by indicating that there is no evidence to support the claim that government expenditure leads to poverty reduction, especially in developing countries.

Domestic credit to private sector, GDP growth, Trade Openness, Money Supply, and Institutional Quality Index were however found to be insignificant even at 10% level of significance. This means that according to this study, these variables do not play a controlling role in poverty reduction in Africa. Mulok et al., (2012) indicated that economic growth is not necessarily a poverty reduction tool. Saeed (2020) also opined that increase in money supply by the central bank do not contribute to poverty reduction due to its ability to increase inflation because of the excess liquidity, confirming the insignificant contribution of money supply to poverty reduction.

3.12 Threshold effect of the various components of financial inclusion on poverty reduction

It is imperative to split the components that form financial inclusion into the various indicators (i.e., Access, usage, and barriers) to ascertain the threshold level at which each of them impacts on poverty reduction.

3.12.1 Threshold effect of financial Access on poverty reduction

This section investigates the threshold level at which financial access impacts poverty reduction in Africa.

	Model 1: Threshold Effect of Financial Access on poverty reduction				
Model	Threshold	Lower	Upper	F-statistic	P-value
Threshold 1	0.0714	0.0679	0.0718	18.34	0.0500
Threshold 2	0.1096	0.0904	0.1107	12.97	0.0500

Table 3.6: Threshold Effect of Financial Access on poverty reduction

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

In terms of access to financial services and its role in poverty reduction, the study established a double threshold estimate. The threshold values of financial access as shown in Table 3.6 are 0.0714 and 0.1096. This implies that a financial access threshold less than 0.0714 is insignificantly related to poverty reduction. However, financial access threshold values between 0.0714 and 0.1096 impacts poverty negatively. A threshold value beyond 0.1096 will however have a positive impact on household consumption and as such lead to a reduction in poverty.

Explanatory Variables	Coefficient	Standard Error	T
Domestic credit to private sector	0.0225	0.0186	1.21
Dependency ratio	-0.6672***	0.2001	-3.33
Gross national income	0.8017***	0.0752	10.66
Interest rate	-0.0980***	0.0234	-4.13
Education	0.1195	0.0934	1.28
Inflation	-0.0021***	0.0004	-4.47
Economic growth	-0.0008	0.0017	-0.47
Trade openness	-0.0682	0.0460	-1.47
Money supply	0.0567	0.0477	1.19
Government expenditure	-0.2326***	0.0457	-5.08
Institutional quality index	-0.0282	0.0320	-0.88
FII (0)	0.0022	0.5741	0.00
FII (1)	-3.9582***	0.9033	-4.38
FII (2)	0.9022***	0.1299	6.95
Constant	21.3636	1.1101	19.24
No. of observations	340	340	340
No. of Groups	20	20	20

Table 3.7: Model Estimation Results of the Effects of financial Access on poverty reduction (Dependent Variable: Poverty, 2004-2020)

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

As shown in Table 3.7, dependency ratio was found to be significant at 1% level of significance. The sign and magnitude show that a percentage point increase in the ratio of dependence will lead to a reduction in household consumption expenditure by 0.6672 Cent and as such increase poverty levels. Gross national income per capita was also found to be significant at 1% level of

significance. The sign and magnitude indicate that an increase in the per capita income by a dollar will lead to an increase in household consumption by 0.8017 Cents. Interest rate was also found to be significant at 1% level of significance with the sign and magnitude indicating that a unit increase in interest rates will reduce household consumption expenditure by 0.0980 Cents. Inflation was found to be significant at the 1% level of significance. The sign and the magnitude indicate that a unit increase in inflation would reduce household consumption expenditure by 0.0021 Cents. Government expenditure was equally found to be significant at 1% level of significance. The sign and the magnitude show that a dollar increase in general government expenditure reduces household consumption expenditure by 0.2326 Cents.

The economic implications of these significant variables (Dependency ratio, inflation, interest rates and government expenditure) are same as presented in section 3.11.

Domestic credit to private sector, GDP growth, Trade Openness, Money Supply, and Institutional Quality Index were however found to be insignificant even at 10% level of significance.

3.12.2 Threshold effect of financial usage on poverty reduction

Having access to financial services does not translate into usage of same to have its intended poverty reduction effect. It is therefore important to determine the threshold level at which financial services usage will lead to poverty reduction. This section therefore investigates the level at which usage of financial services can stimulate poverty reduction in Africa.

	Model 1: Threshold Effect of Financial Usage on poverty reduction				
Model	Threshold	Lower	Upper	F-statistic	P-value
Threshold 1	0.0643	0.0575	0.0646	18.33	0.0967
Threshold 2	0.0646	0.0630	0.0648	14.10	0.0967

Table 3.8: Threshold Effect of Financial Usage on poverty reduction

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

From Table 3.8, there are double threshold estimates of 0.0643 and 0.0646. A financial usage threshold value below 0.0643 was found to improve consumption expenditure as well as poverty reduction. A threshold value between 0.0643 and 0.0646 will however have an inverse effect on poverty reduction since it will lower consumption. A threshold value beyond 0.0646 will however lead to an increase in consumption and as such stimulate poverty reduction.

Explanatory Variables	**Coefficient**	**Standard Error**	**T**
Domestic credit to private sector	0.0168	0.0186	0.90
Dependency ratio	-0.6943***	0.2053	-3.38
Gross national income	0.8073***	0.0741	10.90
Interest rate	-0.1134***	0.0236	-4.80
Education	0.1246	0.0943	1.32
Inflation	-0.0019***	0.0004	-4.29
Economic growth	-0.0008	0.0017	-0.49
Trade openness	0.0604	0.0479	1.26
Money supply	0.0773	0.0494	1.56
Government expenditure	-0.2642***	0.0454	-5.81

Institutional quality index	-0.0057	0.0328	-0.17
FII (0)	1.7928**	0.8762	2.05
FII (1)	-8.0565***	1.3272	6.07
FII (2)	0.7049***	0.0932	7.56
Constant	20.9113	1.1229	18.62
No. observations	340	340	340
No. of Groups	20	20	20

Table 3.9: Model Estimation Results of the Effects of financial Usage on poverty reduction (Dependent Variable: Poverty, 2004-2020)

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

The results as indicated in Table 3.9 shows that dependency ratio, interest rate, inflation and government expenditure are all found to be significant at 1% level of significance with an inverse relationship with consumption expenditure, hence increase poverty whilst GNI is also significant at 1% level of significance with a direct relationship with consumption expenditure and as such lead to poverty reduction. The economic impact of the significant variables is explained in section 3.11. This indicates that both financial access and usage have similar threshold effects in terms of its poverty reduction effects.

3.12.3 Threshold effect of Financial Barriers on poverty reduction.

This section analysis threshold estimates the role barriers of financial inclusion plays in poverty reduction in Africa.

Explanatory Variables	Coefficient	Standard Error	T
Barrier $< \mathbf{0.6220}$	4.2024**	1.7110	2.46
Barrier$\geq \mathbf{0.6220}$	-0.5740	0.7155	-0.80
Domestic credit to private sector	1.4663***	0.4486	3.2688
Dependency ratio	-2.9605***	0.7442	-3.9778
Trade openness	-0.9828	0.5960	-1.6489
Government expenditure	-0.7729	0.5617	-1.3759
Education	2.8193***	0.8619	3.2709
Interest rates	0.0526	0.3203	0.1643
Inflation	0.0162	0.0103	1.5809
Institutional quality index	0.7498*	0.3466	2.1634
Heteroskedasticity	F-statistics 1.1850 (0.3539)	Obs*R-squared 11.54342 (0.3168)	
Breusch-Godfrey Serial Correlation LM Test	F-statistics 1.2764 (0.3019)	Obs*R-squared 3.7901 (0.1503)	

Table 3.10: Estimates of Threshold effect of barriers on poverty reduction

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

The results indicates that there is no problem of heteroskedasticity and autocorrelation, as such produces valid estimations. The results, as shown in Table 3.10 indicate that when barrier is less than 0.6220, it exerts significant impact on consumption at 5% level of significance. The sign and magnitude of the coefficient shows that when barrier is less than 0.6220, an additional increase in the barrier index increases household consumption by $4.2024. However, if barrier is 0.6220 and

beyond, it has insignificant effect on consumption even at the 10% level of significance. This indicates that the barrier index will only have a negative impact on consumption when it is greater than 0.6220 but will not hurt financial inclusion and poverty reduction if it is less than the threshold value.

Domestic credit to the private sector was found to be significant at the 1% level of significance. This indicates that a percentage point increase in credit to the private sector provided by domestic banks will increase household consumption expenditure by $1.4663. It shows that when credit is advanced to the private sector, it would increase productivity and subsequent profit levels, which would aid them to save and/ invest as well as improve their ability to employ. The increase in profit levels will go a long way to eliminate the barriers that households face in accessing and utilization of financial services, which will increase consumption of beneficiaries and as such reduce their poverty levels. This has been empirically proven by Bello et al. (2021) who argued that having access to credit has the advantage of reducing poverty, due to its ability to increase income levels.

Dependency ratio was found to be significant at 1% level of significance. The sign and magnitude indicate that a percentage increase in the dependent population will reduce the level of consumption by $2.9605, which will increase poverty levels. Educational attainment was found to be significant at 1% level of significance, indicating that a percentage increase in primary school enrollment will increase consumption by $2.8193, which will lead to reduction in poverty. Educational attainment was found to be significant at 1% level of significance, indicating that a percentage increase in primary school enrollment will increase consumption by $2.8193, which will lead to reduction in poverty. The economic implications of these variables (dependency ratio and educational enrolment), and their corroborative studies can be found in section 3.4.

The institutional quality index was also found to be significant at the 10% level of significance. The sign and magnitude indicate that a percentage increase in the index of institutional quality will increase consumption by 0.7498 Cent and as such lead to an improvement in financial inclusion, leading to poverty reduction. When institutions within the economy play their role well, it builds up confidence within the economy which therefore encourages households to participate in the financial sector and as such lead to poverty reduction as indicated by the neo institutional theory. This is consistent with the findings of Anthony-Orji et al. (2019) who confirms the stimulative effect of institutional quality by indicating that involvement of quality institutions is positively related to financial inclusion in Nigeria.

3.13 Moderating effect of institutional quality and its components on poverty reduction

Institutional quality plays an important role, according to the literature, in transferring benefits of financial inclusion on households to ensure poverty reduction. This comprises of the effect of the various components of financial inclusion and institutional quality and how it impacts poverty reduction.

3.13. 1 Moderating effect of institutional quality on financial inclusion impacting poverty reduction.

This section therefore presents the threshold level at which institutional quality influences the effect of financial inclusion on poverty reduction.

Threshold estimate	RSS	MSE	Fstat	Probability
-1.6325	5.4518	0.0169	81.41	0.000

Table 3.11: The Hansen threshold estimates on institutional quality moderating financial inclusion.

Source: Author's calculations, 2023

The F-statistic value of 81.41 is statistically significant at 1% level of significance. The estimates, as shown in Table 3.11 means that there exists a single threshold level of institutional quality moderating financial inclusion leading to poverty reduction in Africa. The threshold value of -1.6325 suggests that there is a single and non-linear relationship between institutional quality, financial inclusion, and poverty reduction in the selected countries in Africa. The threshold value indicates that below a threshold value of -1.6325, financial inclusion will have a negative impact on consumption as well as poverty reduction in Africa. However, above the threshold value, financial inclusion, through the catalytic effect of institutional quality, will have a positive impact on consumption leading to poverty reduction. This therefore suggests that the level of financial inclusion in an economy do not just have its intended purpose of household empowerment and subsequent poverty reduction effect, institutional quality plays a role at a specific threshold, moderating the financial inclusion and poverty reduction nexus.

Explanatory Variables	**Coefficient**	**Standard Error**	**T**
Domestic credit to private sector	0.0161	0.0167	0.97
Dependency ratio	-0.5672***	0.1865	-3.04
Gross national income	0.7296***	0.0696	10.48
Interest rate	-0.1950***	0.0229	-8.53
Education	-0.0996	0.0860	-1.16
Inflation	0.0005	0.0005	1.04
Economic growth	0.0015	0.0015	1.02
Trade openness	-0.0140	0.0428	-0.33
Money supply	0.0927**	0.0443	2.09
Government expenditure	-0.2642***	0.0416	-3.71
FII (0)	-20.3497***	2.5047	-8.12
FII (1)	1.4947***	0.1753	8.53
Constant	21.9856	1.0044	21.89

No. of observations	340	340	340
No. of Groups	20	20	20

Table 3.12: Hansen threshold estimates of institutional quality moderating the financial inclusion and poverty reduction nexus (Dependent Variable: Poverty, 2004-2020)

Source: Author's calculations, 2023 Notes: *, ** and *** denote significance at 10, 5 and 1% respectively

As contained in Table 3.12, dependency ratio is found to be significant at 1% level of significance. The sign and magnitude indicate that a percentage increase in the rate of dependents will reduce household consumption expenditure by 0.5672 Cent. GNI was also established to be significant at 1% level of significance, with the magnitude and sign indicating that a dollar increases in the income per capita of households will lead to an increase in the consumption expenditure by 0.7296 Cent and subsequently reduce poverty levels. Interest rates were found to be significant at 1% level of significance. The sign and magnitude show that a percentage increase in interest rates will result in a decrease in household consumption by 0.1950 Cent. Government expenditure was also found to be significant at 1%. The sign and magnitude show that a percentage increase in general government expenditure will reduce household consumption by 0.2642 Cent. The economic effect of these variables on poverty reduction are the same as presented in section 3.11.

Money supply was found to be significant at 5% level of significance. The sign and magnitude show that when broad money to GDP ratio is increased by a percentage point, household consumption expenditure will increase by 0.0927 Cent. As money supply increases, it lowers interest rates and will therefore encourage households and businesses to borrow from the financial sector resulting in a high level of investment, profitability, and consumption. This is consistent

with the Keynesian's argument that money supply impacts on economic activities since it affects interest rates and credit systems. Ajayi and Ojo (2006) also established that change in the quantity of money in circulation influences economic activities positively, leading to poverty reduction.

3.13. 2. Moderating effect of institutional quality on financial access and financial usage

Aside investigating how institutional quality moderates the financial inclusion and poverty reduction relationship, it is essential to measure whether there exist a threshold level involving the institutional involvement in the rate at which having access to finance can stimulate poverty reduction. This section presents Hansen's threshold estimate of the moderative effects of institutional quality on financial access and poverty reduction in Africa.

It should be noted from the analysis that financial usage does not have a threshold value in terms of the role institutional quality plays in improving financial usage to stimulate poverty reduction. This is because for financial usage, unlike access to financial services which has to do with households' deposit and investment, which demands institutional quality, financial users might not care of quality of institutions for usage since the financial institution is the one giving out their services. For instance, when a customer is giving credit, he/she might not care about the structures of the institution giving out the credit, so far as their credit needs are served.

Threshold estimate	RSS	MSE	F-stat	Probability
0.3334	17.8639	0.0553	79.98	0.000

Table 3.13: The Hansen threshold estimates on institutional quality moderating financial access.

Source: Author's calculations, 2023

The results of the estimates, as found in Table 3.14, show an F-statistic value of 62.10, which is significant at 1% level of significance. This reveals a single threshold level of institutional quality playing a significant role in transferring the benefits of financial access in influencing poverty reduction. A single non-linear threshold value of 0.3334 suggests that below that threshold value, access to finance will have a positive impact on consumption as well as poverty reduction in Africa and a threshold value above 0.3334 will also enhance consumption and subsequently lead to poverty reduction.

Explanatory Variables	**Coefficient**	**Standard Error**	**T**
Domestic credit to private sector	0.0001	0.0033	0.04
Dependency ratio	-0.1532***	0.0394	-3.89
Gross national income	0.0005***	0.00007	6.78
Education	0.0063***	0.0015	4.19
Inflation	0.0016**	0.0008	2.05
Economic growth	-0.0029	0.0026	-1.10
Government expenditure	-0.0303***	0.0033	-9.18
FII (0)	3.6904***	0.3174	11.63
FII (1)	0.9409***	0.2450	3.84
Constant	22.8424	0.3924	58.21
No. of observations	340	340	340
No. of Groups	20	20	20

Table 3.14: Hansen Threshold estimates of institutional quality moderating the financial access and poverty reduction nexus (Dependent Variable: Poverty, 2004-2020)

Notes: *, ** and *** denote significance levels at 10%, 5% and 1% respectively

From Table 3.14, dependency ratio was identified to be significant at 1% level of significance. The sign and the magnitude indicate that a percentage increase in the ratio of dependents will reduce consumption by 0.1532 Cent which will have negative impact on poverty reduction. GNI was also found to be significant at 1% level of significance. The magnitude and sign indicate that a dollar increase in the income per capita of households will lead to an increase in the consumption expenditure by 0.0005 Cent, which impacts subsequent poverty levels. Government expenditure was established to be significant at 1%. The sign and magnitude show that a percentage increase in general government expenditure will reduce household consumption by 0.0303 Cent. The economic implications of these variables on poverty reduction are the same as presented in section 3.11. Inflation was found to be significant at 5% level of significance, indicating that a percentage point increase in inflation leads to an increase in consumption by 0.0016 Cent. This is consistent with Boyd & Smith (1998), who argued that inflation is not always bad, and that at a point it will have no damaging effect on financial sector growth and poverty reduction.

3.13.3 Moderating Effect of political stability on financial inclusion and poverty reduction

It is worthy interrogating the moderative ability of the various components of institutional quality in promoting financial inclusion. This section presents Hansen's threshold estimate of the moderative effects of political stability on financial inclusion and subsequent poverty reduction in Africa.

	Model 1: Threshold Effect of political stability on poverty reduction				
Model	Threshold	Lower	Upper	F-statistic	P-value
Threshold 1	-1.4303	-1.4402	-1.4301	24.47	0.1067
Threshold 2	-0.1786	-0.2568	-0.1771	22.02	0.0800

Table 3.15: The Hansen threshold estimates on political stability moderating the financial inclusion and poverty reduction nexus.

Source: Author's own calculations, 2023

From Table 3.15, the study revealed double threshold values of -1.4303 and -0.1786 moderative effect of political stability on financial inclusion. The findings show that a threshold value below -1.4303 will have a positive impact on financial inclusion and consumption (poverty reduction). Beyond -0.1786, political stability will have an equal positive impact on consumption and poverty reduction.

Explanatory Variables	**Coefficient**	**Standard Error**	**T**
Domestic credit to private sector	0.0034	0.0033	1.06
Dependency ratio	-0.0081**	0.0041	-1.99
Gross national income	0.0004***	0.00007	6.34
Education	0.0070***	0.0015	4. 74
Inflation	-0.0016**	0.0009	-2.06
Economic growth	-0.0003	0.0026	-0.13
Government expenditure	-0.0282***	0.0033	-8.55
FII (0)	3.9112***	0.3405	11.49
FII (1)	2.5651***	0.3103	8.27
FII (2)	3.3866***	0.3863	8.77
Constant	22.0275	0.4040	54.53
No. of Observations	340	340	340
No. of Groups	20	20	20

Table 3.16: Hansen Threshold Estimates of political stability moderating the financial inclusion and Poverty Reduction nexus (Dependent Variable: Poverty, 2004-2020)

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance at 10, 5 and 1% respectively.

The estimates, as contained in Table 3.16, dependency ratio was found to be significant at 5% level of significance. The sign and the magnitude indicate that a percentage increase in the ratio of dependents will reduce consumption by 0.0081 Cent which impacts negatively on poverty reduction. GNI was also found to be significant at 1% level of significance, with the magnitude and sign indicating that a percentage increase in income per capita of households will increase consumption by 0.0004 Cent, which will subsequently lead to poverty reduction. Education was equally found to be significant at 1% level of significance. The sign and magnitude show that a percentage increase in educational level will result in an increase in consumption by 0.0070 Cent. Inflation was also found to be significant at the 5% level of significance. The sign and magnitude indicate that a percentage increase in inflation will reduce consumption by 0.0016 Cent, which will increase poverty levels in households. Government expenditure was additional found to be significant. The sign and magnitude indicate that a percentage increase in general government expenditure will reduce consumption by 0.0282 Cent. The economic implications of these indicators can be found in section 3.11.

3.14 Summary, Conclusion and Recommendations

3.14.1 Introduction

This study purposed to estimate the threshold level of financial inclusion on poverty reduction in Africa, the moderative role of institutional quality. The section is divided into the following sub-headings, summary of findings, conclusions, and recommendations.

3.14.2 Summary of Findings

To estimate the threshold level of financial inclusion on poverty reduction, the following variables were considered, domestic credit to the private sector, dependency ratio, inflation, interest rate, gross national income per capita, education, GDP growth, money supply, trade openness, government expenditure, institutional quality, and poverty. It was revealed that there is a double threshold level at which financial inclusion, moderated by institutional quality, would lead to reduction in poverty in Africa and a specific threshold level at which financial barriers could serve as impediment to financial services accessibility and usage. Furthermore, the study found that domestic credit to private sector significantly impacts poverty reduction, through the improvement in income and creation of employment. This suggests that when the private sector is supported through credit advancement, it leads to a growth in productivity, which would subsequently increase profit levels. This will aid households and firms to save and/ invest which would enable them to withstand any risk. The improvement in profit levels will encourage participation in the financial sector and subsequently increase consumption as well as a reduction in poverty.

GNI per capita was also established to be significant. An increase in economic activities within the economy and the increase in the income of households improve the standard of living of the people. This will encourage more people to use financial products and as such increase consumption which leads to poverty reduction.

Interest rates were also found to be significant, indicating that when interest rates increase, it discourages households and firms from borrowing due to its ability to reduce their disposable income and as such thwarts poverty reduction efforts. Inflation was found to be significant, which its increase equally reduces the quantity of goods one could purchase as such affects consumption and subsequently leads to an increase in the level of poverty in households. Education was also identified to empower and improve income levels of households due to its ability to improve on

the skills of the manpower. The increase in the disposable income of households will encourage savings and investment, which will lead to a drop in the level of poverty of the people.

Government expenditure was found to be significant but with adverse effect, signifying that as government expenditure increases, especially if it is not spent on productive sectors of the economy, it has the tendency to crowd out firms that would employ households, and as such affect their income levels, which will continually widen the poverty gap.

3.14.3 Conclusions

The study sought to estimate the threshold level of financial inclusion that will ensure poverty reduction in Africa. Data on financial inclusion and the control variables were sourced from the World Development Indicators, Global Findex Database and World Governance Indicators covering seventeen-year period (2004-2020). Hansen threshold estimation method was used to ascertain the threshold level at which financial inclusion will lead to poverty reduction in Africa.

Access and utilization of finance has been identified to achieve the fight against poverty, especially in Africa, which has been corroborated by many studies. It is therefore imperative to ascertain the exact level at which this effect will stimulate poverty reduction in Africa.

To estimate the threshold level of financial inclusion, domestic credit to private sector, GNI per capita, inflation, interest rate, GDP growth, age dependency ratio, education, money supply, trade openness, government expenditure and institutional quality were investigated using twenty (because of data availability) countries in Africa.

The study found that domestic credit to private sector significantly improves consumption and poverty reduction. It could therefore be concluded that when credit is advanced to the private sector, it leads to growth in output and subsequent income generation. This will lead to an

improvement in the standard of living of the beneficiaries and as such lead to a reduction in poverty.

GNI per capita was also found to be significant. This can be concluded that when income of households increases, it leads to their inclusion in the financial sector, empowering them and ensuring poverty reduction.

Interest rates were also found to be significant. This implies that an interest rate increase will dampen households and firms' interest to borrow and invest, which will lead to worsening of the fight against poverty. Inflation was found to be significant and as such can be concluded that as the prices of goods and services within an economy increases, purchasing power of households reduces, which further increases their level of poverty.

Education was also identified to be significant. It can therefore be concluded that been educated means that households get empowered and improvement in their income levels because of the acquisition of new skills, which increases their disposable income. This will subsequently lead to a drop in the level of poverty of the people.

Government expenditure was found to be significant but with a negative effect on the poverty level of households. It can therefore be concluded that higher government expenditure will worsen the poverty fight-drive through the crowding out effect.

3.14.4 Recommendations

Through the findings, the following recommendations are made for both policymaking and future studies.

Advocating for the inclusion of households into the financial sector due to its poverty reduction effects, through improvement in income levels of households is very critical. Deliberate measures

must be instituted to improve income levels of households through employment creation, so that they can patronize financial products for its poverty reduction benefits. The private sector has been proven to be an engine of growth. This suggests that to aid the employment creation agenda of member countries, governments should target certain industries by providing them with the necessary financial support so that they will expand and create employment. This will also lead to an increase in tax revenue of the government in the medium to long -run.

Institutional quality has been identified to moderate the financial inclusion and poverty reduction nexus. Governments of member countries should therefore build their institutions and must be allowed to function as expected so that they can perform their role of sanitizing the economy.

Central banks in Africa should also institute expansionary monetary policy by increasing money supply to lower interest rates so that it will encourage households to borrow and invest in their businesses. This will promote growth of local businesses within the economy and as such boost economic activities which would be beneficial to both the economy in terms of exchange rate gains and the creation of employment.

It is recommended for further studies that the threshold level of financial inclusion that will lead to poverty reduction be estimated using the various countries income classification levels, i.e lower-income, middle-income and upper-income countries.

CHAPTER FOUR

FINANCIAL INCLUSION, FINANCIAL STABILITY, AND POVERTY REDUCTION IN AFRICA.

4.0 Introduction

Financial inclusion has been seen in recent years to be collateral effective means of providing financial services to low and middle-income households, who are mostly denied access due to their income level, inability to present sufficient assets as a collateral to secure credits, among others (World Bank, 2022). This call is necessitated since access to financial services has been identified as an effective strategy in fighting poverty (cull et al, 2014) due to its tendency to increase one's income, which leads to economic and social empowerment.

The inability of the poor to access financial services is both demand-sided and supply-sided, including financial institutions failure to offer financial services that meet the needs of the poor and the presence of informal sources of funds which looks convenient to the poor. Littlefield et al. (2006) indicates that the most critical issue with financial services is the number of people who own operational bank accounts. The usage of the account helps to transact financial businesses ranging from access to credit, savings, insurances, remittances, making the ownership and usage of the account pave way for accessing other services (Mohan, 2006).

Furtherance to the micro level benefits of financial access, it can also affect poverty at the macro level. At the macro level, properly regulated financial institutions offer an opportunity for households and firms to save, hence increasing liquidity within the economy. This excess liquidity and increased access to credit because of affordable loans lead to a reduction in interest rates resulting from the excess funds. Increase in savings and investment because of the well-regulated market, coupled with its attendant reduction in interest rates will increase financial inclusion and

subsequently lead to stability of the financial system. Growth in savings and investments will result in expansion of businesses as well as employment creation and increase in income, leading to poverty reduction.

The financial sector is not insulative of any global shock like the financial sector crises of the United States of America in 2008, the covid-19 and the Rusian-Ukrain war. These shocks have dying consequences on the financial inclusion drive and the overall stability of the financial system. The covid-19 for instance, provided mixed effects on the financial sector both directly and indirectly through the slowdown of businesses because of the lock down and social distancing measures. This affected households and firms' ability to redeem their loan obligations, as such affected banks liquidity and their ability to provide more loans to households and affected funds of venture capital and investors (Barajas et al. 2020). This calls for constant guidance of the financial system at both good and bad times, through a well-regulated market such that the financial system would be able to withstand any such shocks.

Financial stability is very critical in sustaining the gains in an economy. Financial inclusion plays a very important role in promoting stability of the financial system in the areas of effective allocation of financial products, well-functioning payment systems, among others. The literature has presented both direct and indirect relationship between financial inclusion and financial stability. Nguyen and Du (2022) established a positive relationship between financial inclusion and bank stability by revealing that an inclusive financial system ensures sound bank deposits and credit systems, making them more resilient to shocks. Jungo et al. (2022) avers that financial inclusion promotes sound financial system in both sub-Saharan African and Latin American and Caribbean countries. This is also corroborated by Dienillah (2015), Morgan and Pontines (2014) and Han and Meleck (2013) who all claimed that financial inclusion has positive effects on

financial stability. Dupas et al. (2012) and Khan (2011) however argued that financial inclusion is negatively related to financial stability since relaxing some of the financial requirements with the aim of promoting financial inclusiveness has the potential to result in loan defaults, for instance, leading to instability of the financial system.

Financial inclusion further impacts financial stability through diversification of bank assets due to the increased lending. Increased savers because of the inclusion would increase bank deposits, reducing risks arising from non-core financing. Transmission of monetary policy is also enhanced through inclusive finance, which impacts all aspects of the economy, leading to stability of the financial system. Ultimately, financial inclusion has been proven to significantly reduce poverty in all economies, through a well-regulated and robust financial space. Despite the importance of financial inclusion in promoting stability of the financial space, literature on this relationship is scary especially in Africa. More so, the impact of financial inclusion on poverty through the mediation role of financial stability is missing in the literature. There is therefore the need to investigate the effect of financial inclusion on poverty, through the mediation role of financial stability due to the latter's role in making the financial system strong to provide the desired intermediation services, resulting in a sustained benefits of financial inclusion for the poor.

4.1 The concept and measurement of financial stability

Financial stability is defined as the ability of the financial system to facilitate and promote economic activities, control risks, and stay resilient to shocks (Schinasi, 2004). The World Bank declares financial stability as a financial system that allocates resources efficiently, manages risks, maintains employment rates, and has the capacity to maintain price levels (World Bank, 2023). A

stable financial system is capable of absorbing shocks through internally controlled mechanisms, that builds enough resilience to withstand any destruction of the economy, the world bank says.

Cheang and Choy (2011) and Hawkings and Klau (2000), presents factors related to the financial sector that, when affected, can trigger financial instability. These are savings, credits, ratio of domestic credit to GDP, money supply, interest rates spread, real interest rate, return on assets (ROA) and return on equity (ROE) of banks, non-performing loans, liquidity, capital adequacy, bank concentration, Bank Z-score, and credit rating of banks. In fact, the true effect of financial stability is eminent during financial instability. This is the period where banks are unable to perform their core functions of project financing that produce growth, imbalances between prices of assets and their intrinsic values and distortions in payment regimes. This can affect the confidence the public have in the financial system, which can lead to bank runs, high inflation, and a totally adverse effect on economic growth.

Many studies have proposed measurement of financial stability. The common method used to measure financial stability with individuals and institutions in perspective is the Z-score, which relates bank buffers to the risk it is faced with. That is, to compare bank capital and returns with volatility of such returns, aimed at measuring the bank's risk to solvency. The Z-score predicts the probability at which a bank's assets grow less than the value of its debt. The higher the Z-score, the less probability of the bank being insolvent and vice versa. At the institutional level, stability of the financial system is measured through the Merton model. The model is used to determine the ability of firms to respond to their financial commitments to prevent default. The Merton model handles an institution's equity in the form of a call option on its volatile assets. For this study, the Bank Z-score, ratio of Bank Credit to Bank deposit and ratio of liquid assets to deposits and short-term funding, as suggested by Khan et al. (2022) was used to measure financial stability.

A stable financial system has stimulative effect in ensuring economic growth because money is the fulcrum on which the economy revolves, leading to reduction in poverty. This therefore indicates that the poor are mostly affected during financial crises. If there are disruptions in the banking sector, small deposits of poor households are affected since they are unable to invest in foreign assets, through diversification. If the banking sector is unstable, it also leads to credit ration, which affect poor borrowers in the sense that banks are said to make less income from loans given to poor people and hence are likely to sacrifice credits given to the poor. At the macro level, financial instability affects transmission of both fiscal and monetary policies. This will lead to volatile price levels, due to the cut in lending and its attendant effect in aggregate demand within the economy, which affects output and income levels, leading to consequential effect on the financial inclusion drive efforts, increasing poverty levels.

4.2 Interrelationship between financial inclusion and financial stability

Financial inclusion has undoubtedly been identified to ensure reduction in income inequality and poverty. Despite this overarching benefit of inclusive finance, it has also been empirically argued to trigger instability of the financial system. There is therefore an inconclusive debate when it comes to how financial inclusion impacts financial stability. Ahamed and Mallick (2019) for instance, asserts that it is unclear how financial inclusion influences the economy in terms of ensuring stability of the banking system.

Financial inclusion has been found to have a positive relationship with financial stability since it leads to savings, provides a solid background for lending to businesses and formalization of the informal users of financial services (Khan, 2011). This will then increase the deposit base of banks by making them more liquid, which will lead to more credits advanced to households and firms as

such increase their participation in the financial sector, leading to stability of the financial system. Provision of credit to firms also leads to increases in output and overall employment creation, which also leads to stability of the system. This is evidence in the fact that increased deposits and loans by SMES have the tendency to impact banks' resilience to shocks, signifying that inclusive finance has some direct relationship with financial stability.

Financial inclusion has been empirically proven to have a positive effect on financial stability. Anthony-Orji et al. (2021) avers that financial inclusion is positively related to financial stability with respect to deposits of commercial banks and investments. Morgan and Pontines (2014) also investigated how SME lending stimulates financial stability. Using bank Z-score and non-performing loans (NPL) of banks as a measure of financial stability, the study revealed that greater degree of credit to SMES is directly associated with low levels of NPL, leading to low default rate, resulting in stability of the financial system. To buttress the effect of SME lending on stability of the economy, Adasme et al. (2006) reveals that loans given to large firms are more likely to default than those given to SMEs. This confirms the fact that small firms that get included into the financial sector through financial inclusion efforts manage credits well enough that leads to stability of the financial system, not only in respect of paying back their loans but their effect on employment creation and its attendant income growth and deposit mobilization (Bruhn and Love, 2014; Prasad, 2010). In a similar study, Tran and Nguyen (2020) posits that bank Z-score is directly related to financial development and negatively related to NPL, resulting in the bank's being able to withstand any shocks in the economy, hence ensure a stable economy. Dienillah et al. (2018) also asserts that financial inclusion is positively related to financial stability in both high income and low-income countries, though the effect is more profound in high income countries. Financial

inclusion has also been avowed to contribute significantly to economic development, which is the base for sound and stable banking system (Ahamed and Mallick, 2019).

Despite the importance of financial inclusion on financial stability, some studies have contended that financial inclusion do not lead to financial stability, or they are marginally related, since financial inclusion may hurt the stability of economy (World Bank, 2014). Mehrotra and Yetman (2015) also argue that credit access to households and firms may have negative effects on the economy due to relaxation of credit rules, leading to credit risk on the banks.

Notwithstanding the few contrary evidence on the impact of financial inclusion on financial stability it can be concluded that including everyone into the financial system has multiple beneficial effects on the economy through deposit mobilization, investments, and employment creation, which subsequently leads to stability of the financial system, resulting in poverty reduction.

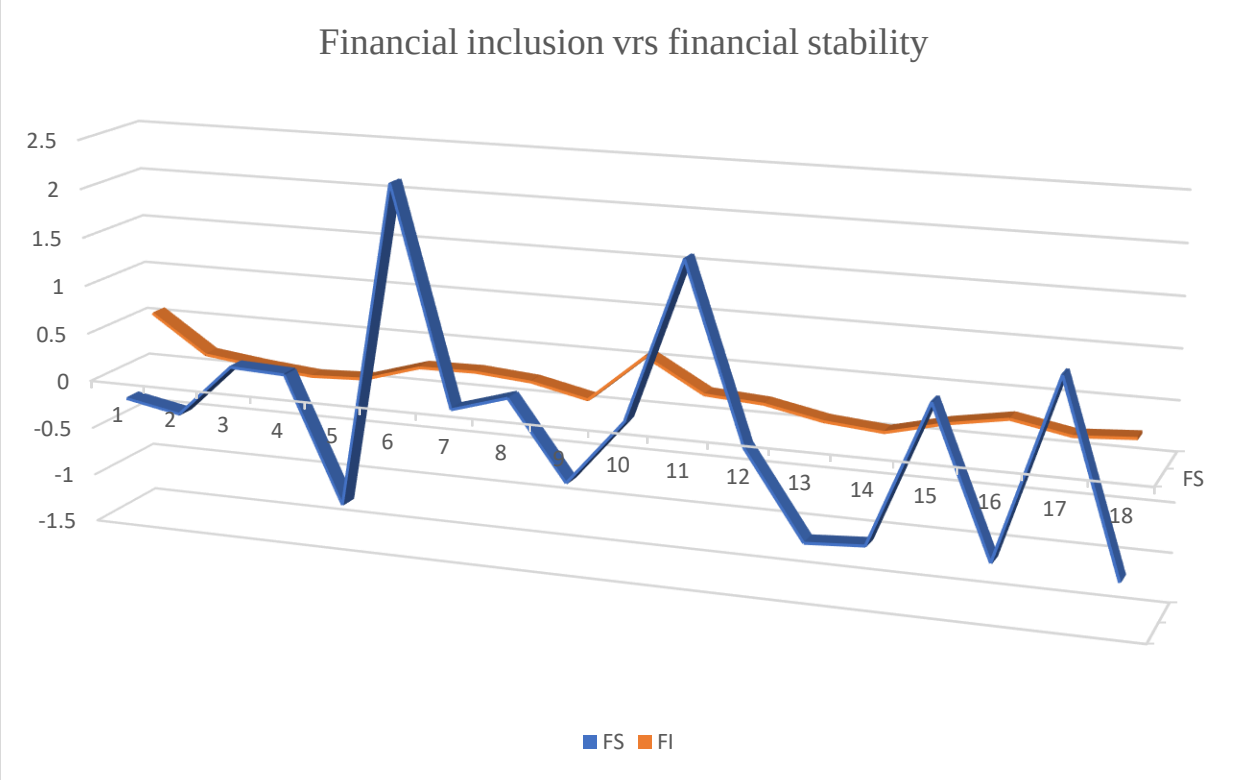


Figure 4.1: Relationship between financial inclusion and financial stability

Source: Author's own construct, 2023.

The literature, as confirmed by the graph, suggests that financial inclusion rate has not been stable in the selected countries over time. Financial stability on the other hand has been stable since there has not been any major instability in the financial sector in Africa during the period under study.

4.3 Review of theoretical and empirical literature

Financial inclusion and financial stability are macroeconomic variables that have greater impact on poverty. The relationship between the variables has theoretical backing which is further empirically proven. The extant literature reveals mainly the positive relationship between financial inclusion and financial stability, which further impacts on poverty reduction, but this is lacking in Africa, which forms the bases for this study. This section cataloged both theoretical and empirical literature, given support for this study.

4.3.1 Theoretical Literature

- **The competition-stability theory.**

The competition– stability theory, which was supported by the study of Boyd and De Nicolo (2005) is a theory that advanced the argument that when competition exists in the banking sector, it promotes stability of the industry. A less competitive or monopolize banking industry leads to market concentration which makes the few players charge high interest rates to increase their interest income at the detriment of the borrower. With competition resulting from more market players, banks charge relatively cheaper interest rates which makes the banking industry accessible to borrowers thereby increasing participation of households and firms into the financial sector which increase financial inclusion and hence stability of the industry.

Banking competition also leads to stability of the market through efficient performance of the financial intermediation role of banks by reducing moral hazard and adverse selection problems. This leads to proper granting of loans to households and firms which ensures less default rate as well as reduction in non-performing loans, which goes a long way to ensure stability of the banking industry (Koetter et al., 2012). A reduction in interest rates also enables perfect selection by households and firms of less risky loan packages, leading to proper investments. It is therefore eminent that competitions in the banking industry have a positive relationship with bank stability. Empirically, it has been proven that with competition in the banking sector, interest rates reduce, leading to low-cost financial products, which could enable borrowers to be able to pay back their borrowed funds, leading to a reduction in non-performing loans (Kasman et al., 2020; De-Ramon et al., 2019). The reduction in interest rates and its attendant low financial products promotes financial inclusion since it increases the incentive to patronize financial products. This shows that banking competition do not only reduce market power of banks, but it also ensures participation

of more households and firms into the financial space, increasing the level of financial inclusion, leading to more profitability of banks, reduces NPL and eventually ensures stability of the financial system.

4.3.2 Review of empirical literature

The literature mainly presents a direct relationship between financial inclusion and financial stability, leading to poverty reduction. Nguyen and Du (2021) explored the effect of financial inclusion on bank stability in the ASEAN countries. Using the system Generalized Method of Moments (GMM) technique, the study found that financial inclusion and bank Z-score are positively related and negatively related to ratio of non-performing loans and standard deviation of rates of deposit growth. This means that banks can gather more deposits and be able to grant safer loans, leading to an increase in financial inclusion and subsequently ensure a stable financial system. In a related study, Pham and Doan (2020) also investigated how financial inclusion impacts financial stability in Asian countries. With the use of the Feasible Generalized Least Squares (FGLS) technique, the study revealed a positive relationship between financial inclusion and financial stability.

Singh and Jha (2021) investigated whether financial development and financial stability are complements or substitutes in fighting poverty in developing countries. Using the pooled Ordinary Least Square (OLS) and panel Quantile Regression estimation methods, the study found that financial development and financial stability have more impact in reducing poverty in developing economies. Financial development and financial stability jointly have a heterogenous impact on poverty. Rewilak (2018) interrogated the detrimental effect of financial instability on poverty. The study employed the system-GMM technique by estimating how banking, currency and debt crises

may affect income and hence impact poverty. The study further revealed that during banking crises, payment systems will be affected which will affect income flow of households who receive remittances, for instance, and can also affect liquidity in the economy. Currency crises, through depreciation of the local currency, may also impact the poor through imported inflation and debt crises also affect the poor through higher taxes and a cut in social spending.

De Haan et al. (2021) explored how financial development may impact poverty directly or indirectly through economic growth, inequality in income and instability of the financial system. With the use of the GMM technique, the study found that financial development indirectly leads to poverty reduction and income inequality through economic growth which leads to stability of the financial system. Similarly, Ratnawati (2020) interrogated how financial inclusion impacts economic growth, income inequality, financial stability and poverty in Asia using the dynamic GMM model. It was established in the study that financial inclusion improves economic growth and financial stability, leading to a reduction in income inequality and poverty. Neaime and Gaysset (2017) explored the impact of financial inclusion and financial stability on poverty and inequality in the MENA countries. With the use of the GMM and Generalized Least Squares models covering the periods of 2002-2012, the results show that financial inclusion impacts positively on financial stability but has no effect on poverty in the MENA region.

Siddik et al. (2018) empirically examined how financial inclusion impacts on stability of a country's financial system. Using the dynamic GMM technique, the study revealed that there is a positive impact of financial inclusion on financial stability, with GDP per capita, ratio of private credit to GDP, liquidity, and ratio of domestic credit to private sector and financial crises negatively related to financial stability. Al-Smadi (2018) examined how financial inclusion impact financial stability in Jordan. Using the Fully Modified Least Squares (FMOLS) method with data

ranging from 2006 to 2017, the study found a positive but weak relationship between financial inclusion and financial stability. Additionally, real GDP per capita positively impact on stability while income inequality, domestic credit to private sector, global financial crises and financial integration are negatively related to financial stability in Jordan.

Khan et al. (2022) examined the relationship between financial inclusion, income inequality, poverty, and financial stability in 54 African countries covering the period of 2001-2019. Employing the fixed effect and GMM models, the study established that financial inclusion is negatively related to income inequality and as such significantly reduces the level of poverty in Africa. The study further avers that financial inclusion impacts the financial system, leading to a stable financial landscape. Tchamyou (2021) explored how financial development impacts the rife inequality in Africa, using depth, efficiency, activity, and stable financial dynamic channels. Using the GMM techniques, the study confirmed that the effective way of reducing inequality in Africa is through financial depth and stability of the financial system using exclusively governance policy instruments. This therefore means that with financial stability and financial depth, coupled with the support of effective governance, inequality as well as poverty would be eliminated in Africa.

Anarfo and Abor (2020) investigated the role financial regulations play in fostering financial inclusion, moderated by financial stability in sub-Saharan Africa. Financial inclusion is found to be negatively related to capital adequacy ratio since holding the regulations tight can affected liquidity of banks hence reduce loanable funds, leading to credit rationing which affect participation of households and firms from participating in the financial sector, affecting financial inclusion. The results further show that financial stability and financial regulations are positively related to financial inclusion in the sub region.

4.4 Conceptual framework of the study

As has been discussed in the literature, financial inclusion has been identified to promote financial stability and poverty reduction. The literature mostly identified the role financial inclusion plays in ensuring stability and reducing poverty. What is missing is the role financial stability plays in the financial inclusion and poverty reduction nexus. This study therefore proposes to fill this gap by revealing the moderative role of financial stability in ensuring financial inclusion stimulates poverty reduction in Africa within the context of institutional quality. This is diagrammatically represented in Figure 4.2

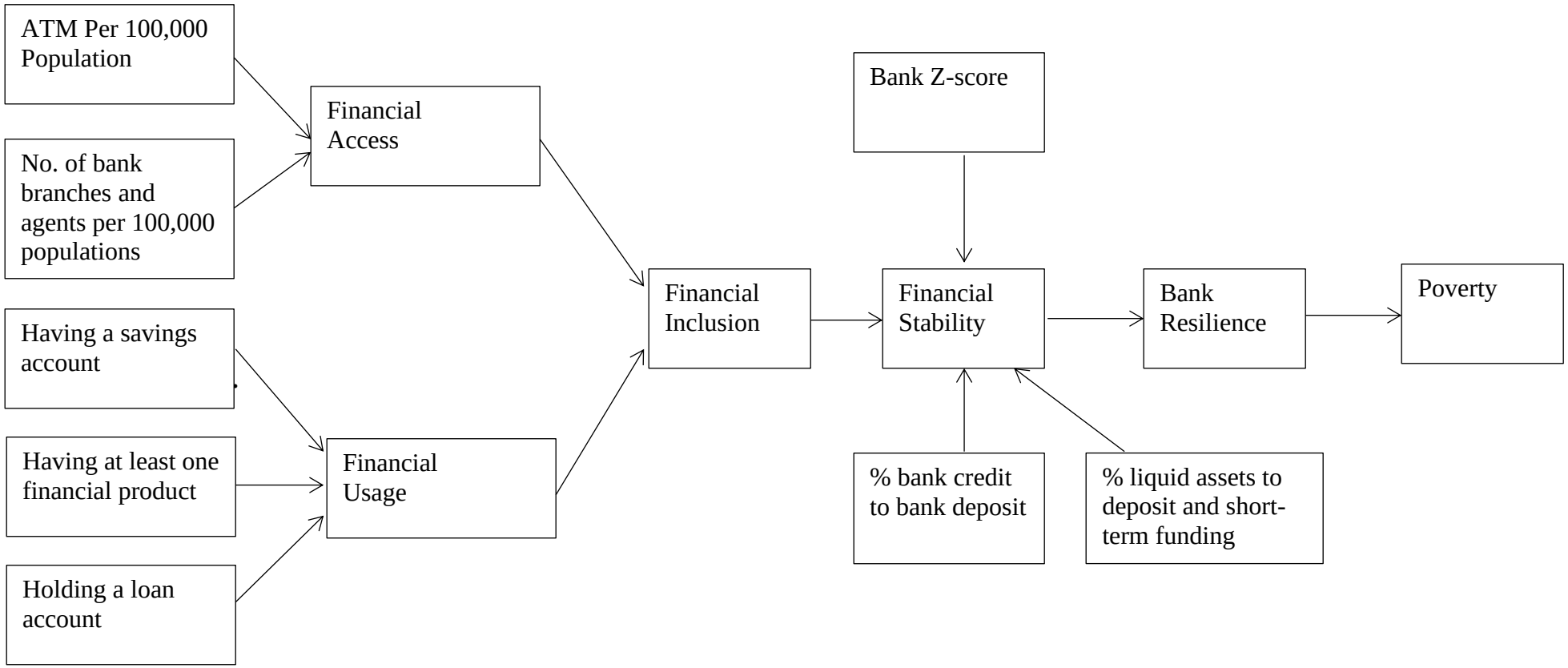


Figure 4.2 Conceptual framework of financial inclusion, financial stability, and poverty reduction

Source: Author's own construct, 2023

4.5 Data and Methodology

4.5.1 Data

This study is quantitative type with data from secondary sources, covering a period from 2004 to 2020, which period was selected due to data availability. The measurement of the data as compiled by the data sources compiled up to 2020 as at 2022 when the study was conducted. The starting year was chosen because measurement of most of the variables used in the study started in 2004, especially those used in the measurement of the components of financial inclusion variable, which legitimizes the choice of the study period.

The composite index of financial inclusion data on the following variables was used; number of Automated Teller Machines (ATM) per 100,000 population, branches of banks and agents per 100,000 population, having a savings account, having at least one financial product, and holding a loan account in a financial organization. The index of financial inclusion was determined using the Principal Component Analysis (PCA) techniques. The financial stability variable is modeled using data on Bank Z-score, percentage of Bank Credit to Bank deposit and percentage of Liquid assets to deposits and short-term funding, which is used to estimate an index using the PCA technique. The financial stability data was compiled from the Financial Structures database (FSD) of the World Bank and the institutional quality data was compiled from the World Governance Indicators (WGI) and the financial inclusion data was compiled from the World Development Indicators (WDI). The WGI compiles observations on governance from experienced individuals through surveys across countries, which is modeled on three pillars: independence, accountability, and scope of action. Many empirical studies used the WGI database for their research; Nguyen and Ha (2021), Muriu (2021), Eldomiaty et al. (2020), Zulkhibri and Ghazal (2017), Khan et al. (2022), Tsouli (2022), Nsiah et al. (2021) among others. Twenty (20) African countries were used

in the study because of data availability, (Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo DR, Egypt, Ghana, Lesotho, Madagascar, Namibia, Nigeria, Rwanda, Sierra Leone, South Sudan, Tanzania, Togo, Uganda, and Mozambique).

4.6 Estimation technique

This section discusses the technique that was employed in estimating the short and long-run effect between financial inclusion, financial stability, and poverty reduction in Africa with the use of the panel Autoregressive Distributive Lag (ARDL) model.

4.6.1 The Panel Autoregressive Distributive Lag (ARDL) method

The panel ARDL bound test model is useful in testing the short and long- run co-integration among variables. The panel ARDL is preferred due to its ability to test both short and long- run effects among variables simultaneously. This method is also useful if the variables in the study have mixed order of integration. That is, if the variables are integrated of order I (0) or I (1) or both. The method also comes handy due to its ability to estimate models with small data samples involved (Muhammad and Abdullahi, 2020). Furthermore, the model can handle serial correlation and endogeneity problems among variables. All these properties make it appropriate for this study since the study sought to find short and long-run cointegration between financial inclusion, financial stability, and poverty reduction in Africa. Also, the data of this study is integrated of order I (0) with potential endogeneity problems due to the lag terms and the relatively small data samples due to nonavailability of data. Two different models were stated representing the effect of financial inclusion on financial stability and effect of financial stability on poverty reduction presented in equations (1) and (2). The first model (1) is stated following Pham and Doan (2020) and the second model (2) is estimated following Singh et al. (2021) and Al-Samid (2018)

Mathematically, the models are specified as follows.

$$FSI = f(FII, GXP, TOP, EDU, GNI, DCP, INF) \quad [1]$$

$$POV = f(FSI, TOP, GXP, GNI, INF, EDU, DCP, IQI) \quad [2]$$

These models are then transformed into separate stochastic equations for the purpose of estimation.

Equations (1) and (2) are therefore transformed as follows.

$$FSI_t = \alpha_0 + \alpha_1 lnFII_t + \alpha_2 lnGXP_t + \alpha_3 lnTOP_t + \alpha_4 lnEDU_t + \alpha_5 lnGNI_t + \alpha_6 lnDCP_t + \alpha_7 INF_t + \varepsilon_t \quad [3]$$

$$lnPOV_t = \beta_0 + \beta_1 lnFSI_t + \beta_2 lnGXP_t + \beta_3 lnTOP_t + \beta_4 lnEDU_t + \beta_5 lnGNI_t + \beta_6 lnDCP_t + \beta_7 INF_t + \beta_8 IQI_t + \varepsilon_t \quad [4]$$

Where $\alpha_1 \ldots \alpha_7$ *and* $\beta_1 \ldots \beta_8$ are coefficients, $FSI_t, FII_t, GXP_t, TOP_t, EDU_t, GNI_t, DCP_t, INF_t,$ *and* IQI_t represents Financial stability, Financial inclusion, Government expenditure, Trade openness, Education, Gross national income, Domestic credit to private sector, Inflation and Institutional quality respectively.

For the short and long-run co-integration between FII and FS, and between FS and POV, albeit other control variables, the panel ARDL model is specified by including the lags of the dependent and independent variables.

From equation (3),

$$FSI_t = \alpha_0 + \sum_{i=1}^{\rho} \alpha_1 FS_{t-1} + \sum_{i=0}^{k_1} \alpha_2 FII_{t-1} + \sum_{i=0}^{k_2} \alpha_3 GXP_{t-1} + \sum_{i=0}^{k_3} \alpha_4 TOP_{t-1} + \sum_{i=0}^{k_4} \alpha_5 EDU_{t-1} + \sum_{i=0}^{k_5} \alpha_6 GNI_{t-1} + \sum_{i=0}^{k_6} \alpha_7 DCP_{t-1} + \sum_{i=0}^{k_7} \alpha_8 INF_{t-1} + \varepsilon_t \quad [5]$$

$k_1 \ldots k_7$ respectively represents the maximum lags for the independent variables (FII, GXP, TOP, EDU, GNI, DCP and INF) and ρ is the lag for the dependent variable, where the optimum lag for each of the variables is selected automatically by the EViews software that was used for the estimation.

To test for the cointegration through the panel ARDL bound test, equation (5) is formulated as;

$$\Delta FSI_t = \alpha_0 + \sum_{i=1}^{\rho} \alpha_1 \Delta lnFSI_{t-1} + \sum_{i=0}^{k} \alpha_2 \Delta ln\, FII_{t-1} + \sum_{i=0}^{k} \alpha_3\, \Delta lnGXP_{t-1} + \sum_{i=0}^{k} \alpha_4\, \Delta lnTOP_{t-1} + \sum_{i=0}^{k} \alpha_5\, \Delta lnEDU_{t-1} + \sum_{i=0}^{k} \alpha_6\, \Delta lnGNI_{t-1} + \sum_{i=0}^{k} \alpha_7 \Delta ln\, DCP_{t-1} + \sum_{i=0}^{k} \alpha_8 \Delta ln\, INF_{t-1} + \alpha_9 FSI_{t-1} + \alpha_{10} lnFII_{t-1} + \alpha_{11} lnGXP_{t-1} + \alpha_{12} lnTOP_{t-1} + \alpha_{13} lnEDU_{t-1} + \alpha_{14} lnGNI_{t-1} + \alpha_{15} lnDCP_{t-1} + \alpha_{16} INF_{t-1} + \varepsilon_t \quad [6]$$

Here $\alpha_1 \ldots \alpha_8$ represents the coefficients of the short-run dynamics and $\alpha_9 \ldots \alpha_{16}$ represents coefficients of the long-run relationship among the variables. Δ is the difference indicator and ln is the natural log of the variables. The variables without the natural log are those that contain negative data points.

There is the need to test how the variables used in the study will converge in the long run towards the equilibrium by using the Error Correction Model (ECM) introduced by Engle and Granger (1987). Since the cointegration has been established, the long-run model was estimated as follows.

$$\Delta FSI_t = \alpha_0 + \sum_{i=1}^{\rho} \alpha_1 \Delta lnFSI_{t-1} + \sum_{i=0}^{k} \alpha_2 \Delta ln\, FII_{t-1} + \sum_{i=0}^{k} \alpha_3\, \Delta lnGXP_{t-1} + \sum_{i=0}^{k} \alpha_4\, \Delta lnTOP_{t-1} + \sum_{i=0}^{k} \alpha_5\, \Delta lnEDU_{t-1} + \sum_{i=0}^{k} \alpha_6\, \Delta lnGNI_{t-1} + \sum_{i=0}^{k} \alpha_7 \Delta ln\, DCP_{t-1} + \sum_{i=0}^{k} \alpha_8 \Delta ln\, INF_{t-1} + \lambda ECT_{t-1} + \varepsilon_t \quad [7]$$

Where

ECT and λ represents respectively, the error correction term of the relationship between the variables and the speed of adjustments of the long-run equilibrium due to any shocks.

Similarly, from equation 4,

$$POV_t = \beta_0 + \sum_{i=1}^{\rho} \beta_1 POV_{t-1} + \sum_{i=0}^{k_1} \beta_2 FSI_{t-1} + \sum_{i=0}^{k_2} \beta_3 GXP_{t-1} + \sum_{i=0}^{k_3} \beta_4 TOP_{t-1} + \sum_{i=0}^{k_4} \beta_5 EDU_{t-1} + \sum_{i=0}^{k_5} \beta_6 GNI_{t-1} + \sum_{i=0}^{k_6} \beta_7 DCP_{t-1} + \sum_{i=0}^{k_7} \beta_8 INF_{t-1} + \sum_{i=0}^{k_7} \beta_9 IQI_{t-1} + \varepsilon_t \quad [8]$$

$k_1 \ldots k_7$ respectively represents the maximum lags for FII, GOVEXP, TO, Edu, GNI, DCPS, IQ and Inf, where the optimum lag for each of the variables is selected automatically by the EViews software that was used for the estimation.

To test for the cointegration through the panel ARDL bound test, equation (5) is formulated as.

$$\Delta lnPOV_t = \beta_0 + \sum_{i=1}^{\rho} \beta_1 \Delta lnPOV_{t-1} + \sum_{i=0}^{k_1} \beta_2 \Delta\, lnFSI_{t-1} + \sum_{i=0}^{k_2} \beta_3 \Delta ln\, GXP_{t-1} + \sum_{i=0}^{k_3} \beta_4 \Delta\, lnTOP_{t-1} + \sum_{i=0}^{k_4} \beta_5\, \Delta lnEDU_{t-1} + \sum_{i=0}^{k_5} \beta_6 \Delta\, lnGNI_{t-1} + \sum_{i=0}^{k_6} \beta_7\, \Delta lnDCP_{t-1} + \sum_{i=0}^{k_7} \beta_8\, \Delta INF_{t-1} + \sum_{i=0}^{k_7} \beta_9 \Delta\, IQI_{t-1} + \beta_{10} lnPOV_{t-1} + \beta_{11} lnFSI_{t-1} + \beta_{12} lnGXP_{t-1} + \beta_{13} lnTOP_{t-1} + \beta_{14} lnEDU_{t-1} + \beta_{15} lnGNI_{t-1} + \beta_{16} lnDCP_{t-1} + \beta_{17} INF_{t-1} + \beta_{18} IQI_{t-1} + \varepsilon_t \quad [9]$$

Where $\beta_1 \ldots \beta_9$ represents the short-run dynamics and $\beta_{10} \ldots \beta_{18}$ represents coefficients of the long-run relationship among the variables. Δ is the difference indicator and ln is the natural log of the variables. There is the need to test how the variables used in the study will converge in the long run towards the equilibrium by using the Error Correction Model (ECM) introduced by Engle and

Granger (1987). Since the cointegration has been established, the long-run model was estimated as follows.

$$\Delta lnPOV_t = \beta_0 + \sum_{i=1}^{\rho} \beta_1 lnPOV_{t-1} + \sum_{i=0}^{k_1} \beta_2 lnFSI_{t-1} + \sum_{i=0}^{k_2} \beta_3 ln\, GXP_{t-1} +$$

$$\sum_{i=0}^{k_3} \beta_4 lnTOP_{t-1} + \sum_{i=0}^{k_4} \beta_5 lnEDU_{t-1} + \sum_{i=0}^{k_5} \beta_6 lnGNI_{t-1} + \sum_{i=0}^{k_6} \beta_7 lnDCP_{t-1} +$$

$$\sum_{i=0}^{k_7} \beta_8 INF_{t-1} + \sum_{i=0}^{k_7} \beta_9 IQI_{t-1} + \lambda ECT_{t-1} + \varepsilon_t \quad [10]$$

ECT and λ represents respectively, the error correction term of the relationship between the variables and the speed of adjustments of the long-run equilibrium due to any shocks.

4.7 Description and Measurement of Variables

This section presents each variable and explanations of its economic importance and its expected impact in promoting financial inclusion, financial stability, and poverty reduction in Africa.

4.7.1 Dependent variable (s)

- **Household consumption expenditure**

Household consumption expenditure is used as a proxy for poverty levels in this study. This is because poverty data is not available in the countries selected. Further information on the choice of this method can be found in section 3.5.1

- **Financial Stability**

According to the World Bank, a stable financial system is one that can manage financial risk, eliminate price fluctuations, allocate resources efficiently and maintain employment levels within the economy. It is commonly measured using the Z-score, which compares capital and returns with risk to a bank's solvency risk. The Z-score is negatively related to the probability of insolvency of

banks. Boyd and Runkle (1993), Demirguc-kunt, et al. (2008), among others, used the Z-score to access a bank's stability. A stable financial system is positively related to financial inclusion due to its ability to increase deposits and investments. It is further expected that a stable financial system will lead to poverty reduction due to its ability to promote full employment levels and as such increase income levels. It has been empirically proven that financial inclusion has a significant impact on financial stability and poverty reduction (Khan et al., 2022; Neaime and Gaysset, 2018). The financial stability variable is modeled using data on bank z-score, ratio of bank credit to bank deposit and ratio of liquid assets to deposits and short-term funding, with the data sourced from the Financial Structures database of the World Bank.

4.7.2 Explanatory Variables

- **Financial Inclusion**

For financial inclusion, dimensions covering access and usage were used to construct the financial inclusion index. Details on this variable is contained in section 2.6.1

- **Institutional quality**

Institutional quality (extractive or inclusive) has an effect of economic growth. A well-functioning institutional environment increases confidence of the citizenry in their participation in the financial sector, leading to an all-inclusive financial system and hence stability of the financial system. Institutional quality plays a critical role in ensuring stability of the banking system through elimination of bank risk (Tran et al., 2022; Balutel, 2020). It is therefore expected that institutional quality will have a direct effect on financial inclusion as well as financial stability. Details on this variable could be referred in section 2.6.2

- **Inflation**

Inflation is defined as the persistent rise in the price of goods and services over time. It is derived using the consumer price index, which indicates the percentage change in the average cost of a basket of goods and services over time at predefined intervals. Inflation has a detrimental influence on the income of the poor, which changes over time. In the short run, an increase in unanticipated inflation will reduce unemployment, which will benefit the vulnerable. Nonetheless, in the long run, increases in inflation cannot reduce unemployment, hence cannot reduce poverty. Easterly and Fischer (2001), support the argument that in the long run, low levels of inflation increase the income levels of the poor. This happens through the influence of interest rates because of a change in inflation. When inflation increases, it leads to a rise in lending rates which discourages households and firms from accessing credit, and vice versa. It is therefore expected that a change in inflation will have a dual direction on financial inclusion. Also, a low level of inflation coupled with its effect on interest rates will promote savings and investments due to its ability to enroll more people into the financial space, hence leading to a stable financial landscape.

- **Education**

Education, the training of human capital, is an important component of economic success. Education is regarded as a crucial instrument in the fight against poverty since poverty and education are inversely related as a higher level of education decreases the number of destitute individuals due to the knowledge gained and its effect on higher pay (Awan et al, 2011). Educational background is expressed as a ratio of gross school enrolment and the total population, regardless of age. It is therefore expected that improvement in the level of education will have a positive relationship with financial inclusion and stability of the financial system.

- **Domestic credit to the private sector**

This refers to the financial resources like loans, trade credits, purchases of nonequity securities, account receivables that establishes claim for payments, that are advanced to the private sector by financial institutions (monetary authorities, deposit money banks, microfinance institutions as well as cooperatives). The private sector is regarded as an engine of growth in an economy, especially developing economies like Africa, due to its role in income/revenue generation through creation of employment and payment of taxes. Unfortunately, in Africa most private enterprises suffer crowding out effects due to competition with international corporations and/government for the limited domestic funding (Obeng-Amponsah, et al., 2019). Olowofeso et al. (2015) have established that there is a positive relationship between growth in credit to private sector and economic growth in Nigeria and Ghana. This suggests that as the private sector accesses more funds, it increases their output, creates employment and as such improves income generation and wealth creation. This will then lead to an increase in financial inclusion and stability because of the increase in income generation and as such lead to poverty reduction. Domestic credit to the private sector is therefore expected to have a direct positive relationship with financial inclusion and financial stability.

- **Gross National Income per capita (GNI)**

GNI per capita is the gross national income divided by the midyear population. It is used to measure the wealth of every country from year to year. As GNI grows, it means that the income of the citizenry grows which is a function of one's ability to patronize the financial sector as such improves on stability of the financial system. The increase in the GNI measures economic growth better due to its ability to improve the standard of living of the people and as such leads to poverty reduction (Majid, 2003).

- **Trade Openness**

According to the World Trade Organization (2018), trade among and within nations is a key enabler to growth in the world and reduction in poverty, since there is evidence that an open economy has opened greater opportunities for millions of people worldwide which has led to a reduction in extreme poverty. According to Keho (2017), countries with higher degree of trade openness benefits more than countries with lower level of openness in terms of economic growth since they can benefit from technologies transfer from developed economies. It is measured as the total of exports and imports of goods and services, which is expressed as a percentage of GDP. Improved trade means an increase in income, which is a function of inclusive finance and stability of the financial system.

- **Government expenditure**

The neo-classical economists argue that government investment increases public debt and interest rates, through the crowding out effect, which has the potential to limit the role of the private sector in the economy and as such lowers output. The Keynesian economists, on the other hand, support the argument that through the multiplier effect theory, government expenditure has stimulating effect in an economy, both in terms of infrastructure financing and/transfers. This is because Government investment has a significant effect on economic growth, which subsequently benefits the poor, especially those in rural areas (Fan et al., 1998). This is because when governments invest in productive sectors like agriculture, infrastructure, among others, it has employment creation effects on the populace and subsequent increase output in the economy. This will increase income of households and as such improve living condition as well as encourage them to participate in the financial sector, leading to financial stability It is measured as government's final consumption expenditure/transfers as a percentage of GDP. Government expenditure in productive sectors of

the economy is therefore expected to reduce poverty, due to its economic growth prospects (Kakar, 2011). The economic impact of the variables relative to the dependent variable is presented in the appendix.

4.8 Empirical Results Analysis

This section presents the summary statistics of all variables used to estimate the long a short run relationship between the variables.

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
FII	306	0.2051	0.1624	0.0177	0.7484
DCP	306	2.4686	1.0036	-4.9030	4.1007
GNI	306	6.9435	0.7962	5.6842	8.8561
EDU	306	4.6619	0.1840	3.9867	5.0060
INF	306	9.8744	25.4212	-8.9747	379.9996
TOP	306	4.1384	0.4220	3.0312	5.1063
GXP	306	2.5718	0.5510	1.2775	4.3716
IQI	306	0.2229	0.9928	-2.5006	2.4135
POV	306	24.1206	1.4334	2.05947	27.6125
FST	306	-0.00000000764	1.000003	-1.5877	3.6193

Table 4.1: Summary Statistics

Source: Author's own compilations, 2023

From Table 4.1, it can be observed that financial inclusion (FII) has an average index of 0.2051 and a standard deviation of 0.1624. The minimum and maximum values are 0.0177 and 0.7436 respectively. The average financial inclusion index confirms the fact that the level of financial inclusion in the selected countries is low.

The average value of domestic credit to the private sector (DCP) is 2.4686 and a standard deviation of 1.0036, showing a stable variable, with the minimum and maximum values of -4.9030 and 4.1007 respectively. Gross national income per capita (GNI) has an average value of $6.9435 and a standard deviation of $0.7962, with a minimum value of 5.6842 and a maximum value of 8.8561, indicating that there are variations in the GNI per capita of the selected countries in Africa.

Education (EDU) has a mean value of 4.6619 primary enrolment as a percentage of gross enrolment and a standard deviation of 0.1840 with respectively minimum and maximum values of 3.9867 and 5.0060, the mean value indicating a very stable variable. Inflation (INF) has an average value of 9. 8744 and a standard deviation of 25.4212, with minimum value of -8.9747 and a maximum value of 379.9996. The standard deviation value indicates that there are variations in the variable, meaning that inflation rate is not stable on the continent.

Trade openness (TOP) has a mean value of 4.1384 and a standard deviation value of 0.4220, indicating a stable variable. The minimum value is 3.0312 and a maximum value of 5.1063. Government expenditure (GXP) was also identified to have an average value of 2.5718 and standard deviation of 0.5510, with the minimum and maximum values of 1.2775 and 4.3716 respectively.

Institutional quality index (IQI) was found to have an average value of 0.2229 and a standard deviation of 0.9928, indicating an unstable variable. The minimum and maximum values are -2.5005 and 2.4135 respectively.

The average poverty rate is $24.1206 and standard deviation of $1.4337 showing an unstable variable. The minimum value is $20.5947, and a maximum value of $27.6125 Financial stability has a mean value of -0.00000000764 and a standard deviation of 1.000003 showing a very unstable variable. The minimum and maximum values are -1.5877 and 3.6193 respectively. To enhance significance, all the variables were logged.

4.9 Result of the Unit Root Test

Table 4.2 below shows results of the unit root test for the variables according to Levin-Lin-Chu and Hadri LM tests for establishing the long and short run relationship between financial inclusion, financial stability, and poverty reduction.

Variable	Levin-Lin-Chu	Hadri LM
POV	-2.7527***	38.2243***
FII	-3.5997***	36.0423***
DCP	-5.1422***	30.7574***
GNI	-3.5433***	34.4741***
EDU	-3.0474***	29.1930***
INF	-6.5680***	9.1305***
TOP	-1.8345**	17.4384***

GXP	-3.2452***	18.1010***
IQI	-2.9518***	27.2604***
FSI	-5.2247***	20.2414***

Table 4.2: Unit root for Levin-Lin-Chu and Hadri LM tests

Source: Author's own compilations, 2023

The result of the Levin-Lin-Chu and Hadri LM tests show that all the variables used in the study (financial inclusion index, domestic credit to private sector, GNI per capita, education, inflation, trade openness, government expenditure, institutional quality index and financial stability) are all stationary at the level (I (0)) and are therefore valid for the data estimation, indicating that there would not be any spurious result.

4.10: Pairwise correlation

This section describes how the various variables correlate with the dependent variable as well as intercorrelation between the independent variables in the model as contained in the correlation matrix in Table 4.3.

	POV	FII	DCPS	GNI	EDU	INF	TO	GOVEXP	IQI	FS
POV	1.0000									
FII	0.0335	1.0000								
DCP	0.1837	0.6651	1.0000							
GNI	0.2853	0.7209	0.4357	1.0000						
EDU	-0.1676	0.1931	0.3122	-0.0579	1.0000					
INF	-0.0939	-0.1241	-0.1880	0.0062	-0.2005	1.0000				
TOP	-0.5843	0.2271	0.0898	0.1264	0.1500	-0.0097	1.0000			
GXP	-0.5506	0.3520	0.2722	0.2262	0.2305	0.2194	0.5064	1.0000		

IQI	0.0387	0.4281	0.3520	0.4995	0. 0701	-0.0424	0.1999	0.2222	1.0000	
FSI	0.6868	0.2017	0.2665	0.5106	-0.1669	-0.0266	-0.3982	-0.2260	0.0616	1.0000

Table 4.3: Correlation matrix for the variables

Source: Author's own compilations, 2023

As can be inferred from Table 4.3, there is a positive correlation between financial inclusion and poverty, though the correlation is a weak one. Domestic credit to the private sector also has a weak positive correlation with poverty. Gross National Income (GNI) correlates positively with poverty with the coefficient of correlation indicating that there is a weak positive association. Education and poverty are weak and positively correlated. Inflation is negatively associated with poverty, with the coefficient showing that the correlation is weak. Trade openness and poverty are negatively related to a weak relationship. Government expenditure was also found to have negative correlation with poverty, though the association is weak. Institution quality index positively correlates with poverty with the degree of correlation been a weak type. Financial stability is strong and positively correlated with poverty.

4.11 Analysis of the panel ARDL Bound test results

Financial inclusion has been theoretically identified to play an enhancing role in promoting financial stability through effective participation of households and firms in the financial sector due to the role the later plays in making financial institutions more resilient to withstand any shocks. This suggests that for financial inclusion to affect poverty reduction, a robust and stable financial system is key. This was done by estimating two models: the effect of financial inclusion on financial stability, and the effect of financial stability on poverty reduction in Africa. It should be noted that the PMG/ARDL-type was used to analyze the result which has the potential to correct any stability problem in the analysis. This means that it will not be necessary to do any stability test, indicating that non-linear combination of the explanatory variables cannot affect the dependent variable in anyway. Though the normality test, according to the study proved otherwise, it does not have any effect on the overall outcome of the result, improving reliability of the results.

4.11.1 Analysis of the panel ARDL Bound Test results on the effects of financial inclusion on financial stability in Africa.

This section presents estimates of the role financial inclusion plays in ensuring financial stability both in the short and long-run.

Variable	Coefficients	Standard Error	Z
lnFII	0.3730***	0.0679	5.49
lnGXP	0.0373	0.1338	0.27
lnTOP	-0.2704**	0.0953	-2.84
lnEDU	2.1633***	0.2838	7.62
lnGNI	2.0153***	0.1878	10.73
lnDCP	0.1572***	0.0371	4.24
INF	-0.00009	0.0011	-0.87

Table 4.4: Long run estimates of the Effect of Financial Inclusion on Financial Stability in Africa

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

As contained in Table 4.4, financial inclusion was found to be significant at 1% level of significance in terms of ensuring financial stability. The sign and the magnitude show that a percentage increase in the financial inclusion index will increase financial stability by 0.3730 in the long run. When financial inclusion improves through for instance, increase in loan advance to

households and firms, it helps financial institutions to diversify their investments and as such reduce the overall risk in their loan portfolio thereby reducing the inter-connectedness in the financial system. Credit advances to households and firms will lead to a growth in their businesses and as such increase savings as well as bank deposits, leading to a reduction in non-core financing of the banks. This will position banks well enough to withstand any shocks in the financial sector and as such lead to financial stability. An inclusive financial system and its corresponding increases in participation of households and firms into the financial system, boost competition of financial institutions, and enhancement of liquidity of the financial sector, leading to a stable financial market, confirming the competition-stability theory that underpinned the study. This is confirmed by Hawkins (2006) who argued that provision of financial services in all forms promotes financial stability.

Literacy level through education was also found to by significant at 1% level of significance. The sign and magnitude show that a percentage point increase in the level of education will increase the level of financial stability by 2.1633 in the long run. A literate individual is expected to know the importance of the financial sector and the role it plays in socio-economic development. An educated person is therefore expected to utilize the loan acquired for the right purpose, to save and invest a portion of their income, which goes a long way to ensure stability of the financial sector. This leads to an increase in participation of households and firms in the financial sector, improves on competition, and stability of the market. The Federal Reserve Bank of St. Louis (2017) revealed the relationship between the level of education and wealth creation by indicating that the more one is educated, the more employable they become and the more income they earn. Being educated also improves one's knowledge in finance and as such improves their participation

in the financial sector through savings and investment, among others, which is a positive sign in ensuing financial stability, the Bank added.

Gross national income (GNI) was equally found to be significant at 1% level of significance. The magnitude and sign demonstrate that an increase in the GNI by a dollar will lead to 2.0153 increase in financial stability in the long run. Income is the principal determinant for the ability of one to participate in the financial sector in any form, especially savings and investment. This will enhance liquidity of the market, competition as well as resilience of the banks to any shock, especially in the period of financial stress. This finding is consistent with Adem (2022), who argued that income growth or diversification can ensure financial stability due to its ability to increase deposits in banks which gives them more resilience to withstand any shocks.

Domestic credit to the private sector was also found to be significant at the 1% level of significance. The sign and magnitude indicate that a percentage point increase in credit provided to the private sector will increase financial stability in the long run by 0.1572. Access to credit, especially by Small and Medium Enterprises (SMEs) helps them to improve upon their businesses, which leads to more employment creation and improvement in income levels. This will generate more wealth through savings and investment, which leads to improving liquidity of banks and as such improves their resilience. This will lead to a liquid and competitive market as such further ensure that banks are well capitalized to withstand any shocks thereby leading to a more stable financial system. Morgan and Pontines (2014) confirmed that increased credit to SMEs has the tendency to reduce non-performing loans, hence promote financial stability

Trade openness was also found to be significant at 5% level of significance. The sign and magnitude indicate that a percentage point increase in trade openness will reduce financial stability

by 0.2704 in the long run. In most developing countries like Africa, incumbent industrials fight against trade openness due to its ability to lower monopoly power so that they shall continue to manipulate the market. If this is not controlled, it has the tendency to thwart the efforts of trade openness in promoting financial stability. Rahman (2020) affirmed this finding by revealing that trade openness is negatively related to bank's risk-taking ability, which weakens stability in the financial system. Al-Sawai and Al-Azzam (2015) also indicates that trade openness is negatively related to financial stability. Government expenditure and inflation were however found to be insignificant in the long run in promoting financial stability, even at 10% level of significance.

Variable	**Coefficients**	**Standard Error**	**Z**
Δ***l***nFII	-0.5245*	0.1418	-1.76
Δ***l***nGXP	0.1143	0.2975	0.55
Δ***l***nTOP	0.6303***	0.2081	2.76
Δ***l***nEDU	0.1041	0.2286	0.07
Δ***l***nGNI	0.7660	1.4074	0.85
Δ***l***nDCP	-0.3659	0.9045	-1.36
ΔINF	0.0082	0.2700	1.48
Cointegration	-0.5307***	0.0055	-3.74
Constant	13.8565***	3.8076	3.64

Table 4.5: Short run estimates of the Effect of Financial Inclusion on Financial Stability in Africa

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance at 10, 5 and 1% respectively

From Table 4.5, financial inclusion was also found to be significant at 10% level of significance. The sign and magnitude show that a percentage increase in the index of financial inclusion will reduce financial stability by 0.5245 in the short term. The quest to encourage households to participate in the financial sector with both regulation and the urge for financial institutions to lesson some of their requirements for accessing financial services has the tendency to hurt the financial stability efforts. For instance, if a credit facility is advanced to a customer without due diligence or by lowering the standards as happened in the United States in 2008, all in the name of encouraging the person to patronage the financial sector, it can lead to non-performing loans, which can go a long way to increase financial instability. It can also be the case that in the short-run, financial institutions may not have built strong systems to monitor the acquisition of those financial services, which results in its negative effect on the financial system. This is consistent with Dienillah et al. (2018) who argued that if requirements to access credit are reduced in a bit to get more households enrolled in the financial sector, it will increase risk of banks which can be a threat to financial stability. Khan (2011) also added that if microfinance institutions are not well regulated, under the notion that they help to include less privilege people in the financial sector, its failure can have a contagious effect on the entire economy which can causes instability.

In the short run, trade openness was found to be significant at 1%. The sign and magnitude indicate that a percentage point increase in trade openness will improve financial stability by 0.6303. Trade openness plays a vital role in an economy with regards to revenue generation. This then increases savings and investment, which will make banks more capitalized and as such increase their resilience and subsequently lead to financial stability. Asghar and Hussain (2014) confirm that trade openness is positively related to financial inclusion and financial stability.

4.12 Analysis of the panel ARDL Bound Test results on the effects of financial stability on poverty reduction in Africa.

A stable financial sector has been found to contribute to enhancing disposable income of households which increases their consumption levels leading to reduction in poverty. This section deals with how financial stability contributes to poverty reduction in both the short and long-run. The estimates of the relationship are contained in Table 4.6

Variable	Coefficients	Standard Error	Z
FSI	0.1386***	0.0297	4.67
lnTOP	0.7976***	0.2005	3.98
lnGXP	-0.5961***	0.1388	-4.30
lnGNI	0.9707***	0.1013	9.58
INF	-0.0012	0.0016	-0.77
lnEDU	2.2884***	0.4322	5.30
lnDCP	0.7719***	0.1066	7.24
IQI	0.3465***	0.0347	9.98

Table 4.6: Long run estimates of the Effect of Financial Stability on Poverty Reduction in Africa

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

Financial stability was found to be significant in impacting poverty reduction at 1% level of significance. The sign and magnitude show that a unit increase in financial stability will result in an improvement in household consumption by 0.1386 in the long run, which will subsequently lead to poverty reduction. A stable financial system means that, all things being equal, there are reliable market participants, enhances competition as well as liquidity of the market. According to the International Monetary Fund (IMF), financial stability and by extension, economic stability is very key in ensuring poverty reduction in the world, especially Africa where poverty levels are still high. The stable financial system ensures that banks are well capitalized to offer more loans to households and firms which will mean that jobs would be created, and income levels improved, leading to poverty reduction. A stable financial system also impacts on poverty through its promotion of economic growth and income generation (World Bank, 2018; Chaouachi and Chaouachi, 2021). Furthermore, a stable financial system will boost confidence of investors in the economy, which will attract foreign direct investments, boost economic growth, and leads to reduction in poverty. Singh & Jha (2021) reveals that financial stability is associated with reduction in poverty levels, confirming the poverty reduction efforts of financial stability as revealed in the study.

Similarly, trade openness was found to be significant at 1% level of significance. The sign and magnitude indicate that a percentage increase in the level of trade liberalization will increase household consumption by 0.7976 in the long run, leading to poverty reduction. Through trade openness, households and firms benefit through income generation, which leads to poverty reduction from the direct generation of income through job creation. Theoretically, international trade enhances welfare gains (poverty reduction) through the exchange of goods and services and the specialization in the production sector, leading to innovation from the international exchange

of ideas, which can strengthen domestic producers because of the knowledge transfer (Cali et al., 2015). The World Bank and the World Trade Organization further confirm the poverty reduction effect of trade liberalization in the sense that through imports, the poor can benefit from decline in prices of goods and services.

Government expenditure was found to be significant at 1% level of significance. The sign and magnitude demonstrate that in the long run, a one dollar increase in government general expenditure will reduce consumption expenditure by 0.596107. Through the crowding effect, government expenditure can crowd out the private sector from the market which can affect production of goods and services within the economy. This can lead to job losses and subsequent reduction in income and hence increase poverty. Mitchell (2005) and Barro (1990) argue that government spending could destroy gains in the economy, supporting the findings of this study.

Gross National Income (GNI) was also found to be significant at 1% level of significance. The sign and magnitude indicate that a percentage increase in income per capita of households will lead to an improvement in the consumption expenditure by 0.9707 in the long run. When income per capita of households increases, it grants them more purchasing power to buy and consume, which will increase household consumption expenditure, subsequently leading to a reduction in poverty. More income encourages the participation of households and firms in the financial sector, encourages liquidity and competition of the market. This is consistent with the study of Nandori (2010), who argued that an increase in the per capita income of households leads to a corresponding decrease in poverty.

Education is also significant at 1% level of significance. The sign and magnitude indicate that a percentage increase in educational level will result in an increase in household consumption

expenditure by 2.2884 in the long run. When people are well-informed through education, they can take prudent decisions in terms of managing their finances such that they will be able to save and invest, hence escape poverty. An educated society is well informed, as such overcomes the moral hazards and information asymmetry, leading to a competitive market. This finding is consistent with the studies of Awan, et al. (2011) and Arias et al. (2016) who all revealed that the level of educational attainment is negatively related to poverty reduction.

Domestic credit to the private sector was found to be significant at 1% level of significance. The sign and magnitude show that a percentage increase in the credit advanced to the private sector will increase consumption by 0.7719 in the long run. When the private sector has access to credit it enables them to increase production which will lead to business growth and create employment. Growth in output coupled with job creation will therefore lead to a growth in income levels and as such lead to poverty reduction. Bukari et al. (2021) confirms the fact that access to credit and other financial products contributes effectively to reduction in poverty.

Institutional quality was also found to be significant at 1% level of significance. The sign and magnitude show that a percentage increase in institutional quality index will increase consumption by 0.3465 in the long run. It has been proven from both theory and empirical studies that institutions play an indispensable role in promoting economic growth and subsequent poverty reduction. A financial system where banks play their financial intermediation role dispassionately promotes confidence in the institutions and as such households and firms will patronize the sector through loan acquisition and investment. When the court and other government agencies also discharge their duties well as expected, it gives households and firms the courage to engage the financial institutions since they belief any dispute that arises out of the transaction would be handled fairly without fear or favor. This will then ensure full participation and a subsequent

increase in output, income levels and eventual poverty reduction benefits. The following studies confirms the output growth and subsequent poverty reduction role of institutional quality: Kouadio and Gakpa (2022); Aracil et al. (2022); Wandeda et al. (2021); Singh (2021)

Variable	**Coefficients**	**Standard Error**	**Z**
ΔFSI	-0.0446**	0.0389	2.15
Δ***l***nTOP	-0.4577	0.4407	-1.04
Δ***l***nGXP	-0.0733	0.0956	-0.77
Δ***l***nGNI	0.3544	0.5146	-0.69
ΔINF	0.00004	0.0022	0.02
Δ***l***nEDU	0.0676***	0.2880	3.23
Δ***l***nDCP	-0.0454	0.0888	-0.51
ΔIQI	-0.0599*	0.0350	-1.7
Cointegration	-0.1052**	0.0496	-2.12
Constant	0.4718**	0.2237	2.11

Table 4.7: Short run estimates of the Effect of Financial Stability on Poverty Reduction in Africa

Source: Author's own calculations, 2023 Notes: *, ** and *** denote significance levels at 10, 5 and 1% respectively

From Table 4.7, financial stability was found to be significant at 5% level of significance in the short run. The sign and magnitude demonstrate that a unit increase in financial stability will reduce consumption expenditure by 0.0446 and therefore lead to an increase in poverty. In the short run, some of the policies that are aimed at ensuring stability, like some requirements at the various financial institutions, has the potential to scare households and firms away from participating in the financial sector, leading to a fall in consumption and a rise in poverty.

Education was found to be significant at 1% level of significance, with the sign and magnitude showing that a percentage point increase in the level of education will lead to an improvement in consumption expenditure by 0.0676 in the short run. An explanation of the impact of educational attainment on poverty reduction can be found in section 4.12.

Institutional quality was found to be significant at the 10% level of significance. The sign and magnitude indication that a unit increase in institutional quality will result in a decrease in household consumption expenditure by 0.0599 in the short run, leading to an increase in poverty. Some stringent regulations or legal regimes in the financial sector have the tendency to course dissatisfaction in households in a short time which can scare them away from participating in the financial sector leading to a reduction in consumption. The World Bank supports this argument by stating that inflexibility of financial regulations of countries can for instance, hinder women participation in the financial sector (World Bank, 2014). It can therefore be concluded that financial inclusion stimulates poverty reduction through financial stability, among other control variables, indicating that financial stability mediates the financial inclusion - poverty reduction nexus.

The study sought to ascertain if there exists a threshold level at which financial stability mediates the financial inclusion - poverty reduction interaction but both the single and double threshold test showed that there exists no threshold value.

4.13 Summary, Conclusions, and Recommendations

4.13.1 Introduction

This study is purposed to estimate the short and long-run effect of financial inclusion on financial stability which would impact poverty in Africa. This section is sub-divided into three sections comprising summary of findings, conclusion, and recommendations.

4.13.2 Summary of Findings

The study sought to investigate how financial inclusion affects poverty reduction through financial stability in both the short and long-run. This was done by first estimating the effect of financial inclusion on financial stability and then estimating the effect of financial stability on poverty reduction. To determine the effect of financial inclusion on financial stability and poverty, the following variables were investigated in addition to the financial inclusion variable, as control variables; Government expenditure (GXP), trade openness (TOP), education (EDU), gross national income (GNI), domestic credit to private sector (DCP), institutional quality (IQI) and inflation (INF). The results show that financial inclusion significantly promotes financial stability in both the short and long-run. This implies that when more people get included in the financial sector, through the financial inclusion initiatives, it leads to more deposits mobilization by banks and investments by households and firms, leading to employment creation and income generation, which impacts on resilience of the banking sector. This therefore makes banks more liquid and as

such positions them to withstand any shocks in the financial system. Also, trade openness was found to be significant in ensuring financial stability in the long run. This is eminent from the fact that improved trade results in an increase in income which promotes deposits, leading to a stable financial landscape. Education was found to be significant in the long run in promoting financial stability. This sterns from the fact that when individuals are more educated it promotes financial literacy and are also able to manage their finances well, all things been equal, as such encourage the educated to patronize financial products, leading to a stable financial system.

Gross national income was also found to positively impact financial stability in the long run. Increase in income per capita is a motivation for one to participate in the financial sector, leading to a surge in deposits and investments, resulting in financial stability.

Government expenditure and inflation, according to the study, were insignificant at both short and long-run in ensuring financial stability.

On the short and long-run effects of financial stability on poverty reduction, the study found that financial stability significantly impacts poverty reduction in both short and long-run. This is evident that a stable financial system ensures more loanable funds are available for banks, which means that more credits are available for households and firms, leading to more savings, investments, employment creation and income generation, resulting in increase in consumption and a reduction in poverty. Trade openness was found to be significant in poverty reduction in the long run. Trade liberalization leads to growth in income levels, especially foreign exchange. This leads to an increase in the purchasing power of households, hence increased consumption, resulting into poverty reduction. Government expenditure was also found to be significant in reducing poverty in the long run. Government investments in the productive sectors of the economy have

the potential to have a spillover effect in promoting businesses, leading to income growth and investment. This results in increases in consumption and such leads to a reduction in poverty. Gross national income was equally identified to impact poverty in the long run. Increase income per capita means improvement in purchasing power of households, leading to increase in consumption and reduction in poverty. In both short and long-run, educational attainment was established to be significant in reducing poverty, due to its ability to increase participation in the financial sector because of surge in financial literacy, leading to improvement in consumption, ensuing reduction in poverty. Domestic credit provided to the private sector was avowed to be significant in the long run. When businesses grow through credits provided to them, it leads to employment creation and income growth, resulting in an increase in consumption and a reduction in poverty. Institutional quality was similarly found to be significant in reducing poverty in both the short and long- run. When institutions function effectively within the economy, it has the potential to increase confidence of households and firms in accessing financial services, leading to growth in savings and investment. This will increase consumption expenditure on households and hence ensure poverty reduction. Inflation was found to be insignificant in both the short and long-run in ensuring poverty reduction in Africa.

4.13.3 Conclusions

The study estimated the short and long-run relationship between financial inclusion, financial stability, and poverty reduction in Africa. The data on the financial inclusion and household consumption expenditure (poverty) variables were compiled from the World Development Indicators (WDI) and data for the financial stability variable was sourced from the Financial Structures database which was analyzed using the panel Autoregressive Distributive Lag (ARDL) method. There is a unanimous call for every nation to find pragmatic measures to get all its citizens included into the financial system due to its ability to eliminate poverty. Financial inclusion has however been argued by some scholars to have the tendency to destabilize the financial system. There was therefore the need to investigate how the financial inclusion call will impact stability of the financial system as well as the fight against poverty in Africa. To investigate the short and long-run effect of financial inclusion on stability of the financial system as well as poverty reduction, the study estimated two models on effect of financial inclusion on financial stability and subsequently ascertain the effect of financial stability on poverty reduction within the period of 2004 to 2020.

The study found that financial inclusion significantly demonstrates positive effects on financial stability both in the short and long-run. It can therefore be concluded that inclusive finance has the tendency to promote savings and investments, which is a prerequisite for a stable financial system. Trade openness was found to be significant in promoting a stable financial system. This can be concluded that when trade is improved, income and investment improve, leading to a stable financial system. Education was identified to impact positively on financial stability due to its impact on financial literacy, which could be concluded that knowledge in financial services will improve participation, resulting in a stable financial system. Gross national income was also

established to contribute to financial stability through its impact on income. This could then be concluded that more income means enough incentive to participate in the financial sector, ensuring its stability. Domestic credit to private sector was also found to impact positively on financial stability, indicating that credit to the private sector encourages business growth, leading to employment creation, income growth and more participation in the financial sector, hence leads to a stable financial system.

In another vain, financial stability was found to contribute significantly to reducing poverty. It can therefore be inferred that in both short and long run, when the financial system is stable, households and firms will have access to financial services in the form of loans and investments which will increase their income and consumption levels, leading to reduction in poverty. Trade openness was also identified to impact poverty reduction in the sense that, when trade improves income improves as well, leading to increase in consumption and subsequently reduce poverty. Government expenditure was equally established to contribute to poverty reduction. It can then be concluded that when government spends in productive sectors, it spills over all other sectors of the economy leading to growth in businesses, increasing income and consumption levels, resulting in poverty reduction. Gross national income was also identified to impact poverty. It can therefore be concluded that an increase in income will increase purchasing power of households, leading to a surge in consumption and reduction in poverty. Educational attainment was established to stimulate poverty reduction. This can be concluded that higher educational level guarantees higher income and increase in consumption, resulting in poverty reduction. Domestic credit to private sector was found to reduce poverty, which can then be concluded that when firms are supported with credit, they expand and employ more people, leading to increase in income and consumption, impacting poverty reduction. Institutional quality was found to impact poverty, concluding that

built trust and confidence in the financial system because of quality of institutions, will ensure participation of households and firms in the financial sector. This leads to growth in businesses, savings, and investment, resulting in an increase in consumption and reduction in poverty.

4.13.4 Recommendations

Based on the findings of this study, the following recommendations were enumerated for the consideration of policy makers and development partners, and suggestions for future research. It has been proven in the literature and confirmed in this study that income level of households plays a critical role in promoting financial inclusion. Efforts should therefore be made by governments in the selected countries to get everyone enrolled in the financial sector through improvement in income of the citizenry and deliberate policies aimed at getting, especially the financially excluded people, into the financial landscape since it has been found that the level of financial inclusion in Africa is low.

To ensure stability of the financial system, governments must institute measures that are friendly to households and firms in terms of promoting their inclusion in the financial sector due to its effect in deposit mobilization, investments, and job creation. This should be done by not compromising regulatory standards that will safeguard the resilience of the financial system to enhance its stability.

In the era of exchange rate fluctuations with its attendant effect on price levels and debt of African countries, efforts must be made to improve local production for export, through trade liberalization, so that the nation and /individuals would benefit from the income growth, stability of the financial system and poverty reduction.

As was established in the study, loans for SMEs have a better chance of improving the economy in terms of job creation and reduction in non-performing loans. Efforts must therefore be made to increase credit access to households and firms to improve their businesses, income level and boost economic growth. This will increase deposits and investments within the economy, leading to financial stability and a reduction in poverty.

Governments must invest, especially in the productive sectors of the economy since government expenditure has been found to be productive in fostering financial stability and reduction in poverty. This will go a long way to have a spillover effect in the economy by promoting businesses, employment, and income generation, which will promote stability of the financial system, leading to reduction in poverty.

It is proven both theoretically and empirically that institutions play a critical role in proper functioning of economic agents. Institutions must therefore be given the necessary training and be allowed to discharge their duties dispassionately to boost confidence of the people in accessing financial services.

Central banks in Africa and development partners should institute measures that would aim at bringing financial services to the doorstep of households and firms so that the involuntarily excluded people could participate in the financial sector.

To promote further studies, a study should investigate the effect of financial inclusion, financial stability, and poverty reduction, using other poverty measures.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter takes snapshots of all the chapters of the study. It is divided into four sections: summary of the research and its findings, contribution and research implications, limitation, and direction for future research, and closing statement.

5.2. Summary of the research and its findings

The study looked at the effect of financial inclusion on poverty reduction in Africa, with moderative effect of institutional quality. This was done with the aim to fill the gap identified in the literature with regards to the financial inclusion and poverty reduction nexus. The study specifically examined the determinants of financial inclusion, with the demand, supply, and infrastructural factors in perspective. The threshold level at which financial inclusion will stimulate poverty reduction, moderated by institutional quality, was also investigated. The quest to increase financial inclusion has a potential effect on the stability of the financial system if regulations are taken for granted. The study therefore interrogated the relationship between financial inclusion, financial stability, and poverty reduction. This was done through the following hypothesis: what influences one's involvement in the financial sector, with demand, supply as well infrastructural factors viewpoint? At what threshold level will financial inclusion stimulate poverty reduction? and finally what relationship exists between financial inclusion, financial stability, and poverty reduction?

5.2.1 Institutional quality relevance in determinants of financial inclusion in Africa

The study examined determinants of financial inclusion, using the GMM and OLS estimation techniques. The study found that domestic credit to private sector is a significant supply-sided factor that influence financial inclusion. This indicates that credit plays a crucial role in business growth which stimulates productivity and improve profit levels, as such enable households and firms to save or invest so that they would be able to withstand any risk, making them participants in the financial sector. Furthermore, GNI per capita was also found to be a significant demand-sided factor that influences financial inclusion. An increase in GNI means an increase in income per capita, which encourages households to deal in financial products, since the literature reveals income inequality as one of the barriers that inhibit one from participating in the financial sector. Finally, institutional quality was found to be significant, indicating that infrastructural factors also contribute immensely towards households and firms' participation in financial services. The study further revealed that GNI per capita, Money supply and institutional quality are significant contributing factors in the elimination of financial barriers that inhibit participation of households and firms in the financial sector in Africa due to the advantage of increase in loanable funds and income, which promote businesses and consumption with the operation of quality of institutions. This will ensure affordability of funds and the build-up of confidence of the public in patronizing financial services.

5.2.2 Threshold effect of financial inclusion on poverty reduction, with the impact of institutional quality

This study is purposed to beef up the financial inclusion- poverty reduction literature since the exact level at which financial inclusion will have its poverty reduction effect has not been extensively revealed in the extant studies. This study therefore investigated the threshold level at which financial inclusion will stimulate poverty reduction, using the Hansen threshold estimation method. It was revealed that there exists a double threshold level at which financial inclusion, moderated by institutional quality, will influence reduction in poverty in Africa. It was specifically established that below a certain threshold level, financial inclusion shows a negative impact on poverty reduction and beyond a certain threshold level, inclusive finance is positively significant in reducing poverty. Similarly, it was revealed that there is a specific threshold level beyond which financial barriers could inhibit one's participation in financial services accessibility and usage.

5.2.3 Financial inclusion, financial stability, and Poverty reduction in Africa

Despite the theoretical and empirical impact of financial inclusion on poverty reduction and economic growth, it has also been proven that it could destabilize the financial system, if not properly implemented. Using the panel ARDL bound test method, the study examined the short and long-term cointegration among financial inclusion, financial stability, and poverty reduction in Africa. The study revealed that financial inclusion significantly enhances financial stability in both short and long-run, indicating that as participation in the financial sector increases, it leads to more deposits mobilization, leading to highly liquid financial system which impacts on resilience of the banking sector. Financial stability was equally identified to stimulate poverty reduction in Africa. A stabilized financial system guarantees easy access to loanable funds which is advanced

to households and firms, thereby increasing consumption, savings, and investments, hence reduced poverty.

5.3 Contribution and research implications

5.3.1 Research contribution

The study has made some significant contributions to research. First, the study revealed that demand, supply as well as infrastructure factors inclusively play a significant role in enrolling households and firms into the financial sector. This is an improvement over the literature that only revealed supply and/or demand side factors that affect financial inclusion.

The study also revealed that financial inclusion does not only impact poverty, but specified the exact threshold level at which financial inclusion will stimulate poverty reduction in Africa. This therefore demonstrates that the financial inclusion drive efforts must target the desired level of inclusion that will ensure the needed poverty reduction impact in Africa.

Finally, the study contributed to research by revealing that financial stability plays a moderating role in the financial inclusion and poverty reduction nexus. This is an improvement over previous studies that only argued for the impact of financial inclusion on poverty reduction.

5.3.2 Practical and policy implications

The study revealed that both demand and supply as well as infrastructural factors play a role in promoting financial inclusion in Africa. To improve upon the level of financial inclusion in the continent, which is generally low, governments should target demand, supply as well as infrastructure (institutional quality) factors to have a holistic policy in making the financial sector attractive to households and firms. Due to the fragile nature of the financial system in Africa, many

barriers (distance, documentation, trust, affordability), inhibit one's involvement in the financial sector. In canvasing for participation of households and firms in the financial sector, efforts must therefore be made to overcome these barriers so that the financial inclusion drive efforts will yield the needed results. The income level of households significantly informs one's decision to use financial products. Governments in Africa must therefore focus on job creation policies through the support of the private sector to boost income levels. Furthermore, Central banks in Africa should provide the banking sector with liquidity through the adoption of expansionary monetary policies, supported by the necessary regulations, which must be directed towards the involuntarily excluded people to enroll them into the financial sector.

The relationship between financial inclusion and poverty reduction is a nonlinear type, indicating that the positive effect of the former is felt at a point. It is therefore evident that there is a beneficial level of financial inclusion that will impact poverty reduction. Development partners must therefore support countries in the region to achieve financial inclusion levels that will benefit the poor.

Institutional quality is critical in moderating the financial inclusion and poverty reduction relationship. Institutions in Africa must therefore be built with support from development partners and must be allowed to function as expected, so that they can perform their role of sanitizing the economy to boost the confidence of market participants.

Liquidity of the financial system is critical in ensuring stability of the system. This positions financial institutions well enough to have access to more loanable funds for households and firms. Access to loans by the private sector goes a long way to creating more jobs to create more wealth, which helps to eliminate income inequality. More income therefore enhances more participation of households and firms into the financial sector, firming the stability of the financial system. This

therefore supports the fact that to ensure stability of the financial sector, income is key. To create more jobs, to increase income, is paramount in ensuring participation of households in the financial sector since income is directly related to demand for financial services. This guarantees households a position to overcome poverty, which further encourages participation of households in the financial sector, leading to stability of the economy.

Trade openness is critical in promoting economic growth, especially in an era where exchange rate has been found to destabilize most African economies due to how countries in the region are highly indebted in foreign denominated instruments. Governments in the region should therefore develop critical sectors of the economy for the purposes of export, which will help generate more foreign exchange to support the balance of payments of the country. This will increase demand for labor which will go a long way to increase employment and income generation, and reduction of imports, that inure to the benefit of the economy in the medium to long term.

5.3.3 Limitation and direction for future studies

The study was basically challenged with data, which prevented the researcher from including more countries and periods in the analysis.

The findings of this study call for recommendation for future studies.

- It is incumbent to ascertain determinants of financial inclusion in Africa with the income classifications of the countries in perspective; that's from the stance of low, lower-middle- and middle-income countries.
- Furthermore, it would also be worthwhile to estimate the threshold level of financial inclusion that will reduce poverty for the low, lower-middle- and middle-income countries.

- The relationship between financial inclusion and financial stability, relative to poverty reduction could also be investigated using the different poverty measures.

5.4 Closing statement

Financial inclusion has been proven to play an important role in reducing poverty due to its ability to eliminate income inequality. It has also been established that improved financial inclusion enhances participation of households and firms in the financial sector which has the advantage of increasing liquidity in the financial system, leading to its stability, which leads to poverty reduction. The impact of financial inclusion on poverty reduction as established in this study is a nonlinear one, which means that the impact can only be felt at a certain threshold level. The study contributed to the body of knowledge by estimating the threshold level at which financial inclusion will stimulate poverty reduction in Africa, which policy must be targeted at improving financial inclusion to a level that will lead to poverty reduction. Stability of the financial system is critical in moderating the financial inclusion and poverty reduction nexus, hence the quest for all to be included must be done with the stability of the financial system in cognizance and hence should not be compromised. Institutional quality plays a phenomenal role in the financial intermediation process, as presented in the study, which calls for the strengthening of institutions in the region and must be allowed to function as such, to enhance financial inclusion to inure to the benefit of the region in terms of poverty reduction.

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Appendix

Objective 1

```
summarize FII ATM lnBBnAgents lnSAVINGS lnLOANACT lnFinPRDCT lnDCPS lnDPR lnGNI lnEDU lnTO
lnGOVEXP lnINTR IQ
```

Variable	Obs	Mean	Std. Dev.	Min	Max
FII	340	.1926558	.1589434	.0176502	.748355
ATM	340	7.597389	12.6869	0	72.44603
lnBBnAgents	340	.9301765	.851527	-1.197538	2.737609
lnSAVINGS	340	4.950025	1.454322	-.7550226	7.690318
lnLOANACT	340	2.898417	1.520021	-3.912023	5.579541
lnFinPRDCT	340	3.013598	.7530278	1.194168	4.481256
lnDCPS	340	2.448677	.9613556	-4.902963	4.100734
lnDPR	340	4.409819	.1515316	4.077746	4.682638
lnGNI	340	6.913295	.7762458	5.684208	8.856057
lnEDU	340	4.650216	.1869466	3.986655	5.006008
lnTO	340	4.093197	.4265269	3.031221	5.106306
lnGOVEXP	340	2.546971	.5336202	1.277459	4.371582
lnINTR	340	1.725502	.7697162	-2.811397	2.985682
IQ	340	.0857411	1.030212	-2.500549	2.413501

```
pwcorr FII lnDCPS lnDPR lnGNI lnINTR lnEDU lnTO lnGOVEXP lnINTR IQ
```

	FII	lnDCPS	lnDPR	lnGNI	lnINTR	lnEDU	lnTO
FII	1.0000						
lnDCPS	0.6580	1.0000					

```
       lnDPR |  -0.5943  -0.4701   1.0000
       lnGNI |   0.7174   0.4274  -0.7056   1.0000
      lnINTR |   0.0856   0.2378   0.1365  -0.1645   1.0000
       lnEDU |   0.2254   0.3082  -0.3103  -0.0058   0.2699   1.0000
        lnTO |   0.2814   0.1107  -0.3020   0.1413  -0.1348   0.2032   1.0000
    lnGOVEXP |   0.3664   0.2778  -0.4665   0.2303  -0.2860   0.2590   0.5187
      lnINTR |   0.0856   0.2378   0.1365  -0.1645   1.0000   0.2699  -0.1348
          IQ |   0.4727   0.3421  -0.4641   0.4907   0.2128   0.1259   0.2935

             | lnGOVEXP   lnINTR       IQ
-------------+---------------------------
    lnGOVEXP |   1.0000
      lnINTR |  -0.2860   1.0000
          IQ |   0.2490   0.2128   1.0000

xtabond2 FII L.FII lnDCPS lnDPR lnGNI lnEDU lnTO lnGOVEXP INTR IQ, gmm(lnDCPS lnEDU lnGNI
)iv(lnDCPS lnEDU lnTO lnGNI )robust

Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.

Warning: Number of instruments may be large relative to number of observations.

Warning: Two-step estimated covariance matrix of moments is singular.

  Using a generalized inverse to calculate robust weighting matrix for Hansen test.

  Difference-in-Sargan/Hansen statistics may be negative.


Dynamic panel-data estimation, one-step system GMM

------------------------------------------------------------------------------

Group variable: CODE                            Number of obs      =       320

Time variable : YEAR                            Number of groups   =        20

Number of instruments = 285                     Obs per group: min =        16

Wald chi2(9)  =  54524.56                                      avg =     16.00

Prob > chi2   =     0.000                                      max =        16

------------------------------------------------------------------------------

             |               Robust
```

```
         FII |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         FII |
          L1. |   .9186726    .044719    20.54   0.000     .8310249     1.00632
              |
       lnDCPS |   .0074898   .0031097     2.41   0.016     .0013949    .0135847
        lnDPR |   .0165272   .0138259     1.20   0.232    -.0105711    .0436256
        lnGNI |   .0151283    .007304     2.07   0.038     .0008127    .0294439
        lnEDU |   .0103419   .0093806     1.10   0.270    -.0080437    .0287275
         lnTO |   .0078857   .0044094     1.79   0.074    -.0007566     .016528
     lnGOVEXP |   .0020116   .0025435     0.79   0.429    -.0029736    .0069967
       lnINTR |  .0009781   .0003984     2.46   0.014     .0001973    .0017589
           IQ |    .0016756   .0007285    2.30   0.013      .0042851    .0009338
        _cons |  -.2636687   .1420365    -1.86   0.063    -.5420552    .0147178
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(lnDCPS lnEDU lnTO lnGNI)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/16).L.FII collapsed
Instruments for levels equation
  Standard
    lnDCPS lnEDU lnTO lnGNI
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.FII collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.60  Pr > z =  0.110
Arellano-Bond test for AR(2) in first differences: z =   0.67  Pr > z =  0.506
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(11)   =  12.46  Prob > chi2 =  0.330
  (Not robust, but not weakened by many instruments.)
```

```
Hansen test of overid. restrictions: chi2(11)   =    6.50  Prob > chi2 =  0.838
  (Robust but weakened by many instruments.)
```

Individual institutional quality indicators

```
xtabond2 FII L.FII lnDCPS lnDPR lnGNI lnEDU lnTO lnGOVEXP INTR POLITICALSTABILITY , gmm(lnDCPS
lnEDU lnGNI )iv(lnDCPS lnEDU lnTO lnGNI )robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.
Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: CODE                            Number of obs      =       320
Time variable : YEAR                            Number of groups   =        20
Number of instruments = 285                     Obs per group: min =        16
Wald chi2(9)  =  37350.84                                      avg =     16.00
Prob > chi2   =     0.000                                      max =        16
------------------------------------------------------------------------------
                   |               Robust
               FII |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------------
               FII |
               L1. |   .9165516   .0459585    19.94   0.000     .8264746    1.006629
                   |
            lnDCPS |   .0070747   .0031431     2.25   0.024     .0009143    .0132351
             lnDPR |   .0197754   .0162352     1.22   0.223     -.012045    .0515957
             lnGNI |   .0162779   .0084126     1.93   0.053    -.0002105    .0327662
             lnEDU |   .0107493   .0091106     1.18   0.238    -.0071071    .0286057
              lnTO |   .0078367   .0042276     1.85   0.064    -.0004494    .0161227
          lnGOVEXP |   .0027626    .003046     0.91   0.364    -.0032075    .0087327
              INTR |    .000955   .0004082     2.34   0.019     .0001549    .0017551
```

```
POLITICALSTABILITY |    .0023093    .000950    2.43   0.036       .0060156    .0013969
             _cons |  -.2895507   .1622771    -1.78   0.074    -.6076081    .0285067
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(lnDCPS lnEDU lnTO lnGNI)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/16).L.FII collapsed
Instruments for levels equation
  Standard
    lnDCPS lnEDU lnTO lnGNI
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.FII collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.24  Pr > z =  0.215
Arellano-Bond test for AR(2) in first differences: z =   0.03  Pr > z =  0.973
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(11)   =  16.59  Prob > chi2 =  0.121
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(11)   =   6.93  Prob > chi2 =  0.805
  (Robust, but weakened by many instruments.)
```

Barriers

```
regress Barrier lnDCPS lnGNI lnEDU lnGOVEXP lnTO lnMS IQ

      Source |       SS           df       MS      Number of obs   =        32
-------------+----------------------------------   F(7, 24)        =      6.93
       Model |  4.10807845         7   .58686835   Prob > F        =    0.0001
    Residual |  2.03112811        24  .084630338   R-squared       =    0.6692
```

Total	6.13920657	31	.198038921	Root MSE	.29091

Adj R-squared = 0.5727

Barrier	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnDCPS	.1262737	.1318253	0.96	0.348	-.1458005	.3983478
lnGNI	-.1716868	.0984466	-1.74	0.094	-.3748707	.031497
lnEDU	.3518557	.336428	1.05	0.306	-.3424975	1.046209
lnGOVEXP	.1632424	.1238635	1.32	0.200	-.0923994	.4188841
lnTO	.0676302	.1672131	0.40	0.689	-.2774807	.4127411
lnMS	-.3539749	.2011831	-1.76	0.091	-.7691965	.0612466
IQ	-.2383465	.0925842	-2.57	0.017	-.4294309	-.0472621
_cons	.5913111	1.762129	0.34	0.740	-3.045545	4.228168

OLS estimates on the factors that influence barriers of financial services in Africa.

Dependent Variable: BARRIERS
Method: Least Squares
Date: 11/09/23 Time: 09:59
Sample: 1 26
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDCPS	0.079085	0.033133	2.386876	0.0282
LNGNI	-0.373944	0.098343	-3.802436	0.0013
LNEDU	0.259750	0.293811	0.884072	0.3883
LNGOVEXP	-0.001462	0.009236	-0.158267	0.8760
LNTO	0.070764	0.136679	0.517738	0.6109
LNMS	-0.269917	0.125436	-2.151828	0.0452
IQI	0.023594	0.010278	2.295588	0.0349
C	2.916793	1.352345	2.156840	0.0448

R-squared	0.778987	Mean dependent var	0.911154
Adjusted R-squared	0.693038	S.D. dependent var	0.434483
S.E. of regression	0.240722	Akaike info criterion	0.237311

Sum squared resid	1.043046	Schwarz criterion	0.624417
Log likelihood	4.914959	Hannan-Quinn criter.	0.348784
F-statistic	9.063316	Durbin-Watson stat	1.996784
Prob(F-statistic)	0.000082		

Individual institutional quality indicators

```
regress Barrier lnDCPS lnGNI lnEDU lnGOVEXP lnTO lnMS CONTROLOFCORRUPTION

      Source |       SS           df       MS      Number of obs   =        32
-------------+----------------------------------   F(7, 24)        =      6.93
       Model |  4.10807865         7  .586868379   Prob > F        =    0.0001
    Residual |  2.03112791        24   .08463033   R-squared       =    0.6692
-------------+----------------------------------   Adj R-squared   =    0.5727
       Total |  6.13920657        31  .198038921   Root MSE        =    .29091

------------------------------------------------------------------------------
     Barrier |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnDCPS |   .1262735   .1318253     0.96   0.348    -.1458005    .3983475
       lnGNI |  -.1716868   .0984466    -1.74   0.094    -.3748707     .031497
       lnEDU |   .3518559    .336428     1.05   0.306    -.3424973    1.046209
    lnGOVEXP |   .1632424   .1238635     1.32   0.200    -.0923993    .4188842
        lnTO |   .0676301   .1672131     0.40   0.689    -.2774807     .412741
        lnMS |  -.3539748   .2011831    -1.76   0.091    -.7691962    .0612466
CONTROLOFCO~N |  -.3610586   .1402509    -2.57   0.017    -.6505222    -.071595
       _cons |   .3710032   1.807011     0.21   0.839    -3.358483     4.10049
------------------------------------------------------------------------------
```

regress Barrier lnDCPS lnGNI lnEDU lnGOVEXP lnTO lnMS GOVTEFFECTIVENESS

```
      Source |       SS           df       MS      Number of obs   =        32
-------------+----------------------------------   F(7, 24)        =      6.12
       Model |  3.93557318         7   .56222474   Prob > F        =    0.0004
    Residual |  2.20363338        24  .091818058   R-squared       =    0.6411
-------------+----------------------------------   Adj R-squared   =    0.5364
       Total |  6.13920657        31  .198038921   Root MSE        =    .30301

------------------------------------------------------------------------------
          Barrier |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------+-----------------------------------------------------------------
           lnDCPS |   .1996359    .172801     1.16   0.259    -.1570078    .5562796
            lnGNI |  -.1176285   .1197943    -0.98   0.336    -.3648717    .1296147
            lnEDU |   .2756284   .3459997     0.80   0.433      -.43848    .9897368
         lnGOVEXP |   .0885638   .1234796     0.72   0.480    -.1662857    .3434132
             lnTO |   .0135294   .1724431     0.08   0.938    -.3423756    .3694344
             lnMS |  -.4027752   .2270801    -1.77   0.089    -.8714455    .0658951
GOVTEFFECTIVENESS |   -.367948   .1789061    -2.06   0.051     -.737192    .0012959
            _cons |   .6675196    1.91618     0.35   0.731    -3.287281     4.62232
------------------------------------------------------------------------------
```

Objective 2

Threshold effect of financial inclusion on poverty reduction (Camara and Tuesta, 2017)

```
xthreg lnPOV2 (lnDCPS lnDPR lnGNI lnINTR lnEDU INF Y lnTO lnMS lnGOVEXP IQI), rx ( FI ) qx (FI )
thnum (2) grid (400) trim (0.01 0.01) bs (300 300)

Estimating the threshold parameters:  1st ......  2nd ......  Done

Threshold estimator (level = 95):

------------------------------------------------------

     model |    Threshold         Lower         Upper

-----------+------------------------------------------

      Th-1 |       0.0534        0.0519        0.0535

     Th-21 |       0.3141        0.3119        0.3152

     Th-22 |       0.0438        0.0431        0.0443

------------------------------------------------------

Threshold effect test (bootstrap = 300 300):

-------------------------------------------------------------------------------

 Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1

-----------+-------------------------------------------------------------------

    Single |    6.5870     0.0204      11.22  0.3000  17.0926  21.2963  31.7595

    Double |    6.1731     0.0191      21.66  0.0567  17.3313  21.7782  35.1511

-------------------------------------------------------------------------------

Fixed-effects (within) regression               Number of obs      =       340

Group variable: CODE                            Number of groups   =        20

R-sq:  within  = 0.7434                         Obs per group: min =        17

       between = 0.0592                                        avg =      17.0
```

```
       overall = 0.0737                                        max =        17

                                              F(14,306)          =     63.33
corr(u_i, Xb)  = -0.2644                      Prob > F           =    0.0000

------------------------------------------------------------------------------
      lnPOV2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnDCPS |   .0216309    .017855     1.21   0.227    -.0135032     .056765
       lnDPR |  -.4397328   .1999339    -2.20   0.029    -.8331521   -.0463134
       lnGNI |   .7359757   .0746333     9.86   0.000     .5891162    .8828352
      lnINTR |  -.1061861   .0226293    -4.69   0.000    -.1507148   -.0616574
       lnEDU |   .1757333   .0919339     1.91   0.057    -.0051694     .356636
         INF |  -.0012325   .0004424    -2.79   0.006     -.002103    -.000362
           Y |   .0006174   .0016001     0.39   0.700    -.0025312    .0037661
        lnTO |   .0370952   .0453355     0.82   0.414    -.0521136     .126304
        lnMS |   .0218127   .0480225     0.45   0.650    -.0726833    .1163088
    lnGOVEXP |  -.2265338   .0443204    -5.11   0.000    -.3137452   -.1393224
         IQI |  -.0156934   .0308449    -0.51   0.611    -.0763884    .0450016
             |
   _cat#c.FI |
           0 |   2.552843   1.050951     2.43   0.016     .4848381    4.620848
           1 |  -2.577246   .8775697    -2.94   0.004    -4.304081   -.8504112
           2 |   1.650246   .1860716     8.87   0.000     1.284105    2.016388
             |
```

```
       _cons |   20.11629   1.081846    18.59   0.000     17.98749    22.24509
-------------+----------------------------------------------------------------
     sigma_u |   1.576626
     sigma_e |  .14203373
         rho |  .99194964   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(19, 306) = 801.80                     Prob > F = 0.0000
```

Threshold effect of financial inclusion on poverty reduction (Sarma, 2008,2012)

```
xthreg lnPOV2 (lnDCPS lnDPR lnGNI lnINTR lnEDU INF Y lnTO lnMS lnGOVEXP IQ), rx (FII )
qx ( FII ) thnum (2) grid (400) trim (0.01 0.01) bs (300 300)
Estimating the threshold parameters:  1st ......  2nd ......  Done
Boostrap for single threshold
.................................................. +   50
.................................................. +  100
.................................................. +  150
.................................................. +  200
.................................................. +  250
.................................................. +  300
Boostrap for double threshold model:
.................................................. +   50
.................................................. +  100
.................................................. +  150
.................................................. +  200
.................................................. +  250
.................................................. +  300

Threshold estimator (level = 95):
```

```
-------------------------------------------------
     model |    Threshold         Lower         Upper
-----------+-------------------------------------
      Th-1 |       0.0442        0.0412        0.0444
     Th-21 |       0.0455        0.0454        0.0455
     Th-22 |       0.0455        0.0410        0.0458
-------------------------------------------------

Threshold effect test (bootstrap = 300 300):
------------------------------------------------------------------------------
 Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1
-----------+------------------------------------------------------------------
    Single |    6.5813     0.0204      14.43  0.2933  20.9174  25.8498  33.0743
    Double |    3.8323     0.0119     231.70  0.0000  24.9513  29.4713  42.6015
------------------------------------------------------------------------------

Fixed-effects (within) regression               Number of obs      =       340
Group variable: CODE                            Number of groups   =        20

R-sq:  within  = 0.8407                         Obs per group: min =        17
       between = 0.0631                                        avg =      17.0
       overall = 0.0779                                        max =        17

                                                F(14,306)          =    115.36
corr(u_i, Xb)  = -0.3421                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      lnPOV2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnDCPS |   .0255015    .014242     1.79   0.074    -.0025231    .0535261
```

```
       lnDPR |  -.7269427   .1573353    -4.62   0.000    -1.036539   -.4173468
       lnGNI |   .7852177   .0586286    13.39   0.000     .6698515    .9005839
      lnINTR |  -.0383642   .0180768    -2.12   0.035    -.0739348   -.0027937
       lnEDU |   .0580246     .07055     0.82   0.411    -.0807999    .1968491
         INF |  -.0031304   .0003456    -9.06   0.000    -.0038105   -.0024504
           Y |  -.0007187   .0012644    -0.57   0.570    -.0032068    .0017694
        lnTO |  -.0949389   .0359768    -2.64   0.009    -.1657322   -.0241457
        lnMS |    .124755   .0378977     3.29   0.001      .050182     .199328
    lnGOVEXP |  -.0884382   .0374731    -2.36   0.019    -.1621757   -.0147006
          IQ |   .0552015   .0250916     2.20   0.036    -.0301879      .06856
             |
  _cat#c.FII |
          0  |    2.48742   .8081581     3.08   0.002     .8971694     4.07767
          1  |  -41.89183   2.910882   -14.39   0.000    -47.61971   -36.16395
          2  |   1.473932   .1526619     9.65   0.000     1.173532    1.774332
             |
       _cons |   21.36213   .8465946    25.23   0.000     19.69625    23.02802
-------------+----------------------------------------------------------------
     sigma_u |  1.6168858
     sigma_e |  .11190951
         rho |   .9952324   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(19, 306) = 1504.50                 Prob > F = 0.0000
```

Individual components of financial inclusion

```
. xthreg lnPOV2 ( lnDCPS lnDPR lnGNI lnINTR lnEDU INF Y lnTO lnMS lnGOVEXP IQI), rx ( ACCESS ) qx
( ACCESS ) thnum (2) grid (400) trim (0.01 0.01) bs (300 300)

Estimating  the  threshold  parameters:   1st ......  2nd ......  Done
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	0.0714	0.0679	0.0718
Th-21	0.1096	0.0904	0.1107
Th-22	0.0799	0.0778	0.0806

Threshold effect test (bootstrap = 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	6.9449	0.0215	12.97	0.2367	16.8834	19.9537	26.0177
Double	6.5717	0.0203	18.34	0.0500	15.5086	17.6137	25.2559

Fixed-effects (within) regression Number of obs = 340

Group variable: CODE Number of groups = 20

R-sq: within = 0.7268 Obs per group: min = 17

between = 0.0665 avg = 17.0

overall = 0.0802 max = 17

F(14,306) = 58.16

corr(u_i, Xb) = -0.2910 Prob > F = 0.0000

lnPOV2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnDCPS	.0224969	.0185633	1.21	0.226	-.014031	.0590249
lnDPR	-.6671894	.2000865	-3.33	0.001	-1.060909	-.2734698
lnGNI	.8016937	.0752331	10.66	0.000	.653654	.9497335
lnINTR	-.0980479	.0237595	-4.13	0.000	-.1448006	-.0512953
lnEDU	.11947	.0934198	1.28	0.202	-.0643564	.3032965
INF	-.0021292	.0004484	-4.75	0.000	-.0030114	-.0012469
Y	-.0007819	.001655	-0.47	0.637	-.0040386	.0024748
lnTO	-.0682117	.0465015	-1.47	0.143	-.1597149	.0232916
lnMS	.0567024	.0477276	1.19	0.236	-.0372136	.1506183
lnGOVEXP	-.2326041	.0457445	-5.08	0.000	-.3226177	-.1425904
IQI	-.0282129	.031987	-0.88	0.378	-.0911552	.0347293
_cat#c.ACCESS						
0	.0022266	.5741182	0.00	0.997	-1.127493	1.131946
1	-3.958155	.9033119	-4.38	0.000	-5.735644	-2.180666
2	.9021768	.1298677	6.95	0.000	.6466301	1.157723
_cons	21.36359	1.110131	19.24	0.000	19.17913	23.54805
sigma_u	1.5832107					
sigma_e	.14654711					

```
          rho |  .99150483   (fraction of variance due to u_i)

------------------------------------------------------------------------------

F test that all u_i=0: F(19, 306) = 755.95                  Prob > F = 0.0000



xthreg lnPOV2 (lnDCPS lnDPR lnGNI lnINTR lnEDU INF Y lnTO lnMS lnGOVEXP IQI), rx (USAGE) qx(
USAGE) thnum (2) grid (400) trim (0.01 0.01) bs (300 300)

Estimating  the  threshold  parameters:   1st ......  2nd ......  Done

Boostrap for single threshold

Threshold estimator (level = 95):

--------------------------------------------------

     model |    Threshold         Lower         Upper

-----------+--------------------------------------

      Th-1 |       0.0643        0.0575        0.0646

     Th-21 |       0.0646        0.0630        0.0648

     Th-22 |       0.0615        0.0575        0.0617

--------------------------------------------------

Threshold effect test (bootstrap = 300 300):

------------------------------------------------------------------------------

 Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1

-----------+------------------------------------------------------------------

    Single |    7.0173     0.0217      14.10  0.2300  18.9438  23.0726  30.6079

    Double |    6.6404     0.0206      18.33  0.0967  18.2060  23.4184  32.7282

------------------------------------------------------------------------------

Fixed-effects (within) regression               Number of obs      =       340
```

```
Group variable: CODE                            Number of groups   =        20

R-sq:  within  = 0.7240                         Obs per group: min =        17
       between = 0.0612                                        avg =      17.0
       overall = 0.0754                                        max =        17

                                                F(14,306)          =     57.33
corr(u_i, Xb)  = -0.2613                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      lnPOV2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnDCPS |   .0168157    .018593     0.90   0.366    -.0197707    .0534021
       lnDPR |  -.6942672   .2052923    -3.38   0.001    -1.098231   -.2903039
       lnGNI |   .8072963   .0740818    10.90   0.000     .6615221    .9530705
      lnINTR |  -.1134053   .0236207    -4.80   0.000    -.1598848   -.0669258
       lnEDU |   .1245768   .0943133     1.32   0.188    -.0610079    .3101615
         INF |  -.0018937   .0004417    -4.29   0.000    -.0027629   -.0010245
           Y |   -.000807   .0016581    -0.49   0.627    -.0040696    .0024557
        lnTO |   .0604336   .0479384     1.26   0.208     -.033897    .1547643
        lnMS |   .0773423   .0494288     1.56   0.119    -.0199211    .1746058
    lnGOVEXP |  -.2642109   .0454368    -5.81   0.000    -.3536189   -.1748028
         IQI |  -.0056718   .0327581    -0.17   0.863    -.0701313    .05878
_cat#c.USAGE |
```

```
          0  |   1.792845   .8761602     2.05   0.042     .0687834    3.516906
          1  |   8.056481   1.327213     6.07   0.000     5.444862     10.6681
          2  |   .7049027   .0931987     7.56   0.000     .5215113    .8882941
             |
       _cons |   20.91138   1.122865    18.62   0.000     18.70187     23.1209
-------------+----------------------------------------------------------------
     sigma_u |  1.5732682
     sigma_e |  .14731126
         rho |  .99130889   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(19, 306) = 721.49                     Prob > F = 0.0000
```

Moderating effect of institutional quality on the financial inclusion and poverty reduction nexus

```
xthreg lnPOV2 (lnDCPS lnDPR lnGNI lnINTR lnEDU INF Y lnTO lnMS lnGOVEXP), rx ( FI) qx ( IQI )
thnum (1) grid (400) trim (0.01) bs (300)
Estimating  the  threshold  parameters:   1st ......  Done
Boostrap for single threshold
Threshold estimator (level = 95):
-----------------------------------------------------
     model |    Threshold         Lower         Upper
-----------+-----------------------------------------
      Th-1 |      -1.6325       -1.6626       -1.4835
-----------------------------------------------------
Threshold effect test (bootstrap = 300):
```

```
------------------------------------------------------------------------------
 Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1
-----------+------------------------------------------------------------------
    Single |    5.4518     0.0169      81.41  0.0000  23.6457  28.3749  41.9461
------------------------------------------------------------------------------

Fixed-effects (within) regression               Number of obs      =       340
Group variable: CODE                            Number of groups   =        20

R-sq:  within  = 0.7734                         Obs per group: min =        17
       between = 0.0417                                        avg =      17.0
       overall = 0.0551                                        max =        17

                                                F(12,308)          =     87.60
corr(u_i, Xb)  = -0.3153                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      lnPOV2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnDCPS |   .0161411   .0166501     0.97   0.333    -.0166212    .0489034
       lnDPR |  -.5671962   .1864812    -3.04   0.003    -.9341344    -.200258
       lnGNI |   .7296047   .0696177    10.48   0.000     .5926181    .8665912
      lnINTR |  -.1950057   .0228521    -8.53   0.000    -.2399717   -.1500397
       lnEDU |  -.0996127   .0860351    -1.16   0.248    -.2689037    .0696783
```

```
         INF |   .0004961   .0004781     1.04   0.300    -.0004447    .0014368
           Y |    .001536   .0014995     1.02   0.306    -.0014146    .0044867
        lnTO |  -.0140369    .042776    -0.33   0.743     -.098207    .0701332
        lnMS |   .0926862   .0443411     2.09   0.037     .0054364     .179936
     lnGOVEXP |  -.1542352   .0415851    -3.71   0.000    -.2360621   -.0724083
              |
    _cat#c.FI |
           0  |  -20.34974   2.504739    -8.12   0.000     -25.2783   -15.42117
           1  |   1.494738   .1753005     8.53   0.000       1.1498    1.839676
              |
        _cons |   21.98557   1.004412    21.89   0.000      20.0092    23.96195
--------------+----------------------------------------------------------------
      sigma_u |  1.6190869
      sigma_e |  .13304366
          rho |  .99329304   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(19, 308) = 1052.46                     Prob > F = 0.0000
```

Moderating effect of institutional quality on financial access and poverty reduction nexus

```
xthreg lnPOV (DCPS DPR GNI EDU INF Y GOVEXP), rx (ACCESS ) qx ( IQI ) thnum (1) grid (400) trim (0.01) bs (300)
Estimating the threshold parameters:  1st ......  Done
Threshold estimator (level = 95):
```

```
-------------------------------------------------
     model |    Threshold         Lower         Upper
-----------+-------------------------------------
      Th-1 |       0.3334        0.3049        0.3671
-------------------------------------------------
Threshold effect test (bootstrap = 300):
------------------------------------------------------------------------------
 Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1
-----------+------------------------------------------------------------------
    Single |   17.8639     0.0553      79.98  0.0000  35.5208  41.2604  51.3992
------------------------------------------------------------------------------



Fixed-effects (within) regression               Number of obs      =       340
Group variable: CODE                            Number of groups   =        20
R-sq:  within  = 0.6425                         Obs per group: min =        17
       between = 0.1803                                        avg =      17.0
       overall = 0.2065                                        max =        17
                                                F(9,311)           =     62.10
corr(u_i, Xb)  = -0.3071                        Prob > F           =    0.0000

------------------------------------------------------------------------------
        lnPOV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

DCPS	.0001151	.0032849	0.04	0.972	-.0063484	.0065786
DPR	-.0153163	.0039404	-3.89	0.000	-.0230696	-.0075631
GNI	.0004701	.0000693	6.78	0.000	.0003337	.0006064
EDU	.0062554	.0014925	4.19	0.000	.0033187	.0091922
INF	.0016002	.0007814	2.05	0.041	.0000626	.0031378
Y	-.0028556	.0025993	-1.10	0.273	-.00797	.0022589
GOVEXP	-.0302589	.0032967	-9.18	0.000	-.0367456	-.0237723
_cat#c.ACCESS						
0	3.690399	.3173706	11.63	0.000	3.065934	4.314864
1	.940926	.2450352	3.84	0.000	.4587896	1.423062
_cons	22.8424	.3924142	58.21	0.000	22.07028	23.61452

sigma_u	1.340109	
sigma_e	.23966692	
rho	.96900705	(fraction of variance due to u_i)

F test that all u_i=0: F(19, 311) = 294.08 Prob > F = 0.0000

Moderating effect of the institutional quality indicators on financial inclusion and poverty reduction nexus

```
xthreg lnPOV (DCPS DPR GNI EDU INF Y GOVEXP), rx ( FII ) qx ( POLITICALSTABILITY ) thnum (2) grid
(400) trim (0.01 0.01) bs (300 300)

Estimating the threshold parameters:  1st ......  2nd ......  Done

Boostrap for single threshold

Threshold estimator (level = 95):

-------------------------------------------------

     model |    Threshold         Lower         Upper

-----------+-------------------------------------

      Th-1 |      -1.4303       -1.4402       -1.4301

     Th-21 |      -1.4303       -1.4402       -1.4301

     Th-22 |      -0.1786       -0.2568       -0.1771

-------------------------------------------------

Threshold effect test (bootstrap = 300 300):

------------------------------------------------------------------------------

 Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1

-----------+------------------------------------------------------------------

    Single |   18.9132     0.0586      24.47  0.1067  25.0480  30.4402  47.0016

    Double |   17.7063     0.0548      22.02  0.0800  19.7957  26.8604  36.6548

------------------------------------------------------------------------------

Fixed-effects (within) regression               Number of obs      =       340

Group variable: CODE                            Number of groups   =        20

R-sq:  within  = 0.6457                         Obs per group: min =        17

       between = 0.0762                                        avg =      17.0

       overall = 0.0996                                        max =        17
```

```
                                                F(10,310)         =     56.49
corr(u_i, Xb)  = -0.4454                        Prob > F          =    0.0000

------------------------------------------------------------------------------
       lnPOV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        DCPS |   .0034371   .0032569     1.06   0.292    -.0029712    .0098454
         DPR |  -.0081359   .0040782    -1.99   0.047    -.0161603   -.0001114
         GNI |   .0004225   .0000666     6.34   0.000     .0002914    .0005536
         EDU |   .0070237   .0014818     4.74   0.000      .004108    .0099393
         INF |   .0016078   .0007799     2.06   0.040     .0000732    .0031423
           Y |  -.0003444   .0026069    -0.13   0.895    -.0054738     .004785
      GOVEXP |  -.0282393   .0033041    -8.55   0.000    -.0347405   -.0217381
             |
  _cat#c.FII |
          0  |   3.911189   .3404712    11.49   0.000     3.241262    4.581116
          1  |    2.56505   .3103294     8.27   0.000     1.954432    3.175669
          2  |   3.386629   .3863233     8.77   0.000     2.626482    4.146776
             |
       _cons |   22.02754   .4039798    54.53   0.000     21.23265    22.82243
-------------+----------------------------------------------------------------
     sigma_u |  1.5206872
     sigma_e |  .23899207
         rho |  .97589591   (fraction of variance due to u_i)
```

F test that all u_i=0: F(19, 310) = 403.03 Prob > F = 0.0000

Threshold effect of financial barriers on financial inclusion on poverty reduction

Dependent Variable: POVERTY

Method: Threshold Regression

Date: 08/21/22 Time: 12:44

Sample: 1 32

Included observations: 32

Threshold type: Bai-Perron tests of L+1 vs. L sequentially determined

Thresholds

Threshold variable: BARRIER

Threshold selection: Trimming 0.15, , Sig. level 0.05

Threshold value used: 0.6219791

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BARRIER < 0.6219791 -- 10 obs				
BARRIER	4.202403	1.711002	2.456107	0.0224
0.6219791 <= BARRIER -- 22 obs				
BARRIER	-0.573951	0.715478	-0.802193	0.4310
Non-Threshold Variables				
LNDCPS	1.466321	0.448578	3.268818	0.0035
LNDPR	2.960465	0.744246	3.977804	0.0006
LNTO	-0.982826	0.596044	-1.648914	0.1134
LNGOV	-0.772863	0.561718	-1.375892	0.1827
LNEDU	2.819290	0.861934	3.270890	0.0035
LNINTR	0.052639	0.320318	0.164333	0.8710
INF	0.016242	0.010274	1.580859	0.1282
IQ	-0.749800	0.346583	-2.163407	0.0416

R-squared	0.620565	Mean dependent var	24.37872
Adjusted R-squared	0.465342	S.D. dependent var	1.380924
S.E. of regression	1.009736	Akaike info criterion	3.107562
Sum squared resid	22.43048	Schwarz criterion	3.565604
Log likelihood	-39.72099	Hannan-Quinn criter.	3.259390
Durbin-Watson stat	1.887489		

Objective 3

Short and Long run effect of financial inclusion on financial stability

Dependent Variable: D(FS)

Method: ARDL

Date: 12/09/22 Time: 13:18

Sample: 2005 2020

Included observations: 288

Maximum dependent lags: 1 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (1 lag, automatic): LNFII LNGOVEXP LNTO LNEDU LNGNI LNDCPS INF

Fixed regressors: C

Number of models evalulated: 1

Selected Model: ARDL(1, 1, 1, 1, 1, 1, 1, 1)

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
LNFII	0.372958	0.067940	5.489531	0.0000
LNGOVEXP	0.037327	0.133815	0.278947	0.7807
LNTO	-0.270431	0.095309	-2.837400	0.0052
LNEDU	2.163279	0.283802	7.622483	0.0000
LNGNI	2.015277	0.187789	10.73160	0.0000
LNDCPS	0.157245	0.037066	4.242305	0.0000
INF	-0.000918	0.001059	-0.866375	0.3878
Short Run Equation				
COINTEQ01	-0.530710	0.141767	-3.743528	0.0003
D(LNFII)	-0.524507	0.297516	-1.762956	0.0801
D(LNGOVEXP)	0.114287	0.208103	0.549187	0.5838
D(LNTO)	0.630337	0.228639	2.756909	0.0066

D(LNEDU)	0.104072	1.407377	0.073948	0.9412
D(LNGNI)	0.766034	0.904489	0.846925	0.3985
D(LNDCPS)	-0.365914	0.270022	-1.355123	0.1776
D(INF)	0.008197	0.005523	1.484326	0.1400
C	13.85646	3.807575	3.639184	0.0004

Mean dependent var	0.017712	S.D. dependent var	0.356247
S.E. of regression	0.229962	Akaike info criterion	-0.092789
Sum squared resid	7.244880	Schwarz criterion	1.963700
Log likelihood	183.1968	Hannan-Quinn criter.	0.729672

*Note: p-values and any subsequent tests do not account for model selection.

selection.

Short and Long run effect of financial stability on poverty reduction

Dependent Variable: LnPoverty

Method: ARDL

Date: 12/08/22 Time: 19:50

Sample: 2005 2020

Included observations: 288

Maximum dependent lags: 1 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (1 lag, automatic): FS LNTO LNGOVEXP LNGNI INF LNEDU LNDCPS IQ

Fixed regressors: C

Number of models evalulated: 1

Selected Model: ARDL(1, 1, 1, 1, 1, 1, 1, 1, 1)

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
FS	0.138613	0.029699	4.667203	0.0000
LNTO	0.797607	0.200538	3.977326	0.0001
LNGOVEXP	-0.596107	0.138782	-4.295282	0.0000
LNGNI	0.970672	0.101291	9.582998	0.0000
INF	-0.001186	0.001550	-0.765209	0.4457
LNEDU	2.288380	0.432176	5.295016	0.0000
LNDCPS	0.771909	0.106597	7.241413	0.0000
IQ	-0.346490	0.034718	-9.980052	0.0000
Short Run Equation				
COINTEQ01	-0.105215	0.049586	-2.121859	0.0359
D(FS)	0.044618	0.038853	2.148371	0.0051
D(LNTO)	-0.457674	0.440718	-1.038472	0.3012
D(LNGOVEXP)	-0.073304	0.095590	-0.766854	0.4447
D(LNGNI)	-0.354393	0.514585	-0.688698	0.4924
D(INF)	3.82E-05	0.002177	0.017565	0.9860
D(LNEDU)	0.067609	0.020901	3.234723	0.0071
D(LNDCPS)	-0.045405	0.088812	-0.511248	0.6101
D(IQ)	-0.059894	0.035024	-1.710059	0.0899
C	0.471834	0.223735	2.108894	0.0371

Mean dependent var	0.043480	S.D. dependent var	0.176165
S.E. of regression	0.069110	Akaike info criterion	-3.290741
Sum squared resid	0.563594	Schwarz criterion	-1.003048
Log likelihood	691.4833	Hannan-Quinn criter.	-2.375813

*Note: p-values and any subsequent tests do not account for model selection.

A-Priory expectational signs of the independent variables of the study

Variable	Description	Expected sign	Data source
DCP	Domestic credit to private sector	Positive (+)	WDI
DPR	Dependency ratio	Negative (-)	WDI
GNI	Gross national income per capita	Positive (+)	WDI
EDU	Education	Positive (+)	WDI
INF	Inflation	Negative (-)	WDI
GDP	GDP growth	Positive (+)	WDI
MSP	Money supply	Positive (+)	WDI
TOP	Trade openness	Positive (+)	WDI
GXP	Government expenditure	Positive (+)	WDI
IQI	Institutional quality index	Positive (+)	WGI

A-Priory expectational signs of the independent variables of the Determinants of financial inclusion

Variable	Description	Expected sign	Data source
FII	Financial inclusion	Positive (+)	WDI
DCP	Domestic credit to private sector	Positive (+)	WDI
GNI	Gross national income per capita	Positive (+)	WDI
EDU	Education	Positive (+)	WDI
INT	Interest Rate	Negative (-)	WDI
INF	Inflation	Negative (-)	WDI

TOP	Trade openness	Positive (+)	WDI
GXP	Government expenditure	Positive (+)	WDI
MSP	Money Supply	Positive (+)	WDI
IQI	Institutional quality index	Positive (+)	WGI

A-Priory expectational signs of the independent variables on the threshold effect of financial inclusion on poverty reduction

Variable	**Description**	**Expected sign**	**Data source**
FII	Financial inclusion index	Positive (+)	WDI
DCP	Domestic credit to private sector	Positive (+)	WDI
GNI	Gross national income per capita	Positive (+)	WDI
EDU	Education	Positive (+)	WDI
INF	Inflation	Negative (-)	WDI
TOP	Trade openness	Positive (+)	WDI
GXP	Government expenditure	Positive (+)	WDI
IQI	Institutional quality index	Positive (+)	WGI
FSI	Financial stability index	Positive (+)	FSD

A-Priory expectational signs of the independent variables on financial inclusion, financial stability, and poverty reduction