University of Reading

Banking Reforms and Microfinance in Developing Countries:

Impact on Economic Welfare

PhD in Finance

ICMA Centre, Henley Business School

A thesis submitted to the University of Reading, United Kingdom

for the award of the degree of Doctor of Philosophy in Finance

Agnes Olatokunbo Martins

July 2022

Declaration

I confirm that this is my work and that the use of all material from other sources has been properly and fully acknowledged.

Agnes Olatokunbo Martins

Dedication

I dedicate this thesis to my dad – the late Pastor Johnson Adekola Nubi who set my feet upon the path of knowledge and encouraged me to embark on this doctoral research journey but sadly passed on to glory before I could finish.

Acknowledgments

My most profound appreciation goes to my supervisors, Professor Adrian Bell, and Dr. Linda Arch. I owe the commencement, the journey, and the conclusion of this thesis to them. My supervisors helped broaden my research horizon on banking reforms by pointing out how much more the world could learn about microfinance and poverty alleviation. Both of my supervisors have been fantastic role models and I feel fortunate to have been their supervisee. They both worked tirelessly to point me in the right direction. I am grateful for their critical, insightful, constructive, detailed, and timely comments on all aspects of this thesis from start to finish.

I would like to sincerely thank my husband – Biodun – my greatest cheerleader; Kemi, Seye, and my entire family; Nike, Evelyn, and all my friends; for their unconditional support and for always being there for me. I would like to express my sincere gratitude to the professors, friends, and colleagues at the ICMA Centre and Henley Business School for being so supportive – Professor Carol Padgett, Professor Mike Clement, Dr. Nick Antypas, Dr. Sarah Jewel, Leanne, and Matt to mention a few.

I give special thanks to the organisers and participants at the World Finance Conference, Norway, 2021. Specifically, I thank Dr. Kais Bouslah of St. Andrews University, Dr. Samuel Nyarko of Montpellier Business School, and Dr. Sherrihan Radi of the University of Kent for their thorough review and comments on my papers that made my thesis all the better. I thank friends and former colleagues at the Central Bank of Nigeria, the Nigeria Deposits Insurance Corporation, and the Nigerian Banking Industry for their support and participation in the survey for this thesis.

Above all, my everlasting gratitude goes to God Almighty, the advocate of the poor and vulnerable who ultimately led me down this route and saw this work to a flourishing conclusion.

Abstract

Developing countries often seek to improve the welfare of their citizens by strengthening their banking systems and deploying microfinance for the financially excluded. However, quite often, the same rigour is not applied to probe whether the policies have the intended outcomes. Resilient banking systems and access to credit are considered a pathway to economic development but limited research has been conducted in developing countries. Specifically, the impact of the whole suite of the Basel II/III reforms in Africa has never been assessed. Although there have been several studies on the impact of microfinance on poverty reduction, a consensus on its benefits has not been reached. The divergent views leave policymakers uncertain as to whether to continue to adopt international best practice reforms. Using quantitative and qualitative research methods, this thesis comprehensively investigates the impact of the Basel II/III reforms on banking system resilience in Africa and the impact of microfinance on poverty alleviation in developing countries globally. The potential of developing countries to contribute to global markets when this potential is stagnating in other parts of the world underscores the importance of this study. The potential spill-over effect of unabated poverty is an additional factor.

The study finds that achieving banking system resilience in Africa through the implementation of Basel II/III is highly dependent on compliance with regulatory requirements, limiting leverage, and the macroeconomic environment. Microfinance was found to improve some dimensions of economic welfare but requires a massive deployment and other development tools to have a significant impact. Economic shocks such as COVID-19 adversely affect microfinance institutions and households. A major contribution of this research is that it makes explicit the connection between the issue of bank regulation/reform and the issue of microfinance, and how these both interact with the issue of poverty and poverty reduction.

Table of contents

List of tables and figures **11**

List of Abbreviations **14**

1 Global Introduction **15**

1.1 The Relevance of Banking reforms and Microfinance to Economic Welfare 15

1.1.1 Banking Reforms (the risk argument) 15

1.1.2 Risk in Microfinance Institutions (Financial Exclusion and Access to Credit) 16

1.2 Why Africa and its Economic Welfare Matters 18

1.3 Motivation for the Research 19

1.3.1 Research Questions 20

1.4 Overall Research Design 21

1.4.1 The Impact of Basel II/III Banking Reforms on Banking System Resilience 21

1.4.1.1 Qualitative Country Case Studies 22

1.4.2 Impact of Microfinance on Poverty 22

1.5 Summary 23

2 Literature Review **25**

2.1 Introduction 25

2.2 The Nexus between Banking Crises and Poverty 26

2.3 General Causes of Banking Sector Crises 27

2.3.1 The Nigerian Banking Sector Crisis 2009 -2011 29

2.3.2 Causes of the Nigerian Banking Sector Crisis 30

2.4 Nature of Risk 31

2.5 Types and Sources of Risk 32

2.5.1 Introduction 32

2.5.2 Credit Risk 33

2.5.3 Market Risk 34

2.5.4 Operational Risk 35

2.6 Risk Management 36

2.7 Regulation 37

2.7.1 Bank Regulation 40

2.7.2 Bank Regulation in England before the Secondary Banking Crisis 40

2.7.3 Bank Regulation in The United States before the Great Depression 41

2.7.4 Bank Regulation in Asia before the Asian 1997 Crisis 43
2.7.5 Bank Regulation in Nigeria Before the Crisis of 2009 44
2.7.6 Post-crisis reforms in Nigeria: Regulatory Response to the Crisis..... 45
2.7.7 Review of the Literature on Capital, Risk Management and Bank Failures in South Africa 46
2.8 Response to the Global Financial Crisis and Evaluation of Post Crisis Reforms across the World 47
2.9 Microfinance as an Economic Welfare Tool 50
2.10 Linking the resilience of banks and poverty reduction to economic welfare 51
2.11 Conclusion 52
3 Basel II/III Implementation in Africa: Impact on Banking Sector Resilience 53
3.1 Introduction 53
3.1.1 The Basel Capital Framework (BCF) 55
3.1.1.1 The Conceptual Framework..... 56
3.1.1.2 Basel III: Global Regulatory Framework for More Resilient Banks and Banking Systems..... 57
3.2 Literature Review and Hypotheses..... 59
3.2.1 Determinants of resilience 59
3.2.2 The impact of capital requirements on resilience and efficiency 61
3.2.3 The impact of capital requirements on credit supply and performance..... 62
3.2.4 Macro- and microeconomic factors..... 64
3.2.5 Measures of banking system resilience 65
3.3 Implementation of the Basel Capital Framework in Africa..... 66
3.3.1 Peer group in Basel Implementation 66
3.3.2 Empirical strategy 69
3.3.3 Data and summary statistics 72
3.4 Empirical results reflecting the impact of the BCF in Africa..... 75
3.4.1 Impact of the BCF on banking system resilience..... 77
3.4.1.1 Rate of credit growth as a leading indicator of instability..... 81
3.4.2 Impact of the BCF on the Supply of Credit..... 83
3.4.2.1 Impact of the BCF on Credit to GDP per capita 85
3.4.3 Impact of the BCF on Performance and Efficiency 87

3.5 Impact of Basel II/III on Banking System Resilience – A Qualitative Case Study of South Africa 89
3.5.1 **Introduction and value addition of this case study** 89
3.5.2 Methodology and Sources of Data 90
3.5.2.1 Limitations of Quantitative Approaches 90
3.5.3 Background of South Africa's Banking System 93
3.5.4 Analysis Of South Africa's Banking Sector Resilience 96
3.5.4.1 Banking Sector Z-score 96
3.5.4.2 South African Government and the SARB Assessment 99
3.5.4.3 Profitability and bank capital to assets ratio 100
3.5.4.4 Bank failures 101
3.5.4.5 Corporate Governance 103
3.5.4.6 Contagion and consumer confidence 103
3.5.4.7 Asset quality 104
3.5.4.8 Credit ratings 105
3.5.5 Other Reviews of South Africa's Banking Sector Resilience 106
3.5.5.1 Sector Assessment Program (2014) 106
3.5.5.2 South Africa Article IV Report 2017 107
3.5.5.3 Financial Stability Board Peer Review of South Africa 2020 108
3.5.5.4 Stress tests 108
3.5.6 Analyses of findings 112
3.5.7 Summary of South Africa document analysis 113
3.6 Summary and Conclusions 114
4 Basel II/III Implementation in Nigeria: Impact on the Resilience of its Banking Sector 116
4.1 Introduction 116
4.1.1 Motivation for the research 116
4.1.2 Contributions of this study 117
4.1.3 Why Nigeria? 117
4.2 Background 118
4.2.1 Nigeria's Banking System 118
4.2.2 The Implementation of the Basel II/III Capital Framework in Nigeria 120
4.3 Literature Review and Hypotheses 121
4.4 Empirical strategy and summary statistics 124

4.4.1 Financial Soundness Indicators (FSIs) 125
4.4.2 Macroprudential Analysis 126
4.5 Impact of the BCF on Resilience and Performance 132
4.5.1 Impact of the BCF on Resilience – Compliant Banks 132
4.5.2 The role of corporate governance 133
4.5.3 Impact of the BCF on Resilience – All Banks (compliant and non-compliant) 135
4.5.3.1 Difference-in-Differences Identification Strategy: Nigeria vs Ghana 138
4.5.4 Impact of the BCF on Industry performance 138
4.6 Effectiveness of the Banking reforms 140
4.6.1 Impact of Macroeconomic factors on FSIs 140
4.6.2 Measuring the Strength of the Resilience of the Banking Sector 143
4.6.2.1 Sustainability of the Industry resilience in the face of macroeconomic shocks 144
4.6.2.2 Impact of GDP and Inflation on the Industry Non-performing loans 145
4.6.3 **Economic Significance of the predictions**. 146
4.6.3.1 Post COVID-19 Assessment 148
4.7 Effectiveness of the Banking reforms – A qualitative case study 149
4.7.1 Industry Perception of the Impact of the BCF 152
4.7.2 Regulatory Perception of the Impact of the BCF 160
4.7.3 **Summary of findings from the survey research** 166
4.8 Summary and Conclusions 166
5 The Impact of Microfinance on Poverty – A Global Study 170
5.1 Introduction 170
5.2 Literature review 174
5.2.1 What is poverty? 174
5.2.1.1 Dimensions of poverty 174
5.2.2 An Appraisal of the Impact of Microfinance 175
5.2.2.1 The Dimensional Impact of Microfinance 176
5.2.2.2 Impact of Microfinance Loans on Income Poverty 178
5.2.2.3 Social Performance in Microfinance 179
5.3 Data and Empirical Analysis 181
5.3.1 Empirical Strategy 185
5.3.1.1 Trends in Global Financial Inclusion, Microfinance and Poverty 191

5.4 Results and discussions 195
5.4.1 The Impact of Microfinance Loans on Dimensions of Poverty 198
5.4.2 The Impact of Microfinance Loans on Multidimensional Poverty 205
5.4.3 Impact of Microfinance Loans on Income Poverty 206
5.4.4 Robustness Tests 208
5.5 Summary and Conclusions 212
6 The Impact of Microfinance and Economic Shocks on Households: Micro-Level Evidence from Nigeria 215
6.1 Introduction 215
6.1.2 Background Information on Nigeria 218
6.1.3 Poverty in Nigeria 220
6.2 Literature review 222
6.2.1 The Impact of Microfinance on Poverty Alleviation 222
6.2.2 The Impact of Microcredit on Poverty 223
6.2.3 The Impact of Micro-savings on Poverty 224
6.2.4 Microfinance and Economic shocks 225
6.3 Data and empirical analysis 228
6.3.1 Underestimation of the Impact of Microfinance 228
6.3.2 Sources of Data 229
6.3.3 Impact of Microfinance Savings and Loans on Households 230
6.3.4 Impact of Economic Shocks and COVID-19 on Microfinance Banks 232
6.3.5 Summary Statistics 234
6.3.6 Impact of Economic Shocks and COVID-19 on Household Poverty 245
6.4 Results and discussions 248
6.4.1 Poverty trends in Nigeria 248
6.4.2 The Impact of Microfinance Savings on Poverty Dimensions 253
6.4.3 The Impact of Microfinance Credit on Poverty Dimensions 259
6.4.4 Impact of COVID-19 Economic Shock on Poverty 263
6.4.5 Impact of Economic Shocks on Microfinance Banks 273
6.5 **Summary** 285
7 Global Conclusion 289
7.1 Introduction 289

7.2 Did the implementation of Basel II/III improve banking system resilience in Africa generally? 290
7.3 Did the implementation of Basel II/III improve banking system resilience in Nigeria specifically? 291
7.4 Impact of the BCF on banking system resilience in Nigeria and South Africa – A qualitative approach 292
7.5 Impact of Microfinance on Poverty Globally 294
7.6 Impact of Microfinance on Poverty in Nigeria 295
7.7 Final words 297
7.7.1 The strengths and limitations of the research 298
7.8 Future Research 299
References 301
Appendices 322
Appendix I: Basel II/III Implementation: Chronology of Events 322
Appendix II: Commercial Banks operating in Nigeria as of September 30, 2018 322
Appendix III: Financial Soundness Indicators 323
Appendix IV: Difference-in-Differences Identification Strategy - Nigeria vs Ghana 324
Appendix V: Details of documents reviewed. 335
Appendix VI: Questionnaire 339
Appendix VII: Geographic Regions, Countries, and Economic Classes 342
Appendix VIII: Number of Microfinance Institutions in Each Country 343
Appendix IX: Impact of Micro-credits on Human Development, Life Expectancy, Education, Employment and Youth not in School using Two-Step System GMM 345
Appendix X: Household Items 346
Appendix XI: Correlation matrix of explanatory variables 347
Appendix XII: Simple Poverty Scorecard® Poverty-Assessment Tool 348
Appendix XIII: Surprising Findings 350

List of tables and figures

List of tables

Table 3.1 Basel III capital requirements 59
Table 3.2 - Extent of adoption of Basel Capital Framework by African countries..... 67
Table 3.3 - Summary statistics 74
Table 3.4 - Correlation table 75
Table 3.5 - General impact of prudential ratios on bank resilience (Bank Z-score) in Africa . 76
Table 3.6 - Bank Z-score: Two-sample t-test of Z-score before and after implementation of Basel II 77
Table 3.7 - Impact of the BCF on African countries' banking system resilience 79
Table 3.8 – Absolute domestic credit as a percentage of GDP 81
Table 3.9 - Annual growth rate of credit to GDP (%) 82
Table 3.10 - Change in Credit/GDP growth relative to 2014 – post-BCF period 84
Table 3.11 - Difference in percentage annual credit growth pre and post country Basel II implementation 84
Table 3.12 - Credit to GDP per capita: Two-sample t-test conducted before and after the BCF 85
Table 3.13 - Impact of BCF on credit to GDP per capita 86
Table 3.14 - Impact of BCF implementation on performance and efficiency 88
Table 3.15 Summary statistics 96
Table 3.16 Sovereign debt credit rating for South Africa 2014 - 2021 106
Table 3.17 Stress test results from 2006 - 2021 109
Table 3.18 Consolidation of factors and events 112
Table 4.1 - Categorisation of Nigerian banks 118
Table 4.2 - Summary statistics of variables extracted from the financial statements of fourteen banks. 128
Table 4.3 – Summary Statistics of FSIs for the Nigerian Banking Industry 2008 to 2018 129
Table 4.4 - Summary statistics of the Ibrahim Index of African Governance (IIAG) 130
Table 4.5 -Test of equality of pre and post BCF means of balance sheet and income statement variables..... 130
Table 4.6 Mean equality test of Financial Soundness Indicators (FSIs) pre and post BCF ... 131
Table 4.7 – Balance sheet Insolvent (non-compliant) banks 132
Table 4.8 – Impact of post-BCF Capital of compliant banks on industry resilience (Z-scores) 133
Table 4.9 – Director related facilities and bank regulatory contraventions 135
Table 4.10 – Difference-in-Differences regression of the Z-score on capital to assets, return on assets and volatility (All banks)..... 136
Table 4.11 – Z-score by year, by bank, and for the year 2019 137
Table 4.12 – Impact of post- BCF leverage on Net interest Margin and Return on Assets .. 139
Table 4.13 - Descriptive statistics of macro-economic and systemic indicators..... 140
Table 4.14- Mean equality test: Macroeconomic variables..... 141
Table 4.15– Impact of post -BCF macroeconomic variables on regulatory capital, asset quality, earnings, liquidity, and credit..... 141
Table 4.16 - Impact of post BCF risk premium on lending and credit to Government on FSIs 142
Table 4.17 - Nigeria's banking system Z-score, GDP and Inflation 143

Table 4.18 Resilience (Z-score) of the Banking Industry at Inflation of 14% and a slowing or growing economy..... 145
Table 4.19 - Resilience (NPLs) of the Banking Industry in a slowing or growing economy .. 146
Table 4.20- Resilience (NPLs) of the Banking Industry with increasing or decreasing inflation 146
Table 4.21 Job Designations of respondents from the Banking industry 150
Table 4.22 Operators' Responses – Banking Industry..... 153
Table 4.23 Comments on the BCF from Banking Industry Operators 158
Table 4.24 161
Table 4.25 Comments on the unintended consequences of the BCF from Regulators and Bank Supervisors. 165
Table 5.1 Summary Statistics..... 187
Table 5.2 Matrix of correlations 191
Table 5.3 The Impact of Microfinance Loans on the Human Development Index..... 196
Table 5.4 Impact of Micro-credits on Life Expectancy (LEI) and Education (EDI)..... 200
Table 5.5 Impact of Micro-credits on Employment and Youth not in School 202
Table 5.6 Impact of Microfinance loans on Assessment in Reading 204
Table 5.7 The Impact of Microfinance Loans on Multidimensional Poverty 205
Table 5.8 Impact of Microfinance loans/GDP on Population living below the Income Poverty line..... 207
Table 5.9 Impact of Microfinance Loans Per Capita on Population Living Below the Poverty Line 209
Table 5.10 Impact of Microfinance Loans Per Capita on Multidimensional Poverty 210
Table 5.11 Impact of Microfinance loans on Education and Productivity 211
Table 5.12 Impact of Employment and Schooling on demand for microfinance loans..... 212
Table 6.1 Nigeria Geopolitical Zones and Households 2018/2019..... 235
Table 6.2 Savings and Credit 2018/2019 235
Table 6.3 Household demographic information 2018/2019 236
Table 6.4 Loans, assets, food, and non-food expenditure 2018/2019 238
Table 6.5 Nigeria COVID-19 National Longitudinal Phone Survey Statistics..... 239
Table 6.6 Summary statistics of microfinance banks and economy..... 243
Table 6.7 Absolute Poverty rates in Nigeria from 2003 to 2019 248
Table 6.8 Characteristics of likely microfinance savers 252
Table 6.9 Characteristics of likely microfinance borrowers 253
Table 6.10 Impact of Microfinance Savings on Food Security 254
Table 6.11 Impact of Microfinance Savings on Non-food Consumption 255
Table 6.12 Impact of Microfinance Savings on Dwelling 256
Table 6.13 Impact of Microfinance Savings on Access to Healthcare 257
Table 6.14 Impact of microfinance savings on Education..... 258
Table 6.15 Impact of Microfinance Borrowing on Food Security..... 259
Table 6.16 Impact of Microfinance Borrowing on Non-food Consumption 260
Table 6.17 Impact of Microfinance Borrowings on Dwelling 260
Table 6.18 Impact of Microfinance Borrowings on Access to Health Care..... 262
Table 6.19 Impact of microfinance borrowings on Education 262
Table 6.20 Poverty Likelihood from the Simple Poverty Scorecard 264
Table 6.21 Impact of COVID-19 on Poverty and Living Standards..... 265
Table 6.22 Impact of economic shocks on microfinance industry resilience 276

Table 6.23 Impact of Economic Shocks on Domestic Credit 279
Table 6.24 Impact of economic shocks on industry liquidity 280
Table 6.25 Impact of Economic Shocks on Industry Return on Assets 282
Table 6.26 Impact of economic shocks on shareholders' funds..... 283
Table 6.27 Impact of economic shocks on long term funding 284

List of Figures

Figure 1-1 Research Scope: Impact of Basel II/III on Banking System Resilience..... 21
Figure 1-2 Research Scope: The Impact of Microfinance on Poverty..... 23
Figure 3-1 **–** Basel II - three pillars, three risk buckets. 56
Figure 3-2 Basel II/III Capital Framework Adoption in Africa as of 2017 (12 countries) 67
Figure 3-3- Trend of absolute domestic credit to the private sector in some selected African countries 82
Figure 3-4 Number of registered banks in South Africa 94
Figure 3-5 Deposit market share of banks in South Africa..... 94
Figure 3-6 South Africa Banking System Z-score (absolute score and growth rate) 96
Figure 3-7 South Africa Banking System Z-score (absolute and growth rate) pre and post the BCF..... 97
Figure 3-8 South Africa Bank Z-score for the period 2006 to 2020 99
Figure 3-9 Trend and growth rate of ROA and capital to total assets ratio..... 101
Figure 3-10 Financial Conditions Index 107
Figure 3-11 Banking Stability and Financial Stress Indexes..... 110
Figure 4-1 Bank Authorisations in Nigeria's Banking Sector 151
Figure 4-2 Survey Responses – Banking Industry 154
Figure 4-3 Survey Responses, adverse consequences – Banking Industry 156
Figure 4-4 Survey Responses – Regulators and Bank Supervisors 162
Figure 4-5 Survey Responses, Unintended Consequences – Regulators and Bank Supervisors 163
Figure 5-1 Countries included in the Microfinance Impact Analysis 182
Figure 5-2 Global Account Ownership and Percentage Increase in Financial Inclusion 2011 to 2017..... 191
Figure 5-3 Trends of Multidimensional Poverty 193
Figure 5-4 Global Trend of Microfinance Loans as a Percentage of GDP from 2013 to 2019 194
Figure 6-1 Map of Nigeria with states..... 218
Figure 6-2 Circular flow of income..... 227
Figure 6-3 Poverty Indicators pre and post COVID-19 lockdown 241
Figure 6-4 Aid flows from donor countries pre and post the global financial crisis (GFC) ... 244
Figure 6-5 Percentage Change in Poverty in Nigerian States 2003 - 2010 249
Figure 6-6 Poverty rate by State in Nigeria as of 2019 249
Figure 6-7 Change in standardised poverty scores of each state between 2004 and 2019 . 250
Figure 6-8 Kernel density propensity to save and borrow..... 251
Figure 6-9 Growth of deposits and long-term loans..... 273
Figure 6-10 Microfinance banking sector Z-score trend..... 274

List of Abbreviations

AACB	Association of African Central Banks
BCBS	Basel Committee on Banking Supervision
BCF	Basel Capital Framework
BIS	Bank for International Settlements
CABS	Community of African Banking Supervisors
CBN	Central Bank of Nigeria
EAC	East African Community
ECOWAS	Economic Community of West African States
FSB	Financial Stability Board
FSB RCG	Financial Stability Board Regional Consultative Group
FSI	Financial Soundness Indicator
GAFTA	Greater Arab Free Trade Area
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GFDD	Global Financial Development Database
GII	Global Innovation Index
GNI	Gross National Income
HHI	Herfindahl-Hirschman index
IMF	International Monetary Fund
LMICs	Low and Lower-Middle income countries
MFI	Microfinance Institution
NBS	National Bureau of Statistics
NPL	Nonperforming loan
OAU	Organisation of African Unity
OECD	Organisation for Economic Co-operation and Development
ROA	Return on Assets
ROE	Return on Equity
RWA	Risk-Weighted Assets
SADC	Southern African Development Community
SARB	South African Reserve Bank
SPM	Social Performance Management
SSA	Sub-Saharan Africa
WAMZ	West African Monetary Zone

Chapter One

1 Global Introduction

1.1 The Relevance of Banking reforms and Microfinance to Economic Welfare

Banking and microfinance are essential parts of financial development and are critical to the economic welfare of society. Financial development has long been hailed as having a salutary effect on poverty alleviation because it impacts aggregate economic growth positively (Beck et al., 2007, Eryılmaz et al., 2015). However, Africa and many developing nations need to make vast improvements in delivering state-of-the-art financial systems that effectively serve the citizenry and improve economic welfare. Although most developing countries will agree with this point, the question they often grapple with is how to achieve it. Countries commonly adopt international best practices or what has been proven to work in other jurisdictions. Banking reforms and microfinance are typical examples.

Financial development could be described as improving efficiency, stability, and access to the financial system (Eryigit and Dulgeroglu, 2015). According to Mendelson (2021), there are close interconnection and feedback loops between the financial system, institutions, and household resilience. This necessitates the need for effective risk management and the need to strengthen resilience at the banking, microfinance institution, and household level.

1.1.1 Banking Reforms (the risk argument)

A stable banking system is essential to aid the flow of funds from surplus to deficit units of the economy. Savers want to save and access their funds without undue risk, while borrowers are willing to take on more risk to finance businesses and other life requirements. Similarly, financial service providers such as banks take steps to assess and mitigate risks while providing such services.

Banking services are usually provided by the private sector under a capitalist system of operating solely for profits. However, in the event of banking system instability or failure, substantial negative externalities may be foisted on the economy (Beck, 2016). A negative externality exists when the production or consumption of a product results in a cost to a third party[1]. For instance, while providing a banking service, consumers and other stakeholders may be inadvertently harmed. Instability could arise, when concerns about the banking

[1] Negative externality | economics | Britannica

system erode consumer confidence even before an actual bank failure occurs. Instability could also arise because of flawed risk management in financial institutions leading to insolvency. Concerns about fragility could trigger hesitancy about saving in banks and reluctance by banks to take on interbank exposures. Similarly, such anxieties could eventually become a self-fulfilling prophecy sparking a spiral leading to a liquidity squeeze and impeding the creation of credit. The combination of these factors would have a detrimental effect on the economy, businesses, and households such as loss of welfare. The loss of welfare is a negative externality that extends beyond its immediate causes to citizens that had nothing to do with it. A notable example of this is the global financial crisis of 2007 to 2008, where the economically vulnerable were worst hit through bank failures, recessions, and ensuing austerity measures.

To help mitigate these risks and concerns, governments have introduced a series of banking reforms to improve risk management in banks. Examples include banking regulation, deposit insurance schemes and consumer protection policies to enhance customer confidence. Of note in the banking sector are the regulations triggered by the GFC. The Basel Committee on Banking Supervision developed a comprehensive set of reforms to strengthen regulatory capital, liquidity, and macroprudential standards called "Basel III: A global regulatory framework for more resilient banks and banking systems"[2]. Other reforms include improvements in international financial reporting standards and corporate governance.

1.1.2 Risk in Microfinance Institutions (Financial Exclusion and Access to Credit)

Microfinance institutions are susceptible to funding risk, fraud risk and credit risk (Ibtissem and Bouri, 2013, Boateng et al, 2014). Such risks, although not usually systemic, could hurt the poverty alleviation policies of the Government and the SDGs. Many countries have therefore introduced Social Performance Indicators (SPIs) to ensure an effective focus on governance, risk management, products and clients and balancing financial and social goals (Microfinance Barometer, 2019, Microfinance Barometer, 2016, Roodman, 2012). Ineffective risk management creates significant hardship for MFIs, economies, and households each time there is an economic downturn or shock. Governments have also introduced microfinance

[2] Basel Committee on Banking Supervision. 2011. *Basel III: Global Regulatory Framework for more Resilient Banks and Banking Systems. BIS*. https://www.bis.org/publ/bcbs189.htm [Accessed March 30, 2020].

frameworks to bring on board the financially excluded. Also, most regulators have introduced rules to ensure the sustainability of MFIs.

Another difficulty is that banks, in setting their risk appetites, may exclude small businesses and households from access to credit. Large banks view small businesses and households as unable to provide enough deposits to cover their marginal costs and, therefore, they are not profitable customers. In addition, although small businesses and households may be economically active, their activities may be seen as being menial and volatile and thus could pose huge credit risks to the banks. The unwillingness of large banks to extend services to households and small businesses leads to financial exclusion and reduces the welfare of the economically active poor. Falling short of a minimum standard of economic welfare pre-determined by society is considered poverty, but this definition is somewhat limited (Lipton and Ravallion, 1995).

1.1.3 Poverty and Poverty Reduction

In the area of poverty and economic welfare, in 2000, all 191 United Nations member states committed to the Millennium Development Goals of eradicating poverty and improving standards of living by 2015 (United Nations). These goals were succeeded by the Sustainable Development Goals in 2016 and are to be achieved by 2030. These regulations and goals aim to produce well-functioning economies, alleviate poverty, and increase prosperity for all.

As Hartwell (1972) observes, the aim of studies in economics and, by extension, finance is to understand and reduce poverty. For democratic governments, it is also to deliver on campaign promises and ensure re-election. As several developing nations have high poverty levels and fragile banking systems that do not support economic growth, they embrace international best practices in financial and economic development as a means of improvement.

Banks and microfinance institutions are in the business of financial intermediation and are a central pillar of economic growth. As financial intermediation may give rise to financial and economic crises, governments need to intervene (Gorton and Winton, 2003). Governments undertake the role of facilitating public goods such as banking stability, consumer confidence and financial inclusion in areas where the private sector is unable or unwilling to. For stability to be maintained, financial system regulators introduce policies, rules and regulations geared

toward effective risk management and customer protection. This is to enable country-wide prosperity by providing the infrastructure to support businesses and citizens in the economy.

1.2 Why Africa and its Economic Welfare Matters

Africa is the second most populous continent in the world, with an estimated 1.37 billion people representing 17.4% of the global population. The continent has the highest population growth rate at 2.45%, while the world population growth has slowed to 1% driving Africa's global share higher. It is therefore projected that by 2050, Africa will account for 25% of the global population and 40% of youths under 18 years old. Nigeria is predicted to have the second-highest population growth rate in the world after India by 2050 (United Nations, 2020c). However, what is critical is the changing age structure and dependants' dependency ratio, as this leads to economic growth. As Bloom and Williamson (1998) point out in the demographic dividend theory, increases in the working-class population with fewer dependants lead to higher production per capita, higher earnings and improved quality of human capital as savings are invested in health and education. Human capital is also more competitive resulting from the abundant supply of labour. The authors find that this contributed to the East Asian economic miracle. However, to reap the economic growth potential of a changing population structure, appropriate social, economic and political structures need to be in place (Bloom and Williamson, 1998). Africa is seen as equally able to reap demographic dividends and financial development is a vital factor (Bloom et al., 2017).

Paice (2021) sees the sheer size and growth of Africa's youth population as a "Youthquake", putting Africa in the centrality of global affairs. Africa's growth potential has important implications for global economic growth, trade patterns, human capital supply, investments, and markets. With the population ageing and declining in many parts of the world, Africa potentially constitutes a mega-market for fashion, sport, technology, and several other products of the world.

The CEO of the African Development Bank gave the "Youthquake" further emphasis in his statement - "think of a continent with a rising middle class, rapid urbanization and that will have the youngest population on earth by 2050. Think of a continent where consumer spending is projected to reach $1.4 trillion in the next three years and business-to-business spending to reach $3.5 trillion in the next eight years" (Adesina, 2017). Paice (2021) further

observes that the continent's growing youthful demographic structure is its prime attraction to investors. Africa's youthful age structure is predicted to result in billions of dollars annually. Economic growth in SSA is predicted to accelerate by 8% annually and, by 2050, be more significant in GDP terms than the USA and the Eurozone are today (Paice, 2021). With the gloomy economic outlook in most of the western world today, the world cannot afford to overlook the potential of Africa. The prosperity of the African continent should be of concern to developed nations not for these positive reasons only but also the fact that ignoring it could have dire consequences such as migration, refugees, and the need for development assistance.

1.3 Motivation for the Research

Despite the banking reforms and poverty alleviating policies adopted by most developing countries in line with international best practices, a commensurate effort has not been put into evaluating the impact of these reforms. Empirical research into the impact of the Basel II/III reforms on banking system resilience in Africa is scarce and patchy. Nigeria experienced a banking crisis in 2009-2011, after the GFC of 2007-2009 and thus introduced the Basel II/III reforms in 2014. However, empirical research into its success in achieving the much-touted resilience is non-existent. South Africa also introduced the reforms in 2008 (South Africa Reserve Bank, 2008). Investigation into its impact is minimal.

Microfinance is a developmental tool adopted by many developing countries. Yet another significant gap in the literature is a holistic assessment of the impact of microfinance on poverty alleviation. The literature is divided on its impact as a result of the multidimensional nature of poverty and limited empirical research. Apart from an expected positive impact of microfinance on poverty reduction, it is possible that it could have an impact on some dimensions of economic welfare, which are equally beneficial. The third significant gap in the literature is the impact of economic shocks on banking reforms, the poverty alleviating missions of microfinance institutions and the households they are meant to serve. The ongoing COVID-19 pandemic, which led to falls in economic growth globally, provides a basis for further investigation into this matter. Continued adoption of developmental tools by policymakers and regulators without a thorough impact assessment to determine whether to continue with that line of action or to change course is detrimental to economic resources and welfare, thus motivating this research. Nigeria is a typical example of a country that had

implemented banking reforms and microfinance policy but with no empirical impact assessment. The following section discusses the research questions of this thesis.

1.3.1 Research Questions

This thesis aims to investigate the success of banking reforms and microfinance in the pursuit of resilient banking systems and poverty reduction in developing countries. Resilient banking systems are expected to support economic growth and lead to prosperity. Microfinance is intended to cater for the unbanked or the financially excluded. It is anticipated that the combination of a resilient banking system and higher financial inclusion will go a long way to improve economic prosperity. On the other hand, banking crises drain economic resources. Instability in the banking system leads to economic consequences that are injurious to all, but worst of all, the financially excluded. Instances are government revenue deployed to banking system bailouts, loss of depositors' savings, and declining credit for business, to mention a few. The opportunity cost of these incidents is reduced economic growth and development. The research questions investigated in this thesis are:

i. Did the implementation of Basel II/III improve the resilience of banking systems in Africa? This is addressed in Chapter 3.
ii. Did the implementation of Basel II/III improve banking system resilience in Nigeria? This is addressed in Chapter 4.
iii. What is the global impact of microfinance on poverty and economic welfare? This is addressed in Chapter 5.
iv. What has the impact of microfinance on poverty and economic welfare been in Nigeria? This is addressed in Chapter 6.
v. Do economic shocks, including the COVID-19 shock, affect the resilience of microfinance institutions and households? This is also addressed in Chapter 6

These questions are based on the expected relationship between finance and poverty as presented in both the theoretical and empirical literature. Theoretical literature posits that differences in GDP per capita across countries are because of credit market imperfections, implying that poverty can be reduced by relaxing constraints such as access to finance and the cost of borrowing (Galor and Zeira, 1993). Banerjee and Newman (1993) assert that capital market imperfections influence the occupation choices of the poor, supporting the notion that financial development would be beneficial for inequality and poverty reduction.

The availability of more funds through borrowing enables the poor to grow more prosperous. However, Aghion and Bolton (1997) argue that wealth redistribution policies are required to reduce the need for the poor to borrow so much, suggesting that excessive borrowing could be harmful. In the empirical literature, Zhang and Ben Naceur (2019) find that strengthening financial access and stability contributes to reducing poverty. In investigating these research questions, the study seeks to find explanations for findings that run contrary to expectations and proffer policy recommendations. A mixed-method research strategy of quantitative and qualitative analyses is used. The research strategy is also both policy and practice oriented. These are discussed in the subsequent section.

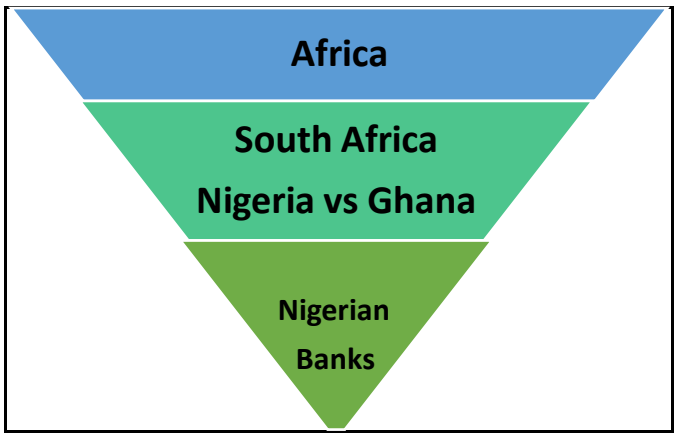
1.4 Overall Research Design

The overall research design is a combination of cross-sectional and longitudinal studies and country case studies. The study starts with a comprehensive review of the literature in chapter 2. The study then analyses the impact of financial and developmental policies on economic welfare in two parts, as described in the forthcoming section.

1.4.1 The Impact of Basel II/III Banking Reforms on Banking System Resilience

The first part of the research has three building blocks involving investigation at the continent level, the country level, and the bank level. The study thoroughly explores the impact of the Basel II/III reforms on banking sector resilience in Africa generally and in Nigeria and South Africa specifically. Nigeria and South Africa are the two largest economies in Sub-Saharan Africa by GDP. The research design combines cross-sectional econometric analyses and country case studies. A schematic of the approach is shown in figure 1-1.

Figure 1-1 Research Scope: Impact of Basel II/III on Banking System Resilience



An empirical examination of the impact of the Basel II/III reforms on banking sector resilience in Africa was conducted, and the results are presented in chapter 3. Fixed-effects and first-differences panel data models which adjust for confounding variables were estimated to establish the impact of the reforms in Africa. In chapter 4, a deeper dive analysis was conducted using Nigeria in a quantitative case study to further unpack the findings from chapter 3. A difference-in-differences identification strategy was additionally employed using Ghana as a control group and Nigeria as the treated group. Ghana had yet to adopt the BCF as of 2018 and thus could serve as a counterfactual case. Further rationale for using Ghana as the control is explained in chapter 4. The final building block was drilling down to the individual banks in Nigeria to further explore the idiosyncratic factors that aid or inhibit the desired impact of Basel reforms and to explain results to a greater extent. A fixed-effects model was used to analyse data from 14 banks that adopted Basel II/III in Nigeria.

1.4.1.1 Qualitative Country Case Studies

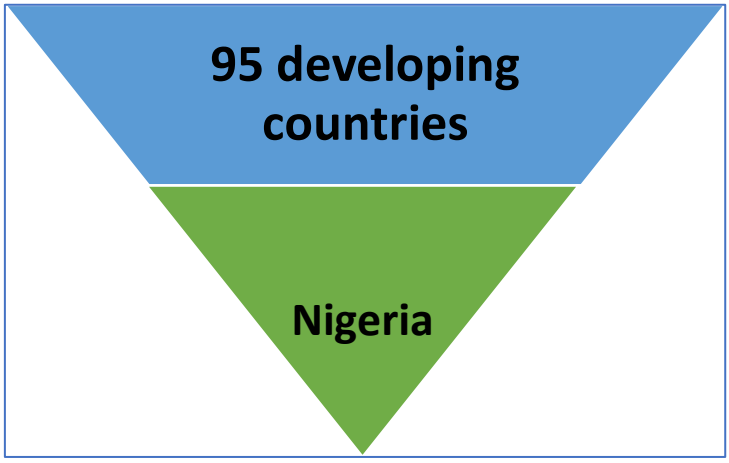
Given that quantitative analyses have limitations and the possibility that not all relevant variables were included in the models, two qualitative case studies of South Africa and Nigeria were conducted to further explore quantitative findings. The case study approach was beneficial for in-depth, multi-faceted exploration in a real-life context.

The findings are presented in chapters 3 and 4. The research method in the case of South Africa involved an extensive and comprehensive review of documents from stress tests, IMF Article IV reviews, Financial Stability Board peer review, and credit rating agencies for evidence of the impact of Basel II/III on the resilience of South Africa's banking system (chapter 3). In addition, for Nigeria, a survey was conducted on the regulators and the operators in the Nigerian banking system to obtain views on the impact of the Basel reforms on banking system resilience from both operational and regulatory perspectives. The respondents included regulators and bank supervisors from the Central Bank of Nigeria and the Nigeria Deposit Insurance Corporation. Respondents from the banking industry included Chief Executive Officers of banks, Chief Risk Officers, and Chief Financial Officers (chapter 4).

1.4.2 Impact of Microfinance on Poverty

The second part of the thesis focuses on the impact of microfinance on poverty and adopts a bi-dimensional approach, as shown below.

Figure 1-2 Research Scope: The Impact of Microfinance on Poverty



The first section is the macro-dimension of microfinance, and the findings are presented in chapter 6. It involves a panel study to examine the impact of microfinance on poverty reduction and dimensions of poverty in 95 countries globally. It utilises an autoregressive model of data from 95 developing countries between 2013 and 2019 and is estimated using the Generalised Method of Moments (GMM) approach. Chapter 7 examines and analyses the impact of microfinance on poverty using micro-evidence from households in Nigeria and a Propensity Score Matching methodology. It further examines the impact of economic shocks, including the COVID-19 pandemic.

1.5 Summary

This chapter provides a global introduction to the entire thesis and its motivation. It enumerates the research questions and gives an insight into the research design, its strengths, and limitations. Following the introduction, chapter two presents a literature review of banking reforms and microfinance. Chapter 3 conveys the study and findings on Basel II/III implementation in Africa and its impact on banking system resilience. Chapter 4 delves into Basel II/III implementation in Nigeria and the impact on the resilience of its banking sector. Chapters 3 and 4 also present two qualitative country case studies on the impact of the Basel reforms – one on South Africa and the other on Nigeria. Chapter 5 presents the impact of microfinance on poverty globally, while chapter 6 presents a case study of the impact of

microfinance in Nigeria. Chapter 7 summarises, concludes, provides policy recommendations, and suggests directions for future research.

Chapter Two

2 Literature Review

2.1 Introduction

Financial sector development is anticipated to lead to economic growth. Levine (2005) defines financial development as the improvement in the ability of financial systems to mobilise and pool savings, improve investments, exert corporate governance, and diversify and manage risk. Financial sector development is also expected to bring benefits to the poor such as easing credit constraints, thereby fostering entrepreneurship and growth (Claessens, 2006, Zhuang et al., 2009, Levine, 2005). Banking crises tend to undermine progress made in financial sector development. At the same time, financial exclusion inhibits access to credit, innovation, and development.

Several developing countries have experienced banking crises instigating a setback in economic development. The Nigerian banking sector experienced a severe crisis from 2009 to 2011, shortly after the global financial crisis. This period witnessed non-performing loans reaching as high as 40%, capital adequacy ratios declining as low as 5%, a freezing up of the interbank market, a slowing down of credit and a general economic decline. One of the factors deemed to have contributed to this malaise was poor risk management on the part of the banks and the regulators. Other factors included aggressive asset origination, the concentration of assets in the capital market and the oil sector, and insider abuse. All these, combined with poor management oversight, almost brought a vibrant banking sector recently recapitalised to its knees. The Central Bank of Nigeria thus embarked on massive reforms to address the factors responsible for the crisis, institute effective risk management and place the industry back on the path of sustainable growth, well-positioned to support the economy (CBN, 2011).

Apart from the damaging effect of banking crises on financial development, many developing countries inclusive of Nigeria, have high financial exclusion rates. Even where banking crises have not specifically occurred, households and SMEs in developing nations are notoriously financially excluded. Banking crises are likely to aggravate financial exclusion and adversely impact economic welfare. Financial exclusion has also been linked to poverty. Due to high rates of financial exclusion, developing nations introduced microfinance and other poverty

alleviating policies to further expand the benefits of financial development. This is critical considering that most countries signed up for the sustainable development goals in 2015, and the first goal is to eliminate poverty by 2030.

This literature review examines if measures embarked upon by regulators post crises have had the desired effect of minimizing the probability of future disasters, enhancing financial stability, and supporting economic growth. It is essential to examine these to determine which strategies need to be sustained, which need to be fine-tuned, and which need to be dropped entirely. The review also examines the nexus between banking crises and poverty, the causes of banking crises; the Nigerian banking sector crisis of 2009 to 2011; the nature of risk; the types and sources of financial risk in banking; and how this kind of risk is managed. The review further explores the types of bank regulation in specific jurisdictions, including Nigeria, before the crisis. In the second step, the review examines the efficacy of microfinance as a developmental tool and concludes with the types, impact, and evaluation of reforms in banking and microfinance across the world. This is to enable this research to measure what happened in Nigeria and other developing countries against the rest of the world.

2.2 The Nexus between Banking Crises and Poverty

Empirical evidence shows that banking crises are associated with an increase in poverty through economic recessions, inflation, and fiscal retrenchment (Baldacci et al., 2002). Banking crises have also been linked with increases in the depth of already existing poverty in developing nations (Nikoloski, 2011). Banking crises, when systemic, necessitate costly reforms of the banking system with high tax implications, spending cuts, and forgone economic output. Often, these costs exceed 50% of GDP (Honohan and Klingebiel, 2000, Klingebiel and Laeven, 2002). This was the experience in Malaysia, where in response to a financial crisis in 1997, the government created an asset management company called Danaharta with the objective of stemming instability in the financial system. The asset management company was to purchase non-performing loans (NPLs) from the financial system and maximize the recovery value. Danaharta received funding from the government and issued zero-coupon, government-guaranteed bonds in exchange for the NPLs. Danaharta also managed NPLs worth RM27.97 billion ($6.6 billion)[3] previously acquired by the

[3] RM – Malaysian ringit. USD/MYR = 0.23574 as of April 11, 2022. Source: Convert Malaysian Ringgit to United States Dollar | MYR to USD Currency Converter (themoneyconverter.com)

government and the central bank (Dreyer, 2021). Similarly, following the banking crisis in Nigeria in 2010, the asset management company of Nigeria (AMCON) was established. The concept was similar to that of Danaharta and the National Asset Management Agency of the Republic of Ireland. AMCON acquired the NPLs of banks totalling ₦4.02 trillion($9.6 billion)[4] for ₦1.76 trillion ($4.2 billion) for which zero-coupon bonds were issued (Makanjuola, 2016, Securities and Exchange Commission, 2011, Central Bank of Nigeria, 2011a). Both episodes represent economic output foregone, and the poor, who are much less able to withstand income cuts, more likely to suffer the brunt (Honohan, 2005).

Kirkpatrick et al. (2000) argue that financial sector development contributes to economic growth and poverty reduction in developing countries. In addition, the robust prudential regulation of financial institutions is a necessary condition for stable and efficient financial sector development. Effective prudential regulation could have prevented to a considerable extent, the negative externalities foisted on the poor by banking crises. Antoniades et al. (2020) find that financial crises reverse the progress made in reducing poverty and result in an approximately 10% increase in extreme poverty in low-income countries. Crises are also associated with a decrease in government spending on education and could have a negative impact on other SDGs related to poverty. The following section explores the general causes of banking sector crises and the causes of the Nigerian banking sector crisis.

2.3 General Causes of Banking Sector Crises

Financial crises and economic crises are interrelated, and therefore one can lead to the other (Snowden, 2012). This linkage is in line with Minsky's theory which states that fragility results from increasing debt levels which in turn stems from the optimism of an ever-growing economy (Minsky, 1977). Orlowski (2008) argues that the global financial crisis resulted from global savings leading to excessive credit creation and inflation in asset prices. Obstfeld and Rogoff (2009) support the argument that global imbalances and the global financial crisis were interwoven. They maintain that both have their roots in economic policies adopted in some developing countries before the crisis and the negative effect of these policies were transmitted through the United States to global financial markets. Yet another reason given

[4] ₦ - Nigerian Naira (NGN). NGN/$ = 416.2 as of Mar 1, 2022. www.cbn.gov.ng

for the crisis is the irrational exuberance of investors in the United States which till now has not dissipated (Shiller, 2015). Holt (2009) concurs with earlier findings that the financial crisis was caused by the bursting of the housing bubble, which itself resulted from low mortgage interest rates and relaxed standards for mortgage loans. He asserts that these factors caused the credit crisis in the US to be more acute.

Turning to the official reasons for the crisis, the Financial Crisis Inquiry Commission of the United States concluded that the GFC was caused by: widespread failures in financial regulation and supervision; failures of corporate governance and risk management at many systemically important financial institutions; a combination of excessive borrowing, risky investments, and lack of transparency; lack of crisis preparedness on the part of government; a systemic breakdown in accountability and ethics; collapsing mortgage-lending standards; over-the-counter derivatives; and failures of credit rating agencies. However, dissenting voices within the same report assert that the crisis was neither a result of too little nor too much regulation. In their view, there were ten fundamental causes of the crisis, which were: a credit bubble as a result of inflows from China and other developing countries from the late 1990s; a housing bubble, non-traditional mortgages; failures in credit rating; concentrated correlated risk; capital inadequacy on the part of financial institutions; contagion; shock and panic in the financial sector which eventually led to an economic recession (The Financial Crisis Inquiry Commission, 2011). The inquiry carried out in the United Kingdom attributed the crisis to severe regulatory failure. The underlying causes in the inquiry report included: failure to heed warnings from history; manipulative conduct driven by misaligned incentives; lack of market discipline and inadequate checks and balances (House of Lords and House of Commons, 2013). Several of these factors appear applicable to Nigeria and other emerging economies, and therefore, it is imperative to establish the extent to properly evaluate the post-crisis reforms.

Other studies attribute the cause of the crisis to risky illiquid assets that were initially thought to be safe; short-term funding using these assets as collateral; connectedness in the market in periods of stress; and constrained liquidity in markets leading to insolvency (Saunders and Allen, 2010). With the benefit of hindsight, Allen (2012) argues that financial institutions did not follow industry best practices as it pertains to liquid markets, thus giving rise to the global financial crisis. According to him, these go beyond Value at Risk (VAR) as a risk management

tool in the determination of capital adequacy to the use of stress tests. Allen further highlights the need for substantial reserves and deferred compensation for illiquid positions. He points out that liquid markets are a vital element in risk control. He further points out the need to ensure that the source of input into models used for risk management is independent. Furthermore, he states that data analysis needs to be responsive to changes in the market environment. One can infer from this that a crisis can occur as a result of the crystallisation of model risk and erroneous data.

Another interesting point that Allen (2012) cautions against is the naivety of investors in accepting superior returns without additional risk. This argument underscores the risk/return trade-off concept. Another point of view is from Calomiris and Haber (2015), who assert that banks are fragile by design. This, they claim, is because governments have inherent conflicts of interest with banks due to borrowing from banks while also regulating them, resolving failed banks whilst requiring the political support of owners, debtors, and creditors.
The literature has enumerated various causes of crises, primarily rooted in risk and ineffective risk management. It remains to be established if some of these causes are contextual as not all countries have suffered from financial crises, and some have suffered to a greater extent than others.

2.3.1 The Nigerian Banking Sector Crisis 2009 -2011

The Nigerian economy had been bullish for over five years prior to 2009, generating a lot of optimism in line with the Minsky theory. This optimism probably contributed to the crisis. Agbonkpolor (2010) contends that faulty risk management, erosion of shareholders' funds, an explosion in banks' balance sheets and regulatory failure led to a banking crisis in Nigeria. According to the then governor of the Central Bank, the Nigerian banking sector crisis was triggered by the global financial crisis (GFC). By 2008, contagion from the GFC, which started in the United States, had spread across the globe, and by the last quarter, the US and European countries officially declared that they were in a recession. The initial impact of the crisis was not felt by Nigeria because the banking system only had minimal integration with the global system. Besides, Nigerian banks were well capitalized with simple financial products. However, the country was not insulated from the second-round effects. By the time the crisis degenerated into a liquidity and credit crunch, Nigeria was affected through the

financial and real sector channels. The effects were manifested by a fall in trade, remittances, and aid. The price of Nigeria's main export – crude oil, fell by 50%, and the All-Share Index of the Nigerian Stock Exchange fell by 76% between 2007 and 2009. This downturn impaired banks' balance sheets through increased bad loans and lower profits (Sanusi, 2011).

Sanusi (2011) further notes that prior to the crisis in 2009, the Nigerian banking sector had undergone a consolidation and recapitalization exercise aimed at strengthening the sector. Twenty-five well-capitalized banks emerged from a previous eighty-nine, with a minimum regulatory capital of ₦25 billion. This better positioned the banks for adequate financing of infrastructure and the economy in general. However, the booming economy between 2004 and 2008, the unprecedented increase in oil prices and the vast inflows of foreign exchange into the country caused a liquidity glut. With substantial capital and liquidity, the banks took on more risks, and by the end of 2008, they had exposure to the oil industry and the capital market of ₦1.6trillion representing more than 60% of their shareholders' funds. Thus when the GFC eventually hit Nigeria, the banks were ill-equipped to weather the storm, and the banking sector was thrown into crisis (Sanusi, 2011). It would be beneficial to examine whether the crisis in Nigeria was unique or whether parallels on the underlying causes can be drawn with the rest of the world.

2.3.2 Causes of the Nigerian Banking Sector Crisis

Before the GFC struck, there was already an interplay of factors that made the Nigerian banking sector even more vulnerable. The then governor of the Central Bank notes that these include macroeconomic instability caused by large and sudden capital inflows, critical failures in corporate governance at banks, lack of investor and consumer sophistication, inadequate disclosure and transparency about the financial position of banks, critical gaps in regulatory framework and regulations, uneven supervision and enforcement, unstructured governance and management processes at the CBN, and weaknesses in the business environment (Sanusi, 2011).

A special examination conducted by the CBN and NDIC in 2009 to ascertain the health of the banking sector revealed a number of weaknesses, including poor risk management; capital deterioration exacerbated by the crises in the capital market and the fall in crude oil prices;

and weak corporate governance (CBN, 2014). The Central Bank of Nigeria Annual Report for the year ended December 2009 also gives the following reasons for the crisis: corporate governance failures; the overbearing influence of board chairs/chief executive officers; unsecured loans, lack of risk understanding on the part of customers and investors; lack of coordination amongst regulators; lack of consolidated supervision; general weak supervisory processes; harsh business environment; tortuous legal processes; and absence of reliable credit reporting information (Central Bank of Nigeria, 2009). Thus, it is apparent that the major reasons for the banking industry's distress were a failure of corporate governance, risk management and supervision.

2.4 Nature of Risk

As the failure of risk management has been cited as one of the reasons for the banking sector crisis, it is worth reflecting on what constitutes risk. It is necessary to delineate what risk is to be clear on how to manage it. This evaluation will concentrate on risk in financial markets only. Finance theory tends to distinguish between risk and uncertainty. Risk is seen as outcomes that can be quantified, and uncertainty is seen as outcomes that cannot be quantified thus called the “Knightian uncertainty”. Some authors define risk in financial markets in terms of probabilities, some in terms of uncertainty and others in terms of both. Knight (1921), as cited in Watkins (1922), defines risk in relation to competitive markets as a measurable uncertainty and contrasts it with the uncertainty that cannot be measured. Financial markets could be considered as part of competitive markets. Extending this exposition, Markowitz (1952) considers an investor who has certain beliefs about the future performance of assets and selects his portfolio based on these. He then describes risk in terms of the variability of these expected returns around the mean. Campbell (2005), although also defining risk in terms of probability of occurrence, restricts uncertainty to the harmful aspect. Whether these definitions led to effective management of risk in banking systems remains to be determined.

Sharpe (1964) introduced a new dimension when he claimed that risk is made up of two components – diversifiable or specific risk and non-diversifiable or systematic risk. Diversifiable risk is unique to a particular asset, company, or industry, while systematic risk

applies to the entire market. He thus asserts that diversification can help avoid some of the risks of an asset. Building on this theory, Lintner (1965) revealed that risk is measured not only by its variability around the mean but by how it moves with other assets – that is, its covariance. It would be necessary to explore the extent to which these subtle but critical distinctions were built into subsequent bank regulation.

Another insight into the meaning of risk is from Bessis (2011), who defines risk as being the unpredictability of return on investments, comprising both positive and negative results. Crouhy et al. (2006) describe risk as unexpected loss, as anticipatory provisions should have been made for anything other than this. Nevertheless, one needs to consider the feasibility of knowing every possibility that could give rise to an unexpected loss. ISO/IEC Guide 73:2002 defines risk as a combination of the probability of an event and its consequence. The measurability dimension in these definitions raises concerns. The uncertainty that cannot be measured as a result of limited data still needs to be managed.

Crouhy et al. (2006) point out that although some uncertainties cannot be measured, we can still assess and manage them through mechanisms such as worst-case scenarios and risk transfer. Therefore, market participants expect that if such threats are adequately anticipated, mitigated, and monitored, unexpected losses should be minimised or at least well buffered. Consequently, outcomes should be in line with strategic plans; profitability should improve, and the trajectory of economic growth should be enhanced. This was the expectation when the post-crisis reforms in Nigeria and several developing countries were instituted.

2.5 Types and Sources of Risk

2.5.1 Introduction

Studies have shown that credit rationing and risk management are a major source of concern in developing countries. For instance, how to strike a balance between financial intermediation to achieve economic development, while reducing operational and credit risks that confront banks is a major issue (Mutezo, 2013, Wyk et al, 2004). The application of risk management in the developing world has been found to be limited (Claessens, 1993). Identifying and understanding the types and sources of risk is an important aspect of effective risk management and performance evaluation in financial institutions. It enables informed

decisions, mitigation of risks, and achievement of objectives while minimizing negative outcomes.

Following the various definitions of risk in the previous section, this review now examines the various types of risk and how they emerge. Heffernan (2005) subdivides risk specific to banking business into credit, counterparty, liquidity, settlements, market, capital, operational, and sovereign risk. Crouhy et al. (2006) subdivide risk into market, credit, liquidity, operational, legal, business, strategic and reputational risk. However, the authors see only market and credit risks as financial risks. Some other authors would include operational risk and, more recently, liquidity risk. For instance, Bessis (2011) defines financial risks according to the sources of uncertainty and includes credit, market, liquidity and interest rate risk, divided into subclasses relative to the specific events that trigger losses. Credit and market risk appear to be the worst culprits in the GFC; however, operational risk was also addressed in the banking reforms. This research will delve into these more.

2.5.2 Credit Risk

Studies observe that credit risk was at the heart of the Global Financial Crisis of 2007 to 2009. It was also a major feature in the Nigerian banking sector crisis. D'amico et al. (2017) assert that credit risk is one of the most critical contemporary problems that research has investigated in the financial literature. Lending is a significant source of credit risk to commercial banks (Baesens et al., 2016). These authors argue that even though credit risk may arise from fixed income securities, securitisation investments, contingent credit exposures, credit derivatives and over-the-counter derivatives, lending merits particular focus. However, considering the interplay of variables during the various financial crises, it is essential to examine all sources of credit risk.

Credit risk is the potential for loss as a result of borrower default, credit standing deterioration, and the dynamics of recovery rates (Bessis, 2011, Crouhy et al., 2006). Bouteille and Coogan-Pushner (2012) expand on this definition by attributing the possibility of default to the inability, unwillingness or the non-timeliness of a counterparty to honour a financial obligation. Rossi (2014) takes this definition forward by showing that the borrower's incentive to default is dependent on the value of the asset compared to the value of the obligation.

Thus, he claims default is an embedded put option available to the borrower when the value of the asset falls below the value of the obligation. This was demonstrated during the GFC when borrowers who could afford to pay their mortgages voluntarily defaulted on them because the value of the houses had fallen below the mortgage value (The Financial Crisis Inquiry Commission, 2011).

Academic studies point to the fact that credit risk can arise from bank-specific factors and macroeconomic factors. Specifically, a study carried out by Chaibia and Ftiti (2015) supports this finding by discovering that macroeconomic variables, including GDP growth, interest rate, unemployment rate, and exchange rates, had a substantial effect on the economies of France and Germany. They assert that different bank-specific factors drove credit risk, such as loan loss provisions and inefficiency in France and leverage in Germany. The authors need to provide further clarity on how loan loss provisions can cause credit risk, as the former is usually a symptom of the latter.

On a different note, research by He and Xiong (2012) finds that a further cause of credit risk is deterioration in debt market liquidity. Furthermore, Gilchrist (2016) finds that examining the credit spreads from secondary financial markets can reveal the emergence of credit risk. Indicators derived from the spreads provide evidence of the direction of real activity and lending for the euro area as a whole and individual countries (Gilchrist, 2016). The author further observes that disruptions in secondary markets lead to economic downturns. However, their research shows indicators of credit risk and not the causes. Reinhart and Rogoff (2011) observe that soaring government and private debt precede banking crises. As asset quality deteriorates, loan defaults increase, leading to a banking crisis.

2.5.3 Market Risk

Market risk is the potential for the value of a security or asset to reduce due to changes in market variables such as equity prices, interest rates, commodity prices and exchange rates. The Bank for International Settlements (BIS) defines market risk as being the risk of losses in on- and off-balance sheet positions arising from movements in market prices (BIS, 2003). Market risk is commonly measured using Value at Risk (VAR) models. This was invented by JP Morgan in the 1980s but criticized for being backward looking. Köksal and Orhan (2013) found

that VAR models did not work well during the crisis. They performed even worse in developed economies than in emerging economies. They explained this dichotomy by the fact that the crisis was more devastating in developed economies. They further suggested that VAR models should be used in conjunction with other models and frequently evaluated. Related to this, Trenca et al. (2015) observe that unexpected crystallisations of market risk during the crisis have led to heightened interest in its measurement and management. They further note that the Basel committee recommends VAR and stress tests to estimate the capital required to absorb losses. However, the effectiveness of these methods in predicting the amount of loss and thus the capital required might be flawed. The authors find that the GARCH model with structural breaks in the variance and the Extreme Value Theory predict higher levels of losses and, by extension, higher capital requirements. They conclude that managers should use a variety of econometric models and provide sufficient capital buffers based on the output.

2.5.4 Operational Risk

The Basel Committee on Banking Supervision (2019) defines operational risk as being the risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events. It includes legal risk but excludes strategic and reputational risk. McConnell and Blacker (2013) argue that the GFC was triggered not only by credit and market risk but also by operational risk. Consequently, its systemic dimension should be addressed by banking regulation. Banks may not have incentives to accurately disclose operational risk and the extent of accurate disclosure depends on corporate governance and supervisory strength (Barakat and Hussainey, 2013).

The BCBS capital framework permits three methods for calculating operational risk capital requirements in a range of increasing risk sensitivity: (1) the Basic Indicator Approach, (2) the Standardised Approach, and (3) the Advanced Measurement Approach. However, Supervisors are required to review the capital requirement estimated by a bank in this regard for general credibility. If credibility is lacking, appropriate supervisory action is recommended under Pillar 2 of the framework[5]. Understating capital charges for operational risk reduces the capital

[5] Basel Committee on Banking Supervision. 2006. *Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version. BIS.* https://www.bis.org/publ/bcbs128.htm [Accessed April 23, 2020].

buffers available to absorb unexpected losses and thus undermines the resilience of the banking system. De Jongh et al. (2013) find that operational risk factors played a significant role in fuelling the duration and severity of the GFC. This underscores the importance of effective regulation of operational risk as well as corporate governance and effective supervision.

2.6 Risk Management

The standard ways of managing risk are avoiding the risk by withdrawing from the activity altogether, transferring the risk to another party, for instance, insurance, accepting the risk, and mitigating the risk by reducing the likelihood or impact.

According to Bessis (2011), risk management is the process of ensuring that the risks of a financial institution are identified, assessed and controlled. A risk management framework is a representation of actions, techniques or tools deployed to manage the risks of an entity (Chapelle, 2019). Kaplan and Mikes (2012) maintain that risk management goes beyond mechanistic compliance with a list of rules, as this failed several institutions during the crisis. They propose that a qualitative approach should be the basis of segregating risks into preventable, strategic, and external risks, each of which should have a different technique of management. According to them reducing the probability of occurrence is the best way to reduce strategy risks, while proactive identification and mitigation was best for non-preventable risks.

The need to manage risk arises from the damaging impact of not doing so, which may lead to financial distress and even insolvency (Kaplan and Mikes, 2012, Stulz, 2008). Some authors see risk as a value-creating mechanism that needs to be appropriately managed. Risks that materialise in future could cause losses to a financial institution, which, if discounted to present value, would reduce the value of the firm. Thus, risk management is the ability to minimise such a reduction in value (Schroek, 2002). He elaborates further, "The key value-added feature of banks is their ability to allocate risk efficiently at minimum cost through the trading of and the bundling and unbundling of the risks of various financial contracts" (Schroek, 2002, p.29).

Depositors' funds are a liability of the bank and thus a corporate liability. Black and Scholes (1973) derive a formula to value options based on a principle of no-arbitrage if options are

correctly priced in the market. They claim that almost all corporate liabilities can be viewed as a combination of options. Thus, this postulation could be used to derive the discount applicable to depositors' funds in the event of default by the bank and give insight into the state of health of the bank and help manage the risk of failure better.

Various other means of financial risk measurement and management have emerged over the years. Acerbi et al. (2001) maintain that the expected shortfall (ES) method, which measures the average of all tail losses greater than the VaR, is preferred because the VaR is sometimes unable to distinguish portfolios that bear different levels of risk, thus limiting the management of risk. Others include Extreme Value Theory (EVT) which measures the probability of catastrophic events; the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) process used to estimate volatility in financial markets; Autoregressive Integrated Moving Average (ARIMA), which uses time-series data to predict future trends. These models appear to be more impactful in assessing and managing risk. However they have also been criticized as being inaccurate and inadequate, particularly in emerging markets, as they do not incorporate qualitative risk contexts (Nwogugu, 2006).

Thus, the most effective means of risk management for emerging economies has yet to be determined. Usually, emerging economies adopt what is considered best practice from advanced economies such as the Basel II/III banking reforms. However, these may not be fit for purpose, considering the peculiar circumstances of emerging economies. Obviously, regulation needs to be strengthened in the banking industry, but proportionality must be built in. The literature has shown various means of risk management ranging from rule-based approaches, risk identification and treatment, and reduction of probability of occurrence to quantitative means of assessing the health of banks and risk in the system. It also revealed the importance of building in a qualitative context. These appear to be steps in the right direction for effective regulation.

Based on the foregoing, the following section reviews the types of regulation to mitigate banking and systemic risks that have changed and developed as time passed by.

2.7 Regulation

Before considering the impact of regulation on the banking industry, it is worthwhile reflecting on what exactly regulation means. Why must we have it, and whom does regulation benefit? Selznick (1985) defines regulation as 'the sustained and focused control exercised by

a public authority over activities valued by the community' (Selnick 1985, p.363). However, valued activities are open-ended. It would be helpful to establish the scope of such activities. Black (2001) states that 'regulation is a process involving the sustained and focused attempt to alter the behaviour of others according to defined standards or purposes to produce a broadly defined outcome or outcomes' (Black 2002, p.142).

Koop and Lodge (2017) view regulation as the intentional intervention in the activities of a target population. Specifically, they define "prototype regulation" as interventions that are intentional and direct – involving binding standard-setting, monitoring, and sanctioning – and which are exercised by public-sector actors on the economic activities of private-sector actors. Regulation is considered appropriate if it is in conformance with the following principles: Proportionality; Accountability; Consistency; Transparency; Targeting (Better Regulation Task Force, 2003). The task force further suggests that regulation is fit for purpose if it is well thought out; avoids unintended consequences; balances risks, costs, and benefits; is not overly complex; has broad public support; is enforceable; and is relevant to current conditions.

These definitions of regulation lead to the question of the purpose of regulation in banking and if those purposes are being achieved. How do we link the variables between banking regulation and its impact? To what extent does regulation explain the behaviour or state of banking? The general theory of regulation has evolved over time. However, specific theories of the impact of regulation on banks are only just emerging. The backwardness in the evolution of theory in this regard is surprising since banking is considered one of the most regulated industries. Most of the existing theory of regulation stems from the role of government in the economy in the event of market failure. As stated in Ogus (2004) symptoms of market failure include the incidence of monopolistic behaviour, negative externalities, neglect of public goods and information asymmetry. He further states that where markets fail to produce productive and allocative efficiency, the alternative is enforcement by the law, which may not be affordable. This constitutes a failure of both the market and the law, in which case the only remedy is enforcement by a regulator.

There are two main views on the theory of regulation - the public interest view and the private interest view. The former is regarded as the normative theory meaning the ideal situation,

and the latter is the positive view describing what exists. According to the public interest view, the interventions by the government are a result of market failures and aim to benefit the public at large (Morgan et al., 2007). Putting this differently, the objective of the public interest theory is to design regulations that will pursue and achieve collective goals (Ogus, 2004). Regulations are expected to stimulate good behaviour and sound corporate governance. By extension, governments regulate to ensure better functioning and thus more efficient banks, ultimately for the benefit of the economy as a whole (Casu et al., 2017). The literature argues that regulation should promote social welfare, which can be seen as productive and allocative efficiency of economic output (Morgan et al., 2007). The degree to which this has been achieved in the banking industry needs to be ascertained. It follows from these postulations that understanding the causes of predatory lending, consumer exploitation, financial crises their its adverse impact on the poor is imperative. Even more crucial for bank regulators is how such negative externalities can be prevented.

Stigler (1971) was more cynical in his view of regulation for economic welfare and collective good. He explored the relationship between regulations and economic interest as opposed to the public interest and went on to explore the process by which regulation is achieved. He concluded that to use the state for reforms, the basic logic of political life must be learned, and until then, victims of the state's support of special interest groups will have no means of redress. Stigler's findings support the private interest view. Consistent with this view, Peltzman (1989) argues that in addition to regulation being captured by the industry, regulators are incompetent and have limited success in promoting social welfare. If these views hold, it could imply that regulation in the banking industry does not benefit the public at large. Interestingly, Danisewicz et al. (2018) find that enforcement actions by regulators in single-market banks lead to adverse effects on the macroeconomy and reduce economic growth. Building on these theories is the issue of regulatory capture which Bó (2006) describes as the process through which special interests affect state interventions and end up manipulating the state agencies that are meant to control them. The question then is what causes regulatory capture? How prone is the banking industry to it, and how can it be remedied?

Posner (1971), a supporter of the public interest theory, argues that regulated industries provide services at low prices and in large quantities, something not attainable by an unregulated industry. Posner further postulates that one of the functions of regulation is to perform distributive and allocative goals similar to taxation (Posner, 1974). Thus, it would be of interest to see if this translates into more credit at low prices in the banking industries of developing countries and if it addresses the problem of concentration risk.

Shleifer (2005) raises very pertinent questions about whether regulation has supported growth or hindered economic and social progress. He argues that the strategies for enforcing socially desirable conduct of business (market discipline, courts, government regulation, and state ownership) range from no government intervention whatsoever to total government control. According to him, each of these strategies has its costs and benefits, which must be subjected to careful analysis regarding efficiency. These costs range from social losses due to private expropriation and social losses due to state expropriation, thereby constituting a trade-off. Shleifer, therefore, maintains that the optimal choice of strategy depends on this trade-off and the institutional quality in the relevant jurisdiction. The relevance of institutional quality is also supported by Fratzscher et al. (2016), who point out that the success of post-crisis reforms in fifty emerging and advanced economies depended on this. This raises the question as to whether trade-offs appropriate to the banking sector in Nigeria and other African countries were considered prior to the crisis and in the post-crisis reforms.

2.7.1 Bank Regulation

Having laid the foundation of what regulation is and what it sets out to achieve, it is essential to examine the kind of regulatory structures that preceded the major banking crises across the world. The literature points to some common themes. This research will describe three historical case studies of regulation in order to draw out some general points:

2.7.2 Bank Regulation in England before the Secondary Banking Crisis

Arch (2018) observes that the banking sector in the United Kingdom from the period 1946 to the early 1970s witnessed relative stability. Regulation was based on a foundation of moral suasion – the law, non-statutory regulation, and self-regulation. The Bank of England Act enacted in 1946 established the regulatory relationship between the clearing banks, the Bank of England, and the Treasury. This style of regulation was strikingly different from what

existed in the United States and Germany (Youssef et al., 2016). Arch finds that regulatory tools were less codified in the past compared to today. She, therefore, recommends that in considering how best to manage the risk of banking crises, it is essential to reflect critically upon the effectiveness of regulation as it is today with detailed, technical rules. This infers that the less codified and simple rules of the pre- 1970s may have accounted for the relative stability. However, a different definition of stability could imply a different conclusion. For instance, Turner (2014) describes instability as the collapse of banks' share prices relative to the rest of the market. To that extent, he does not see the post-1973 period as a period of instability. From the period 1945 onwards, Turner is of the view that financial repression in terms of what the banks were permitted to do explains the stability. He argues that stricter regulation of banks and discontinuing the limited liability of shareholders are the keys to sustained stability. The question this raises is to what extent Turner's definition of instability can be extended to countries with many banks not listed on the stock exchange or that have inefficient capital markets. It could also be debated to what extent unlimited liability is feasible today.

Again, simple and less codified rules may have been relevant only in a totally different context. With the breaking down of cross-country barriers, financial firms are more and more seeking high returns with a minimal amount of regulation. Pawley et al. (1991) note that the fringe banking crisis of 1973 to 1974 in the UK occurred at a time of a large inflow of new institutions as a result of perceived liberal market conditions. They further suggest that self-regulatory organisations may themselves be subject to regulatory capture. As Kane (2009) points out, varying levels of stringency and enforcement in regulation across the world in a bid to attract financial firms have led to sub-optimal supervision. Furthermore, contrary to the suggestion that less codified rules may be a solution, Kane states that rules are necessary for regulatory institutions to limit the exploitation of gaps and ambiguities by regulated entities, which could undermine the objectives of a regulatory regime.

2.7.3 Bank Regulation in The United States before the Great Depression

White (2014) examines the regulation of the banking sector in the United States between 1900 and the Great Depression. He finds that between 1900 and 1914, a dual system of national and state-chartered banks had evolved as a result of constraints placed on banking by state and federal legislation. The National Banking Act of 1864 had been expected to

replace state control with federal control of the banking industry. However, White maintains that this was not successful due to the greater attraction of the less stringent regulation of banks with state charters. He finds that the state charters were more attractive for reasons including lower capital requirements, no reserve requirements, weaker portfolio restrictions, and deposit insurance schemes in some states. Of interest is the fact that he notes that the dichotomy between state and federal regulation was reinforced by a powerful opposition to amendments to the law from entrenched business interests. This appears to support the views of the private interest theorists of regulation. The resultant effect was an industry composed of thousands of small banks, thus impairing the integration of money markets, and increasing the industry's vulnerability to financial crises and panics.

The number of banks and the dual system of regulation was in sharp contrast to most jurisdictions in the literature that had a small number of banks and a single regulator. However, Germany had a similar jurisdictional overlap to that of the United States, reflecting the general complexity of the political structures of sub-state powers (Youssef et al., 2016). One can conclude that White considers the system of regulation counterproductive. A similar view is expressed by Selgin (1996), who argues that government interference undermines the inherent efficiency, safety, and stability of a free monetary system. However, this view is not supported by Dehejia and Lleras-Muney (2007) who find that the system of regulation actually supported economic growth at the state level. These authors do not however examine the extent to which stability was sacrificed for this growth. Extending these arguments to the issue of supervision for stability, Goodhart (1988) argues that regulatory authorities such as central banks are necessary to effectively supervise and regulate the commercial banking system. This was, however, not the case in the United States, as White points out that although a system of bank supervision was introduced to ensure the efficient functioning of the industry, the objective was not realized. This was because the rivalry between state and federal regulators tended to weaken the regulation of banks to the point where entry into the industry was virtually unrestricted.

White further illustrates the attempts to amend legislation to strengthen the banking industry. Unfortunately, legislation perpetuated the fragmented structure of the banking industry and its consequent fragility. However, as Arch (2018) points out, causality is not clear cut in situations of regulation and stability, leaving a gap that research needs to fill.

2.7.4 Bank Regulation in Asia before the Asian 1997 Crisis

The three main interrelated origins of the crisis were financial sector weaknesses in Asian emerging economies along with easy global liquidity conditions; external sector problems in these economies; and contagion from Thailand to other Asian countries and eventually to equity markets in some major industrial countries (Goldstein and Kim, 1999). Corsetti et al. (1999) find that the foundation for this crisis was laid by regulatory inadequacies, unhealthy relationships between private and public institutions, moral hazards, and financial markets liberalization. They dissect the problem into three different but interrelated dimensions at the corporate, financial, and international levels. At the corporate level, they observe an unruly tendency of the government to give guarantees to risky private projects, intervening in favour of troubled firms, all in a bid to sustain high rates of economic growth as a result of political pressure.

At the financial level, the literature points towards a myriad of structural distortions in the pre-crisis Asian financial and banking sectors: lax supervision and weak regulation; weak prudential standards and enforcement; low capital adequacy ratios; lack of incentive-compatible deposit insurance schemes; insufficient expertise in the regulatory institutions; distorted incentives for project selection and monitoring; outright corrupt lending practices; subjective criteria of credit allocation. All of these factors contributed to the build-up of severe weaknesses in the undercapitalized financial system, whose most visible manifestation was eventually a growing share of non-performing loans (Lindgren et al., 1999; Goldstein and Kim, 1999; Corsetti et al.; 1999).

Corsetti et al. (1999) note that the international dimension stemmed from a moral hazard problem hinged upon the behaviour of international banks, which over the period leading to the crisis had lent large amounts of funds to the region's domestic intermediaries, with apparent neglect of the standards for sound risk assessment. They suggest that this may have been based on the presumption that short-term interbank cross-border liabilities would be effectively guaranteed by either a direct government intervention in favour of the financial debtors or by an indirect bail-out through IMF support programs.

Similar to the researchers above, Casu et al. (2017) observe that the fast-paced liberalization processes, free capital flows, pegged exchange rates and weak management and legal

systems led to the financial crisis of 1997, which started in Thailand and quickly spread in varying degrees to neighbouring countries. During the crisis, several banks failed while others were nationalized, restructured and later re-privatized.

2.7.5 Bank Regulation in Nigeria Before the Crisis of 2009

The Central Bank of Nigeria (CBN) is responsible for providing regulatory oversight of commercial banks (Deposit Money Banks) and Other Financial Institutions (the Federal Republic of Nigeria, 1991). The Central Bank of Nigeria and the Nigerian Deposits Insurance Corporation (NDIC) are jointly responsible for the supervision of banks. The NDIC, in addition, provides insurance cover for depositors' funds in banks and other insured financial institutions and is also responsible for liquidating distressed banks (the Federal Republic of Nigeria, 2006).

Promoting financial stability is one of the core functions of the Central Bank of Nigeria, as outlined in Section 2 of the 2007 CBN Act. The CBN carries out this function by conducting continuous surveillance and supervision of the banking industry. The absence of an institution to carry out surveillance in the sector during the early stages of the development of the Nigerian financial system led to the failure of several banks between 1892 and 1951 (CBN, 2011).

The need to promote growth in the real sector of the Nigerian economy led to a structural adjustment programme in 1986, of which financial sector reforms formed a significant part (Ojo, 1993). These reforms were followed by a change from a direct control lending model to a market-based model and the deregulation of interest rates. Ikhide and Alawode (1994) assert that this led to high non-performing loans in the 1990s. The rules for exit and entry into the banking business were relaxed, and capital adequacy standards were reviewed upward. In 1990 prudential guidelines were introduced to enhance the safety and soundness of the Nigerian banking system. The CBN Act, no 24 of 1991 granted the CBN autonomy and boosted its powers of ensuring a sound financial system. The Banks and Other Financial Institutions Act (BOFIA) introduced regulatory reforms that contributed immensely to the stability of the financial system in a deregulated economy. However, some have argued that the deregulation and liberalization led to a sharp rise in the number of banks (Uche, 1997), which were predominantly small and characterized by poor management and fraudulent practices (Ojo, 1991).

The introduction of the universal banking policy by the CBN in 2001 made way for all banks to engage in retail and wholesale business with the intention of deepening their financial intermediation roles. However, Oke and Poloamina (2012) find the impact of universal banking policy on efficiency insignificant. Therefore, they were of the view that the repeal of the policy at the end of 2010 was long overdue.

The 2004 banking consolidation was a significant milestone in Nigerian banking sector reforms. According to Soludo (2004), the key elements of the reform included NGN25 billion (USD $189million)[6] minimum capitalization for banks, gradual withdrawal of public sector funds from banks; consolidation of banking institutions; a risk-focused and contingency planning framework for banking system distress. The consolidation programme, which culminated in the emergence of 25 banks from the previous 89 banks, was aimed at strengthening the capital base, ensuring the safety of depositors" funds and repositioning the industry for effective financial intermediation. Odeleye (2014) finds that the consolidation exercise did impact efficiency positively. However, Owojori et al. (2011) observed that operational risk increased after the exercise and recommended that measures be taken to help preserve the banking system and sustain the benefits of consolidation on the economy. Unfortunately, despite these measures, Nigeria had a banking crisis in 2009 leaving the industry none the wiser on how to maintain stability.

2.7.6 Post-crisis reforms in Nigeria: Regulatory Response to the Crisis

In 2009, reforms tagged the Project Alpha initiative for reforming the Nigerian financial system commenced (Central Bank of Nigeria, 2009). According to Sanusi (2012), Project Alpha revolved around 4 pillars, which include: "enhancing the quality of banks; establishing financial stability; enabling healthy financial sector evolution and ensuring that the financial sector contributes to the real economy". The overarching goal of these reforms was to achieve the emergence of a robust financial system that can deliver effective and efficient intermediary functions of transferring funds from surplus units to deficit areas of the Nigerian economy. This research evaluates the extent to which these objectives were achieved.

[6] NGN – Nigerian Naira - $1 USD = 132NGN in 2004 Central Bank of Nigeria: Exchange Rate Archives (cbn.gov.ng)

The banking sector regulator in Nigeria – the Central Bank, has over the years, embarked on several reforms to strengthen the resilience of the sector, and ensure it contributes to the real economy. However, it is also argued that Nigeria's approach to regulation is slow, and reactionary and that the powers of the regulator need to be subjected to checks and balances. Furthermore, historical and political influences appear to play out in the regulatory approach (Adeyemo, 2022). However, on November 12, 2020, a new banking act - the Banks and Other Financial Institutions Act 2020 was signed into law thereby repealing the erstwhile Banks and Other Financial Institutions Act 1991[7]. The new law introduces some novel provisions such as the limitation of liability arising from unprecedented events such as the ongoing COVID-19 pandemic, the establishment of a resolution fund and a special credit tribunal to improve loan recovery. It is hoped that the new law will address some of the concerns around reactiveness and the private interest stance.

2.7.7 Review of the Literature on Capital, Risk Management and Bank Failures in South Africa

Although South Africa has never had a banking crisis as defined by the world bank, it is useful to probe further why that is the case. This study conducts qualitative research of South Africa in chapter 3 to further illuminate this issue. The theoretical literature reveals several perspectives on the role of capital in banking. The systemic risk argument posits that when capital requirements are not risk-sensitive, banks have the incentive to increase the risk of their assets or increase leverage (Santos, 2000, Koehn and Santomero, 1980). A natural consequence of this is bank failure, as banks would not be cautious given that the negative externalities of leverage are foisted on society. Rochet (1992) argues that the potential benefits of risk-sensitive capital are negated by limited liability, and thus a minimum capital regulation is required to prevent bank failure. Santos (1999) posits that higher capital standards cause banks to lower their risk, consequently reducing the risk of insolvency. Banks systematically have very high leverage which is inimical to the interest of depositors and the economy at large. This is in sharp contrast to the theory of Modigliani and Miller (M&M) (1958) on the irrelevance of the capital structure. The theory assumes a frictionless world devoid of imperfections such as taxes, costs of financial distress, transactions costs, asymmetric information, and regulation. Miller (1995) argues that these imperfections may

[7] Federal Republic of Nigeria. 2020. *Bank and Other Financial Institutions Act 2020*. https://www.cbn.gov.ng/out/2021/ccd/bofia%202020.pdf [Accessed April 8, 2022].

not be significant enough to overturn the irrelevance proposition. The M&M theory suggests that the value of a firm is determined by its underlying assets and the cash flows it generates, rather than the way it is financed. Thus, the theory is not fully applicable to banks due to their unique characteristics and their regulatory environment. The capital structure decisions of banks can have significant implications for their risk profile, regulatory compliance, and funding costs (Berger et al., 1995). Reality has shown that there are significant deviations from a frictionless world in banking such as asymmetric information, interconnectedness, and costs of financial distress. Banks' custody of depositor funds is a source of increased leverage particularly if a bank's capital is being eroded by losses. These make the capital structure very relevant.

The whole point of the Basel II/III capital regulations was to address the risky behaviour of banks. Excessive risk-taking could lead to increased impairments, increased leverage manifested by declining capital to assets ratio, bank runs and failures indicative of systemic risk (Liikanen et al., 2012). Another viewpoint is the possible reduction in credit as a result of the BCF. Diamond and Rajan (2000) argue that higher capital standards reduce the probability of financial distress in banks but also reduce their ability to create liquidity. Lower liquidity could result in a lower credit supply. Having reviewed a number of banking regulations across the that did not prevent the GFC, this review proceeds to examine the response to the GFC and other post-crisis reforms.

2.8 Response to the Global Financial Crisis and Evaluation of Post Crisis Reforms across the World

The causes and responses to the GFC are broad. This research does not cover all responses but only touches on a few aspects considered relevant to this study. The most predominant response to the GFC carried out by most jurisdictions was massive asset purchases or quantitative easing. This was intended to be the panacea to a rapidly deteriorating world economy with the hope of re-igniting growth. However, this response could have unintended consequences. Motto et al. (2015) find that asset purchases could have effects beyond the financial market stress being addressed. They claim that transmission channels differ across risk regimes. That is why a clear understanding of the source of risk and the understanding of its management is essential.

A significant reform taken to ensure that banking crises of the scale of the GFC never reoccur was the introduction of Basel III – A global regulatory framework for more resilient banks and banking systems (Basel Committee on Banking Supervision, 2011), which was adopted by all advanced countries and many emerging economies. In addition, new International Financial Reporting requirements such as IFRS 9 were introduced to enhance resilience and transparency in banking systems. Several developing countries cherry-picked aspects of Basel II and III for adoption.

There is no consensus on the efficacy of reforms around the world yet. The G20 countries were alarmed at the devastation caused by the global financial crisis. In their view, the cause of the crisis was excessive risk-taking, poor risk management, and deficiencies in financial regulation and supervision. They, therefore, determined that it was needful to make banks more resilient by strengthening capital, mitigating risks in banks and at the same time ensuring that credit growth was shored up and sustained (G20 Finance Ministers, 2008). This view was supported by the group of central bank governors and heads of supervision (The Group of Central Bank Governors and Heads of Supervision, 2010). However, these two objectives are seen as contradictory by some studies. While some opine that stricter capital is required for bank stability (Admati and Hellwig, 2012), some are of the view that this would increase funding costs and thus shrink lending (Elliott and Santos, 2012). Fratzscher et al. (2016) find that while higher capital alone does not improve bank stability directly, more stringent measurement of it does. They further find that increased supervisory independence and discretion mitigated the adverse effects of the crisis conditional on the pre-crisis strength of institutions. Interestingly, they find that bank regulation and the quality of institutions have a substitution rather than a complementary relationship.

Lybeck (2016) has a surprisingly totally different view and argues that given the poor performance of other bank resolution options, taxpayer-funded bailouts are required to have a stable financial system that supports economic growth. Orazalin and Mahmood (2019) find that corporate governance improved bank performance in Kazakhstan - an emerging economy, after the global financial crisis. However, research is divided on whether corporate governance influences performance positively or not. Some authors have been unable to find evidence that a positive influence exists (Bhagat and Bolton, 2008; Core et al., 2006). However, since these studies were conducted either before the crisis or just after it, these

views need to be re-examined considering massive reforms in corporate governance after the crisis.

There are instances where post-GFC reforms have shown positive effects on the real economy but unintended consequences on the financial sector. For instance, in order to stabilize the Chinese economy after the GFC, the government injected a four trillion yuan (USD $600billion)[8] stimulus package. This, however, led to the growth of Local Government Financial Platforms and shadow banking. Moreover, the banking sector in China itself is now experiencing deteriorating asset quality which is threatening its stability, while capital ratios have dropped (Kwong and Poon, 2019).

Erfani and Vasigh (2018) examine the impact of the GFC on Islamic banks. They find that, unlike conventional banks, Islamic banks did not buckle under the crisis. Islamic banks due to their ethical dimension, are expected to be better managed even in the face of regulatory failure. However, it is also argued that the ethical dimension alone is not sufficient to compensate for ineffective regulation (Alhammadi et al., 2018). At the time of the banking crisis in Nigeria, only one Islamic bank was in operation. However, since the crisis, more Islamic banks have been licensed, and the regulations have been strengthened. It remains to be seen the extent to which this will contribute to stability.

Tarullo (2019), while acknowledging the giant strides achieved in financial stability in the United States with post-crisis reforms, points out that the reforms do not deal effectively with threats from the non-regulated sectors. He further maintains that the sustainability of the subsisting reforms depends on the political environment and political will, especially in the current anti-regulation stance. Similarly, some other studies on post-crisis stance show an inclination toward deregulation. They assert that a lack of compliance on the part of EU national governments puts economies at risk, but on the other hand, the application of global best practices without taking into consideration critical jurisdictional details is unhelpful. They further find many of these rules are too technocratic and reflect a bias toward business interests over societal interests (Van Der Veer and Haverland, 2018). Thus, one can conclude

[8] Chinese Yuan/ US dollar = 0.15 as of May 03,2022 CNY to USD Exchange Rate | Latest News and Forecasts for Chinese Yuan/U.S. Dollar - WSJ

that the literature is not unanimous on the most effective manner of regulation. This review proceeds to examine microfinance as a tool of economic welfare.

2.9 Microfinance as an Economic Welfare Tool

The development literature is mostly in agreement that the poor have inadequate access to credit from the formal financial sector due to the high probability of default and the inability to put up suitable collateral to mitigate the risk. For this reason, several jurisdictions have enunciated policies to promote microfinance as a means to increase access to credit by the poor. The award of the Nobel Peace Prize to Mohammed Yunus in 2006 generated worldwide recognition of the potential impact of microfinance in reducing poverty and improving economic welfare around the world. The 'Yunus-effect' has led to the proliferation of microfinance not only in developing countries but also in advanced countries such as the US, Spain, and Sweden. Microfinance is promoted as a critical intervention for improving the lives of vulnerable individuals (Rogaly, 1996, Silver et al., 2009, Bruhn-Leon et al., 2012, Barinaga, 2014). Microfinance had emerged as an effective strategy for poverty reduction and one of the prime strategies for achieving the then Millennium Development Goals, now the Sustainable Development Goals (Ehigiamusoe, 2021). Some academic research finds that microfinance has significant positive benefits for poverty reduction (Aigbokhan and Asemota, 2011, Welle-Strand et al., 2010, Ahmed and Kitenge, 2021). On the other hand, De Haan et al. (2021) argue that financial development does not have a direct effect on the poverty gap, which is the shortfall of income from the national poverty line. If this is true, then efforts at banking stability and financial inclusion might be futile.

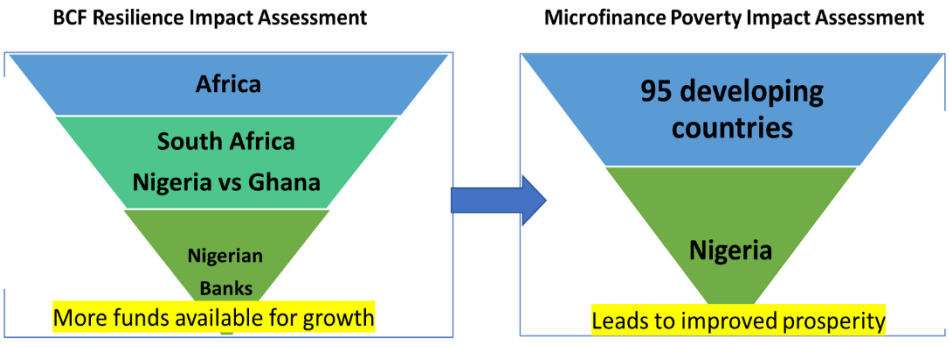
Hausmann (2019) argues that microcredit by itself is not sufficient to lift the poor out of poverty. For growth to be Inclusive, the poor need to be able to connect to the inputs that would make them productive. These inputs include connectivity, infrastructure, roads, and electricity to connect the poor to the cities. Because the poor are not connected to the city, they are not included in the higher productivity and higher wage activities in the city. This constitutes an exclusion trap – the poor are not connected because it is not profitable for them to be, for instance, in the banking system, and because the poor are not connected, they remain unproductive and poor. The trade-off of inclusion is how to pay the fixed costs. This can be achieved by either lowering or sharing the fixed costs through technology such as cell phones in Kenya, microlending and collective investments that connect people to

networks. Thus, even though microfinance may not be an overall panacea to poverty alleviation, it reduces the fixed costs that keep the poor trapped in poverty.

2.10 Linking the resilience of banks and poverty reduction to economic welfare

It is worthwhile to evaluate the implications of banking reforms and microfinance for economic welfare, as measured by resilience of banks and poverty reduction. The economic impact of crises such as instability in the banking system or disruptions in microfinance leading to financial exclusion could have dire consequences for welfare. Improved economic welfare depends on the ability of the financial system and the economy to cope and recover from shocks thereby minimizing aggregate consumption losses (Hallegatte, 2016). Zhuang et al (2010) in a literature review of financial sector development (which includes stability and access to finance), economic growth and poverty reduction find that there are credible arguments that financial sector development plays an important role in facilitating economic growth and poverty reduction, and these arguments are supported by empirical evidence from across the world. There are however disagreements over how financial sector development should be implemented in developing countries, particularly the relative importance of large and small banks while broadening the access to finance by microenterprises.

Thus, the rest of this thesis explores how to ensure resilience in the banking system thereby avoiding the economic costs of bailouts, fiscal retrenchments and austerity measures which reduce the welfare of all citizens but especially the poor. It further explores the impact of microfinance and how it improves the economic welfare of the financially excluded. To reach the last mile of the economically and financially excluded, the banking system needs to be resilient and access to finance needs to be inclusive (EFInA, 2021).



It is expected that the combination of a resilient banking system and improved financial inclusion will improve economic welfare for all.

2.11 Conclusion

As a pre-cursor to empirically evaluating banking reforms, microfinance and its implications for economic welfare, this chapter reviewed the nexus between banking crises and poverty, various definitions of risk, their sources and how they can be managed, and post-crisis reforms in the Nigerian banking sector and other jurisdictions. It further explored the causes of the financial crises and the kind of regulation in place in various jurisdictions before the implosion of their financial systems. While various crises were attributed to numerous causes, it does appear that political and economic regimes, as well as the quality of institutions, had a role to play. The literature is however divided on the benefits of regulation and whether recovery after the crisis can be attributed to the reforms carried out.

The review covered microfinance as a development tool and its ability to complement banking reforms in poverty alleviation and improving economic welfare. The literature also has disputed evidence that microfinance has significant positive effects on poverty reduction.

Some gaps in the literature that remain to be determined are what made some countries immune to the GFC. What is the most effective means of post-crisis reforms and bank resolution? Should governments bail out financial institutions or not? Should bank regulation and supervision be made more or less stringent? Were the perceived causes of the banking sector crises correctly identified, Did the regulatory response address the root causes, and how we can measure its effectiveness. Finally, in pursuit of reduction in poverty in line with the first goal of the SDGs, this research examines the impact of microfinance at a global, country and household level.

Chapter Three

3 Basel II/III Implementation in Africa: Impact on Banking Sector Resilience

3.1 Introduction

All countries desire banking system stability, yet instances of instability that lead to severe consequences for the wider economy arise often. Historically, crisis upon crisis has led to the sequential tightening and strengthening of banking regulations. However, this has not entirely prevented crises from occurring. In advanced countries, where the effectiveness of many of these reforms has been tested and fine-tuned as gaps have been revealed, the findings on effectiveness are inconclusive. Hence, if the results are inconclusive in developed economies—for which many of these reforms were intended—even more uncertainties remain regarding the fate of developing economies. Questions arise regarding the efficacy of and need for some of these banking reforms in developing economies.

Empirical studies in this area have been limited and segmented. Thus, this study investigates the impact of the implementation of the Basel II/III Capital Framework on resilience, performance, and credit supply in the banking industry in Africa. No empirical study has been conducted to evaluate the impact of these specific reforms. Investigations have been conducted in different areas of prudential regulation, such as capital regulation, liquidity, asset quality, governance, and risk management, but the impact of the whole suite of Basel reforms in Africa has not been assessed. This constitutes a significant gap in the literature as regulators and policymakers in Africa need to establish the value of expending resources on these reforms and whether the effects are beneficial or detrimental to their economies. These findings will also be of interest to multilateral organizations, such as the International Monetary Fund (IMF) and the World Bank, that support these reforms. It is further necessary to understand how the effectiveness of these reforms can be improved. Crucially, if demonstrable benefits are found, the rest of the developing world would be encouraged to adopt similar reforms. Banking stability is vital for economic growth and social welfare, which is elusive in many developing countries. This research is unique as it concentrates on Africa at large, unlike others that have examined individual, or only a few, African countries. It also examines the impact of all Basel II/III capital reforms rather than a single element. The findings add to the body of knowledge, investigating the extent to which the Basel Capital Framework

(BCF) reforms meet the expectations of banking sector resilience and economic performance in Africa, with inferences for other developing regions and nations.

To place issues in a proper context, considering if stability equates to resilience is necessary. The World Bank views financial stability as the capacity of the system to withstand shocks and, through self-corrective mechanisms, return to its normal function of supporting the economy. Thus it is resilience to stress (World Bank, 2016). Minsky (1982) defines financial instability as "*a process in which rapid and accelerating changes in the prices of assets (both financial and capital) take place relative to the prices of current output*." Minsky further explains that a financial system is robust if it can withstand moderate changes in financial variables. Robustness or fragility depends on cash flows and the ability of debtors to meet their obligations. Minsky's financial instability hypothesis holds that changes in this relationship during years of tranquillity transform a robust system into a fragile one. Prudent borrowing with sound underwriting degenerates into speculative and Ponzi borrowing as optimism increases with growth in the economy. When asset prices stop rising, a debt-deflation spiral occurs, and sudden liquidations of assets or positions follow the over-indebtedness of the prosperous years leading to a credit crunch (Fisher, 1933). Stability is destabilizing – leading first to the expansion of investment and then to a recession. It is the responsibility of the lender of last resort to ensure that the debt-deflation mechanism does not lead to systemic insolvencies (Minsky, 1982). Stability, Minsky appears to be suggesting, can itself lead to instability. He defines robustness as the ability to tolerate moderate shocks. What then is resilience?

The Merriam Webster dictionary defines resilience as "*the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress."* It also defines stability as "*the property of a body that causes it when disturbed from a condition of equilibrium or steady motion to develop forces or moments that restore the original condition."* This can be compared to the ability of a banking system impaired by asset deterioration to bounce back. The Financial Soundness Indicators compilation guide (IMF) refers to resilience as a dimension of financial market liquidity and defines it as the speed with which price fluctuations arising from trades are dissipated or the speed with which imbalances in orders are reversed with new orders. The Basel Committee on Banking Supervision, in its Sound Practice standards for Liquidity risk management and supervision,

advise supervisors to regularly perform a comprehensive assessment of a bank's overall liquidity risk management framework and liquidity position to determine whether they have an adequate level of resilience to liquidity stress given its role in the financial system (Basel Committee on Banking Supervision, 2008). All definitions do not appear to distinguish between resilience and stability and suggest an ability to return to a state of equilibrium after a shock. Thus, this research will see stability and resilience as the same and use the terms interchangeably.

To evaluate the impact of the implementation of the BCF, this study investigates whether the institution of the Basel II/III capital accords improves the resilience of the banking sector in Africa and whether these actions lead to improved performance, higher credit supply, and ultimately, an improved economy. The findings are crucial to understanding whether regulatory authorities' policy measures have the desired impact.

3.1.1 The Basel Capital Framework (BCF)

According to the Bank for International Settlements (BIS), the Basel Committee on Banking Supervision (BCBS) was formed in 1974 following severe financial market disturbances caused by the collapse of the Herstatt Bank (BIS: Bank for International Settlements, 2014). One of the aims of the formation was to enhance the quality of supervision across member jurisdictions. To strengthen the stability of the international banking system, the committee released the Basel Capital Accord in 1988, which required a minimum ratio of 8% of capital to risk-weighted assets. By 1996, the committee issued an amendment to incorporate market risk in the calculation of risk-weighted assets.

In 2004, a revised framework was issued with the intent of ensuring that capital held by banks better reflected their underlying risks. The revision included a modification of credit risk and the addition of operational risk. The framework comprised three pillars – minimum capital requirements, supervisory review, and disclosure requirements. In 2006, the rules were extended to the trading book, and a comprehensive document was released called Basel II: International convergence of capital measurement and capital standards (Basel Committee on Banking Supervision, 2006).

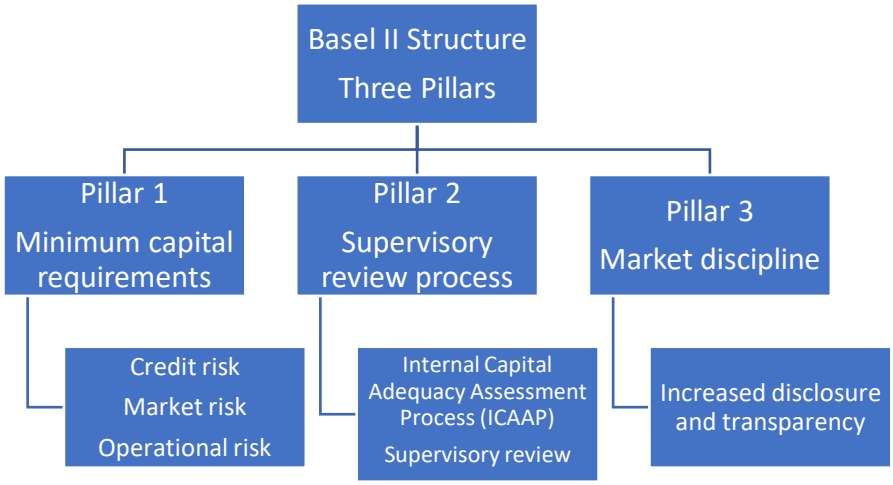
In response to the 2007 to 2009 global financial crisis, the committee issued Basel III in 2010 to address weaknesses of poor governance and risk management, amongst other factors. The

revised framework, which strengthened and extended Basel II, included stricter requirements for the quality and quantity of regulatory capital, a countercyclical capital buffer, a leverage ratio and liquidity requirements[9]. In parallel to these events, the regulation of bank capital has become a primary focus of banking systems across the world not only in BCBS member countries but in all countries desirous of a healthy banking system. Such regulation was expected to promote banking stability and resilience (Fratzscher et al., 2016). Baker and Wurgler (2015) find that higher capital leads to lower idiosyncratic risk in banks but that this may also lead to higher costs of capital with undesirable implications for investment and the economy at large. It is, however, also argued that depending on the manner of capital regulation, banks could take on more risks, thus increasing the probability of failure (Koehn and Santomero, 1980). Some African countries adopted Basel III, while others cherry-picked certain elements thereof and combined them with Basel II. However, many African countries continue to adhere to the Basel II (or Basel I, in some cases) framework.

3.1.1.1 The Conceptual Framework

A schema of the conceptual framework of the Basel II accord is shown in figure 3-1. It has three pillars and three risk buckets.

Figure 3-1 – Basel II - three pillars, three risk buckets.



Adapted from Van Greuning and Brajovic Bratanovic (2009)

The three pillars are intended to be mutually reinforcing. The framework is designed to incentivise banks to improve their management of risk by making capital requirements

[9] Basel Committee on Banking Supervision. 2011. *Basel III: Global Regulatory Framework for more Resilient Banks and Banking Systems. BIS*. https://www.bis.org/publ/bcbs189.htm [Accessed March 30, 2020].

sensitive to underlying risks. The accord gives banks various options to determine capital requirements depending on their risk management proficiency and the approval of their regulators. Credit risk can be determined via a standardised approach or an internal ratings-based approach, which could be at a foundational or advanced level. Market risk also has the options of a standardised building block approach and an internal model approach using Value at Risk (VAR) models. Operational risk could be determined via a basic indicator approach, a standardised approach, or advanced measurement approaches using models. Under the Supervisory review process (Pillar 2), regulators are expected to ensure that the assessments by banks of their capital requirements are in line with their risk profiles and based on sound internal processes. Market discipline (Pillar 3) recognises that rules need to be accompanied by incentives to comply and thus, enhanced disclosure and transparency are intended to enable investors to make informed decisions. (Basel Committee on Banking Supervision, 2006, Van Greuning and Brajovic Bratanovic, 2009).

The framework requires the capital ratio to be at least 8% of total risk-weighted assets (RWA), calculated as:

Minimum capital requirement = 8% x (Credit RWA + Market RWA + Operational RWA)

The constituents of regulatory capital were as follows:

1. Tier 1 - paid-up share capital, disclosed reserves.
2. Tier 2 - undisclosed reserves, asset revaluation reserves, general provisions, loan-loss reserves, hybrid capital instruments, subordinated debt
3. Tier 3 - short-term subordinated debt solely for market risk capital requirements.

Tier 2 elements were limited to a maximum of 100 per cent of tier 1 elements; subordinated term debt was limited to a maximum of 50 per cent of tier 1 capital; tier 3 capital was limited to 250 per cent of tier 1 capital that was required to support market risks. (Basel Committee on Banking Supervision, 2006). Basel III revisions published in 2011 have further strengthened these requirements and abolished tier 3 capital.

3.1.1.2 Basel III: Global Regulatory Framework for More Resilient Banks and Banking Systems

During the global financial crisis, vulnerabilities in the banking system spread swiftly to the rest of the financial system. Many banks had impaired capital, high leverage, and insufficient liquidity buffers and thus were unable to absorb the systemic trading and credit losses that

arose. This led to a loss of confidence in the banking system. To address the market failures revealed by the crisis, the BCBS introduced several critical reforms intended to strengthen micro-prudential and macroprudential regulation. The reforms were intended to raise the resilience of individual institutions to periods of stress and help contain systemic risks arising from procyclicality and the interconnectedness of financial institutions (Basel Committee on Banking Supervision, 2011).

The significant changes to the Basel II framework are as follows:

1. Regulatory capital would comprise Tier 1 and Tier 2 capital only. Tier 3 was eliminated.
2. Tier 1 capital must be predominantly common shares and retained earnings and comprise Common Equity Tier 1 and Additional Tier 1. To qualify as additional Tier 1, instruments must be subordinated, non-cumulative and irredeemable. Innovative hybrid instruments are no longer allowed.
3. The ratio of Tier 2 to Tier 1 capital was reduced from 100 per cent to one third or 33.3 per cent.
4. Tier 2 capital to constitute no more than 25 per cent of regulatory capital.
5. The Capital Conservation buffer (CCR) was introduced to protect banks during periods of stress when it is challenging to raise capital.
6. A Countercyclical buffer was introduced to address the variability of earnings during stressed periods.

In effect, capital requirements were increased and tightened. The net effect is shown in table 3.1.

T*able 3.1* Basel III capital requirements

Basel III Capital requirements	**Common Equity Tier 1 (%)**	**Additional Tier 1 (%)**	**Tier 1 Capital (%)**	**Tier 2 Capital (%)**	**Total Capital (%)**
Minimum	4.5	1.5	6.0	2.0	8.0
Conservation buffer	2.5				2.5
Minimum **+** conservation buffer	7.0	1.5	8.5	2.0	10.5
Countercyclical buffer	0 – 2.5				

Source: Basel Committee on Banking Supervision, 2011

The framework further introduced a minimum leverage ratio of 3% to strengthen liquidity risk management; a liquidity coverage ratio of not less than 100 per cent to focus on banks' ability to meet withdrawal demands over a 30-day period, and a net stable funding ratio of at least 100 per cent to address liquidity management over an annual horizon. In addition, the stress testing requirement of Basel II was upscaled. Banks were required to identify exposures that gave rise to a high degree of wrong-way risk. Stress testing and scenario analyses had to be designed to identify risk factors that were positively correlated with counterparty creditworthiness (Basel Committee on Banking Supervision, 2011).

3.2 Literature Review and Hypotheses

3.2.1 Determinants of resilience

Berry et al. (2015) of the New Economics Foundation highlight the need to build resilience in financial systems. The foundation defines resilience as "*the capacity of the financial system to adapt in response to both short-term shocks and long-term changes in economic, social, and ecological conditions while continuing to fulfil its functions in serving the real economy*." To this end, it defines six resilience factors: diversity, interconnectedness, financial system size, asset composition, liability composition, and transparency. These conditions align with the BCF, as they can be mapped to the three pillars of Basel. The BCF considers the effective management of credit risk, market risk, operational risk, and other risks grouped as Pillar 2 risks as the primary determinants of stability. The effectiveness of bank supervision under Pillar 2 and market discipline through transparency under Pillar 3 are also considered vital determinants.

There are other factors considered to contribute to resilience. Chen et al. (2016) observe that a banking sector characterized by a higher degree of competition is less susceptible to shocks, implying higher resilience. The stabilising effect of a higher degree of competition is supported by Beck et al. (2006) and Schaeck et al. (2009). Some studies suggest that more concentrated banking systems are likely to be more resilient due to large banks' ability to diversify their risks (Beck et al., 2006). This is contrary to the 'too-big-to-fail' risk, which became evident during the GFC. Whereas the resilience of Canada and Australia during the GFC seemed to support higher concentration, the experience in Switzerland and the Netherlands with equally concentrated financial systems proved otherwise. However competition and concentration differ, and academic studies need to distinguish between the two concepts (OECD Competition Commission, 2010). Arch (2020) finds that concentration does not imply the absence of competition or its stabilizing benefits; thus, earlier ambiguous findings on the impact of competition could be a definitional issue. An OECD roundtable on competition, concentration, and stability in the banking sector finds that concentration and competition are not the same , and concentration is not an appropriate proxy for competition (OECD Competition Commission, 2010).

Subsequently, the research considers what concentration is and how it differs from competition. "*A competitive situation is one where individuals with different and opposed interests seek to maximize their own advantages or rewards. In economic theory, the competition between buyers and sellers of commodities in the market is held to reduce prices, equalize profits in different enterprises, and promote the efficiency of production*" (Abercrombie et al., 2006). The Routledge dictionary of economics defines concentration as "*the extent to which an industry is dominated by a few firms*" (Rutherford, 2013). The World Bank recognizes that competition has to do with the contestability (i.e., the ease of entry into and exit from) of the banking industry. Extending these definitions to the banking industry, competition should lead to greater efficiency and cheaper services, while concentration implies that only a few banks dominate the industry, which could lead to "too-big-to-fail" risk. The higher capital requirements and more stringent supervision required by the BCF could serve as entry barriers, causing less competition, more concentration, and greater resilience. The World bank distinguishes between measures for concentration, which include the Concentration ratio and the Herfindahl-Hirschman index (HHI) and measures for competition,

which include the Panzar-Rosse H-statistic, the Lerner index, and the Boone indicator (The World Bank, 2016). However, both factors are likely interrelated, and this should be borne in mind in the assessment of resilience. Regrettably, the academic literature is not unanimous concerning the factors that lead to universal resilience. However, a lack of competition and the presence of concentration appear to be important issues to be considered in the pursuit of stability.

3.2.2 The impact of capital requirements on resilience and efficiency

One expectation of the implementation of the BCF is improved resilience in the banking sector (Basel Committee on Banking Supervision, 2006). Logically, it is believable that different characteristics of the banking sector and its environment would dictate the level of resilience achieved. However, there is no consensus in the literature that these measures apply in Africa. Allen and Wood (2006) argue that capital regulation does more harm than good as the minimum requirements are arbitrary. Kasekende et al. (2012) observe that most African banks already hold capital in excess of global standards, even without the formal adoption of Basel III. However, given that banks in Africa face much greater volatility in the value of their assets, they maintain that an effective prudential regime must include restrictions on risk exposure. On the one hand, Triki et al. (2017) argue that the impact of capital stringency in Africa depends on the bank's size and risk level. On the other hand, Fratzscher et al. (2016) state that higher capital buffers improved bank stability after the GFC in the Euro area. Admati and Hellwig (2012) adopt the opposing view that capital regulation under Basel III is not stringent enough. Other views supporting Fratzscher et al. (2016) on the positive impact of capital requirements on bank stability include those of Baker and Wurgler (2015), who find that higher capital requirements lead to lower idiosyncratic risk in banks.

Yakubu and Bunyaminu (2021) observe that stringent regulatory capital standards are imperative for banking stability in Sub-Saharan Africa. However, they studied the entire 2000–2017 period without comparing the pre- and post-Basel implementation years. Adesina and Mwamba (2016) also find that higher common equity capital is associated with lower bank risk in Africa. This contradicts Koehn and Santomero (1980) who find that capital regulation leads banks to take more risks, increasing the probability of failure. However more recently, studies by Oyetade et al (2022) and Ogunleye (2018) confirm that increased capital requirements improve banking system resilience in Nigeria. This study therefore expects a

positive impact of the BCF on all African countries subject to country-specific peculiarities, macroeconomic factors, and regulatory and business environments. Based on the disputed views in the literature, this study therefore proposes the following hypothesis:

Hypothesis 1: *The impact of the Implementation of the Basel II/III Capital Framework on the resilience of banking systems in Africa is not uniform across all countries as it will depend on macroeconomic factors, the regulatory environment, and idiosyncratic factors.*

3.2.3 The impact of capital requirements on credit supply and performance

The financial intermediation theory of banking claims that banks collect deposits and then create credits out of these (Werner, 2016). In the fractional reserve theory of money creation, the lending ability of banks is limited by the deposits they can mobilise, and reserve requirements (Wang et al, 2020). The credit creation theory of banking does not consider banks as financial intermediaries but argues that each bank creates money newly when granting a bank loan. Banks create bank deposits as a result of lending. Consequently, the amount of money that a bank can create is not constrained by their deposit taking activities and the act of lending creates new purchasing power that did not previously exist (Starkey 2018, Werner 2016, McLeay et al. 2014). According to these theories, lending depends on the willingness and ability of banks to grant loans. However, they do not consider the impact of defaults on these loans which lead to unexpected losses which must be buffered by capital. Basel III is expected to provide incentives for undiminished credit supply in the face of economic shocks through the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). It is also expected to ensure increased high-quality capital to absorb unexpected losses (Basel Committee on Banking Supervision, 2011).

Empirically, regarding credit supply, Onoh and Iheanacho (2016) find that the 2005 regulatory-induced bank consolidation exercise in Nigeria had a positive effect on credit. Ben Naceur and Kandil (2013) find that Egypt, Jordan, Lebanon, Morocco, and Tunisia experienced significant increases in credit growth after the implementation of Basel I, which strengthened capital requirements and is expected to indicate the likely impact of further tightening. Contrarily, Repullo and Suarez (2008) find that the higher buffers required by Basel II are insufficient to prevent a contraction in credit supply in the event of a recession. Taylor and Goodhart (2006) and Gordy and Howells (2006) assert that Basel II could force banks to curtail credit supply due to the need to hold capital commensurate with potential losses during

economic downturns. In contrast, studies show that the BCF, specifically by strengthening supervisory independence, helped reduce the decline in domestic credit in the euro area (Fratzscher et al., 2016). Triki et al. (2017) find that less competition, which could result from capital regulation, enhances efficiency in credit supply. One would expect such efficiency in intermediation activities to improve bank performance and, ultimately, resilience. However, Triki et al. (2017) find that more stringent capital requirements do not generally enhance the efficiency of banks in Africa but rather only benefit large and low-risk banks.

Ghanem (2017) finds an increase in credit growth following the implementation of capital regulations in the Middle East and North Africa (MENA) region. Nonetheless, this does not cover the whole of Africa, which is aligned with the aim of this study. Regarding the liquidity components of the BCF, Adesina (2019) argues that Basel III liquidity requirements could exert significant positive effects on bank loan growth rates in Africa. However, balance sheet proxies replaced the liquidity coverage and net stable funding ratios, as most African countries have yet to adopt Basel III. These discussions lead to the following hypothesis:

Hypothesis 2: *Implementation of the Basel II/III Capital Framework in Africa leads to increased credit supply in Africa.*

In general, there is a positive relationship between banking stability and performance. Banks that are stable and well-managed are more likely to be profitable, attract and retain customers, and maintain competitiveness[10]. Theoretically, the profitability determinants of banks are divided into two main categories - internal determinants and external determinants. The internal determinants include factors that can be controlled such as liquidity, investments in securities and subsidiaries, loans, non-performing loans, and overheads. Other determinants are savings, deposits, and total capital reserves. External determinants include systematic factors such as interest rates, inflation rates, and GDP growth (Devinaga, 2010). Bhattacharya and Thakor (1993) from the review of the theoretical literature find that financial intermediation takes an informational approach. The unique funding of banks by depositors gives them both an incentive advantage and an informational advantage in lending to firms with insufficient information to borrow in public debt and equity

[10] McKinsey's Global Banking Annual Review | McKinsey

markets. This should improve performance. However, the ability of banks to perform efficiently also depends on the legal and regulatory environments in which they operate. Differences in these features across political jurisdictions can lead to differences in efficiency (Hughes and Mester, 2013). Similarly, other literature on the theory of banking examines the economic functions of banks in environments in which agents are asymmetrically informed. Another considers the incentive effects (moral hazard) resulting from deposit insurance. Both theories make predictions about the relationship between banking firm size and performance (Boyd and Runkle, 1993). The BCF is also expected to provide incentives for better risk management, improved efficiency and thus better performance.

Empirically, some studies have found that more stringent capital requirements enhance bank performance (Chortareas et al., 2012). Bitar et al. (2016) also find in their study of the MENA region that compliance with the BCF improves efficiency and profitability. Ben Naceur and Kandil (2009) further find that capital requirements have a positive impact on performance in Egypt.
Based on these findings, the following hypothesis is proposed:

Hypothesis 3: *Implementation of the Basel II/III Capital Framework in Africa improves the performance of its banking systems.*

3.2.4 Macro- and microeconomic factors

There is academic consensus that macroeconomic factors, such as loose monetary policy and global imbalances, in addition to the quantity and quality of capital, led to asset bubbles that contributed to the GFC. Loose monetary policy contributed in the sense that too much money was allowed to remain in circulation including funds flooding into the United States from China and other developing countries in search of higher yields. When the Federal Reserve Bank decided to raise interest rates, prices of assets including Mortgage-Backed Securities crashed. Many banks had used short term liabilities to fund long term assets, leading to a maturity mismatch that eventually resulted in a string of bank insolvencies and eventually the crisis (The Financial Crisis Inquiry Commission, 2011). This was further aggravated by microeconomic factors. Microeconomic factors focus on individual countries financial sectors, as opposed to the global or national economy. Such factors include weak regulatory and

institutional frameworks, funding structures of banks, and financial innovations (OECD Competition Commission, 2010). The effects of these macro and micro factors would be a weakening of banking sector resilience or instability. Calomiris and Haber (2015) further suggest that the stability of a country's banking system and the availability of credit are dictated by the political structures from which its governing institutions evolve. These factors are considered in this study.

3.2.5 Measures of banking system resilience

The World Bank (2013), in its Global Financial Development Report, on the fourth anniversary of the Lehman Brothers' collapse, emphasized the need for strong regulation, supervision, and healthy competition to build resilience. It utilizes five categories of variables as measures of stability: Z-score, capital adequacy ratio, asset quality ratio, liquidity ratios, and others, such as the net open position. Another method that could be used to predict impending insolvency is the reference point method-based classifier which has also been found to deliver high predictive performance (Ouenniche et al., 2017).

The use of a Z-score for the prediction of the failure of an entity has its roots in the work of Edward Altman 1968 who asserted that the sequential use of financial ratios was ineffective and that amalgamating them into a single score would provide better predictions than individual ratios. He thus came up with a framework that could predict the failure of manufacturing firms two years in advance (Altman, 1968). He further underscored the importance of internal controls. However, in the case of banks, individual accounting ratios are especially vulnerable to creative accounting and manipulation. Also, other factors, such as contagion from other distressed banks, could lead to insolvency. Other researchers later introduced the volatility of earnings as a measure of risk into the assessment (Boyd and Graham, 1986, Wall, 1987). The Z-score is now commonly used as a measure of stability (Boyd and Runkle, 1993, Fratzscher et al., 2016, Čihák and Schaeck, 2010) and can predict bank failure with 76% accuracy in the United States (Chiaramonte et al., 2016). Suss and Treitel (2019) also find a significant negative relationship between the Z-score and bank failure probability in the United Kingdom.

The Z-score is defined as the ratio between a bank's return on assets (ROA) and its capital ratio, divided by the standard deviation of its ROA. It measures the number of standard deviations of bank returns from insolvency; therefore, the higher the value, the further the

industry is from insolvency, and the more stable it is (Fratzscher et al., 2016). It captures the default probability of a country's banking system by comparing its buffers (i.e., capitalization and returns) with the volatility of those returns (Cihak et al., 2012), as reflected in the following equation:

Equation 1

$$Z\text{-score} = (ROA + (Equity/Total\ Assets)) / \sigma_{ROA} \quad (1)$$

The Z-score captures the probability of default of a country's banking system. It compares the buffer of a country's banking system (capitalization and returns) with the volatility of those returns. The standard deviation of ROA is calculated by the World Bank for country-years with no less than 5 bank-level observations. ROA, equity, and assets are country-level aggregate figures. They are calculated from underlying bank-by-bank unconsolidated data from Bankscope and Orbis.[11]

Chortareas et al. (2012) and Ben Naceur and Kandil (2009) find that more capital enhances bank performance, which in turn increases return on assets and the Z-score, as long as it does not increase volatility. Boudriga et al. (2009) also find that a higher capital adequacy ratio leads to a reduction in non-performing loans (NPLs) which should also increase the capital-to-assets ratio in the numerator of the Z-score.

3.3 Implementation of the Basel Capital Framework in Africa

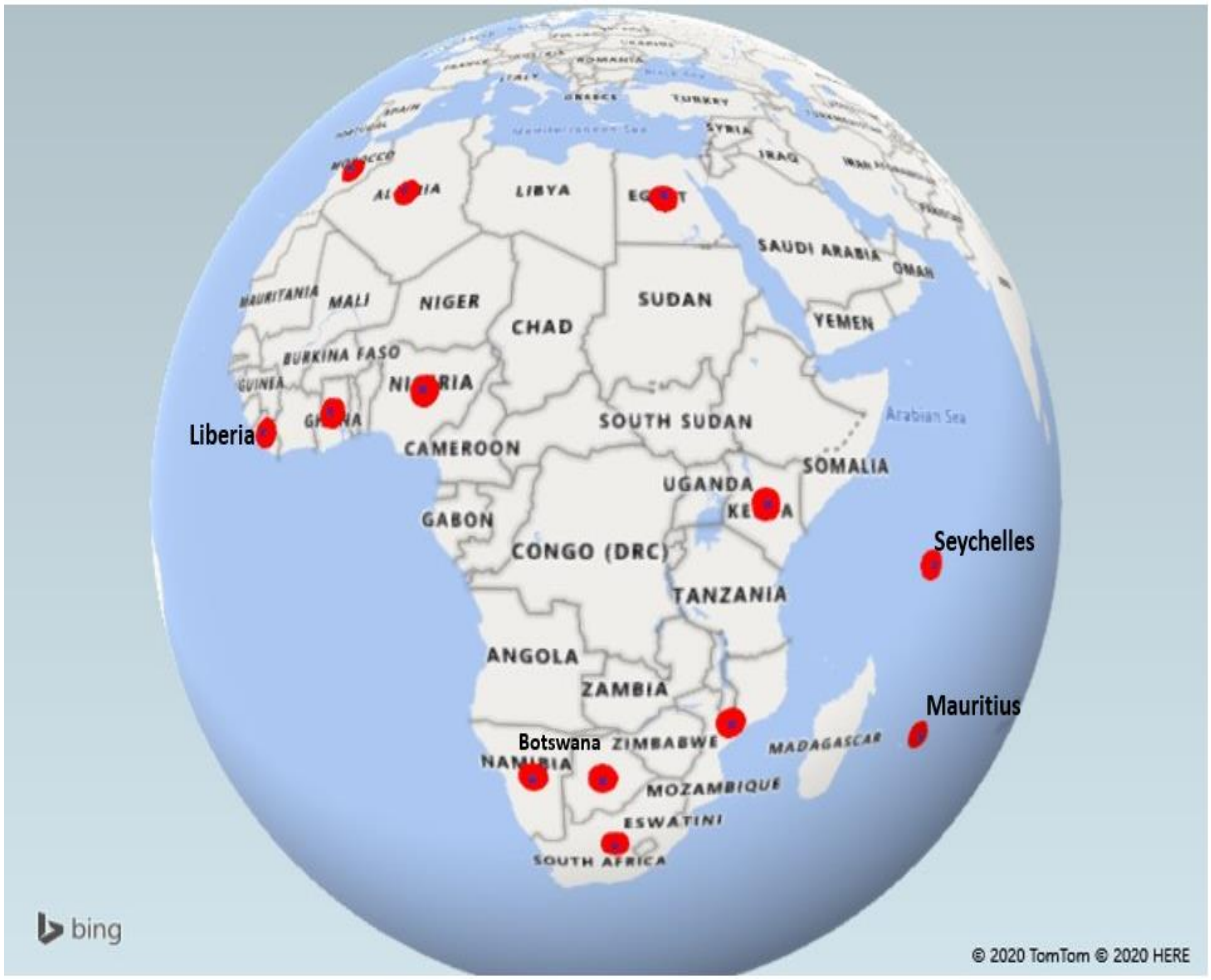
3.3.1 Peer group in Basel Implementation

Figure 3-2 shows the countries included in this study. The twelve African countries that had implemented the BCF were selected to test the general effect of these reforms in Africa. These countries represented the entire population that had implemented the BCF as of 2017. Of these, all except Egypt are Sub-Saharan African countries that share many similarities, both geographically and culturally. They all belong to regional communities, which may affect their economic and financial policies. Egypt, Algeria, and Morocco belong to the Greater Arab Free Trade Area (GAFTA), whereas Nigeria, Ghana, and Liberia belong to the Economic Community of West African States (ECOWAS). South Africa, Seychelles, Botswana, Mauritius,

[11] Glossary | DataBank (worldbank.org)

Mozambique, and Namibia belong to the Southern African Development Community (SADC) and Kenya, the only country in East Africa that had implemented Basel II as of 2017, belongs to the East African Community (EAC) (United Nations Economic Commission for Africa, 2020).

Figure 3-2 Basel II/III Capital Framework Adoption in Africa as of 2017 (12 countries)



Source: created by author using FSI data and Microsoft Bing maps.

. A Financial Stability Institute (2015) survey breaks down the three pillars of Basel II into ten components: Credit risk – Standardised Approach (SA), Foundation Internal Ratings Based Approach (FIRB), Advanced Internal Ratings Based Approach (AIRB); Operational risk – Basic Indicator Approach (BIA), Standardised Approach (TSA), Advanced Measurement Approach (AMA); Market risk – Standardised Measurement Method (SMM), Internal Models (IM); Supervisory Review – Pillar 2 (P2); Disclosure – Pillar 3 (P3). The extent of adoption of the BCF by the 12 African countries that had implemented Basel as of 2017 is shown in Table 3.2.

Table 3.2 - Extent of adoption of Basel Capital Framework by African countries

Country	Regional Community	No of elements implemented in Pillar 1	Elements implemented	P2	P3	Basel III	Elements implemented	Year implemented
South Africa	SADC	8	All elements	Yes	Yes	8	All	2008
Mauritius	SADC	5	SA, BIA, TSA, AMA, SMM	Yes	Yes	3	Def-cap, CCB, D-SIB	2008
Namibia	SADC	4	SA, BIA, TSA, SMM	Yes	Yes	1	LR	2010
Seychelles	SADC	1	BIA	NA	NA	0	NA	2010
Botswana	SADC	3	SA, BIA, TSA	NA	NA	0	NA	2013
Mozambique	SADC	3	SA, BIA, TSA	Yes	Yes	0	NA	2014
Morocco	GAFTA	3	SA, BIA, TSA	Yes	Yes	3	Def-cap, CCB, D-SIB	2008
Egypt	GAFTA	2	SA, BIA	Yes	Yes	0	NA	2012
Algeria	GAFTA	3	SA, BIA, SMM	Yes	Yes	0	NA	2014
Kenya	EAC	2	BIA, SMM	NA	NA	3	Def-cap, CCB, D-SIB	2013
Liberia	ECOWAS	1	SA	Yes	NA	1	LR	2013
Nigeria	ECOWAS	3	SA, BIA, SMM	Yes	Yes	1	D-SIB	2014
Ghana	ECOWAS	0	NA	NA	NA	NA	NA	2018

Source: The Financial Stability Institute (2015). Notes: P2 – Pillar 2, P3 – Pillar 3

Table 3.2 indicates the countries that had implemented some of the eight elements of Basel III, namely, capital definition (Def-cap), liquidity coverage ratio (LCR), risk coverage, capital conservation buffer (CCB), countercyclical capital buffer, leverage ratio (LR), domestic systemically important bank (D-SIB) standard, and global systemically important bank (G-SIB) standard. It further shows the influence and similarity of the extent of adoption between all countries in different economic regions. Even though implementation levels differ, the change in quantity and quality of capital is equivalent across the board. Furthermore, the objective is the same, namely achieving improved banking system resilience, credit supply, and performance. Thus, the impact of the BCF at an aggregate level can be evaluated by comparing the pre- and post-implementation periods.

Further review of International Monetary Fund (IMF) country reports, Financial System Stability Assessment reports, and Central Bank websites of other African countries shows that an additional 17 countries had implemented Basel II and some elements of Basel III between 2018 and mid-2021. These were Angola, Benin, Burkina Faso, Cabo Verde, Chad, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Eswatini, Ghana, Madagascar, Malawi, Mauritania, Sudan, Tanzania, Zambia, and Zimbabwe, bringing the total number of African countries to adopt the BCF to 29, as of June 2021. This was further verified in a study by the Standard Bank Group on the adoption and implementation of Basel recommendations in the African financial system context (Campbell, 2020). However, this analysis considers countries that had adopted the BCF as of 2017 using data from 2000 to 2018. This ensures that only countries

that have reached a reasonable level of maturity in the new capital framework and that have sufficient pre and post implementation data are included in the analysis. It is expected that the results will be generalizable to other countries in Africa.

3.3.2 Empirical strategy

Following Jones' (2019) finding that countries contiguous with each other have similar levels of Basel implementation, this study examines all countries in Africa, totalling 12 that had implemented the framework as of 2017. The empirical link between Basel reform implementation in African countries and banking sector resilience is investigated in view of the many similarities between these countries. The aim is to determine whether the widely held notion of resilience, performance and sustained credit supply holds true. The study covers 12 of 54 countries in Africa because this is the total population that had adopted the BCF as of 2017. As the intention is to evaluate the impact of the BCF on the resilience of each country's banking system and make inferences for the rest of Africa, the sample size is considered adequate since it represents the entire population. As the literature discusses, a small sample size is justifiable when measuring the entire population as it represents all the data that is available and this does not limit the ability to make inferences (Lakens, 2021, Spiegelhalter, 2019).

As the BCF comprises the prudential practices of banking systems, the first step is to establish a relationship between these practices and resilience. Equation (2) tests this relationship in Africa, utilizing the various measures specified by the BCBS and the World Bank's Z-score, capital adequacy ratio, asset quality ratio, and liquidity ratio to measure resilience. The Z-score was used as the dependent variable, whereas the independent variables were as follows: capital-to-assets (CAP) ratio as a measure of leverage, regulatory capital to RWA (CAR) as a measure of the size of the risk buffers, liquid reserves (LQR) as a measure of liquidity risk, NPL as a measure of asset quality, degree of concentration (Conc), and cost-to-income (CTI) ratio as a measure of efficiency. The model was implemented in both a static and dynamic approach, using lagged values of regulatory capital. According to the literature, we can anticipate a positive association of CAP, CAR, and LQR with resilience and a negative association for NPL and CTI though the association with concentration remains unclear.

Equation 2

$$y_{it} = \beta_0 CAP_{it} + \beta_1 CAR_{it} + \beta_2 LR_{it} + \beta_3 NPL_{it} + \beta_4 Conc_{it} + \beta_5 CTI_{it} + \varepsilon_{it} \quad (2)$$

The analysis utilized a random effects estimator in an ordinary least squares (OLS) estimation of 247 annual observations. The choice of a random effects estimator was based on both the Breusch-Pagan Lagrange Multiplier (LM) test and the Hausman test. The Breusch-Pagan Lagrange Multiplier (LM) test evaluated the random-effects model based on the OLS residual, as the estimator would be inconsistent if individual-specific effects were correlated with the regressors, in which case a fixed effects estimator would be more appropriate. The test confirmed the appropriateness of either a random or fixed effects estimator. The Hausman test was then used to determine if a significant difference existed between the fixed and random effects estimators. Herein, no significant difference was found; therefore, the random effects estimator was selected as it is consistent and more efficient (Cameron et al., 2005).

The main objective of the study is to investigate whether implementation of the BCF improved resilience, the performance of the banking sectors, the supply of credit, and ultimately, the real economy in Africa. In a first step, a two-sample t-test of the average Z-score and credit supply was conducted using data from before and after BCF implementation in each of the countries to establish if any statistically significant change in resilience occurred. To rule out mere associations or correlations, a causal effect was established in a second step by utilizing panel data of pre and post BCF variables, holding other relevant factors fixed. The model to establish causality is shown in Equation (3) which estimates the impact of BCF implementation by controlling for the structure of the banking system, macroeconomic factors, and the business environment.

Equation 2 is a preliminary test to assess if there is a relationship between prudential ratios and resilience. If there is none, there would be no point proceeding to prove causality which Equation 3 does. To prove causality, different macroeconomic factors and business environments are held constant so that the only remaining effect could be attributed to the BCF.

The literature suggests that the current Z-score, as a measure of resilience, is influenced by both internal and external factors, including the previous level of the Z-score, macroeconomic conditions, and the competitive environment. Specifically, several authors argue that the level of the Z-score reflects the bank's capital adequacy, asset quality, profitability, and

liquidity, and that these factors are affected by macroeconomic conditions such as interest rates, inflation, and economic growth. Furthermore, they suggest that the Z-score is a relative measure that depends on the distribution of Z-scores across the banking industry, as well as the specific business model and risk management practices of each individual bank (Altunbas, et al, 2011, Gande & Paudyal, 2010, Shen & Chen, 2010, Sironi, 2003)

From the foregoing, the level of resilience of banking systems is considered highly dependent on the previous level of the Z-score in addition to macro-economic and business environments. Since the objective is to assess the contribution of the BCF from each country to overall stability in African banking systems, the post BCF lagged Z-score of each country was used as explanatory variables while the dependent variable is the overall Z-score both pre and post BCF.

Equation 3

$$y_{it} = \beta_0 + \beta_1 (BCF_i \times \Delta Reg_{i,\, t-1}) + \beta_2 GDP + \beta_3 Inflation + \beta_4 Business\ Environment + \beta_5 Conc + \varepsilon_t \quad (3),$$

where y_{it} is the dependent variable (Z-score, performance, or credit supply), i is the country index, and t is the time index. BCF_i is a dummy variable that assumes the value of 1 for years after Basel II/III implementation and 0 otherwise in each country. $\Delta Reg_{i,\, t-1}$ is the lagged average Z-score after the year of BCF implementation. The interaction term $BCF_i \times \Delta Reg_{i,\, t-1}$ captures the combined effect of BCF implementation and regulatory changes. β_1 captures the extent of change in resilience, performance, and credit supply after BCF implementation. To establish a causal connection, variables that could obscure the coefficient of interest were included as controls to enable valid inferences (Angrist and Pischke, 2008). These variables are Gross Domestic Product (GDP), Inflation, Business Environment, and Concentration, whereas ε_{it} represents the error term. The Breusch-Pagan LM test ruled out heteroscedasticity; however, as the data were from the same countries over a 19-year period, a random or fixed model was deemed more appropriate. According to Wooldridge (2015), pooled regressions should only be used for different samples over time. The Hausman test produced significant differences in the random and fixed effects estimations of the coefficients. Thus, a fixed-effects model was chosen that would address unobserved heterogeneity among the countries, ensure consistency in estimations, and is more credible for policy evaluation using aggregated data (Wooldridge, 2015). Two approaches were used

to test for endogeneity: first, the suspected endogenous variables ($BCF_i \times \Delta Reg_{i,\ t-1}$) were regressed on their lagged values as instruments and a complete set of time dummies; the residuals were retrieved. The dependent variable was regressed on the explanatory variables, a full set of time dummies, and the residual. The coefficient on the residual was not statistically significant, implying that endogeneity is unlikely. To further verify this position, regressions were performed using both instrumental variables (xtivreg2) and a fixed estimator (xtreg). The Kleibergen-Paap LM and Cragg-Donald Wald F statistics respectively showed that the endogenous variables were not under-identified, and the instruments were not weak. The estimates of the coefficients were not systematically different, implying the absence of endogeneity, and instrumental variables were not required. In addition, as the dependent variable is likely to be dependent on its previous values, GMM was used in the estimation to control for endogeneity and omitted variable bias – Xtivreg2 using Stata software. It was used as robustness test for the fixed effects model.

Therefore, the conclusions of the analysis are based on fixed estimator regressions.

3.3.3 Data and summary statistics

Data were obtained on the dependent and independent variables of 13 African countries, including 12 that had implemented the BCF as of 2017. The most current data available from the World Bank database, covering the 19-year period from 2000 to 2018, were analysed, giving rise to 247 observations made annually. The data were obtained as follows:

1. Domestic credit to the private sector as a percentage of GDP, GDP, and inflation figures were obtained from the World Development Indicators database of the World Bank. Domestic credit to the private sector captures the level of credit provided to the private sector by deposit-taking institutions other than monetary authorities. The GDP, constant at 2010 prices, was used in the analysis (The World Bank, 2020b).
2. Data on Z-scores, liquid reserves to total assets, capital to total assets, regulatory capital to RWA, NPLs to gross loans, concentration, and CTI ratios were retrieved from the Global Financial Development Database of the World Bank (The World Bank, 2019). Concentration is measured as the share of total assets held by the country's three largest banks, calculated using underlying bank-by-bank unconsolidated data from Bankscope. The lower the ratio, the lower the degree of concentration.

3. Data on the status of Basel implementation in various African countries were obtained from the Financial Stability Institute survey (Financial Stability Institute, 2015). Although the date of the survey was 2015, the report contains the expected dates of implementation. The actual implementation was confirmed from the various country websites.

Table 3.3 provides descriptive statistics of these variables.

Table 3.3 - Summary statistics

Variable		Mean	Median	Std. Dev.	Min	Max	Skew	Observations
Bank Z-score	overall	14.44	12.48	10.07	1.07	47.34	1.58	N = 247
	between			8.87	4.40	39.17		n = 13
	within			5.35	5.45	44.85		T = 19
Credit to GDP (%)	overall	51.63	26.13	200.24	1.85	2532.22	11.06	N = 247
	between			60.89	12.63	240.59		n = 13
	within			191.47	-187	2343.26		T = 19
Concentration (%)	overall	66.74	65.50	19.76	23.32	100.00	-0.05	N = 180
	between			17.20	43.25	100.00		n = 11
	within			12.68	35.97	103.44		T = 16.4
Cost-to-income ratio (%)	overall	56.50	54.74	17.56	19.90	189.87	2.41	N = 226
	between			14.44	31.58	89.05		n = 13
	within			11.68	21.34	157.31		T = 17.4
NPLs to Gross Loans (%)	overall	11.96	7.20	11.48	1.10	51.77	1.38	N = 174
	between			9.66	2.33	37.57		n = 12
	within			5.89	1.05	35.39		T = 14.5
Regulatory capital to RWA (%)	overall	15.67	15.29	3.88	1.75	27.10	0.24	N = 165
	between			3.06	11.89	21.85		n = 12
	within			2.83	1.53	23.45		T = 13.8
Capital to Total Assets (%)	overall	9.25	8.57	2.82	1.49	17.70	0.77	N = 157
	between			2.18	5.78	13.88		n = 12
	within			1.84	0.40	16.61		T = 13.1
Liquid Reserves to Total Assets (%)	overall	21.38	20.2	20.56	1.76	115.72	0.77	N = 228
	between			16.81	3.85	59.62		n = 13
	within			12.50	-20.78	81.06		T = 17.5

Source: Data from The World Bank (2019) were used in the authors' calculations. Note: N: No of observations; n: no of countries; T: no of years

Table 3.3 reports the means as well as between- and within-country variations (standard deviations) of the variables selected for the 13 African countries over 19 years. The resilience measure—the Bank Z-score—has a mean of 14.44, with the lowest and highest scores being 1.07 and 47.34, respectively. The higher the score, the greater the distance to insolvency. The overall variation is explained mainly by varying degrees of resilience between the different countries rather than within the same country over time. Credit to GDP has a mean value of 51.63% and ranges from 1.85% to 2532.22%. The variation appears to be primarily due to different policies within countries over time. Further analysis showed that this effect was largely driven by Liberia. While outliers are not removed, they are accounted for in the regressions by incorporating country-specific fixed effects and time effects to present a comprehensive analysis. Nevertheless, explanations for extreme values, such as in the case of Liberia, are provided to give further insight. Table 3.4 contains the correlation matrix of the regressors.

Table 3.4 - Correlation table

	LQR to TA (%)	Cap to TA (%)	Reg cap to RWA (%)	NPLs to GL (%)	Conc (%)	C_ GDP (%)	CTI (%)
LQR to TA (%)	1						
Cap to TA (%)	0.0236	1					
Reg cap to RWA (%)	0.0804	0.5989	1				
NPLs to GL (%)	0.4066	-0.0145	-0.2594	1			
Conc (%)	-0.1662	-0.3603	-0.0942	-0.209	1		
C_ GDP (%)	-0.5686	-0.353	-0.2127	-0.3452	-0.0182	1	
CTI (%)	0.0995	-0.0606	-0.3289	0.1056	0.05	-0.3238	1

Notes: LQR to TA: Liquid reserves to total assets; Cap to TA: capital to total assets; NPLs to GL: non-performing loans to gross loans; Conc: concentration; C_ GDP: credit to GDP; CTI: cost-to-income ratio

None of the coefficients exhibits a strong correlation with each other, indicating that multicollinearity is not a concern.

3.4 Empirical results reflecting the impact of the BCF in Africa

Observations from the 13 African countries are evaluated to investigate the relationship between the Z-score and prudential ratios, the results of which are shown in Table 3.5.

Table 3.5 - General impact of prudential ratios on bank resilience (Bank Z-score) in Africa

Variables	Bank Z-score	Bank Z-score + Lagged Regulatory Capital
Concentration	-0.005	-0.010
	(0.015)	(0.015)
Cost to Income	-0.045	-0.072***
	(0.029)	(0.026)
NPLs to Gross loans	-0.054*	-0.079**
	(0.032)	(0.034)
Regulatory Capital to RWA	-0.22**	-0.162*
	(0.099)	(0.085)
Lagged Regulatory Capital to RWA		0.198***
		(0.065)
Capital to Total Assets	0.376***	
	(0.126)	
Liquid Reserves to Assets ratio	-0.076**	-0.069**
	(0.029)	(0.029)
Constant	18.62***	19.74***
	(3.741)	(3.779)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. Estimated using Fixed effects (Xtreg – Stata software)
R-squared: overall = 0.1066, within countries = 0.1974, between countries = 0.1259, rho = 0.9614

The regressions give the goodness of fit of the model overall, within and between countries. The rho coefficient shows the proportion of variation in the dependent variable (Z-score) explained by the country -specific effects. The second regression (column 3) omits capital to total assets ratio because of its high correlation with Regulatory Capital to RWA. Lagged Regulatory Capital to RWA is included in the second regression to determine if the prior year value of regulatory capital has a positive impact, even though current regulatory capital has a negative impact as shown in columns 2 and 3.

On the one hand, table 3.5 shows that concentration does not have a significant impact on resilience in Africa. This is not surprising as the literature is divided on its impact. On the other hand, as expected, NPLs have a statistically significant negative impact. Efficiency measured by the CTI ratio also has a statistically significant negative impact. This is expected as inefficiency reduces returns, which in turn reduces capital buffers and resilience. The CAP ratio portrays a significant positive relationship, while regulatory capital has a lagged positive effect. Although an initial negative impact is revealed, regulatory capital improves resilience in the following year. This is logical, as compliance with regulatory capital requirements could initially constrain risk assets but subsequently lead to improved risk management, reduced

losses, and increased capital buffers. The liquid reserves to assets ratio surprisingly shows a significant inverse relationship with resilience, possibly because higher liquid reserves imply lower loan supply and consequently, lower returns. In turn, lower returns reduce capital buffers. These findings are similar to those of the conclusions of Chortareas et al. (2012) that an inverse relationship exists between capital and productivity in developing compared with developed countries. They point to the level of economic development and excessive government interference in developing countries as an explanation. The rho estimate derived from the random effects regression shows that 96% of the variation in resilience (Z-score) was the result of country-specific differences. Based on evidence from the results that the various prudential ratios significantly impact resilience in Africa, the following section investigates if implementing the BCF improves resilience.

3.4.1 Impact of the BCF on banking system resilience

To analyse the impact of the BCF on the resilience of banking systems in Africa, a two-sample t-test on the equality of the average Z-scores before and after implementation of the BCF was conducted as a first step. The results are presented in Table 3.6.

Table 3.6 - Bank Z-score: Two-sample t-test of Z-score before and after implementation of Basel II

Country	Implementation Year	Pre-Basel Z-score	Post-Basel Z-score	Change	p-value
Nigeria	2014	15.375	15.684	0.308	0.863
Kenya	2013	15.713	20.044	4.332***	0.002
Egypt	2012	14.824	20.234	5.410***	0000
South Africa	2008	18.425	14.331	-4.095	0.221
Seychelles	2010	8.366	9.939	1.573	0.168
Algeria	2014	13.058	20.585	7.527**	0.017
Botswana	2013	7.829	8.65	0.821	0.258
Liberia	2013	5.357	5.782	0.425	0.870
Mauritius	2008	19.488	15.709	-3.779**	0.021
Morocco	2008	36.684	41.114	4.430***	0.004
Mozambique	2014	4.171	4.968	0.796	0.350
Namibia	2010	22.889	8.745	-14.143*	0.062

Notes: 'Pre-Basel' is defined as the period from 2000 up to the year of the country's implementation of the framework, while 'post-Basel' runs from the year following implementation until 2018. The year of implementation is omitted from the analysis. *** p<0.01, ** p<0.05, * p<0.10

The mean Z-scores for 9 of the 12 countries increased after implementation of the BCF compared to the mean before implementation. For Kenya, Egypt, Algeria, and Morocco, the increases are statistically significant, proving that the difference was not due to random chance. However, the Z-scores of South Africa, Mauritius, and Namibia decreased after implementation. These three countries belong to the same economic region and adopted the BCF to similar levels of stringency. Both South Africa and Mauritius adopted Basel III in 2017. Their proximity is a possible reason for the similarities in their financial policies and, consequently, their response to the BCF, as prior studies discuss (DiMaggio and Powell, 1983, Jones and Zeitz, 2019). Similarly, in their study of 42 African countries, Triki et al. (2017) find similar efficiency ratios, suggesting similarities in their mode of operation. The three mentioned countries belong to the Southern African Development Community (SADC), the objectives of which are to foster economic development and growth through regional integration. This gives credence to the findings of Jones and Zeitz (2019) that interdependence brings about the convergence of financial policies.

The analysis proceeds to establish causality. Consistent with the methodology of Fratzscher et al. (2016) and Equation 3, Table 3.7 shows the results of the panel regressions of each country's Z-score over the 19-year period on post-BCF implementation lagged Z-scores while controlling for macroeconomic factors. The aim is to test for a statistically significant improvement in resilience after the implementation of the framework. According to Ang (2014), economic growth and inflation are critical macroeconomic variables that affect asset value. Thus, the regressions control for GDP per capita and inflation as well as different business environments and levels of concentration in banking systems. The African countries post BCF lagged Z-scores, with each relevant year of BCF implementation added as a suffix, are used as explanatory variables. The coefficients of the countries capture the post-implementation change in resilience.

Table 3.7 - Impact of the BCF on African countries' banking system resilience

Dependent Variables	**Baseline**	**Baseline**	**GDP**	**GDP**	**_Bus Env**	**_Infla**	**_Conc**
	xtivreg2	xtreg	xtivreg2	xtreg	xtreg	xtreg	xtreg
	1	**2**	**3**	**4**	**5**	**6**	**7**
Nigeria14	0.009	0.009	0.036	0.039	-0.031***	-0.036***	-0.029*
	(0.030)	(0.011)	(0.041)	(0.035)	(0.010)	(0.011)	(0.016)
Kenya13	0.066***	0.063***	0.099***	0.088***	0.020*	0.024*	0.018
	(0.018)	(0.009)	(0.032)	(0.028)	(0.010)	(0.013)	(0.018)
South Africa8	-0.090	-0.122***	-0.090	-0.123***	0.022	0.017	0.020
	(0.063)	(0.031)	(0.062)	(0.030)	(0.031)	(0.033)	(0.032)
Egypt12	0.100***	0.082***	0.119***	0.095***	0.046***	0.042**	0.044**
	(0.018)	(0.009)	(0.028)	(0.018)	(0.015)	(0.015)	(0.017)
Seychelles10	0.009	0.006	0.051	0.038	-0.150***	-0.156***	-0.113***
	(0.044)	(0.028)	(0.057)	(0.032)	(0.024)	(0.046)	(0.030)
Algeria14	0.174***	0.171***	0.187***	0.181***	0.040***	0.036***	
	(0.028)	(0.010)	(0.035)	(0.019)	(0.009)	(0.010)	
Botswana13	0.044	0.033**	0.089*	0.073	0.031*	0.048**	0.027
	(0.031)	(0.012)	(0.048)	(0.044)	(0.015)	(0.020)	(0.025)
Liberia13	0.209	0.262***	0.219	0.262***	-0.257***	-0.263***	
	(0.205)	(0.014)	(0.205)	(0.019)	(0.016)	(0.017)	
Mauritius8	-0.100***	-0.137***	-0.056	-0.097**	-0.062**	-0.053	-0.077**
	(0.0342)	(0.031)	(0.048)	(0.042)	(0.026)	(0.033)	(0.029)
Morocco8	0.0007	-0.015	0.024	0.006	0.000	0.005	-0.013
	(0.020)	(0.023)	(0.028)	(0.027)	(0.018)	(0.023)	(0.022)
Mozambique14	0.189**	0.158***	0.280***	0.252**	0.106***		
	(0.085)	(0.020)	(0.105)	(0.096)	(0.025)		
Namibia10	-0.326***	-0.381***	-0.290***	-0.351***	-0.094***	-0.088**	-0.088***
	(0.115)	(0.029)	(0.109)	(0.031)	(0.025)	(0.029)	(0.024)
GDP pc (ln)			-0.492	-0.512	0.074	0.017	0.321
			(0.348)	(0.456)	(0.345)	(0.406)	(0.495)
Bus Env					0.002	0.002	0.001
					(0.002)	(0.003)	(0.003)
Inflation						0.042	0.001
						(0.039)	(0.030)
Concentration							0.003
							(0.007)
Constant		2.366***		6.339*	1.935	2.384	-0.170
		(0.048)		(3.533)	(2.807)	(3.365)	(4.296)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	234	247	234	247	130	118	95
R-squared	0.201	0.220	0.211	0.237	0.360	0.356	0.481
No of countries	12	12	12	12	12	12	10

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. Row 1 shows the dep. Var. - the average Z-score of the continent, with and without controls. The columns show the post BCF contribution of each country to resilience in Africa, estimated using fixed effects and Instrumental variables.

Columns 1 to 4 show the baseline fixed effects regression results with and without the instrumental variables, respectively. Columns 3, 4, 5, 6, and 7 introduce controls—GDP with instrumental variables, GDP without instrumental variables, business environment, inflation, and concentration, respectively. Time dummies from the first year of BCF implementation in Africa are included.

Table 7 shows mixed results. The baseline results without controls in Column 2 show that the BCF had a statistically significant positive effect on Kenya, Egypt, Algeria, Botswana, Liberia, and Mozambique. It also had a statistically significant negative effect on South Africa, Mauritius, and Namibia. However, after controlling for GDP, inflation, and the business environment, only Kenya, Egypt, Algeria, Botswana, and Mozambique reflected a statistically significant positive impact. For Nigeria, Liberia, Seychelles, Mauritius, and Namibia, the results were significantly negative. The following table summarizes the results:

Table 3.7B Summary of results

Country	Impact	Statistically Significant?
Nigeria	Negative	Yes
Kenya	Positive	Yes
South Africa	Positive	No
Egypt	Positive	Yes
Seychelles	Negative	Yes
Algeria	Positive	Yes
Botswana	Positive	Yes
Liberia	Negative	Yes
Mauritius	Negative	Yes
Morocco	Positive	No
Mozambique	Positive	Yes
Namibia	Negative	Yes

7 countries yielded a positive impact, out of which five were statistically significant. 5 countries revealed negative impacts all of which were statistically significant. Thus, the results support the hypothesis that the impact of the Implementation of the Basel II/III Capital Framework on the resilience of banking systems in Africa is not uniform across all countries as it will depend on macroeconomic factors, the regulatory environment, and idiosyncratic

factors. This could also be due to the varying degree of BCF implementation in the observed countries. A deeper quantitative dive is performed in chapter 4. It could also be due to the limitations of quantitative research as discussed by Nwogugu (2006) who recommends a qualitative risk context over quantitative models in developing countries. However, the results do show that the BCF could lead to improved resilience and the success of the reforms is critically dependent on macroeconomic factors, the business environment, and other microeconomic conditions of the country. Bearing in mind the limitations of quantitative research, a qualitative approach is deployed in chapter 3 and 4 to further explore these issues.

3.4.1.1 Rate of credit growth as a leading indicator of instability

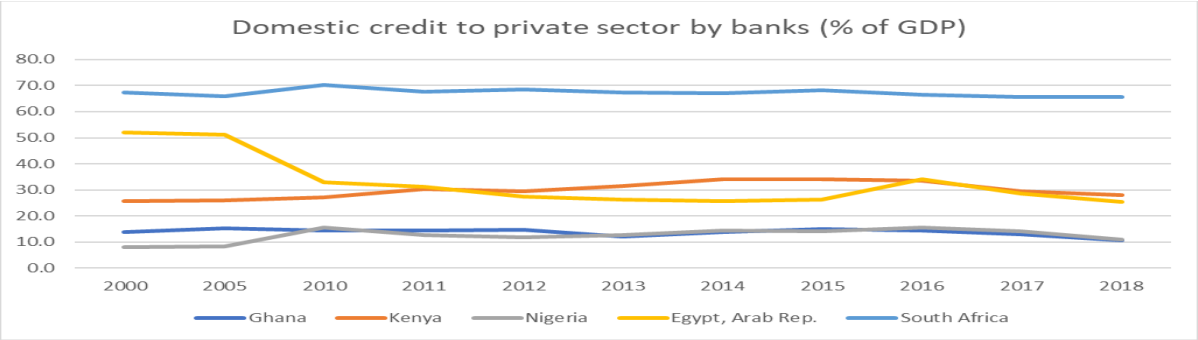
The Global Financial Development Report (2013) regards excessive credit growth as a reliable forward-looking indicator of financial instability. The IMF (2004a) reckons that about 75 per cent of credit booms in emerging markets end in banking crises. This view was earlier expressed by Mishkin (1999) who notes that instability occurs as a result of credit proliferating to the extent that the risk management structures of banks and supervisory resources cannot keep up. The view that rapid credit growth serves as an indicator of an impending crisis is also supported by Pazarbasioglu et al. (2005), Elekdag and Wu (2011), and Taylor (2015). But what then constitutes rapid credit growth? The IMF (2004a) defines a credit boom as a situation where credit growth is 1.75 times higher than the usual deviation around the long-term trend. Igan and Pinheiro (2011) state that a credit boom occurs if credit growth meets one of two conditions: (1) credit growth is 1.5 times faster than its historical trend and the annual growth rate of the credit-to-GDP ratio is higher than 10% (2) annual growth rate of the credit-to-GDP ratio exceeds 20%. The trend of absolute domestic credit as a percentage of GDP for countries representative of each economic sub-region from 2000 to 2018 is shown in table 3.8 and figure 3-3.

Table 3.8 – Absolute domestic credit as a percentage of GDP

Country	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ghana	13.8	15.4	14.6	14.4	14.7	12.1	13.7	14.9	14.4	12.9	10.7
Kenya	25.6	26.1	27.1	30.4	29.5	31.6	34.1	34.2	33.4	29.4	27.9
Nigeria	8.2	8.4	15.6	12.6	11.8	12.6	14.5	14.2	15.7	14.2	10.9
Egypt	52.0	51.2	33.1	31.2	27.4	26.2	25.6	26.3	34.1	28.5	25.5
South Africa	67.3	65.9	70.4	67.6	68.6	67.3	67.1	68.2	66.6	65.6	65.7

Source: World Bank Indicators

Figure 3-3- Trend of absolute domestic credit to the private sector in some selected African countries



Source: World Bank Indicators, Authors calculations

Using rapid credit growth as an early warning signal, the first condition for instability which is credit growing 1.5 times faster than its historical trend, was not met as the trend has been stable over the years, as shown in Table 3.8 and figure 3.

Table 3.9 shows the annual growth rate of credit to GDP for all the African countries that had adopted the BCF as of 2017.

Table 3.9 - Annual growth rate of credit to GDP (%)

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ghana	1.41	-0.28	-0.96	-0.20	0.35	-2.59	1.59	1.16	-0.45	-1.57	-2.13
Kenya	2.35	-0.35	2.20	3.29	-0.94	2.15	2.43	0.12	-0.75	-4.02	-1.50
Nigeria	5.94	1.49	-6.63	-3.05	-0.75	0.76	1.90	-0.29	1.46	-1.50	-3.25
Egypt	-2.72	-6.70	-3.02	-1.92	-3.77	-1.17	-0.62	0.71	7.82	-5.61	-2.97
South Africa	-1.61	-2.09	-4.24	-2.77	1.04	-1.36	-0.21	1.18	-1.64	-1.03	0.17
Seychelles	3.08	-7.80	4.37	-2.20	-0.80	-0.14	3.85	0.16	1.62	2.46	1.01
Algeria	-0.19	3.47	-1.05	-1.49	0.31	2.48	1.84	3.35	1.17	1.92	0.27
Botswana	3.12	3.13	-1.72	0.25	4.42	-0.02	-0.76	2.75	-2.26	-0.10	0.35
Liberia	0.81	1.84	1.50	0.99	-0.22	1.98	-0.51	1.26	0.48	1908.07	610.86
Mauritius	10.09	-1.72	5.23	3.98	9.54	7.46	-7.53	3.94	-6.44	6.10	-24.33
Morocco	5.14	2.60	3.54	3.58	1.22	-3.44	0.11	-4.50	0.20	-1.01	-0.53
Mozambique	3.97	5.75	2.13	-1.10	1.56	3.74	3.99	1.97	-1.03	-7.01	-2.01
Namibia	-1.67	1.42	1.13	0.18	-0.69	-0.19	1.48	2.62	-0.98	-1.79	0.29
Average change	2.29	0.06	0.19	-0.04	0.87	0.74	0.58	1.11	-0.06	145.76	44.33
Av. change exc Liberia	**2.29**	**0.06**	**0.19**	**-0.04**	**0.87**	**0.74**	**0.58**	**1.11**	**-0.06**	**-1.01**	**-2.66**

Source: World Bank Indicators, Author's calculations

The 2nd indicator of instability, which is the growth rate of the Credit to GDP ratio exceeding 10%, was also not met. Starting from 2008, the year of the first implementation of Basel II/III in Africa, the continent (except for an outlier country – Liberia) had never met any of the two conditions that point to an impending crisis or diminishing resilience. The average annual

growth rate ranged from negative 2.66% to positive 2.29%. Thus rapid credit growth is not a risk factor in Africa other than in Liberia. The reason for the sharp rise in the annual growth rate of the Credit to GDP ratio in Liberia was due to measures put in place by the country to combat the lingering effects of the Ebola pandemic which included the MSME and Rural Finance Post-Ebola Project for US$4.8 million which was approved in May 2016, easing of reserve requirements on U.S. dollar deposits (IMF, 2017a), improving macroeconomic environment and declining non-performing loans (Central Bank of Liberia, 2017). It can thus be concluded that rapid credit growth did not pose a risk to stability in Africa.

3.4.2 Impact of the BCF on the Supply of Credit

Taylor and Goodhart (2006) maintain that Basel II could force banks to curtail the supply of credit due to the need to hold capital commensurate to potential losses during economic downturns. This can be seen as one of the unintended consequences of Basel II. Ben Naceur and Kandil (2013) investigated the relationship between the implementation of Basel I and lending activities in Egypt, Jordan, Lebanon, Morocco, and Tunisia and found a significant increase in credit growth. However, this may be due to the risk-insensitivity of Basel I, which was why Basel II was introduced. Repullo and Suarez (2008) find that although Basel II requires holding capital in line with banks' risk-taking activities, the higher buffers accumulated in economic expansions are insufficient to prevent a significant contraction in the supply of credit when a recession eventually occurs. Gordy and Howells (2006) claim that the effect of Basel II on credit supply depends on the extent to which market discipline leads banks to alter lending standards in response to economic downswings. Fratzscher et al. (2016) find that the quality of institutions, supervisory independence, and discretion play a significant role. As some of the countries in Africa were yet to implement pillar 3 of the Basel II framework, which deals with market discipline, it is possible that lending standards may have changed substantially in Africa during economic downturns.

Credit supply was investigated in a sample of countries from each of the economic regions after 2014, the last year of implementation of the BCF by the countries in the study. Table 3.10 shows the change in credit growth as a percentage of GDP relative to 2014 – the post-BCF period.

Table 3.10 - Change in Credit/GDP growth relative to 2014 – post-BCF period

Country	2014	Change 2005-14	2015	2016	2017	2018	Change 2014-18
Ghana	13.7	-10.97%	14.9	14.4	12.9	10.7	-21.81%
Kenya	34.1	30.37%	34.2	33.4	29.4	27.9	-18.04%
Nigeria	14.5	71.96%	14.2	15.7	14.2	10.9	-24.71%
Egypt	25.6	-49.95%	26.3	34.1	28.5	25.5	-0.23%
South Africa	67.1	1.76%	68.2	66.6	65.6	65.7	-1.97%

Source: World Development Indicators, Authors calculations

All the countries in the sample exhibited declines in the growth of credit to GDP ratio. Next, using a two-sample t-test, the average annual growth rates of credit in each country in absolute terms (i.e., not as a percentage of GDP) are compared before and after their different dates of Basel implementation. This is shown in table 3.11.

Table 3.11 - Difference in percentage annual credit growth pre and post country Basel II implementation

Country	**pre-Basel**	**post-Basel**	Diff	p_value
Nigeria	14.75	-5.30	-20.05	.21
Kenya	6.58	3.26	-3.32	.43
Egypt	-0.89	3.72	4.61	.40
South Africa	6.61	-0.02	-6.63	.12
Seychelles	7.34	7.80	0.46	.94
Algeria	13.64	10.95	-2.69	.79
Botswana	11.51	2.84	-8.67**	.04
Liberia	19.79	2951.42	2931.64	.11
Mauritius	9.44	3.79	-5.65	.28
Morocco	8.56	4.01	-4.54	.19
Mozambique	10.72	2.12	-8.60**	.04
Namibia	6.75	3.81	-2.93	.28

***Significant at the 1% level **Significant at the 5% level *Significant at the 10% level

Credit growth post-Basel implementation fell for all countries except Egypt, Seychelles, and Liberia. In Botswana and Mozambique, the declines were statistically significant. Nigeria's annual credit growth rate before Basel was 14.75%, but after it fell to -5.30%. Liberia's jump to 2951% after Basel is an outlier and due to deliberate government policies. Egypt's increase in the average annual supply of credit is not statistically significant. Failure to detect an improvement in credit growth in either absolute terms or relative to GDP could be a result of

changing population figures. Therefore, the following section investigates the impact of the BCF holding population constant using the Credit to GDP per capita ratio.

3.4.2.1 Impact of the BCF on Credit to GDP per capita

Table 3.12 compares the average credit to GDP per capita before and after BCF implementation in each African country.

Table 3.12 - Credit to GDP per capita: Two-sample t-test conducted before and after the BCF

Country	Pre-Basel	Post-Basel	Change	p-value
Nigeria	16.732	16.971	0.239*	0.061
Kenya	16.209	16.477	0.267***	0000
Egypt	17.434	16.989	-0.446***	0000
South Africa	17.425	17.380	-0.044	0.232
Seychelles	9.970	9.989	0.019	0.770
Algeria	15.343	15.993	0.650***	0000
Botswana	12.082	15.247	3.166*	0.066
Liberia	13.042	13.361	0.319**	0.007
Mauritius	13.751	13.934	0.183**	0.001
Morocco	16.599	16.899	0.299***	0000
Mozambique	16.351	16.608	0.258*	0.065
Namibia	13.827	13.895	0.068**	0.011

*** Values are given in constant dollar values and were log-transformed. Significance levels P < 0.1 = 10%, P < 0.05 = 5%, P < 0.01 = 1%. Estimated using T-tests.*

All countries except Egypt and South Africa show statistically significant increases in credit to GDP per capita post-BCF implementation suggesting declining GDP or increasing population. Next, regressions of credit to GDP per capita on post- BCF Z-scores are performed, controlling for macroeconomic factors, the business environment, and the structure of the banking system. The results of the regressions are shown in Table 3.13.

Table 3.13 - Impact of BCF on credit to GDP per capita

Dependent variable/ Post-BCF Z-score	**Credit/GDP pc**	**Credit GDP pc + Inflation**	**Credit/GDP pc + Infl, Bus Env**	**Credit/GDP pc + Infl, Bus Env Con**
Nigeria	0.088***	0.091***	-0.038	0.002
	(0.022)	(0.022)	(0.041)	(0.019)
Kenya	0.099**	0.105**	0.047	0.065**
	(0.038)	(0.046)	(0.028)	(0.022)
South Africa	-0.065***	-0.053*	-0.073	-0.042
	(0.021)	(0.026)	(0.051)	(0.034)
Egypt	-0.154***	-0.145***	-0.0679***	-0.0579***
	(0.029)	(0.036)	(0.021)	(0.015)
Seychelles	-0.029	-0.030	-0.036	0.038
	(0.022)	(0.025)	(0.0456)	(0.041)
Algeria	0.219***	0.222***	0.110**	
	(0.019)	(0.017)	(0.039)	
Botswana	0.162**	0.168**	0.030	0.055**
	(0.055)	(0.076)	(0.024)	(0.022)
Liberia	1.876***	1.809***	0.969***	
	(0.063)	(0.067)	(0.031)	
Mauritius	0.021	0.033	0.017	0.044
	(0.021)	(0.030)	(0.038)	(0.038)
Morocco	0.0468***	0.0566**	0.00272	0.0164
	(0.015)	(0.020)	(0.035)	(0.027)
Namibia	-0.005	0.005	0.008	0.037
	(0.024)	(0.029)	(0.042)	(0.032)
Mozambique	0.169***			
	(0.037)			
Inflation		-0.005	0.003	0.003
		(0.056)	(0.047)	(0.031)
Bus Environment			0.001	0.001
			(0.006)	(0.005)
Concentration				0.005
				(0.00706)
Constant	14.84***	14.83***	15.30***	14.92***
	(0.027)	(0.108)	(0.431)	(0.422)
Time fixed effects	yes	yes	yes	yes
Observations	247	218	118	95
R-squared	0.545	0.525	0.343	0.321
Number of ID	12	12	12	10

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10 **Dependent variables**: (row 1): Credit/GDP pc: Credit to GDP per capita. **Independent variables (Column 1)**: post-BCF Z-score of each country. **Controls:** Inflation, business environment, concentration. Estimated using fixed effects.

Similar to the outcomes of the mean comparison test, Table 3.13 shows that the BCF had a statistically significant impact on credit supply as a percentage of GDP per capita in 7 of the 12 countries—Nigeria, Kenya, Algeria, Botswana, Liberia, Morocco, and Mozambique. South Africa and Egypt show statistically significant declines. Thus, the second hypothesis is not confirmed. The Credit/GDP ratio did not grow, and neither was there a statistically positive difference in annual credit growth rate pre and post BCF. The increase in credit scaled by GDP per capita ratio in the 7 countries could imply that GDP per capita in those countries declined due to decreasing GDP or increasing population. Analyses in the following chapter confirm that GDP per capita declined with statistical significance in Nigeria after the BCF. Thus, GDP growth and population control are critical to the supply of credit having a positive impact. As explained earlier, the varying impact of the BCF may be a consequence of country-specific factors such as population growth.

3.4.3 Impact of the BCF on Performance and Efficiency

Results of the regressions of performance (proxied by ROE and ROA) and efficiency (proxied by the CTI ratio) on the post-BCF Z-score controlling for macroeconomic factors, and business environment of each country are shown in Table 3.14.

Table 3.14 - Impact of BCF implementation on performance and efficiency

VARIABLES	(1) ROE	(2) ROA	(3) CTI
Nigeria	-2.145	-0.111	-2.414
	(3.544)	(0.615)	(2.264)
Kenya	-0.328	0.198	-1.673
	(2.802)	(0.486)	(1.790)
South Africa	3.044	0.261	1.296
	(4.608)	(0.799)	(2.944)
Egypt	1.899	-0.471	-0.846
	(2.825)	(0.490)	(1.805)
Seychelles	-15.54***	-1.250	3.971
	(4.959)	(0.860)	(3.168)
Algeria	-1.475	-0.221	-0.893
	(2.776)	(0.482)	(1.773)
Botswana	-11.63***	-0.459	4.028*
	(3.603)	(0.625)	(2.302)
Liberia	-9.144**	-0.785	5.599*
	(4.470)	(0.775)	(2.855)
Mauritius	-0.136	-0.0242	-10.84***
	(4.494)	(0.780)	(2.871)
Morocco	2.680	0.366	-3.213
	(3.502)	(0.608)	(2.237)
Namibia	5.319	0.213	-3.818
	(3.802)	(0.660)	(2.429)
lnInf	1.471	0.211	-2.700
	(3.379)	(0.586)	(2.159)
BusEnv	-0.328	-0.0837	0.176
	(0.380)	(0.0660)	(0.243)
GDPConstant	6.63e-11	0***	-0*
	(0)	(0)	(0)
Constant	17.99	0.159	65.97***
	(21.44)	(3.720)	(13.70)
Year fixed effects	yes	yes	yes
Observations	118	118	118
R-squared	0.480	0.296	0.441

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10 **Dependent variables**: (row 1): Return on Equity (ROE), Return on Assets (ROA), Cost to income ratio (CTI) **Independent variables (Column 1)**: post-BCF Z-score of each country. **Controls:** Inflation, business environment, time fixed effects, estimated using fixed effects.

The ROA is calculated by dividing the bank's net income by the average of its total assets. The ROE is calculated by dividing net income by shareholders' equity.

The BCF does not appear to have improved performance or efficiency in most countries. Profitability reduced with statistical significance in Seychelles, Botswana, and Liberia. The cost to income ratio declined in Mauritius indicating an increase in efficiency. A possible reason for failure to increase profitability could be movement from lending to lower yield and lower return investments such as Government debt to avoid higher capital charges. This aligns with the literature which argues that more stringent capital regulation leads to higher risk aversion on the part of banks. It further contradicts findings in the literature that assert that more stringent capital requirements enhance bank performance (Chortareas et al., 2012, Ben Naceur and Kandil, 2009).

3.5 Impact of Basel II/III on Banking System Resilience – A Qualitative Case Study of South Africa

3.5.1 Introduction and value addition of this case study

Banking system resilience is considered essential to avoid sacrificing economic welfare opportunities due to the costs of bailouts, fiscal retrenchment, and austerity measures. Bail outs during crises have in some instances cost as much as 70% of government expenditure (Honohan and Klingebiel, 2000, Klingebiel and Laeven, 2002), which could better have been used for poverty reduction and welfare improvement. This has been investigated quantitatively extensively in the literature with interesting results. However, as useful as quantitative research is, it is limited in the sense that there may be data and methodological challenges. Its pursuit of concrete, statistical relationships could also lead to overlooking broader themes and relationships. Complementing quantitative research with qualitative research fills in these gaps. In qualitative research, issues can be examined in detail and in depth. It provides more detailed information to explain complex issues and multiple methods for gathering data. The value addition of this case study is that they make up for the gaps in the quantitative research and either validate or add more information to the findings. The aim of the qualitative research of South Africa is to give more insight into the impact of the BCF on banking system resilience. South Africa was chosen because it is the most advanced country in Africa and one of its largest economies, and therefore the findings should be generalisable to other developing nations under the same circumstances. This section investigates South Africa by applying a comprehensive analysis of relevant documents.

Yin (2018) defines a case study as “an empirical method that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. It entails the “detailed and intensive analysis of a single case”.

This case study explores the response of the South African banking system to the implementation of the Basel II/III capital reforms (BCF). Why did its banking system not buckle under the Global Financial Crisis as many others did? The sub-prime mortgage crisis started in the United States in 2007, and the bankruptcy of Lehman Brothers on September 15, 2008, triggered the subsequent international banking crisis (Dooley and Hutchison, 2009, De Haas and Van Horen, 2012). However, South Africa’s banking system stood firm. Could the BCF have contributed? Is it the same for other crises? This study looks at the more recent pandemic and lockdowns as a comparator. How did the South African banking system perform under the COVID-19 crisis? This research argues that as the BCF increased capital buffers and improved risk management in the banking system, it explains the resilience of South Africa’s banking system to crises.

South Africa was also chosen for a separate study because this case is rather puzzling. The country has weathered various financial and other storms very well, yet the original analysis of this research showed the BCF did not have a statistically significant impact on its banking system resilience. This makes it worthy of further investigation. In addition, South Africa is the second-largest economy in Sub-Saharan Africa, the only member of the Financial Stability Board and the Basel Committee on Banking Supervision from Africa, and a permanent chair of the Regional Consultative Group of the Financial Stability Board. If the BCF failed to have a significant impact on South Africa, it’s hard to see how it would have a positive impact on any other country in the sub-region. The following section describes the methodology employed in this study and the sources of data.

3.5.2 Methodology and Sources of Data

3.5.2.1 Limitations of Quantitative Approaches

The earlier quantitative analysis showed that the impact of the BCF on South Africa’s banking system resilience was positive but statistically insignificant after controlling for the business environment and concentration. But do these results stand up to reality? Even if the

hypothesis of a positive impact is not supported, it still leaves an alternative hypothesis of the BCF averting a negative impact on banking sector resilience. It is possible that there are confounders not controlled for. This section attempts to reconcile the discrepant findings by exploring this possibility qualitatively. Several potential reasons can be adduced for the lack of statistical significance which could be either positive or negative. These include methodology and confounding variables.

A practical test of the impact of the BCF on banking system resilience is the extent to which banks can withstand economic shocks and avoid runs and the triggering of systemic distress. This is because the BCF has both quantitative and qualitative elements aimed at improving not only the quantity and quality of capital but also risk management practices. The quantity and quality of capital are expected to improve loss-absorbency. Risk management is expected to introduce proactiveness in reducing the probability of the occurrence of losses or mitigating the impact. In addition to improving capital adequacy (pillar 1), it also improves risk management practices through periodic internal capital adequacy reviews and supervisory reviews (pillar 2) and fosters transparency and market discipline, which incentivise compliance with rules (pillar 3). Capital and other quantitative elements of the BCF can be analysed to a reasonable extent with statistical methods, but the soft elements of the framework cannot be as easily measured or assessed. This study now progresses to review the literature on the impact of capital and effective risk management on banking system resilience.

It is important to emphasise that the strategy employed for this study is qualitative. The research design is a case study of the specific South African context of the Basel II/III banking reforms. The study covers the period 2000 to 2021. The case study will give a more proximal perspective on the impact of the reforms. Even though the quantitative analysis found a positive impact that was not statistically significant, there is a high possibility that contextual conditions not considered may have interacted in imperceptible ways. Case studies can complement the use of other quantitative methods (Yin, 2018). They are generally helpful where statistical methods have limitations, especially where what is being assessed is whether and how a variable contributed to the outcome rather than assessing the quantum of contribution (George and Bennett, 2005). Thus, the study is expected to give a more insightful understanding of the impact of the reforms.

The research method is an analysis of documents, with each document closely reviewed for evidence of the impact of the BCF on South Africa's banking system resilience. The full details of the specific documents reviewed are shown in appendix V. The logical plan followed in this study is a collection and comparison of data on the level of resilience of the South African banking system before and after the reforms. This gives prima facie evidence of the impact of the reforms. However, the study bears in mind that no change or even a decline in capital safety buffer levels does not imply that the reforms did not have a positive impact. This is because the safety buffer may have absorbed more losses within the period. Profits are expected to be the first line of defence, but where these are insufficient, such losses hit reserves. Thus, the assessment of the South Africa Reserve Bank (SARB) itself, on the impact of the reforms, was interrogated. As this may be subject to bias, the study also reviewed the assessments of independent bodies such as the Financial Stability Board, the IMF, the World Bank, credit rating agencies and the news media. It further reviewed the bottom-up and top-down stress tests of the banking industry and the independent reviews of the methodology thereof. To link the data to the impact of the reforms, the study utilized time-series analysis, pattern matching and explanation building. The analysis draws from the signaling theory which states that information can be extracted indirectly through screening. This can be used to improve the position of the ill-informed by resolving situations with incomplete or asymmetric information (Spence, 1974). A signal is a form of credible communication that conveys information to others (Spence, 2002). Signaling theory could be used in case studies such as this based on the assumption that information asymmetry exists. It reduces information asymmetry by enabling the researcher to know the views and perceptions of the actors involved, so that distortions can be eliminated (Carter, 2006, Connelly et al., 2011). Signaling theory addresses communication by and within organizations (Bergh et al, 2014; Connelly et al., 2011; Highhouse, et al. 2007). Certo, et al., (2001) further demonstrate that firm value can be signaled through the structure of the board.

In these case studies several factors/events influenced resilience differently. These factors and events which are identified using analysis of relevant documents, are conceptualized as signals influencing resilience and motivated the use of the signaling theory. Thus, credible factors/ events obtained through thorough analysis of relevant documents can fill in the gaps

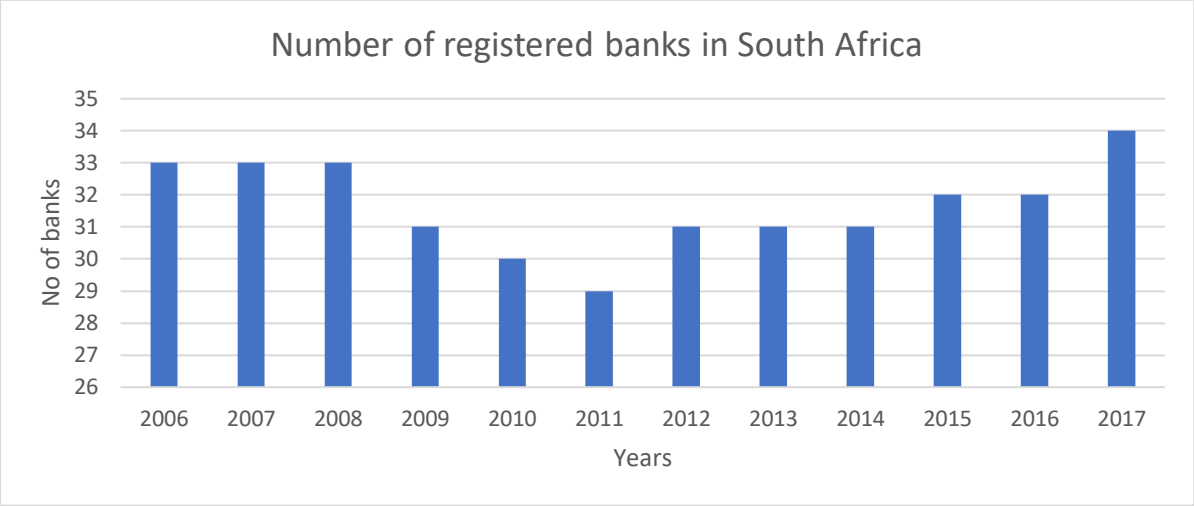
left by quantitative analysis. The data were explored for such factors that could give more profound insight.

Data was collected from the South African Reserve Bank Financial Stability reports (2008 – 2021), the Financial Stability Board peer review report of South Africa of 2020; IMF Article IV reports on South Africa; credit rating reports; Financial Sector Assessment Program (FSAP) of 2014, news media reports; data from the Global Financial Database and the World Development Indicators of the World Bank (2000 - 2021). These documents are described more extensively in appendix V.

3.5.3 Background of South Africa's Banking System

South Africa's banking system is regulated by the South African Reserve Bank (SARB) under the South African Reserve Bank Act, 1989, the Banks Act 1990 and the Financial Sector Regulation Act, 2017. These Acts give power to the Prudential Authority (PA), which is within the administration of the SARB, to register, cancel the registration and supervise banks (Anthony Colegrave Allen & Overy (South Africa) LLP, 2021). As of 2017, there were 34 registered banks in South Africa. Figure 3.4 shows the number of registered banks from 2006 to 2017.

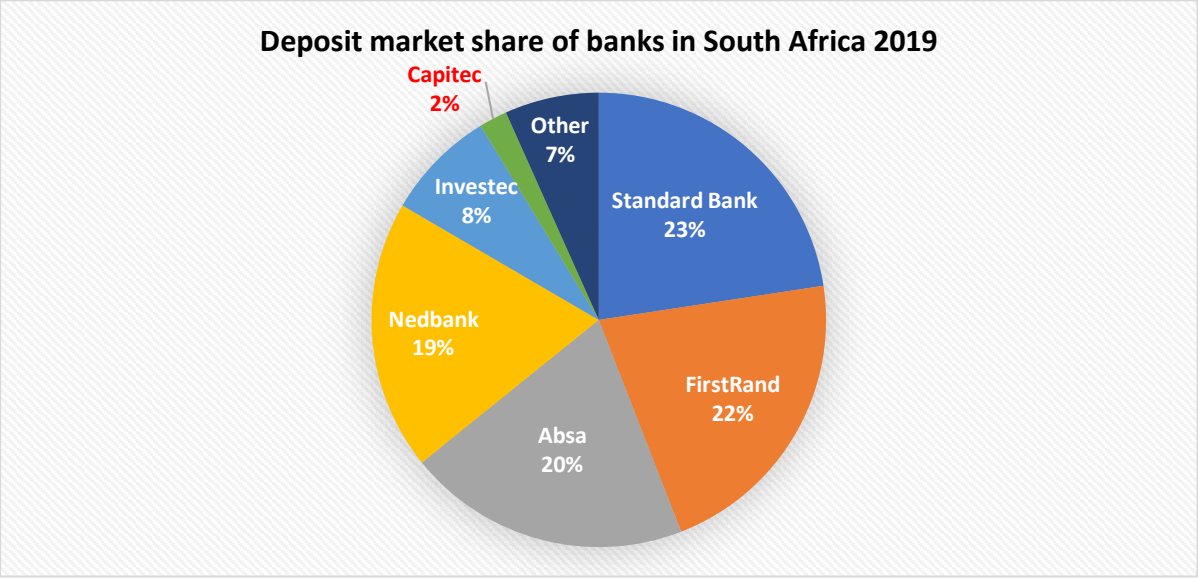
Figure 3-4 Number of registered banks in South Africa



Source: SARB

South Africa is a country with a highly concentrated banking system. As of 2019, the market share of domestic assets of Standard Bank constituted 22.5% of the total value of all banks' deposits, followed by FirstRand at 21.5%, Absa at 20.1%, Nedbank at 19.2%, Capitec at 2% and others at 6.7%. Thus, five banks held 85% of all industry deposits, as depicted in figure 2.

Figure 3-5 Deposit market share of banks in South Africa



Source: Absa Group Limited 2019 Integrated Report

Basel II became effective in South Africa on 1 January 2008, at the commencement of the international banking crisis. The overall objective was to ensure the stability of the banking

system through rigorous risk and capital management requirements (South Africa Reserve Bank, 2008). The SARB states on its website, "*A stable and well-functioning financial system contributes significantly towards balanced and sustainable economic growth ..... Systemic events are likely to negatively affect 'real' economic variables such as gross domestic product growth and unemployment and may reduce public trust and confidence in the financial system"*[12]. Basel III capital requirements were to be phased in over a ten-year period from 2013 (South Africa Reserve Bank, 2012). Transitional arrangements were to last until January 2019. In response to the COVID-19 pandemic, the South Africa Government declared a national state of disaster and the PA issued directives to provide temporary relief to banks and ensure continued compliance with the BCF (Anthony Colegrave Allen & Overy (South Africa) LLP, 2021). South Africa's financial system is rated among the best in the world. It was ranked first out of 148 countries in 2012 for regulation of securities exchange by the World Economic Forum competitiveness survey. It was further ranked first in auditing and reporting standards and third in financial market development (Bhorat et al., 2014). South Africa has also consistently held first place in Africa in the banking system's tier 1 capital from 2000 to 2019 (The World Bank, 2019, The Banker, 2020).

Earlier quantitative analysis revealed that the implementation of the BCF had a positive but insignificant impact on banking system resilience in South Africa. This was surprising given South Africa's reputation in banking regulation and supervision. This earlier finding motivated further analysis. Table 1 presents the summary statistics of the resilience of South Africa's banking system measured by the Z-score for the period 2000 to 2020. The Z-score captures the probability of default of a country's banking system by comparing the buffer of a country's banking system (capitalization and returns) with the volatility of those returns.

[12] Financial Stability (resbank.co.za)

Table 3.15 Summary statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Year	19			2000	2020
Bank Z-score	19	15.019	2.631	11.170	22.450
Growth rate	18	-0.016	0.128	-0.380	0.160
Banking crisis	19	0	0	0	0

Source: Data from the Global Financial Development Database of the World Bank were used in the authors' calculations. Banking crisis: 1 – yes, 0 - no

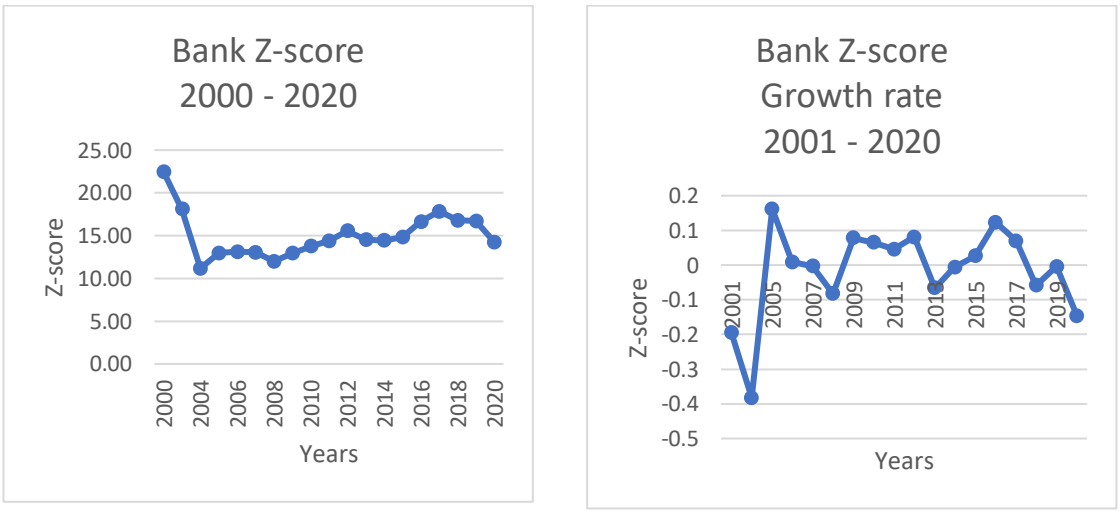
Table 1 shows that during the period, the Z-score was 15.019 on average and ranged from 11.17 to 22.45. The growth rate of the capital buffers was negative 0.016 on average. However, the data also shows that there was no banking crisis during the period. This accentuates the need to further investigate the earlier finding of a statistically insignificant positive impact. The following section considers the limitations of quantitative approaches.

3.5.4 Analysis of South Africa's Banking Sector Resilience

3.5.4.1 Banking Sector Z-score

The Z-score assesses resilience and is a measure of distance from insolvency. The higher the Z-score, the further the bank or banking system is from insolvency. Figure 3 below shows the absolute score and growth rate of SAs Z-score for the period 2000 to 2020.

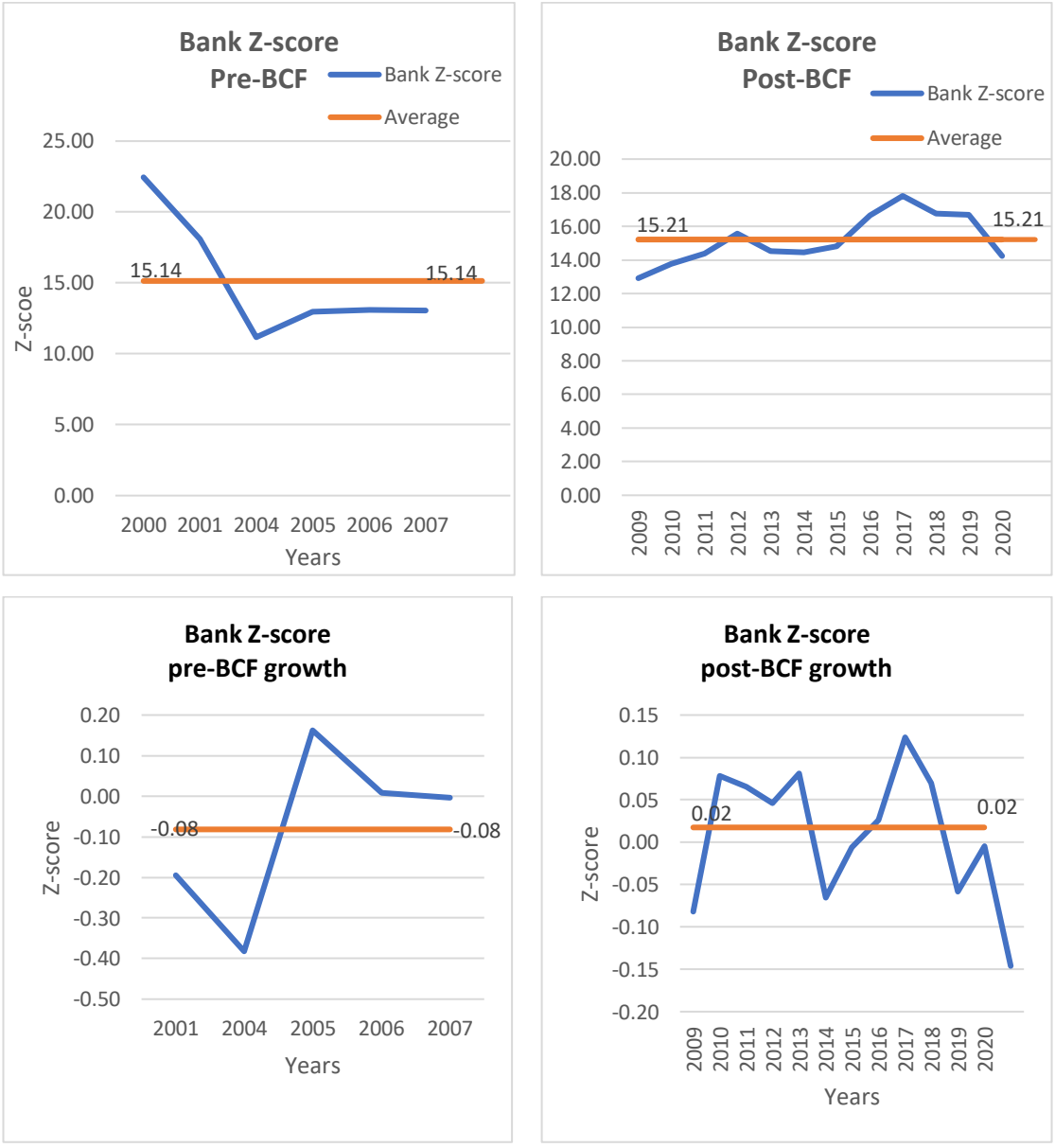
Figure 3-6 South Africa Banking System Z-score (absolute score and growth rate)



Source: Data from the Global Financial Development Database of the World Bank were used in the author's calculations

After a steep drop in the Z-score from 22.45 in 2000 to 11.17 in 2004, the Z-score has been slowly increasing, culminating in 14.25 in 2020. This is the first indication that the BCF was successful despite the statistically insignificant results. However, the rate of growth of the capital buffer shows substantial volatility. As shown in the summary statistics, the growth rate of the Z-score was -0.016 on average and ranged from -0.38 to 0.16. Figure 4 splits the period into two viz: pre-BCF and post-BCF. The year 2008 is omitted, being the year South Africa implemented the BCF.

Figure 3-7 South Africa Banking System Z-score (absolute and growth rate) pre and post the BCF.



The average post-BCF Z-score at 15.21 is only slightly higher than the pre-BCF Z-score at 15.14, suggesting that the BCF did not make much of a difference. However, the average growth rate or rate of accretion of capital buffers increased from -8% to 2%, a change of 10%. Since the rate of accumulation of reserves increased post BCF, there must have been other reasons why reserves did not increase much in absolute terms. A logical possibility is that some of the buffers had absorbed losses resulting from economic shocks such as the GFC and the pandemic. According to the World Bank's Global Financial Development database, South Africa did not officially have a systemic banking crisis during the period 2000 to 2020. According to the database's definition, a banking crisis is systemic if the banking system exhibits substantial losses, bank runs or liquidations. Another condition is if the regulators need to step in to bring stress under control. The banking crisis starts in the first year of these conditions and ends when real GDP and credit growth have been positive for at least two years consecutively.

However, Havemann (2019) claims that 2002 - 2003 represents a "small bank" crisis in which twelve banks experienced runs and a further ten deregistered, leading to an erosion of confidence. The graph above shows that the growth of capital buffers fell from -19% in 2001 to a low of -38% in 2004. Curiously data for the crisis period of 2002 -2003 is omitted from the Global Financial Development database but it is reasonable to assume that this crisis contributed to the reduction in banking system resilience culminating in a low of 11.17 in 2004 from a high of from 22.45 in 2000. Studies find that the crisis reduced stability, led to bank fragility, and was exacerbated by the lack of liquidity support from the SARB (Dwumfour, 2017, Havemann, 2021). Okeahalam (1998) had earlier maintained that the SARB was political in its approach to rescuing banks. Other studies observe that South Africa did not experience any bank failures during the GFC period because the SARB had recently reviewed capital requirements and implemented the BCF. In addition, South African banks were found to build up capital buffers during upturns in the business cycles thus exhibiting countercyclicality (Moudud-Ul-Huq, 2019, Havemann, 2019, Ozili, 2018). The failure of African bank in 2014 might have caused some distress, but a probable reason instability was averted was the BCF which generated improved risk management and increased capital buffer availability to absorb losses. The absorption of losses by capital buffers after the failure led to only a slight dent in the absolute Z-score in 2014.

Figure 5 presents the Z-score using shorter windows to analyse the trend of the South Africa Bank Z-score for the period 2006 to 2020.

Figure 3-8 South Africa Bank Z-score for the period 2006 to 2020

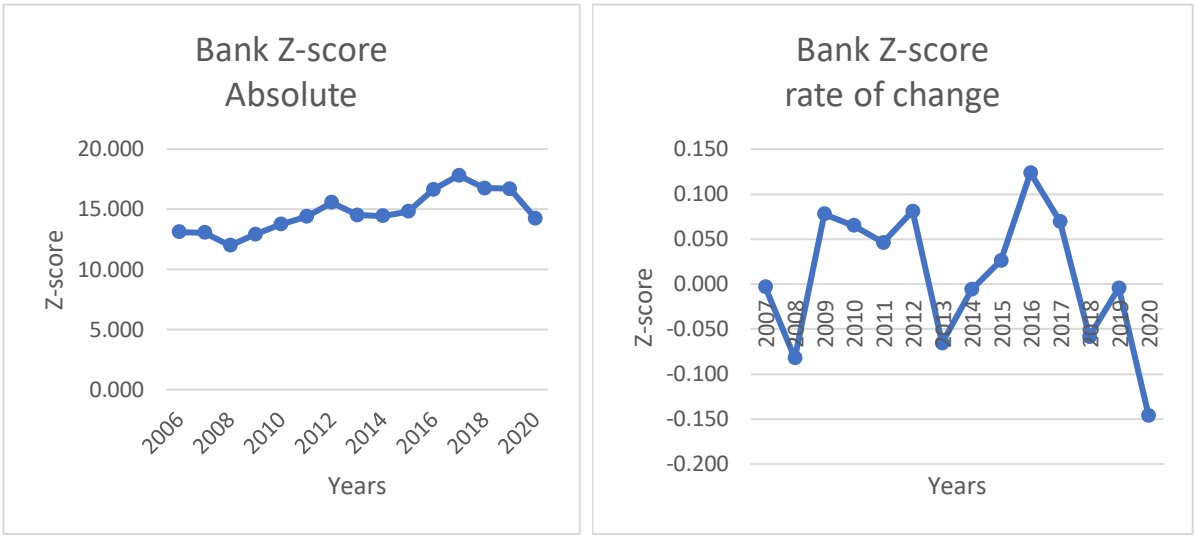


Figure 5 shows that although the Bank Z-score was on an upward trend since the implementation of Basel II in 2008, it started to decline in 2017. The rate of change has been variable, with steep declines in 2007, 2012, 2016 and 2019, but with substantial recoveries in 2008, 2013, and 2018. The rate of change of the Z-score is mean-reverting, fluctuating around the average value and is cyclical. This suggests that even though resilience or the Z-score is shaken by economic shocks, it eventually returns to the point of equilibrium.

3.5.4.2 South African Government and the SARB Assessment

The president of South Africa in 2011 remarked, *"We are pleased with the performance of our financial sector. It has proven to be remarkably resilient in the face of the recent financial crisis and the global economic meltdown"*[13] (National Treasury Dept. Republic of South Africa, 2011). The GFC started in 2007, while South Africa implemented Basel II in 2008. Figure 5 shows that resilience started to improve both in absolute and relative terms after the implementation of the BCF in 2008. South Africa's financial sector report of 2011 reports that the country was able to weather the storm of the GFC, unlike most advanced countries due to the implementation of the Basel II Capital Accord in 2008 which led to improved risk

[13] President Jacob Zuma, State of the Nation Address, 10 February 2011

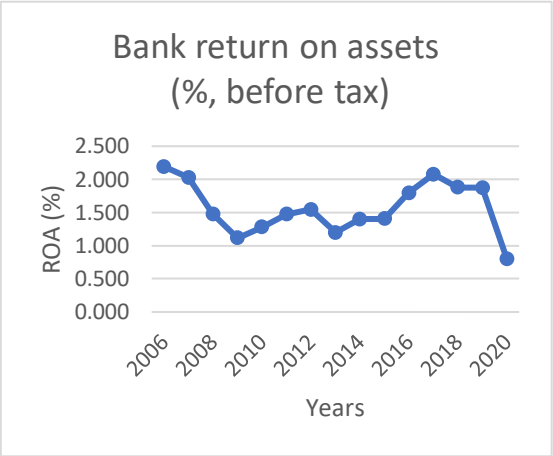
management practices[14]. The SARB also took proactive steps to reduce potential risks – including raising capital adequacy requirements and setting conservative leverage ratios as lending levels soared (National Treasury Dept. Republic of South Africa, 2011). Thus, by the regulator's self-assessment, the BCF prevented a banking crisis in South Africa. This assessment represents a positive indicator on banking system resilience.

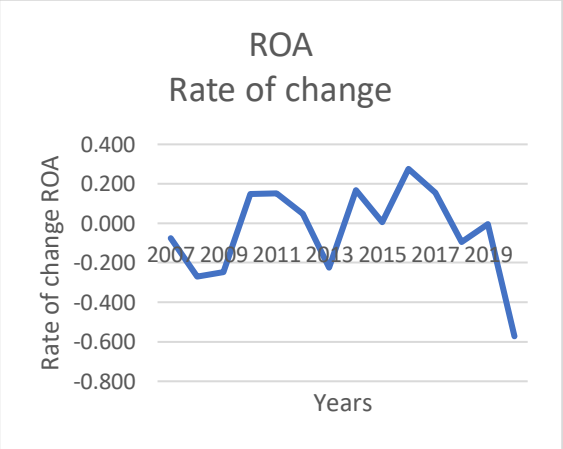
3.5.4.3 Profitability and bank capital to assets ratio

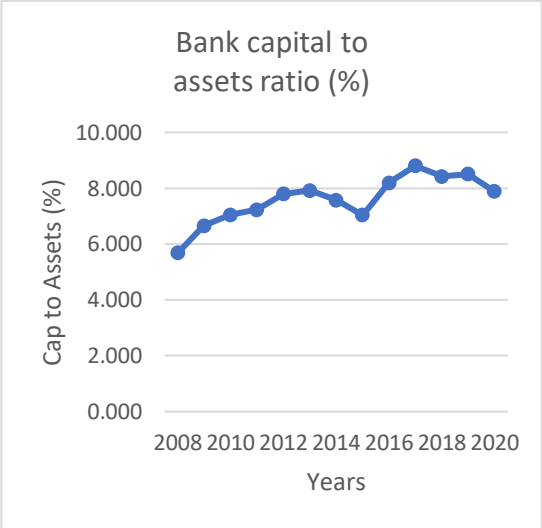
Slow or declining profitability could cause slow accretion to revenue reserves. Losses made by banks erode capital buffers. Declines in the rate of growth of resilience buffers (Z-score) coincided with the introduction of Basel II (2008) and Basel III (2012), as shown in figure 5 but immediately rebounded in the following years as the return on assets rebounded. Figure 6 shows the trend and growth rate of ROA and the trend and growth rate of capital to total assets.

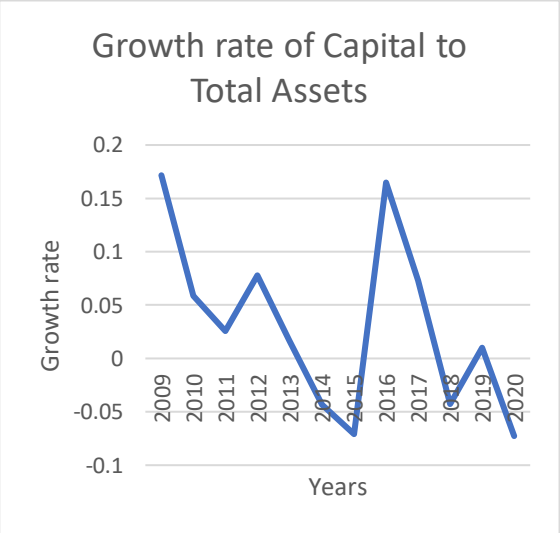
[14] A safer financial sector to serve South Africa better.pdf (resbank.co.za)

Figure 3-9 Trend and growth rate of ROA and capital to total assets ratio









Although capital to assets grew slowly, its rate of growth was impaired by declining profitability as return on assets did not rebound to the pre-BCF period level. Growing capital buffers but declining profitability represent positive and negative indicators, both offsetting each other and thus a neutral impact on resilience.

3.5.4.4 Bank failures

Bank failures can adversely affect the resilience of the banking system. Even if the failure is in respect of small and non-systemically important banks, the rest of the banking system can be affected through interbank exposures, contagion, erosion of depositor confidence, and runs on banks. Bank failure is defined as the need to put a bank into curatorship as a result of its failing health. Curatorship is a clause in the South African Bank Act that enables the takeover of a failing financial institution by the government in a bid to reverse its fortunes and bring it

back to viability (*BUSINESSTECH*, 2018, Banks Act, 1990). Bank failure is also defined as the forfeiture of banking licences either voluntarily or because the bank has a deteriorating financial position. This was the case of Saambou bank which collapsed in February 2002 due to flawed management, poor corporate governance and ignoring the fundamental principles of risk management (Mbuya, 2005, Steyn et al., 2004). Its collapse triggered the deregistering of 22 small and mid-sized banks representing half of the country's banks within one year. Due to the fragility of the remaining banks, consolidation continued after the crisis. Following the curatorship of Saambou bank, seven other banks experienced runs as confidence in the banking system waned. Maturity mismatches led to liquidity problems, solvency problems and ultimately failure (Havemann, 2021, Mbuya, 2005, Dzomira, 2014, Kotzé and Labuschagne, 2014). The failure of these banks may have contributed to the declining banking sector Z-score pre-BCF.

Two South African banks failed post-BCF, namely African Bank in 2014 and VBS Mutual Bank in 2018 (*BUSINESSTECH*, 2018). African Bank's failure was reportedly as a result of bad management and liquidity problems, particularly around unsecured lending (Havemann, 2019, Dzomira, 2014). The then Governor of the South African Reserve Bank, Ms Gill Marcus, at a press conference in connection with African Bank Limited in Pretoria on 10 August 2014 remarked: "t*he problems that have beset African Bank are, in our view, largely specific to their current business model, which does not include a diversified set of products and income streams, nor does it offer transactional banking services" (BIS central bankers' speeches, 2014).* This business model led to substantial bad loans and impairments. The distress of African Bank agitated the South African markets and introduced substantial systemic risk in the financial system (Sanderson et al., 2017). Another bank that failed post-BCF was VBS bank. VBS bank was put under curatorship on 11 March 2018 (National Treasury Republic of South Africa, 2018). However, the financial health of the bank had started to decline long before then. According to *CNBC* news, the curator withdrew the financial statements for the period ending March 2017 due to misstatements and the unreliability of the accounts[15]. *BUSINESSTECH* reports that the failure of VBS bank was as a result of its management's failure to align the business with its sudden rate of growth. The SARB remarked that the bank used short-term municipal deposits as a base for long-term lending. When the municipalities came

[15] VBS curator says the bank's 2017 audited results are not reliable - CNBC Africa

to withdraw their funds, the bank did not have the funds to repay (South Africa Reserve Bank, 2018).

Both failing banks - African Bank and VBS Mutual Bank, understated their non-performing loans and fraudulently misrepresented information in their financial statements (Myburgh, 2016, Parliamentary Monitoring Group, 2016, Motau, 2018). The bail-in of African Bank creditors had a negative impact on the rest of the financial system, but these were limited due to the central bank undertaking complementary interventions such as providing liquidity assistance to banks and non-banks (South Africa Reserve Bank, 2014, Havemann, 2019, Beck et al., 2020). However, contagion effects have been shown to increase the chances of systemic banking distress in the South African banking sector (Visser and Vuuren, 2014). Therefore, the actual failure and the threat of failure analysed in this section represent a negative indicator to the industry with an adverse effect on resilience.

3.5.4.5 Corporate Governance

Sound corporate governance refers not only to the excellent characteristics of the Board and Management but also to the effective performance of their duties. In the case of both banks, evidence of poor oversight by the Board, fraud, corruption, and looting was found. In the case of African Bank Investment Ltd, the Finance Standing Committee of the South African National Assembly blamed its failure on poor fiduciary oversight by the Board of African Bank Investment Ltd. In the case of VBS Mutual, the SARB recommended that the bank leadership and auditors be prosecuted (South Africa Reserve Bank, 2018, Parliamentary Monitoring Group, 2016). This calls to question the governance of the banks and constitutes the microeconomic issues that may put stress on the banking systems' resilience.

3.5.4.6 Contagion and consumer confidence

Reuters reported on August 11, 2014, that there was no risk of contagion after the failure of African bank as the SARB stepped in with a US $1.6billion rescue plan which averted risk to the wider banking industry. However, its announcement of a full-year loss led to an exodus of shareholders, which wiped more than $900 million from its market value[16] (*Reuters*, 2014). The Merchantec Capital CEO Confidence Index revealed that the collapse of African Bank had led to a 17.2% drop in confidence in South Africa's financial sector. The survey collates

[16] No contagion risk as bailed-out South African bank's shares halted | Reuters

responses from over 1000 top CEOs. (Merchantec Capital, 2018, Greve, 2014). The Financial Stability Review second edition of 2017 further observes that "*Media reports on the involvement of a major auditing firm, that audits many of South Africa's banks, in allegations of state capture have put banks that contract the services of this firm into the spotlight ..... there is a risk to financial stability emanating as a result of potential contagion from damage to an individual audit firm's reputation leading to weakening public confidence in a bank or the banking sector*" (South Africa Reserve Bank, 2017b). Thus, even though regulatory action may have prevented the contagion risk which could naturally have followed, there is no telling the quantum of funds that were withheld from the banking system as a consequence of these failures.

Following the failure of African Bank, the SARB provided liquidity support, thereby mitigating contagion risks (Moody's Investors Service, 2014). The bank had incurred record losses on loans to low-income households which triggered a loss of confidence by shareholders and creditors. The authorities announced public support including a ZAR 7 billion ($479.088 million)[17] injection from the SARB for a new bank that would take on retail deposits at face value, senior debt and wholesale deposits at 90 per cent of face value, and new equity from private and public sector sources (IMF, 2015a). This mitigated to a significant extent contagion effects that could have arisen. Thus, as the response of the SARB counterbalanced negative sentiment, contagion effects represent a neutral sign of resilience.

3.5.4.7 Asset quality

Moody's Investor Service in 2014 observed "potential asset quality pressure building up in the retail, small and medium enterprise and corporate loans segment of the banks' portfolios". In view of this, Moody's conducted a forward-looking assessment of banks' resilience stemming from the increasingly challenging operating conditions. (Moody's Investors Service, 2014). The stress to credit portfolios was confirmed by the Financial Stability Review (FSR) of March 2017, which noted risks to the banking system as a result of higher unemployment, low growth in disposable income, and weak corporate profitability leading to increasing asset impairments (South Africa Reserve Bank, 2017a). The FSR of

[17] USD to ZAR Exchange Rate - Bloomberg Markets - 1 USD - 14.6111 ZAR as of 4th April 2022

September 2019 further observed a strong upward trend in impaired advances since the implementation of IFRS 9 in January 2018 (South Africa Reserve Bank, 2019). Increasing credit impairments reduce profitability – the first line of defence against losses. However, sufficient capital buffers would counteract insufficient profitability thereby leading to a neutral effect on resilience.

3.5.4.8 Credit ratings

Deteriorating credit ratings of South African banks confirm the heightened credit risk highlighted by worsening asset quality. Deteriorating credit ratings could trigger increased capital charges. Lower ratings are usually associated with higher debt to capital ratios which could be caused by capital erosion, higher variation in earnings and cash flows, lower profit margins, and lower growth. Moody's investor service on 19th August 2014 downgraded the four largest South African banks and put them on review for further downgrade.[18] This was a fallout of African Bank's failure. The banks downgraded were Standard Bank of South Africa, Absa Bank Limited, FirstRand Bank Limited, and Nedbank Limited, from A3 to Baa1, i.e., from high-grade credit to good. The reasons included weaker economic growth, which was likely to lead to higher credit costs for the banks. This was in addition to the fact that the SARB chose to impose the credit losses of African bank Ltd on unsecured creditors in a bail-in process. Moody's rating agency further stated that banks' ratings could be downgraded if they considered that harsh economic conditions could lead to a deterioration in financial health especially regarding capital and liquidity buffers.

Another reason for a potential downgrade was a deterioration in the creditworthiness of South Africa itself (Baa1 negative), in view of the sizeable holdings of its sovereign debt securities by banks (Moody's Investors Service, 2014). Credit ratings are used by potential investors to gauge creditworthiness and thus would have a significant impact on a country's borrowing costs. In addition, since the banks have substantial exposure to these securities, it is likely that each downgrade would attract a capital charge, thereby putting pressure on the Z-score. The credit rating for South Africa's debt as reported by major credit rating agencies

[18] Moody's Investors Service. 2014. *Rating Action: Moody's downgrades four South African banks; on review for further downgrade*. https://www.moodys.com/research/Moodys-downgrades-four-South-African-banks-on-review-for-further--PR_306571 [Accessed February 10, 2022].

from 2014, when Moody's gave a Baa1 negative rating to 2021, is shown in table 3-16 (Trading Economics, 2022).

Table 3.16 Sovereign debt credit rating for South Africa 2014 - 2021

Agency	Rating	Outlook	Date
Moody's	Baa2	Stable	November 2014
Moody's	Baa2	Negative	November 2014
Fitch	Bbb-	Stable	December 2015
S & P	Bbb-	Negative	December 2015
Moody's	Baa2	Negative	May 2016
Fitch	Bbb-	Negative	November 2016
S & P	Bb+	Negative	April 2017
Fitch	Bb+	Negative	April 2017
Moody's	Baa3	Negative	June 2017
S & P	Bb	Stable	November 2017
Moody's	Baa3	Stable	March 2018
Fitch	Bb+	Negative	July 2019
Moody's	Baa3	Negative	November 2019
S & P	Bb	Negative	November 2019
Moody's	Ba1	Negative	March 2020
Fitch	Bb	Negative	April 2020
S & P	Bb-	Stable	April 2020
Fitch	Bb-	Negative	November 2020
Moody's	Ba2	Negative	November 2020
Fitch	Bb-	Stable	December 2021

Source: Trading Economics (South Africa - Credit Rating (tradingeconomics.com)

As South Africa's credit rating has persistently deteriorated since the failure of African Bank, downward pressure on banks' ratings would be inevitable, in view of their sizeable holdings of sovereign debt securities in line with Moody's rationale. This possibility constitutes a negative sign.

3.5.5 Other Reviews of South Africa's Banking Sector Resilience

3.5.5.1 Sector Assessment Program (2014)

This review conducted by the IMF observed that although the GFC did not trigger a banking crisis, it triggered a recession. It further noted that after six years of fiscal accommodation, balance sheets were more leveraged. A combination of slow growth, high unemployment, low savings, and high-interest rates presented clear risks to banks' balance sheets. The IMF further noted the following weaknesses:

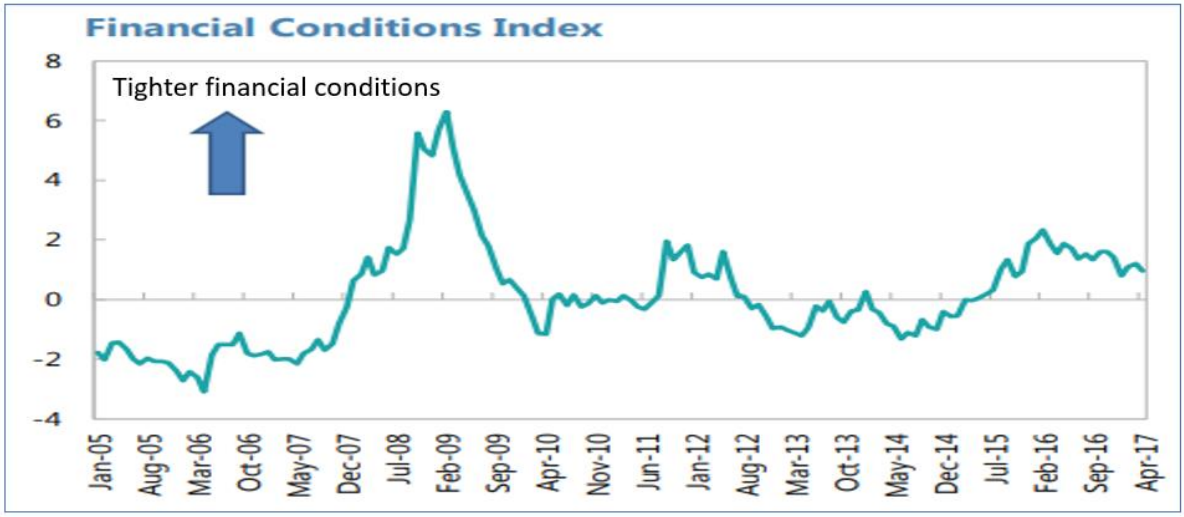
- Absence of early intervention powers and sufficient legal protection for bank resolution officials.
- Absence of a deposit insurance scheme

It can be concluded that while the initial accommodative stance may have facilitated the accumulation of safety buffers, the challenging macroeconomic environment, leverage, and constrained supervisory powers may have heightened risks that exerted pressure on banks' resilience (IMF, 2015a, IMF, 2015b).

3.5.5.2 South Africa Article IV Report 2017

According to the South Africa Article IV report of 2017 by the IMF, financial conditions in the banking sector and capital markets were tighter than their 10-year average. There were relatively high-interest rates, high credit spreads and uncertainties measured by the implied 1-year volatility of the rand (IMF, 2017b). Figure 7 shows the changes in financial tightness.

Figure 3-10 Financial Conditions Index



Source: IMF 2017 South Africa Article IV Consultation Report

Figure 3-10 shows that the tight financial conditions rose above the 10-year average in 2007 - the commencement of the GFC and reached a peak in 2008 – the year of Basel II implementation. The tightness declined in 2009 and was relatively stable until 2014 but started rising in December 2014 and peaked again in 2016. The report further indicates that credit ratings weakened for banks and that banks' balance sheets deteriorated, resulting from protracted low growth. The assessment noted that the banking sector continued to achieve high capital adequacy levels of around 14.9%, and NPLs were stable at 2.9%. However, credit

growth had fallen, and a decline in credit growth could contribute to keeping NPLs and capital adequacy ratios stable. It could also reduce profitability.

3.5.5.3 Financial Stability Board Peer Review of South Africa 2020

The review noted recent bank failures and the challenging economic environment, including high unemployment and slow economic growth since 2008. It further noted that relatively high capital buffers, as well as sound regulation and supervision, had helped mitigate risks. The review considered financial sector risk and vulnerabilities to be elevated but manageable. It further noted that the banking sector stress tests confirm the capital resiliency of banks to severe shocks but illustrate a vulnerability to liquidity shortfalls. It stressed that strong regulation and supervision are essential to ensure financial sector resilience (Financial Stability Board, 2020).

3.5.5.4 Stress tests

This section reviews the results of the bottom-up and top-down stress tests of the banking sector as contained in the financial review reports from 2006 to 2021. The objective of the stress tests is to evaluate the resilience of the sector to a set of plausible adverse scenarios. Such scenarios include four macroeconomic scenarios – a baseline scenario with modest domestic GDP growth and a persistently high unemployment level; a short-lived recession; a severely adverse scenario of a protracted recession; and a scenario of excessive financial market volatility and risk aversion (South Africa Reserve Bank, 2016). The bottom-up tests are conducted by the banks themselves and submitted to the SARB. The top-down tests are conducted by the SARB. The results are then consolidated and compared, and it is communicated to the banks if any action is required. The stress-testing exercise of 2015/16 was subjected to two peer reviews by the Deutsche Bundesbank and the IMF to validate the robustness of the procedures. The Deutsche Bundesbank conducted an on-site review while the IMF conducted a desktop exercise followed by a technical review (South Africa Reserve Bank, 2017b). Thus, the stress tests can be considered robust and reliable. Table 3.17 shows the stress test results.

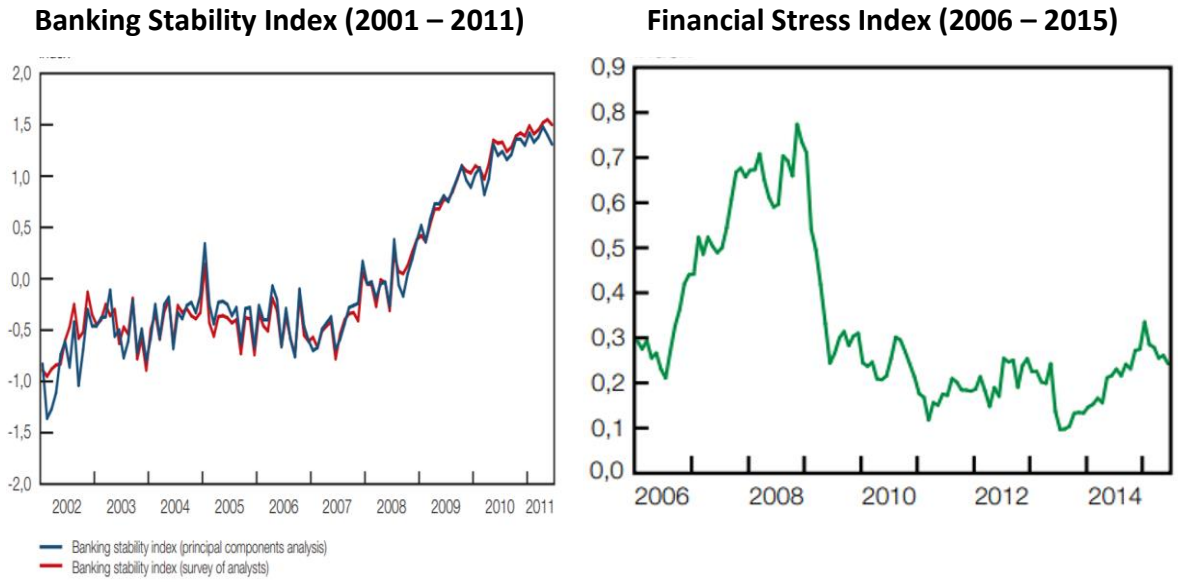
Table 3.17 Stress test results from 2006 - 2021

Financial Stability Report	Stress Tests Results	Source
September 2006	The capital-adequacy ratio, after stress testing the banking sector, remained at 0.6 percentage points above the benchmark of 10 per cent in July 2006	September 2006 (resbank.co.za)
September 2007	The capital-adequacy ratio, after stress testing the banking sector, remained at 0.4 percentage points above the benchmark of 10 per cent	September 2007 (resbank.co.za)
March 2008	The capital-adequacy ratio, after stress testing the banking sector, remained at 0.6 percentage points above the benchmark of 10 per cent	March 2008 (resbank.co.za)
March 2009	Stress tests conducted by the IMF mission team suggested that capital and reserve cushions at banks and insurance companies are sufficient to absorb large, but plausible shocks	March 2009 (resbank.co.za)
September 2011	A newly constructed banking stability indicator called the Banking Stability Index was used to assess the stability of the industry. The index is based on a Principal Component Analysis of a core set of financial soundness indicators. The Index revealed increasing stability from 2007/08, as shown in figure 8 below	September 2011 (resbank.co.za)
March 2015	A Financial Stress Index derived from 5 financial markets – Funding (Government Bond spreads), Equity (All-share index), Foreign Exchange (US$/Rand Volatility Index), Real Estate (House Price Index) was constructed. These are essential sources of funding for banks	March 2015 - Financial Stability Review (resbank.co.za)
September 2015	The Financial Stress Index trend reveals an inverse relationship with banking stability. The index increased sharply over the period 2006 to 2009, which coincided with the GFC and declined sharply thereafter. The FSI again increased gradually from July 2013 to reach its maximum in February 2015. Higher financial stress coincides with low banking stability and vice versa, as shown in figure 8	September 2015 - Financial Stability Review (resbank.co.za)
First Edition 2016	Even in the most adverse scenarios, from the third quarter of 2015, the average CET1 CAR of the participating banks was 11.6 per cent of RWAs, well in excess of the regulatory minimum of 6.75 per cent.	First edition 2016 - Financial Stability Review (resbank.co.za)
2nd Edition 2018	The SARB concluded that the banking sector was adequately capitalised to withstand several plausible and severe stress scenarios designed to simulate additional credit, market and liquidity risks. The	Second edition 2018 - Financial Stability Review (resbank.co.za)

Financial Stability Report	Stress Tests Results	Source
	weighted average total CAR was between 14 and 16% as against the minimum required of between 12 and 13%.	
2nd Edition 2019	There had been a strong upward trend in impaired advances since the implementation of IFRS 9 in January 2018 – The adoption of IFRS 9 was not factored into the quantitative analysis	Second edition 2019 - Financial Stability Review (resbank.co.za)
2nd Edition 2020	In the face of the COVID-19 shock, the SARB acted to ensure the orderly functioning of financial markets by the banking sector and through government bond purchases, thereby contributing to a return to more normal financial market conditions.	Financial Stability Review - Second Edition (resbank.co.za)
2nd Edition 2021	The 2021 results indicate that banks are adequately capitalised and able to withstand the protracted economic disruptions contained in the adverse scenario. Banks' capital adequacy ratios (CARs) deteriorated in the adverse scenario but remained well above the prudential minimum. The aggregated CET1 ratios from the BU and TD results showed deterioration from 11.7% to 10.3% under adverse conditions	Second edition 2021 Financial Stability Review (resbank.co.za)

Source: SARB Financial Stability Review reports 2006 to 2021 Financial Stability Review (resbank.co.za)

Figure 3-11 Banking Stability and Financial Stress Indexes



Source: Financial stability reports of Sept 2011 and 2015

Figure 3-11 shows that banking stability has been on the increase since 2008 the commencement of the BCF, while financial stress although volatile, have never returned to pre-GFC levels.

The summary of the stress test results is that throughout the period 2002 -2021 but especially post-BCF, even under the most adverse scenarios of double-dip recessions, the banking sector was expected to remain resilient and maintain an adequate level of capitalisation and liquidity above the minimum regulatory requirements. This expectation was confirmed during the GFC and the COVID -19 crisis.

3.5.6 Analyses of findings

Table 3.18 consolidates the forgoing variables, analysis and assessments and demonstrates the risks and trade-offs in accumulating safety buffers in the South African banking sector.

Table 3.18 Consolidation of factors and events

	Risk/ Risk Mitigant	Factor/Event/ Indicator	Impact on resilience	Source (Section)
Banking system resilience	Increased capital requirements	Positive	+	5.1.6.2
	Improved risk management	Positive	+	5.1.6.2
	Z-score	Neutral – growth cyclical	+ −	5.1.6.1
	Declining profitability	Negative	−	5.1.6.3
	Deteriorating credit ratings	Negative	−	5.1.6.8
	Fiscal accommodation	Positive	+	5.1.7.1
	Increasing leverage	Negative	−	5.1.7.1
	Increasing volatility	Negative	−	5.1.6.1 - 5.1.7.4
	Limited early intervention powers	Negative	−	5.1.7.1
	Lack of deposit insurance scheme	Negative	−	5.1.7.1
	Consumer confidence	Neutral mitigated by the SARB	+ −	5.1.6.6
	Bank failures	No systemically important bank failed	+	5.1.6.4
	Contagion	Neutral mitigated by the SARB	+ −	5.1.6.4 5.1.6.6
	Corporate governance/ bad business models	Negative	−	5.1.6.4
	FSAP (2014)	Positive	+	5.1.7.1
	Article IV (2017)	Positive/Negative	+ −	5.1.7.2
	FSB Peer review	Positive/Negative	+ −	5.1.7.3
	Stress tests	Positive	+	5.1.7.4

The main finding is that the evidence is mixed – which might explain why overall, at a country level, the BCF appears to have had little impact on resilience. The table shows that roughly the same number of negative factors offset the positive factors, thereby constraining growth in capital but preventing systemic distress. If the SARB had not increased capital requirements and improved risk management through the BCF, the probability of systemic distress and instability during the GFC and COVID-19 would have been high. The possibility of rival explanations for the absence of a banking crisis and the growth of capital buffers during the periods of economic shocks contrary to what happened in other developed economies and in Nigeria cannot be ruled out. Such explanations could include the level of a country's insulation from the international community, thereby avoiding spill overs. But South Africa is highly integrated with the international community through trade, cross border banking, and is a member of the Basel Committee on Banking Supervision and the Financial Stability Board, thus ruling out such an explanation.

3.5.7 Summary of South Africa document analysis

This study utilised a qualitative strategy to drill down further on the impact of the BCF on South Africa's banking system. It conducted a comprehensive review of data from the World Bank Indicators, the Global Financial Development Database, the Financial Stability Review reports of the SARB, stress test results, reviews of the Financial Stability Board, the IMF Article IV, and credit rating agencies from 2000 to 2021. Each assessment revealed a positive, negative, or neutral impact on the resilience of the banking sector. The combination of these factors and events explain why quantitatively resilience did not appear to improve as the positive and negative signals offset each other. It could be seen that capital buffers started to increase with the implementation of the BCF and even though economic storms diminished the buffers, the safety net buffers did not cave in but instead held up. However, it is noteworthy that the South African Government had to support the banking sector by making additional funds available during crisis periods, suggesting that instability could have arisen otherwise. Lack of access to liquidity of last resort is what occurred in some jurisdictions during the GFC. Lehman Brothers was not supported during the subprime mortgage crisis, and this led to its failure and a full-blown financial crisis. However, during the COVID-19 crisis, most countries had learnt their lessons and provided financial support. The study, therefore, concludes that although the BCF improved the resilience of the banking sector in South Africa,

bank supervisors still need to be proactive in scanning the risk horizon. Regulators also need to be proactive in providing support when severely adverse scenarios arise. The following section summarizes and concludes this chapter.

3.6 Summary and Conclusions

This chapter investigated the impact of the Basel II and III reforms on banking system resilience, credit supply, and performance in Africa. A total of 29 out of 54 African countries had implemented the capital framework to varying degrees as of June 2021. However, to ensure a reasonable level of maturity in the application of the BCF and allow for sufficient post implementation years, the sample analysed herein includes only those countries that had implemented the framework as of 2017. The study firstly explored the general association of capital regulation, leverage, and asset quality with resilience in Africa. The study finds that NPLs negatively influence resilience in Africa, while lower leverage has a positive impact. Regulatory capital has an initial adverse effect on resilience but a positive impact in the following year. Liquidity requirements have adverse effects, possibly due to offsetting reductions in high return yielding assets. The second step proved causality by comparing pre and post BCF resilience, credit supply and performance in a dynamic model. Based on the established lagged impact of capital requirements on resilience in the first step, lagged post-BCF Z-scores were included in the model as explanatory variables. Evidently, the BCF improved banking system resilience in seven countries but only five had statistical significance out of the twelve-country population after controlling for macroeconomic factors, the business environment, and concentration. These were Kenya, Egypt, Algeria, Botswana, and Mozambique. Thus, the hypothesis of improved resilience not being uniform across countries is supported.

The reasons for failure to find positive impacts and statistically significant results in other countries are possibly due to the limitations of quantitative research. On the hypothesis of increased credit supply, this was also not confirmed as the study finds that the Credit/GDP ratio did not grow, nor was there a statistically positive difference in annual credit growth rate pre and post BCF. Credit scaled by GDP per capita grew in 7 countries - Nigeria, Kenya, Algeria, Botswana, Liberia, Morocco, and Mozambique implying that GDP per capita in those countries fell due to declining GDP or increasing population. Thus, GDP growth and/or

population control are necessary for the BCF to impart a positive impact on the supply of credit.

Banking system performance and efficiency do not appear to have improved post BCF in most African countries. This could be due to bank portfolio reallocation from high-risk assets such as lending to lower risk and lower return investments such as sovereign debt to avoid higher capital charges.

The qualitative study analysed further the impact of the BCF on South Africa's banking system from 2000 to 2021. The analysis revealed a mix of positive, negative, and neutral impacts on the banking system's resilience, with the combination of these factors explaining why quantitatively, resilience did not appear to improve. While the BCF helped increase capital buffers and held up during economic storms, the government had to provide additional funds during crisis periods, suggesting potential instability.

The quantitative study concludes that a positive impact of the Basel Committee on Banking Supervision's framework (BCF) on credit supply depends on Credit/GDP growth outpacing population growth. Additionally, the benefits of BCF implementation are influenced by macroeconomic factors and the business environment. Factors such as varying degrees of BCF adoption, idiosyncratic risk in countries and banks, poor corporate governance, inadequate supervision, and lack of enforcement of rules can undermine the benefits of BCF implementation. Furthermore, to improve resilience, bank supervisors need to proactively scan the risk horizon, and regulators should provide support during adverse scenarios.

It is concluded that the implementation of the Basel II and III framework has the potential to significantly improve resilience in developing countries since seven of the twelve countries showed a positive impact with five statistically significant.

Chapter Four

4 Basel II/III Implementation in Nigeria: Impact on the Resilience of its Banking Sector

4.1 Introduction

Resilience in banking sectors is an essential ingredient for economic growth and social welfare. However, resilience often caves in, even in advanced economies. Crises after crises have led to a slew of banking reforms, but banking crises still happen notwithstanding. The study of Basel II/III implementation in Africa showed that while the BCF had positive impacts in 7 African countries, representing 58% of the population, this was not experienced in all countries and in all economic dimensions. Moreover, statistically significant positive impacts were only revealed in 5 countries. This study, therefore, explores the underlying phenomena that might explain such an impact. This is important because importing best practices from advanced countries may not yield the expected results if the necessary prerequisites are not in place.

4.1.1 Motivation for the research

This research is motivated by the fact that the earlier study of African countries had shown a negative impact of the BCF on Nigeria which was unexpected. It was expected that the BCF would have a positive impact as is the case in many other countries. Therefore, this study intends to find out why the implementation of the BCF did not have the positive impact on banking system resilience as anticipated. Basel III – the regulatory framework for more resilient banks and banking systems, is expected to enhance resilience in banks. This is however subject to proper implementation and compliance with the guidance. The study of African countries showed that African countries had varying degrees of implementation and that is a factor that could have contributed to the negative impact in the case of Nigeria. Thus, the objective is to investigate what the contributing factors to this negative impact could be.

This study investigates the following questions: Did the implementation of the Basel II/III capital accords improve the resilience and performance of the banking sector in Nigeria? What are the underlying factors that influenced the impact? Answering these questions is key to understanding if the policy measures of the regulatory authorities had the desired impact. The available literature in this respect is superficial and divided. To the best of the

knowledge of this researcher, no empirical study has been conducted to evaluate the impact of the Basel reforms in Nigeria. Some earlier studies in the area of capital regulation find that the 2005 bank consolidation reforms in Nigeria had a positive impact on the capacity of banks to create credit (Onoh and Iheanacho, 2016). Using data from 1993 to 2014, Igbinosa et al. (2017) found that banking regulation in Nigeria did not yield a positive impact on banking performance as measured by return on equity. This was, however, before the implementation of Basel II. Triki et al. (2017) observe that less competition in the banking system enhances efficiency. So far, there has been no evaluation of the entire suite of the Basel reforms.

4.1.2 Contributions of this study

This research adds to the body of knowledge on the extent to which the Basel Capital Framework (BCF) reforms met the expectations of banking sector resilience in Nigeria. Nigeria is Africa's largest economy by GDP, population, and other economic measures, and therefore, findings in Nigeria will have inferences for other developing nations. The study also unearths the conditions required for the implementation of the BCF to have the desired impact on the resilience and the performance of banking sectors. It also shows the impact of improper or incomplete implementation of the BCF.

4.1.3 Why Nigeria?

Nigeria is notably one of the highest recipients of foreign direct investment (FDI) in Africa and held the highest quantity of FDI in West Africa as of 2019 (UNCTAD, 2020). Its banking sector is one of the largest recipients of foreign portfolio investments in the country (National Bureau of Statistics, 2020). Banking sector resilience in Nigeria is crucial because of its dominance in the Nigerian financial markets, the critical role it plays in its economy and the quantum of investment it attracts internationally. These characteristics of Nigeria, beyond any other African nation, make its adoption of the BCF exemplary and critical amongst developing nations. It, therefore, supports the ideal case study that can help illuminate the theoretical and practical realities of the BCF. In addition to the socio-economic features of Nigeria, the country had a well-documented and publicised road map to its BCF implementation, which further made it a model candidate for a case study. The case study

approach enabled extensive and in-depth exploration of the impact of the BCF in a real-life context in Nigeria and facilitated the understanding of complex circumstances. At the same time, a holistic perspective was maintained. The study tests the hypothesis that the BCF improves the resilience of the banking sector in Nigeria. The findings explain the circumstances under which the BCF would improve the resilience of country banking sectors, and these can be generalised analytically to other developing nations under similar conditions.

4.2 Background

Nigeria experienced a banking crisis from 2009 to 2012. Although this was a spill-over from the global financial crisis of 2007 to 2009, it was also because of idiosyncratic issues in the country. The main objective of the BCF banking reforms was to increase the resilience of the banking system against future banking crises and to minimise the adverse effects on the economy. The Central Bank of Nigeria considers a systemic crisis to exist if at least two of three conditions occur - banks that are distressed control 12.5% of the total assets of the industry, 12.5% of deposits are under threat of loss or 12.5% or more of industry loans are non-performing (Central Bank of Nigeria, 2011c). Laeven and Valencia (2012) define a banking crisis as systemic if there are signs of widespread financial distress such as bank runs, nationalisations, or liquidations, and substantial policy intervention is required to stem the tide. Such noticeable systemic disruption marks the first year of the crisis, and it ends the year before real GDP, and credit growth turn positive and remains so for at least two consecutive years. According to this definition, which has been adopted by the World Bank's Global Financial Development Database, Nigeria experienced a banking crisis from 1991 to 1995 and then from 2009 to 2012.

4.2.1 Nigeria's Banking System

As of September 2018, there were twenty-seven commercial banks, also called deposit money banks (DMBs), operating in Nigeria as shown in Appendix II (CBN, 2018). Banking business in Nigeria requires authorising banking licences issued by the Central Bank. These are categorised as follows (CBN, 2010a):

Table 4.1 - Categorisation of Nigerian banks

Licence Authorisation	Minimum capital requirement NGN Billion	Number of licensed banks as of 2018
International	50	9
National	25	10
Regional	10	2
Specialised – National/ Non-interest	10	1
Specialised – Regional/ Non-interest	5	0
Merchant	15	5
Total		27

Source: Central Bank of Nigeria. NGN/$ = 416.2 as of Mar 1, 2022. www.cbn.gov.ng

Nigeria adopted Basel II and some elements of the Basel III capital framework in 2014, after the banking sector crisis of 2009 to 2012. The banking crisis revealed flaws in regulation and supervision. The focus had previously been mainly on the idiosyncratic risks of banks. Monetary policy, which focused on price stability, was conducted separately without any interaction with micro-prudential regulation. A micro-prudential approach evaluates each bank and gives each of them equal weights, often leading to a fallacy of composition. On the other hand, a macroprudential approach is more concerned with average behaviour and institutions that pose a systemic threat to the economy (Crockett, 2000). In a bid to adopt a macroprudential approach, the Financial Policy and Regulation Department was set up in March 2010 with the mandate of monitoring early warning signals that would assess the risk of contagion and prevent a systemic crisis rather than focusing on individual banks only (CBN, 2010b). The first Financial Stability report of the Central Bank of Nigeria was in 2010.

The Central Bank of Nigeria Financial Stability report of 2018 reviewed the economic environment within which the banking system operates. It observed that global economic expansion was decreasing, and financial conditions were tightening as a result of a gradual increase in policy rates in advanced countries. Other concerns were how Brexit, China's slow growth and the bearish performance in global financial markets would affect the global economy. The report noted that risks to the stability of the banking system as a result of high

exposure to the oil and gas sector, cyber-crime and trade tensions remained. The stress tests revealed that the industry was resilient to shocks of up to a 75.00 per cent increase in the nonperforming loans of the industry. However, defaults by the five largest obligors could have a severe impact on the industry (Central Bank of Nigeria, 2018). The IMF (2019), in its Article IV report on Nigeria, noted that although prudential ratios were improving, undercapitalized banks continued to weigh on banking sector performance. They observed that restructured loans, particularly in the oil and gas sector, hid the actual status of asset quality. They suggested the strengthening of banking sector resilience by increasing capital buffers and enhanced supervision of the banking system (IMF, 2019).

4.2.2 The Implementation of the Basel II/III Capital Framework in Nigeria

Nigeria announced the implementation of Basel II/III in December 2013 as part of broad banking sector reforms. This involved a full implementation of Basel II and some elements of Basel III. A test implementation commenced in January 2014 and lasted until September 2014. The aim was to strengthen the quality of the capital of the banks and the stability of the financial system (Banking Supervision CBN, 2014). In addition, it was targeted at evolving a robust financial sector that could contribute to the development of the real sector (Sanusi, 2011). The guidance notes on regulatory capital measurement and management for the Nigerian banking system covered the three mutually reinforcing pillars of Basel II. However, national discretion was applied in several areas to reflect the Nigerian environment. The regulators opted not to use credit rating agencies in the assessment of risk, and to retain the minimum capital adequacy ratio of 10 per cent for banks authorised to operate at a regional or national level and 15 per cent for those authorised to operate internationally. This requirement was higher than the 8 per cent set by the Basel framework (CBN, 2014). The higher minimum capital ratios predated the adoption of Basel II, having been adopted in 2003 (Central Bank of Nigeria, 2010). The financial sector assessment report of 2013 revealed that the reason why higher numbers were chosen was due to the peculiarities of the environment (The IMF/ World Bank, 2013). A chronology of events leading up to the adoption of the new BCF is shown in Appendix I. Qualifying capital under the new BCF was made up of Tier 1 and Tier 2. Tier 2 capital was limited to a maximum of one-third (i.e., 33.33%) of Tier 1 capital, while domestic systemically important banks (D-SIBs) had more stringent requirements,

thereby including some of the elements of Basel III. In computing the capital requirements for credit risk and market risk, the framework directed the use of the standardised approaches. For the computation of the capital requirements for operational risk, only the basic indicator approach was allowed (Central Bank of Nigeria, 2013).

4.3 Literature Review and Hypotheses

Ogunleye (2018) observes that fictitious non-loss absorbent capital, opacity and unreliability in prudential reporting, window-dressing of credit portfolios to avoid loss provisions in banks were some of the sharp practices in the banking industry that led to a spate of earlier bank failures in Nigeria. Indeed, it was against the backdrop of episodic bank failures that the legal framework for bank regulation in Nigeria evolved. The author further argues that capital requirements and risk-based supervision are critical factors for banking system stability. Adeyemo (2022) argues that weaknesses in the regulatory framework and lack of enforcement are a major contributor to banking crisis in Nigeria. One of the expectations of the implementation of the Basel capital framework is improved resilience in the banking sector (Basel Committee on Banking Supervision, 2006). However, for developing countries, it is vital to assess the costs and benefits of the BCF rather than embarking on a wholesale adoption. Beck et al. (2018) are of the view that most developing countries adopt the BCF for reputational and competition reasons. But this view fails to acknowledge the various benefits the BCF could introduce if appropriately tailored to the country's needs. Tailored implementation of the BCF was the approach adopted in Nigeria, as earlier explained. The BCF in pillar 1 introduces improved capital quality and quantity, capital charges for market and operational risk, which are as relevant in developing nations as they are in advanced countries. Pillar 2 motivates a risk-based supervisory approach which facilitates ensuring that capital more accurately reflects risk. Pillar 3 helps enforce additional public oversight of the risk management practices of banks (Fuchs et al., 2012).

Building proportionality into the Basel standards would enable implementation in developing countries in a manner that is aligned with their prudential needs (Beck, 2015). However, many countries, including Nigeria, are already doing that. As observed by Hohl et al. (2018) in a study this researcher participated in, most developing countries apply proportionality, simplifying standards in some cases and applying more stringent requirements in others.

Kasekende et al. (2012) observe that although most African banks already exceed global standards in capital buffers, an effective prudential regime is still desirable given that they face much greater risk. Fratzscher et al. (2016) found that higher capital buffers improved bank stability after the GFC in the Euro area. These findings, however, could be unique to advanced countries. An opposing view is from Admati and Hellwig (2012), who are of the view that capital regulation under Basel III is not stringent enough to prevent failures of banks but do not indicate if this applies to all banks. Flannery (2014) observes that the impact of higher bank capital requirements on stability is not easy to determine as it may cause risky transactions to migrate from the regulated banking system into the "shadow" banking system. Flannery refers to the banking system generally but sharp practices such as these are not likely to apply to all banks but only to those with unsound corporate governance.

A survey by the World Bank on bank regulations in more than 125 countries, finds that there are material cross-country differences in the evolution of regulatory reforms. They state that evidence suggests that many countries are making counterproductive changes to their bank regulations by not enhancing the ability and incentives of private investors to scrutinize banks (Barth et al., 2012). This implies that improved resilience may not apply to all banks and banking systems, and this was confirmed in the study of African banking systems.

Looking at the potential impact of the BCF in Egypt and Tunisia, Abdel-Baki, M. (2012)[19] finds that the BCF would have a higher positive impact in Egypt than Tunisia, since its banking sector is better prepared to meet the capital adequacy requirements required by Basel III. The study finds that the BCF could trigger unwanted impacts. Firstly, the need to raise more capital would impair bank profitability and decrease the lending capacity of banks. Secondly, the reduced interbank funding could lead to liquidity crunches. Finally, the closure of some business activities creates the possibility that customers might take their quest for market risk to the unregulated financial system. The differing impacts on banking systems implies the differing impacts on banks. Adesina and Mwamba (2016) find that increased common equity capital in banks reduces the risk-taking behaviour of banks in South Africa thus higher common equity capital is associated with lower bank risk and therefore improved stability.

[19] Forecasting the Costs and Benefits of Implementing Basel III for North African Emerging Economies: An Application to Egypt and Tunisia | African Development Bank - Building today, a better Africa tomorrow (afdb.org)

However, risk-taking activities vary from bank to bank and thus lower the resilience of the overall banking system.

Oyetade et al. (2022) find that a higher level of capital stringency increases resilience in African banks, and banks with higher capital levels can better absorb risk exposures. This suggests that the BCF may not improve resilience in all banks as this depends on prior capital levels. Prior capital levels depend on risk management, governance, and regulatory enforcement. Abba et al. (2013) empirically examine the relationship between risk and the capital adequacy ratio of banks in a study of 12 banks in Nigeria. They find that when risk levels rise, capital adequacy ratio falls. This implies that the impact of the BCF will depend on differing risk levels in banks.

Based on the forgoing views, this study proposes:

Hypothesis 1: *The implementation of the Basel II/III Capital framework does not improve resilience in all banks.*

Solvency in banks is an essential condition for banking system stability. It is imperative to note that banks can operate even if they are balance sheet insolvent (negative equity), as long as they are cash-flow solvent. Operations in such cases are facilitated by maturity dates of assets and liabilities being correctly aligned. Banks can postpone default if sufficient assets mature before each liability falls due. However, maturity transformation leads to high leverage and fragility (Flannery, 2014, Admati et al., 2010, Diamond and Dybvig, 1983). Although banks are expected to comply with minimum capital requirements for risk-weighted assets, this may not be enforced due to regulatory forbearance (Brown and Dinç, 2011). Durang and Quang (2022) show that the equity ratio of banks (equity over total assets) has a clear positive effect on banks' performance and resilience. This implies that lower or negative equity has a negative impact on bank resilience.

Against this backdrop, the following hypothesis is put forward:
Hypothesis 2: *The implementation of the Basel II/III Capital framework improves resilience in banks that are well capitalized only.*

Sound corporate governance leads to the efficient allocation of capital. The exploitation of banks by insiders for their own purposes increases the likelihood of bank failures and diminished resilience (Levine, 2004). Various researchers have used proxies such as board size, board experience, executive compensation and institutional ownership to evaluate corporate governance and are divided between positive and negative associations with performance and risk (Srivastav and Hagendorff, 2016). Berglöf and Claessens (2006) suggest that enforcement of corporate governance depends on an effective sanctioning regime. Corporate governance is influenced by legal and cultural proclivities. In such cases, when rules are breached, the regulator may impose sanctions such as adverse publicity or fines (Padgett, 2011). Thus, using the level of sanctions as a proxy for corporate governance, this study proposes:

Hypothesis 3: *Good corporate governance improves the impact of the BCF on banks.*

4.4 Empirical strategy and summary statistics

The study investigates whether the implementation of the BCF improved the resilience and performance of the banking sector in Nigeria. A two-sample t-test of the average Z-scores and FSIs of all the banks was conducted, using data from before and after BCF implementation to establish if any statistically significant change occurred. A fixed-effects model was applied to the solvent banks while OLS and random effects estimations were performed as robustness checks. The banks constituted the entire population of the entities that adopted the BCF; thus, a fixed-effects model was considered more appropriate (Brooks, 2019). The Breusch and Pagan Lagrangian multiplier and the Hausman tests supported the appropriateness of the fixed effects estimator. Following the methodology in Fratzscher et al. (2016), a difference-in-differences methodology was also applied. Equation (1) estimates the causal impact of BCF implementation by controlling for macroeconomic factors:

Equation 1

$$y_{t} = \alpha + \beta_1 Baseldum_t + \beta_2(Baseldum_t \times \Delta Reg_t) + \beta_3 Var + X_i + \varepsilon_{it} \quad \ldots\ldots\ldots\

term between the treatment (post-BCF) years and the post-BCF capital ratio, post-BCF return on assets or post-BCF standard deviation of the return on assets. To test the fthe number of sanctions and non-performing loans of directors which are proxies for weak governance were included in equation 1 as controls.

Log transformations of all variables were used in the analysis. However, due to some negative values, the analysis followed the formulae in Busse and Hefeker (2007) which is commonly used in the literature for instance in Cintina and Love (2017), and transforms negative values as follows:

Equation 2

$$y = \ln(x + \sqrt{x^2 + 1})) \quad \ldots\ldots\ldots\

and vulnerabilities (Sundararajan et al., 2002). Capital adequacy can be assessed through regulatory capital to risk-weighted assets, regulatory Tier 1 capital to risk-weighted assets and nonperforming loans net of provisions to capital. Asset quality can be appraised via nonperforming loans to total gross loans and sectoral distribution of loans to total loans. Earnings can be assessed by return on assets, return on equity, interest margin to gross income and noninterest expenses to gross income. Liquidity can be appraised through liquid assets to total assets and liquid assets to short-term liabilities. Sensitivity to market risk can be measured through the net open position in foreign exchange to capital (IMF, 2020a). However, Čihák and Schaeck (2010) caution that these indicators should be utilised with care as they may disguise problems in individual banks and are backward-looking. That notwithstanding, they acknowledge that some of the indicators, such as the nonperforming loan ratio, return on equity and capital adequacy ratio, are helpful in identifying weak banking systems or budding distress. They suggest that these tools should be used alongside other measures such as stress tests, supervision, and regulation. A composite index of financial system soundness using the above framework has not been universally agreed upon due to the possibility that such an index could be potentially misleading, as it may conceal or misrepresent problems by offsetting positive and negative signals from the different individual components (Sundararajan et al., 2002).

4.4.2 Macroprudential Analysis

In addition to the analysis explained above, this study also utilises a macroprudential approach. A macroprudential policy combines micro-prudential policy and macro-economic indicators in evaluating systemic stability or risk. It focuses on the financial system as a whole, with the objective of limiting the macroeconomic costs of episodes of financial distress (Borio, 2009). IMF (2000) defines several macroprudential indicators that comprise aggregated micro-prudential indicators and macroeconomic variables. This is because FSIs are considered lagging indicators, and the Z-score is vulnerable to accounting smoothing. Macroeconomic variables can serve as leading indicators and combined with FSIs, can signal an impending crisis. They can be used in stress tests to assess the impact of shocks on the solvency of the financial system. A financial crisis occurs when the financial system is weak and experiences a shock from the macroeconomy (IMF, 2000). In addition to aggregated micro-prudential indicators, the IMF list several macroeconomic indicators of a financial crisis, including

economic growth, inflation, interest and exchange rates, lending and asset price booms, contagion effects, financial market correlation and government recourse to the banking system.

Table 4.2 shows data extracted from the financial statements of fourteen out of the total number of twenty-seven Nigerian banks. These banks were chosen based on whether they were in existence before and after the implementation of the BCF. Thus, newly licensed banks were excluded as well as those that had been nationalised or otherwise acquired. The banks were also selected on the basis of being public limited companies and having their statements published on the Nigerian Stock Exchange. Thirteen years of data (2007 to 2019) with variables measuring performance, efficiency, and profitability (Cost to income ratio, Net Interest Margin, Profit, ROA, and ROE) were obtained. The Z-scores of the individual banks were calculated and used to measure overall resilience in addition to prudential ratios.

Table 4.2 - Summary statistics of variables extracted from the financial statements of fourteen banks.

Variable		Mean	Std. Dev.	Min	Max
Bank ID				1	15
Year				2007	2019
Z-score (levels)	overall	5.048	8.232	-67.365	17.413
	between		3.688	-6.711	8.977
	within		7.417	-55.607	26.856
Capital to Total Assets (levels)	overall	0.117	0.185	-1.550	0.298
	between		0.091	-0.168	0.176
	within		0.162	-1.265	0.471
Net Interest Margin	overall	0.054	0.016	0.014	0.112
	between		0.009	0.041	0.069
	within		0.013	0.015	0.097
Return on Assets	overall	0.012	0.044	-0.364	0.081
	between		0.020	-0.022	0.051
	within		0.040	-0.331	0.114
Total Assets NGN (Billions)	overall	1,540	1,330	143	6,350
	between		1,030	327	3,420
	within		888	-1,000	5,680
Profit before Tax NGN (Billions)	overall	30	53	-285	243
	between		39	-18	116
	within		38	-237	157
Post-Basel capital	overall	0.041	0.173	-1.550	0.239
	between		0.076	-0.220	0.093
	within		0.157	-1.289	0.447

Source: Authors' calculations based on the financial statements of the banks.

The Z-scores ranged from 17.4 to negative 67. Total assets representing size are a major differentiating factor between the banks. Other than size, most of the variability in the Z-score and the FSIs came from within the banks. The trend of risk in the banking system was assessed using the volatility of the return on assets (ROA) of each of the banks as a proxy. The standard deviations of the ROA were calculated using a three-year rolling window. A Z-score measure using three-year rolling windows appears more in the literature (Bouvatier et al., 2018).

The summary statistics of the FSIs covering eleven years from 2008 to 2018 are shown in table 4.3.

Table 4.3 – Summary Statistics of FSIs for the Nigerian Banking Industry 2008 to 2018

Variable	Mean	Std. Dev.	Min	Max
Year			2008	2018
NPLs to Gross loans	11.33	10.22	2.96	37.25
Liquid Assets to Total Assets	16.04	3.52	11.02	22.64
Cap to Assets	9.39	4.45	1.49	17.95
Return on Assets	1.37	-3.56	-8.85	4.16
Return on Equity	16.37	-26.58	-48.89	65.40
Reg Cap to RWA	14.34	6.34	1.75	21.91
RegTier1 to Cap	13.97	6.14	2.18	21.49
Large Exposure to cap	81.89	82.66	0.00	250.31
Personnel Exp to non-int exp	40.72	9.92	33.41	67.81
Trading Income to total income	2.75	-1.94	0.93	6.54
Interest Margin to Gross Income	58.22	10.29	31.04	67.57
Non-interest exp to Gross Income	64.49	26.94	24.37	137.38
Z-score	5.53	4.06	1.47	11.55
Credit to GDP	15.01	3.57	10.91	22.27

Source: Financial Soundness Indicators – IMF data (https://data.imf.org/)

Table 4.3 shows the average values of Financial Soundness Indicators in the Nigerian banking system from 2008 to 2018. The Z-score was 5.53 on average with the lowest being 1.47 and the highest being 11.55. At a Z-score of only 1.47, the industry was almost insolvent. Nonperforming loans were 11.33 on average with the highest being 37.25, also a sign of a banking system in distress.

A difference-in-difference test was also conducted using Ghana as a control group to further validate the results. Data on the business environment, the rule of law, and overall governance were obtained from the Ibrahim Index of African Governance (IIAG) of the Mo Ibrahim Foundation. The index provides a statistical measure of governance performance in 54 African countries. The IIAG overall governance measure covers four categories – safety and the rule of law, participation and human rights, sustainable economic opportunity, and human development. Indicators that, according to the literature, affect bank stability, regulation, and supervision the most have been chosen for this analysis:

a. Rule of law covers the independence of the judiciary, transparency of the judicial process, access to justice, property rights, mechanisms for the orderly transfer of power, and the absence of multilateral sanctions.

b. Business Regulatory Environment covers the absence of excessive bureaucracy and red tape, the absence of restrictions on foreign investment, the efficiency of customs procedures, the robustness of banks, satisfaction with employment creation, and government development of regional integration (Mo Ibrahim Foundation, 2019).

The governance variables obtained from the Ibrahim governance index of the Mo Ibrahim Foundation are shown in table 4.

Table 4.4 - Summary statistics of the Ibrahim Index of African Governance (IIAG)

Ghana	Mean	Std. Dev.	Min	Max
Business Environment	59.29	3.76	53.50	66.00
Overall Governance	66.76	1.35	64.30	68.10
Rule of Law	89.02	1.49	85.90	90.70

Nigeria	Mean	Std. Dev.	Min	Max
Business Environment	41.90	2.31	39.10	44.90
Overall Governance	45.86	1.19	44.40	47.90
Rule of Law	57.01	6.35	48.80	65.90

Note: (1=low to 100=high)

The index employs a statistical process whereby all raw data is measured on a scale of 0 to 100. A score of 100 is the best score a country can achieve. The table shows that Ghana outperformed Nigeria on all the governance variables.

A t-test was conducted to determine if there were statistically significant changes in the average values of the Z-score and other FSIs after the BCF. Table 5 shows the results.

Table 4.5 -Test of equality of pre and post BCF means of balance sheet and income statement variables.

Variables	Pre-Basel	Post-Basel	Diff	p_value
Z-score - (FS - 2019)	3.583	6.777	3.195**	0.016
Standard deviation of ROA	0.051	0.019	-0.032***	0.000
Capital to Total Assets	0.139	0.09	-0.049*	0.098
Total Assets N'millions	1,030	2,140	1,110***	0.000
Net Interest Margin to Assets	0.053	0.057	0.004	0.222
Profit before tax N'millions	15	47	31***	0.000
ROA	0.006	0.018	0.011*	0.085

***Significant at the 1% level ** Significant at the 5% level *Significant at the 10% level

The average volatility of returns (standard deviation) reduced by 0.032 post BCF, while the average Z-score of the individual banks increased from 3.6 to 6.7, which is a reduction in the probability of insolvency.

Table 6 shows the results of a t-test of the equality of the means of the FSIs pre and post BCF implementation.

Table 4.6 Mean equality test of Financial Soundness Indicators (FSIs) pre and post BCF

FSI	Pre-BCF	Post-BCF	Diff	p_value
Regulatory Capital to RWA	13.499	15.354	1.855	0.632
Regulatory Tier1 Capital to RWA	13.634	14.378	0.744	0.844
NPL net to Capital	55.65	13.909	-41.74	0.248
Capital to Assets ratio	9.226	9.591	0.365	0.894
Large Exposures to Capital	27.494	147.163	119.669**	0.011
NPLs to Gross Loans	12.91	9.424	-3.486	0.576
Interest Margin to gross loans	55.142	61.907	6.765	0.276
Return on Equity	13.711	19.552	5.841	0.718
Return on Assets	0.726	2.139	1.413	0.513
Liquid Assets to Total Assets	14.797	17.522	2.724	0.238
Liquid Assets to Short term loans	20.425	25.916	5.49	0.127
Spread L/D (basis pts)	1912.93	2426.477	513.547***	0.004
FC Liabilities to Total liabilities	1.897	18.689	16.791	0.123

***Significant at the 1% level ** Significant at the 5% level *Significant at the 10% level

Notes: RWA – Risk-Weighted Assets, NPL – nonperforming loans, Spread L/D - spread between lending and deposit rates, FC – Foreign Currency

The average values of the capital adequacy, asset quality, management soundness, and earnings indicators improved post BCF. However, large exposures as a percentage of capital, foreign currency-denominated liabilities to total liabilities and the spread between lending and deposit rates deteriorated. Large exposures as a percentage of capital are a form of concentration risk and have been known to trigger bank failures that could have dire consequences for the rest of the banking industry (Basel Committee on Banking Supervision, 2014). Increasing foreign currency-denominated liabilities to total liabilities translates into increasing currency risk while increasing spread could be indicative of increased risk premium or reduced competition in the industry (IMF, 2004b).

Further scrutiny of the data showed that some banks failed to meet the minimum capital requirement. These banks are shown in table 7.

Table 4.7 – Balance sheet Insolvent (non-compliant) banks

Year	2008	2009	2009	2010	2017	2018	2019
Bank ID	14	12	14	12	13	13	13
Capital to Total Assets	-0.41	0	-0.32	-0.17	-1.55	-1.04	-0.81

Source: Authors' calculations based on the financial statements of the banks.

The capital to assets ratio in the table shows that banks 12, 13, and 14 were insolvent during the period. Bank 13 had been insolvent for three years (2017 to 2019). This is a violation of Nigeria's banking Act – Banks and Other Financial Institutions Act (BOFIA) of 2007, which requires banks to comply with the minimum capital requirement (the Federal Republic of Nigeria, 1991). The fact that these rules were not enforced indicates the use of supervisory discretion, which the banking act also allows and which, according to some studies, could be beneficial (Fratzscher et al., 2016). Supervisory discretion does not necessarily produce a less stable financial system (Palmer and Cerruti, 2009). This is supported by the fact that banks 14 and 12 appear to have recovered after 2010 and bank 13's negative capital position appears to be reducing. However, supervisory discretion may lead to time-inconsistency (Barro and Gordon, 1983). The IMF Article IV report finds that these banks weigh down the industry's prudential ratios in line with the findings of this study.

4.5 Impact of the BCF on Resilience and Performance

4.5.1 Impact of the BCF on Resilience – Compliant Banks

Banks that were balance sheet solvent were regarded as banks compliant with regulations. The data extracted from the fourteen banks for the period 2007 to 2019 gave 182 observations after dropping one of the banks due to its acquisition during the period. The analysis assumes that there is unobserved heterogeneity across the banks in terms of governance and internal controls; thus, a fixed-effects model was chosen. Insolvent banks were excluded from this initial analysis, thus restricting the analysis to compliant banks only. The model regresses the aggregated Z-scores of the solvent banks on their capital to assets ratio, return on assets, total assets, and post-BCF capital in line with equation 1. As a robustness check, the pooled OLS estimator and the random effects estimator were also used. The estimates from the OLS and RE estimators are the same except for the standard errors. The FE estimates gave the highest R squared of 66%. The results are shown in Table 4.8:

Table 4.8 – Impact of post-BCF Capital of compliant banks on industry resilience (Z-scores)

Dep variable: Z-score	OLS	FE	RE
Cap to TA (ln)	0.552***	0.685***	0.552***
	(0.149)	(0.131)	(0.116)
ROA (ln)	0.0555*	0.0539	0.0555
	(0.0299)	(0.0394)	(0.0345)
Total Assets (ln)	0.0646	0.417***	0.0646
	(0.0403)	(0.0846)	(0.0403)
Post Basel	2.133***	1.950***	2.133***
	(0.350)	(0.388)	(0.368)
Post Basel cap	0.659***	0.698***	0.659***
	(0.178)	(0.193)	(0.186)
Constant	1.280	-5.709***	1.280
	(0.874)	(1.717)	(0.903)
Observations	161	161	161
R-squared	0.634	0.661	
Number of banks		14	14

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Estimated using Ordinary Least Squares (OLS), Fixed Effects (FE) and Random Effects (RE).

Year dummies are not used in this regression as the Post Basel variable captures the time effects. The results in table 4.8 show that based on compliant banks alone, the post-BCF capital to assets ratio increases the Z-score by 0.69 under all estimators. Thus, the BCF improved resilience under a regulatory compliance scenario. The second hypothesis that the BCF improves resilience in compliant (positive equity) banks is therefore confirmed.

4.5.2 The role of corporate governance

In addition to the size of banks, which was controlled by the total assets' variable, banks differ in the soundness of corporate governance. Earlier studies have found a positive influence of compliance with corporate governance codes on firm performance (Padgett and Shabbir, 2005). This buttresses the notion that non-compliance can lead to poor performance and bankruptcy. Corporate governance is influenced by legal and cultural proclivities. In such cases, when rules are breached, the regulator may impose sanctions such as adverse publicity or fines (Padgett, 2011). The regulatory authorities in Nigeria have found this approach to enforcing corporate governance particularly effective. Banks in Nigeria are required to publish in their audited financial statements any contravention of regulations for which they have

been fined or penalised (BOFIA, 1991). These include regulations of the Central Bank, anti-money laundering regulations, Securities and Exchange Commission, Nigerian Financial Reporting Council, and other regulators. Banks are also required by law and financial reporting standards to disclose insider/director-related facilities and their performance status. These disclosures are in line with Basel Pillar III disclosures and IFRS with the expectation that transparency will promote discipline by financial markets and thus instill better corporate governance in banks. It is expected that banks with good corporate governance will have fewer contraventions and fines relative to the rest of the industry and no non-performing insider facilities.

Related party transactions constitute a corporate governance challenge (Gordon et al., 2004, Jorgensen and Morley, 2017). Directors could exploit their positions and conduct affairs in a manner detrimental to depositors. Several jurisdictions have therefore put in place fit and proper standards for the management and directors of banks to overcome such challenges. Such standards include disallowing related-party transactions (Van Greuning and Brajovic Bratanovic, 2009). Data were therefore collected on contraventions and non-performing director-related loans from the published financial statements of the banks and used as controls. Table 4.9 shows the details of director related facilities and regulatory contraventions of the banks.

Table 4.9 – Director related facilities and bank regulatory contraventions

Bank	Director related Facilities 1 - non-performing 0- Performing	No of Contraventions
1	1	8
2	1	3
3	1	Not disclosed
4	1	5
5	0	2
6	1	4
7	0	0
9	0	1
10	0	5
11	0	4
12	1	5
13	1	6
14	1	7
15	0	4

Variable	Mean	Min	Max
No of Contraventions	4.2	0	8
Director-related facilities	0.6	0	1

Source: Authors' calculations based on the financial statements of the banks.

Column 1 shows the banks, and column 2 shows the status of director-related facilities. The status takes on a value of 0 if all facilities were performing and 1 if not. Six of the fourteen banks had non-performing director-related facilities. Column 3 shows the number of contraventions as of 2013. It ranged from 0 to 8, with the average being 4. Six banks had more than the average number of contraventions, while one bank did not disclose the data in its financial statements. The industry is skewed towards high contraventions and non-performing insider facilities – a sign of weak corporate governance.

4.5.3 Impact of the BCF on Resilience – All Banks (compliant and non-compliant)

The analysis in the last section excludes the non-compliant banks (banks with negative equity). The next set of regressions introduces the non-compliant (insolvent) banks and corporate governance into the model. Corporate governance is measured by regulatory contraventions and non-performing insider related facilities. Table 4.10 shows the regression results of the Z-score on the capital to assets ratio, return on assets, and volatility for all banks, while controlling for size and corporate governance.

Table 4.10 – Difference-in-Differences regression of the Z-score on capital to assets, return on assets and volatility (All banks)

VARIABLES (ln)	(1) Z-Score	(2) Z-Score	(3) Z-Score	(4) Z-Score + Corp Gov	(5) Z-Score
Post BCF	1.380***	1.251***	1.048***	1.098***	-7.760***
	(0.165)	(0.178)	(0.215)	(0.229)	(2.740)
Post BCF capital	-2.327**	-2.280**	-0.128	-0.0276	
	(0.959)	(0.977)	(1.278)	(1.317)	
Post BCF ROA			-8.226**	-10.27**	
			(3.915)	(4.205)	
Capital to Total Assets	8.928***	8.617***	6.581***	6.576***	
	(0.786)	(0.830)	(1.187)	(1.253)	
ROA			6.819***	6.627***	
			(2.017)	(2.067)	
Total Assets		0.149***	0.125***	0.109**	0.621***
		(0.0500)	(0.0448)	(0.0498)	(0.192)
Contraventions				-0.00405	
				(0.0225)	
Director related facilities				-0.104	
				(0.0970)	
Post BCF Standard Deviation					-1.894***
					(0.666)
Standard Deviation					-0.599**
					(0.234)
Constant	0.503***	-2.610**	-1.863**	-1.450	-13.23***
	(0.144)	(1.037)	(0.942)	(1.016)	(3.843)
Observations	181	181	181	168	181
R-squared	0.830	0.837	0.869	0.874	0.375

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Row 1 – Dependent Variables, Column I – Explanatory variables. Column 2 controls for size, column 3 includes post-BCF ROA, column 4 controls for corporate governance and column 5 tests the impact of volatility.

The main parameters of interest are post-BCF capital, post-BCF ROA and post-BCF standard deviation (SD). These show the impact of the BCF, post-BCF returns and volatility on resilience, respectively. Including banks with negative equity changes the results significantly. The Capital to Total Assets and Return on Assets (ROA) parameters show that capital and returns are positively associated with resilience. However, leverage post BCF measured by capital to assets ratio (Post-BCF Cap in column 1) reduced the average Z-score by 2.3 per cent. Similarly, post-BCF ROA and volatility reduced the Z-score by 8 per cent and 1.9 per cent, respectively. The t-test had earlier shown that the average Z-score of 3.58 pre-BCF rose to an average of

6.78 post BCF. But then, the summary statistics showed that during the period of analysis, the Z-score ranged from -67.37 to 17.41 with an overall mean of 5.05, confirming that averaging was masking the exact position of individual banks, and insolvent banks weighed down the mean. The coefficients of Capital to Total Assets and ROA in column 4 show that weak corporate governance amplifies the negative impact of leverage and reduces the positive impact of return on assets. This is contrary to the findings of Beltratti and Stulz (2012) that banks with better governance do not exhibit superior performance. The combined effect was an amplification of the negative impact of post-BCF ROA on the Z-score. The findings show that regulatory forbearance of breaches of the minimum capital ratio, which translates to high leverage, has a negative impact on resilience.

To better understand the industry resilience dynamics, the study drills down to the individual banks. Table 4.11 presents the industry Z-score by year, by bank and for the year 2019.

Table 4.11 – Z-score by year, by bank, and for the year 2019

Industry Average Z-score by Year		**Average Z-score by Bank**		**Z-score 2019**
Year	**Average Z-score**	**Bank**	**Average Z-score**	
2007	2.04	1	6.51	4.07
2008	1.67	2	4.97	NA
2009	1.47	3	4.97	3.45
2010	5.82	4	5.60	4.60
2011	4.36	5	6.52	5.35
2012	4.99	6	6.64	5.15
2013	4.73	7	8.98	10.70
2014	11.42	9	6.66	5.96
2015	11.55	10	4.41	4.55
2016	11.24	11	5.57	5.09
2017	1.62	12	6.54	6.14
2018	1.99	13	-6.71	-33.18
2019	2.54	14	2.72	3.56
		15	7.28	7.65
Mean	5.05	**Mean**	5.05	2.54

Source: Authors' calculations based on the financial statements of the banks.

The average industry Z-score rose sharply from 4.73 in 2013 just before the BCF to 11.42 in 2014 just after. It remained at this peak until 2017, when it dropped sharply to 1.62, probably due to the 2016 economic recession in Nigeria, which resulted from the global fall in oil prices. Bank 7 is the furthest from insolvency with a Z-score of 10.70 in 2019, while Bank 13 is already insolvent. Bank 13, with a negative Z-score of 33.18, dragged down the mean to 2.54. This

demonstrates that the banks have different levels of idiosyncratic risk, but the less resilient banks could drag down the more resilient ones if a prolonged shock occurs. The BCF improved banking industry resilience after controlling for negative equity positions. When these positions are included, the industry Z-score deteriorates. Had the Z-score of 11.55 in 2015, after the BCF implementation not been that high, the banking system would probably have faced another banking crisis during the recession. Nigeria entered a recession in the second quarter of 2016 and exited in the second quarter of 2017. However, growth remained fragile. The recession had a lagged impact on the distance to default of banks as it did not manifest until 2017 when the Z-score fell to 1.62. But this was a short recession, and it calls to question how long the capital buffers would have held up if the recession had lasted much longer. By 2019, the average Z-score including the insolvent bank had risen to 2.54. It remains to be seen if the banking system is resilient enough to withstand another period of stress like the ongoing COVID-19 pandemic. The following section adopts a different approach to the analysis of the impact of the BCF on Nigeria's banking sector in a bid to ensure the robustness of the findings.

4.5.3.1 Difference-in-Differences Identification Strategy: Nigeria vs Ghana

To further validate the results, a difference-in-differences identification strategy was also employed using Nigeria as the treated group and Ghana as the control group. Ghana had not adopted the BCF as of 2017 and thus was ideal for this purpose. The parallel trend and overlap conditions of the two groups were established. The results of the analysis can be found in appendix IV. The results confirmed that increasing leverage, macroeconomic factors and the business environment constrained the response of the Nigerian banking system to the BCF going by the Z-score indicator. Although some of the FSIs pointed to soundness, it is essential to take a holistic view of all FSIs and the Z-score, as individual FSIs may indicate soundness, but it is not enough to infer resilience. A macro-prudential approach is also crucial as the Z-score and the FSIs may not highlight the inter-connections and sentiments in the industry which may cause contagion and amplify shocks. The following section investigates the impact of the BCF on industry performance.

4.5.4 Impact of the BCF on Industry performance

The impact of the BCF on industry performance measured by the net interest margin and return on assets is shown in table 4.12.

Table 4.12 – Impact of post- BCF leverage on Net interest Margin and Return on Assets

VARIABLES	(1) NIM (ln)	(2) ROA (ln)	(3) StdDev
Post BCF	-0.061***	0.0423*	-0.796***
	(0.022)	(0.022)	(0.092)
Post-BCF capital	0.461***	-0.252*	-0.347
	(0.162)	(0.136)	(0.510)
Capital to Total Assets	0.017	0.293**	0.203
	(0.030)	(0.133)	(0.509)
Total Assets	0.001	0.006**	-0.084**
	(0.002)	(0.003)	(0.038)
Constant	0.037	-0.169**	-1.340*
	(0.039)	(0.068)	(0.799)
R-squared	0.131	0.316	0.584

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Row 1 – Dependent variables, Column 1 – Explanatory variables

The parameter of interest – post-BCF capital shows that leverage (represented by the capital to assets ratio post the BCF) had a significant positive impact on the net interest margin as it improved by a positive 0.46 (col 2 row 3). This shows that banks were taking higher risks to boost returns, since high leverage is indicative of insufficient capital and is a risk to stability. Leverage post-BCF, however, had a negative impact on return on assets (ROA) as it reduced the ROA by -0.252 (col 3 row 3). The ROA, unlike the return on equity (ROE), captures the effect of leverage and other management inefficiencies such as provisions for non-performing loans and other impaired assets .

The analysis shows that leverage increased the risk of insolvency of the industry but boosted the net interest margin (NIM) of banks, as shown by the net interest margin as a percentage of earning assets. The adoption of the BCF did not mitigate this risk as the leverage ratio requirement in Basel III had yet to be adopted. Corporate governance was also seen to play an essential role as regulatory infractions, and non-performing insider related facilities exacerbated the deterioration of the Z-score. The findings highlight the importance of strict leverage rules, enforcement by bank supervisors and improved corporate governance. From the foregoing, it can be deduced that the hypotheses that the BCF does not improve the resilience of all banks; the BCF improves the resilience of well capitalised banks only; and corporate governance improves the impact of the BCF cannot be rejected. However, Industry performance, as shown by the ROA, did not improve.

4.6 Effectiveness of the Banking reforms

Nigeria experienced a banking crisis from 1991 to 1995 and then from 2009 to 2012. Since 2012, none of the definitions of a systemic crisis has been met to date. There was no evidence of bank runs, nationalisations, or policy interventions as there were in 2009. That the recession did not lead to a systemic banking crisis is indicative of the success of the reforms. Had capital buffers not been as high as they were just before the recession, it is possible that a banking crisis could have occurred. This should encourage regulators to sustain these reforms to ensure the system remains solidly resilient to future shocks. Crisis preparedness and management through stress testing and scenario analysis is critical in this regard. Robust reforms are foundational to a resilient banking system, but it is also contingent on corporate governance, the business environment and sound macro-economic management. The study proceeds to analyse the impact of macroeconomic and systemic factors on resilience to assess the effectiveness of the reforms. It also tests the strength of this resilience under various scenarios.

4.6.1 Impact of Macroeconomic factors on FSIs

Table 4.13 presents the descriptive statistics of the macroeconomic variables, and table 4.14 outlines the mean equality test of the variables.

Table 4.13 - Descriptive statistics of macro-economic and systemic indicators

Variable	Mean	Std. Dev.	Min	Max
GDP growth (annual %)	4.46	3.05	-1.62	8.04
GDP per capita growth (annual %)	1.73	2.74	-4.17	5.20
Inflation, consumer prices (annual %)	11.80	2.61	8.06	16.52
Real interest rate (%)	8.41	4.72	1.07	18.18
Risk premium on lending (lending rate minus treasury bill rate, %)	7.49	3.69	3.16	15.21

Table 4.14- Mean equality test: Macroeconomic variables

Variable	Pre-BCF	Post-BCF	Diff	p_value
GDP growth (annual %)	6.503	2.018	-4.485**	0.018
GDP per capita growth (annual %)	3.697	-0.628	-4.324**	0.018
Inflation (annual %)	11.395	12.273	0.878	0.650
Risk premium on lending	8.537	6.229	-2.307	0.300

Table 4.14 shows that GDP and GDP per capita annual growth slowed with statistical significance after the BCF. For that reason, the study conducts a diff-in-diff estimation of the impact of macroeconomic variables on FSIs. The results of how post-BCF GDP and inflation influenced capital adequacy (Reg cap), asset quality (NPL), returns (ROA), liquidity (LA/ST liabilities) and credit are presented in Table 4.15.

Table 4.15– Impact of post -BCF macroeconomic variables on regulatory capital, asset quality, earnings, liquidity, and credit

Dep. Var. (ln)	(1) Reg cap	(2) Reg cap	(3) Reg cap	(4) NPL	(5) ROA	(6) LA/ST Liab	(7) Credit/GDP
Expl. Var(ln)							
Post-BCF	-6.853*	-13.19**	0.429	8.564	-3.581	-5.076*	4.164
	(3.266)	(4.713)	(1.659)	(5.013)	(21.37)	(2.214)	(2.875)
GDP	-2.826*	-2.686**		2.776**	-2.213	-0.443**	0.769*
	(1.331)	(0.692)		(0.958)	(4.119)	(0.129)	(0.337)
Post-BCF GDP	2.896*	2.567**		-2.711**	2.432	0.506**	-0.858*
	(1.332)	(0.692)		(0.964)	(4.120)	(0.167)	(0.344)
Inflation		-3.267**		2.865**	0.879	-0.686**	0.416
		(1.263)		(1.099)	(5.202)	(0.194)	(0.675)
Post-BCF Inflation		2.225		-0.556	-0.517	1.309	-0.710
		(1.274)		(1.248)	(5.211)	(0.656)	(0.770)
Real Interest rate			0.503				
			(0.631)				
Post-BCF Real int			-0.0513				
			(0.659)				
Constant	10.19**	20.02***	1.713	-13.16**	3.695	6.965***	0.177
	(3.264)	(4.680)	(1.552)	(4.634)	(21.34)	(0.768)	(2.618)
R-squared	0.502	0.760	0.278	0.828	0.150	0.572	0.551

***Significant at the 1% level ** Significant at the 5% level *Significant at the 10% level. Row 1 – Dependent Variables -Regulatory capital (Reg cap), non-performing loans (NPL), Return on Assets

(ROA), Liquid Assets to short term liabilities (LA/ST), Credit to GDP ratio (Credit to GDP). Estimated using Fixed Effects

Column 7 of Table 4.15 shows that post BCF implementation, GDP per capita is negatively associated with credit with a 0.86% decline. As post-BCF economic growth resulted in less credit, non-performing loans naturally reduced (column 4), and regulatory capital improved, as shown in columns 1 and 2, probably due to reduced risk-weighted assets and reduced impairments. The improvement in liquid assets to short-term liabilities of 0.51% in column 6 suggests a flight to safer assets. The slowing GDP had caused a reallocation from riskier assets to more liquid and relatively safer assets. Table 4.16 shows the results of the regression of regulatory capital and liquidity on systemic indicators including the risk premium on lending and credit to the government.

Table 4.16 - Impact of post BCF risk premium on lending and credit to Government on FSIs

	(1)	(2)	(3)
VARIABLES (ln)	Reg cap	LA/ST Liab	Reg cap
Post-BCF	-5.554***	-0.773	-0.853
	(1.526)	(0.907)	(4.706)
Risk premium (RPL)	-1.458**	-0.266**	
	(0.537)	(0.106)	
Post-BCF RPL	2.265***	0.377	
	(0.557)	(0.356)	
Credit to Govt			0.278
			(1.412)
Post-BCF Credit to Govt			0.571
			(1.854)
Constant	6.936***	4.416***	2.283
	(1.478)	(0.300)	(3.719)
R-squared	0.709	0.435	0.085

***Significant at the 1% level ** Significant at the 5% level *Significant at the 10% level

The risk premium on lending had a negative impact on regulatory capital and banking system liquidity (columns 1 and 2). However, post-BCF, the reduction in the average risk premium of 2.3%, as shown in column 3 of Table 4.16, significantly improved regulatory capital by 2.26% (post-BCF RPL in column 1). The risk premium on lending is the interest rate charged by banks beyond the risk-free rate and thus can be seen as a price of risk. The decline in risk premium is indicative of a fall in the risk of the borrower, an improvement in asset quality and thus a reduction in charges against regulatory capital. Having analysed the impact of macroeconomic factors on financial soundness, how strong is the resilience of the banking sector? The following section investigates this.

4.6.2 Measuring the Strength of the Resilience of the Banking Sector

The Z-score constructed in this study and used in the foregoing analysis was based on micro-prudential data of the banks, which showed a sharp decline in 2017. The data shows that economic crises have a lagged impact on the financial system. Based on the trend of GDP and inflation, it is likely the Z-sore will fall even further below the eleven-year average of 16%. Table 4.17 shows Nigeria's banking system's Z-score from 2008 to 2018 from the Global Financial Development database of the World Bank which adopts a macro rather than a micro view.

Table 4.17 - Nigeria's banking system Z-score, GDP and Inflation

Year	GDP %	Inflation %	Z-score
2008	6.76	11.58	16.49
2009	8.04	11.54	19.84
2010	8.01	13.72	20.07
2011	5.31	10.84	12.78
2012	4.23	12.22	15.83
2013	6.67	8.48	14.84
2014	6.31	8.06	14.96
2015	2.65	9.01	15.29
2016	-1.62	15.68	15.53
2017	0.81	16.52	16.24
2018	1.94	12.09	13.14

Source: Global Financial Development Database

The crisis of 2009 to 2012 did not take its toll on the Z-score until 2011 when the Z-score dropped from 20 to 12.8. However, the Central bank had to bail out banks and deploy substantial liquidity support to prevent a full-blown economic crisis. Output losses as a percentage of GDP averaged 14%; fiscal costs as a percentage of GDP averaged 11.8%; nonperforming loans averaged 30%, and the increase in public debt was 7.7%. However, the impact of the 2009 crisis was less severe than the one in 1991, when NPLs were as high as 77% and public debt increased by 63%, making that crisis one of the costliest in the world since 1970 (Laeven and Valencia, 2012, Ogunleye, 2018). This suggests that risk management in the banking system has improved over time. However, the Z-score had fallen to 13.14 as of 2018 showing another lagged impact of the 2016 – 2017 recession. The study now proceeds to examine the sustainability of banking sector resilience.

4.6.2.1 Sustainability of the Industry resilience in the face of macroeconomic shocks

A probit model was used to predict the probability of the banking system staying resilient in the event of macroeconomic shocks using the Z-scores from the GFDD database. The objective of using these was to adopt a macro rather than micro approach. From 2008 to 2017, the average industry Z-score ranged from 12.8 to 20, with a mean of 16.2. The model tested the probability of the Z-score falling below the period mean if inflation soared to 14%, beyond the period average of 11.8%, and there were changes in GDP growth. The data shows that the highest GDP growth in the period was 8%, while the lowest was negative 1.6% in 2016 during the recession. The equation used to obtain the predictions is as follows:

$$\mathbf{Y = \beta_0 + B_{(1-k)} X + \mu}$$

with:

$$\mathbf{P(Y = 1|X) = \Phi (\beta_0 + B_{(1-K)} X)}$$

The Z-score or NPLs (nonperforming loans) which measure resilience are the dependent variables. They are binary variables. The model has two regressors represented by **X** – inflation and GDP growth. $\Phi (\beta_0 + B_{(1-K)} X)$ is the cumulative standard normal distribution. The expression used for predictions in Stata software is:

Pr(Z-score, NPLs), predict ()

The results are shown in Table 4.18. The tables were created with the Asdoc program, written by Shah (2018).

Table 4.18 Resilience (Z-score) of the Banking Industry at Inflation of 14% and a slowing or growing economy.

Predictions	Growth rate	Std.Err.	z	P>z	[95%Conf.	Interval]
_at						
1	0.862	0.259	3.330	0.001	0.354	1.370
2	0.412	0.219	1.880	0.060	-0.018	0.842
3	0.063	0.076	0.820	0.412	-0.087	0.212
4	0.002	0.009	0.250	0.800	-0.015	0.019

Adjusted predictions Expression: Pr(Z-score), predict()

1._at	:Inflation (annual %)	=	14
	GDP growth (annual %)	=	-1
2._at	:Inflation (annual %)	=	14
	GDP growth (annual %)	=	2
3._at	:Inflation (annual %)	=	14
	GDP growth (annual %)	=	5
4._at	:Inflation (annual %)	=	14
	GDP growth (annual %)	=	8

The model predicts that if inflation rises to 14% and the economy goes into recession with a GDP growth rate of negative 1% (prediction 1), there is an 86% chance that the Z-score will fall below the average resilience level of 16%. However, if the economy grows at 2%, the probability of a decline in resilience drops significantly to 41% (prediction 2). Nigeria's growth rate slowed to 1.87% in the first quarter of 2020.

4.6.2.2 Impact of GDP and Inflation on the Industry Non-performing loans

Using the ratio of non-performing loans to gross loans as a proxy for resilience, the probit model was used to predict the impact of varying levels of GDP growth and inflation. The maximum NPL ratio tolerable in the Nigerian banking industry is 5%. The results are shown in Table 4.19.

Table 4.19 - Resilience (NPLs) of the Banking Industry in a slowing or growing economy

	Margin	Std.Err.	z	P>z	[95%Conf.	Interval]
_at						
1	0.248	0.235	1.060	0.291	-0.213	0.709
2	0.308	0.170	1.810	0.071	-0.026	0.641
3	0.372	0.157	2.380	0.017	0.066	0.679
4	0.441	0.238	1.860	0.063	-0.024	0.907

Adjusted predictions Expression: Pr(NPL_f), predict()

1._at :GDP growth (annual %) = -1
2._at :GDP growth (annual %) = 2
3._at :GDP growth (annual %) = 5
4._at :GDP growth (annual %) = 8

The model predicts NPLs falling to 5% with a probability of 31% if GDP grows at 2% (prediction 2). If it grows at 8%, the probability increases to 44% (prediction 4).

Table 4.20 shows the predictions of the impact of changing inflation rates on the resilience of the banking sector.

Table 4.20- Resilience (NPLs) of the Banking Industry with increasing or decreasing inflation

	Margin	Std.Err.	z	P>z	95%Conf.	Interval]
_at						
1	0.968	0.046	21.040	0.000	0.878	1.058
2	0.417	0.205	2.030	0.042	0.014	0.819
3	0.012	0.039	0.300	0.767	-0.065	0.089

Adjusted predictions Expression: Pr(NPL_f), predict()
1._at :Inflation (annual %) = 8
2._at :Inflation (annual %) = 11
3._at :Inflation (annual %) = 14

NPLs have a 97% probability of falling to 5% or lower if inflation falls to 8% (prediction 1). However, if it skyrockets to 14%, the probability falls to only 1% (prediction 3). Inflation rose to 12.34% in April 2020.

4.6.3 **Economic Significance of the predictions**.

The results in table 4-18 indicate that at an inflation rate of 14%, there is a positive relationship between economic growth and the resilience of the banking industry, as evidenced by the positive coefficients for the Z-score as economic growth increases, albeit at

a decreasing rate. The estimated coefficients are 0.412, 0.063, and 0.002 for GDP growth rates of 2%, 5%, and 8% respectively. At a GDP growth rate of 8%, the Minsky theory of financial instability appears to be coming into play, as the coefficient is lower compared to levels of 5% and 2%. The Minsky theory of instability suggests that stability within the financial system can lead to instability over time. The theory posits that during times of economic growth and stability, investors and lenders become complacent and take on more risk, leading to the build-up of debt and leverage in the financial system. This can eventually lead to a "Minsky moment," a sudden collapse or crisis caused by a failure of the system to sustain the debt and leverage, resulting in its demise[21]. High inflation can have a negative impact on the financial health of the banking system, which in turn can have broader macroeconomic consequences. Although the coefficients exhibit statistical significance, their economic significance is limited by the substantial effects of inflation, potentially leading to higher non-performing loans and lower Z-scores. Inflation can negatively affect the financial health of the banking industry, High levels of NPLs can lead to reduced lending activity, decreased confidence in the banking system, and potential systemic risks.

The results in table 4-19 indicate that as economic growth increases, the resilience of the banking industry also tends to increase. The estimated coefficients are 0.248, 0.308, 0.372, and 0.441 for GDP growth rates of -1%, 2%, 5%, and 8% respectively. Assuming low inflation, these findings have economic significance, as a GDP growth rate of 8% could potentially enhance banking system resilience by 44%. The results in table 4-20 indicate that as inflation increases, the resilience of the banking industry decreases, as evidenced by the decreasing coefficients for NPLs as inflation increases. The estimated coefficients are 0.968, 0.417, and 0.012 for inflation rates of 8%, 11%, and 14% respectively. These are considered economically significant because inflation could have a substantial impact on non-performing loans and by extension banking system resilience.

GDP growth after the implementation of the BCF improved regulatory capital, liquidity, and asset quality. The reduction in the risk premium post-BCF also improved regulatory capital.

[21] Minsky, H. P. (1992). The financial instability hypothesis. Jerome Levy Economics Institute Working Paper No. 74. https://www.levyinstitute.org/pubs/wp74.pdf

Wray, L. R. (2015). Why Minsky matters: An introduction to the work of a Maverick economist. Princeton University Press.

However, the prediction models reveal that resilience is sensitive to small changes in economic growth and inflation. An 86% chance of a fall in the Z-score or the probability of rising NPLs as the models predict, due to falling GDP growth or rising inflation would have a dire effect on banking system stability and economic welfare. Therefore, policymakers and regulators should be mindful of the potential impact of high inflation and low growth on the banking sector and take appropriate measures to mitigate its adverse effects. It would also be beneficial for policymakers to consider extending the regulatory framework to the Basel III capital conservation and countercyclical buffers to mitigate economic shocks should they arise.

4.6.3.1 Post COVID-19 Assessment

Data released by the GFDD in December 2021 showed that the Z-score fell to 12.98 in 2020 from 13.14 in 2018[22], showing a decline in resilience and confirming the prediction of the model. The COVID pandemic may have led to this decline, but it is also likely that the higher buffers before the pandemic protected the industry from instability.

Contrary to the predictions of the model, NPLs fell despite a contraction in GDP growth and an increase in inflation. The Central Bank of Nigeria Communiqué No. 133 of the Monetary Policy Committee of the 24th of November 2020 reports that GDP fell to -6.1% in Q2 of 2020 but rose to -3.62% in Q3 2020, representing a moderation of 2.48%. Inflation had soared to 14.23% as of October 2020. However, NPLs had fallen to 5.73% from 6.6% in April 2020 (CBN, 2020b). As reported in the Central Bank of Nigeria Communiqué no. 131 of the 274th Monetary Policy Committee meeting of 20th July 2020, the fall in NPLs was largely due to regulatory support. 35,639 loans of businesses impacted by the COVID-19 pandemic, representing 41.92% of the total industry loan portfolio, obtained regulatory approval for restructuring as of July 2020, significantly improving the industry risk profile (CBN, 2020a). By extension, if not for the restructuring of loans and regulatory support, NPLs could have been higher than 10% and the predictions of the model confirmed. Other policy actions that mitigated risk in the industry and improved resilience included (Financial Policy and Regulation Dept. CBN, 2020):

1. Extension of repayment moratorium by 1 year and reduction of interest rates from 9% to 5% on all CBN intervention facilities effective 1 March 2020.

[22] Global Financial Development | Data Catalog (worldbank.org)

2. Allowing banks to give their customers more time to repay loans.
3. Creation of a N50billion ($163 million) targeted credit facility for households and SMEs to combat the impact of the pandemic.
4. Injection of N1 trillion ($3.27 billion) into local manufacturing and import substitution to stimulate the economy.

The findings in this section underline the importance of a macroprudential approach that focuses on the financial system as a whole to limit the macroeconomic costs of financial distress. The effectiveness of a prudential and macro-economic approach in staving off systemic instability is demonstrated by the results of CBNs regulatory support and forbearance. The analysis in this section of the impact of the BCF on banking system resilience, and by extension, sustainable economic growth, and welfare, is complemented by the next section, which explores the impact of the BCF through an industry survey.

4.7 Effectiveness of the Banking reforms – A qualitative case study

The original analysis of this research showed that the BCF had a statistically significant negative impact on Nigeria's banking system resilience. Although subsequent quantitative analysis at the micro level revealed that resilience was weighed down by a few highly leveraged banks, it would be helpful to validate those findings qualitatively. In view of the limitations of quantitative approaches, a survey research method was employed to complement the earlier strategy. The survey covered the operators and the regulators in Nigeria's banking industry. The objective was to establish the impact of the BCF from regulatory and industry perspectives. It is considered that the regulators and the operators are best positioned to evaluate the efficacy of the BCF beyond quantitative methods. The survey instrument is shown in appendix VI.

Some of the questions in the survey were both coded and reverse coded to detect invalid responses and eliminate acquiescence bias. In the banking industry, the questionnaire was sent to the 25 banks in existence at the time of the implementation of Basel II/III. Thirteen banks responded, giving a response rate of 52%. The survey was restricted to only those who had responsibility for managing risk in their institutions. Table 4.21 shows the job functions or designations of the respondents from the banking industry:

Table 4.21 Job Designations of respondents from the Banking industry

Designation Of Respondent	Count
Chairman Risk Managers Association	1
Chief Financial Officer	3
Chief Risk Officer	3
Chief Conduct and Compliance Officer	1
Financial Controller	1
Chief Information Security Risk Manager	1
Operational Risk Manager	1
Risk Manager	1
Risk Officer	1
Total	**13**

The 13 respondents were made up of bank Chief Risk Officers (CROs), Chief Finance Officers (CFOs), Financial Controller, Chief Conduct and Compliance Officer, Information Security Risk Manager and Operational Risk Manager. On the regulatory side, the questionnaire was sent to Bank Supervisors and Regulators of the Central Bank of Nigeria and the Nigeria Deposits Insurance Corporation. A total of 31 responses were received. Table 4.22 shows the designations of respondents from the regulatory and supervisory agencies:

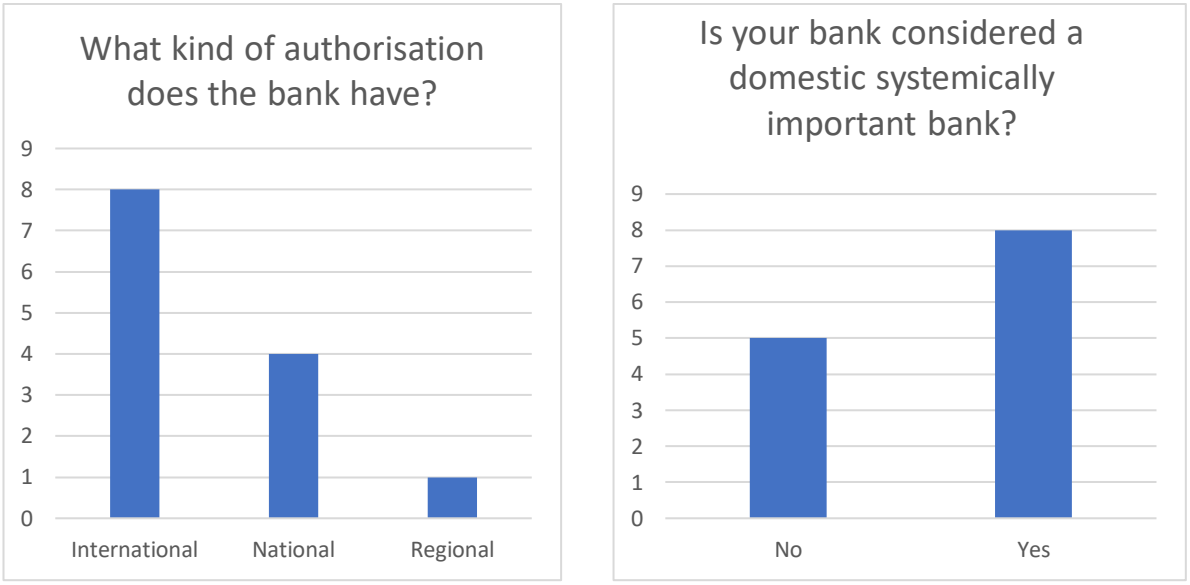
Table 4.22 Job Designations of Bank Regulator and Bank Supervisor respondents

Respondents	Count
Deputy Director	2
Assistant Director	10
Bank Supervisor	4
Senior Manager	2
Principal Manager	2
Regulator	1
Bank Supervisor and Examiner	1
Principal Bank Examiner	1
Bank Examiner	1
Senior Examiner	1
Regulator	1
Manager	1
Non-Executive Director & retired Bank Examiner	1
Deputy Manager	1
Not indicated	2
Grand Total	**31**

Table 4.22 shows that the respondents were senior regulators and bank supervisors with responsibility for supervising banks and ensuring safety and stability in the industry.

Figure 4.1 shows the nature of authorisation of each respondent bank and its systemic importance.

Figure 4-1 **Bank Authorisations in Nigeria's Banking Sector**



8 of the respondent banks had international authorisation, 4 had national authorisation, and 1 had regional authorisation. 8 banks were considered systemically important and 5 were not.

Respondents were required to specify their level of agreement or disagreement with the positive and negative impacts of the BCF. The questions focused on governance, risk management, capital adequacy, the likelihood of bank failure, banking system resilience, profitability, credit supply and unintended consequences. Analysis of the survey data was conducted using Likert charts. Likert charts are widely used rating scales that are useful for capturing, assessing and rating opinions and perceptions of survey respondents[23]. The responses had five-level Likert items comprising Strongly agree, Agree, Disagree, Strongly disagree, and Neutral. These were collated, and percentages of responses to each question were calculated. Unanimous or mainly undisputed responses were taken to be representative of the regulatory and industry views. Further attention was given to dissented responses. This is because minority views could be indicative of issues that could later escalate and affect

[23] Likert scale | social science | Britannica

the entire industry. Therefore, such views should not be overlooked. The following section analyses the responses from the banking industry on the impact of the BCF.

4.7.1 Industry Perception of the Impact of the BCF

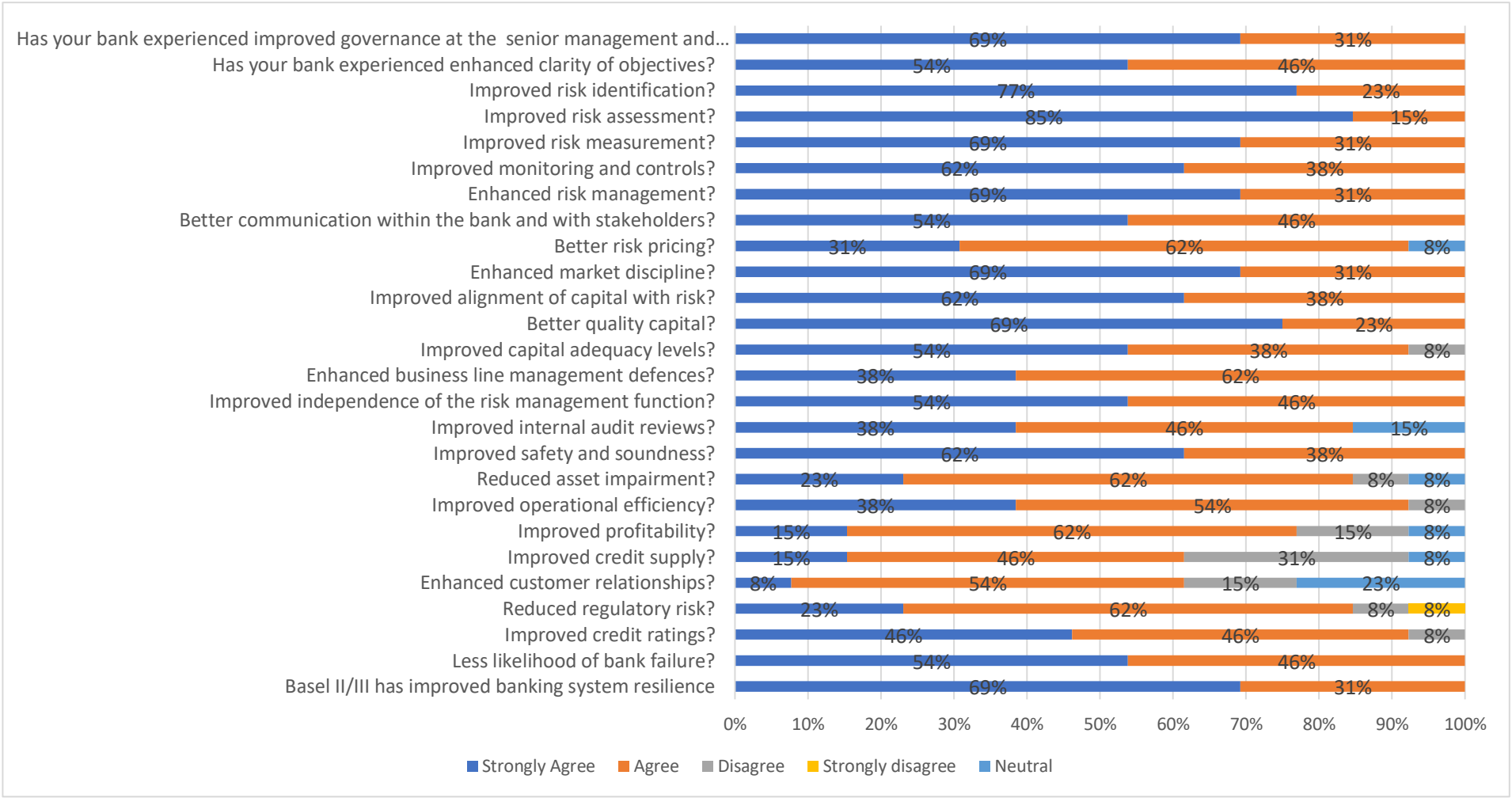
The survey was designed to capture the views of senior banking officials and risk managers in Nigeria on the success of the BCF. Table 4.22 and Figure 4.2 shows the extent to which operators in the industry believe the banking system benefitted from the implementation of the BCF. Table 4.22 presents the descriptive statistics for each survey question. Where there are disagreements for a specific question, these are further probed and discussed below. Figure 4.3 presents the responses on the extent to which banks encountered adverse consequences from the implementation of Basel II/III, in a Likert chart form.

Table 4.22 Operators' Responses – Banking Industry

Question	Strongly Agree	Agree	Total Agree	Disagree	Strongly disagree	Neutral	Total Disagree / Neutral
Has your bank experienced improved governance at the senior management and board levels?	69%	31%	100%				0%
Has your bank experienced enhanced clarity of objectives?	54%	46%	100%				
Improved risk identification?	77%	23%	100%				
Improved risk assessment?	85%	15%	100%				
Improved risk measurement?	69%	31%	100%				
Improved monitoring and controls?	62%	38%	100%				
Enhanced risk management?	69%	31%	100%				
Better communication within the bank and with stakeholders?	54%	46%	100%				
Better risk pricing?	31%	62%	92%			8%	8%
Enhanced market discipline?	69%	31%	100%				0%
Improved alignment of capital with risk?	62%	38%	100%				0%
Better quality capital?	69%	23%	92%				0%
Improved capital adequacy levels?	54%	38%	92%	8%			8%
Enhanced business line management defences?	38%	62%	100%				
Improved independence of the risk management function?	54%	46%	100%				
Improved internal audit reviews?	38%	46%	85%			15%	15%
Improved safety and soundness?	62%	38%	100%				
Reduced asset impairment?	23%	62%	85%	8%		8%	15%
Improved operational efficiency?	38%	54%	92%	8%			
Improved profitability?	15%	62%	77%	15%		8%	23%
Improved credit supply?	15%	46%	62%	31%		8%	38%
Enhanced customer relationships?	8%	54%	62%	15%		23%	38%
Reduced regulatory risk?	23%	62%	85%	8%	7.69%		15%
Improved credit ratings?	46%	46%	92%	8%			8%
Less likelihood of bank failure?	54%	46%	100%				0%

Basel II/III has improved banking system resilience	69%	31%	100%	0%

Figure 4-2 Survey Responses – Banking Industry

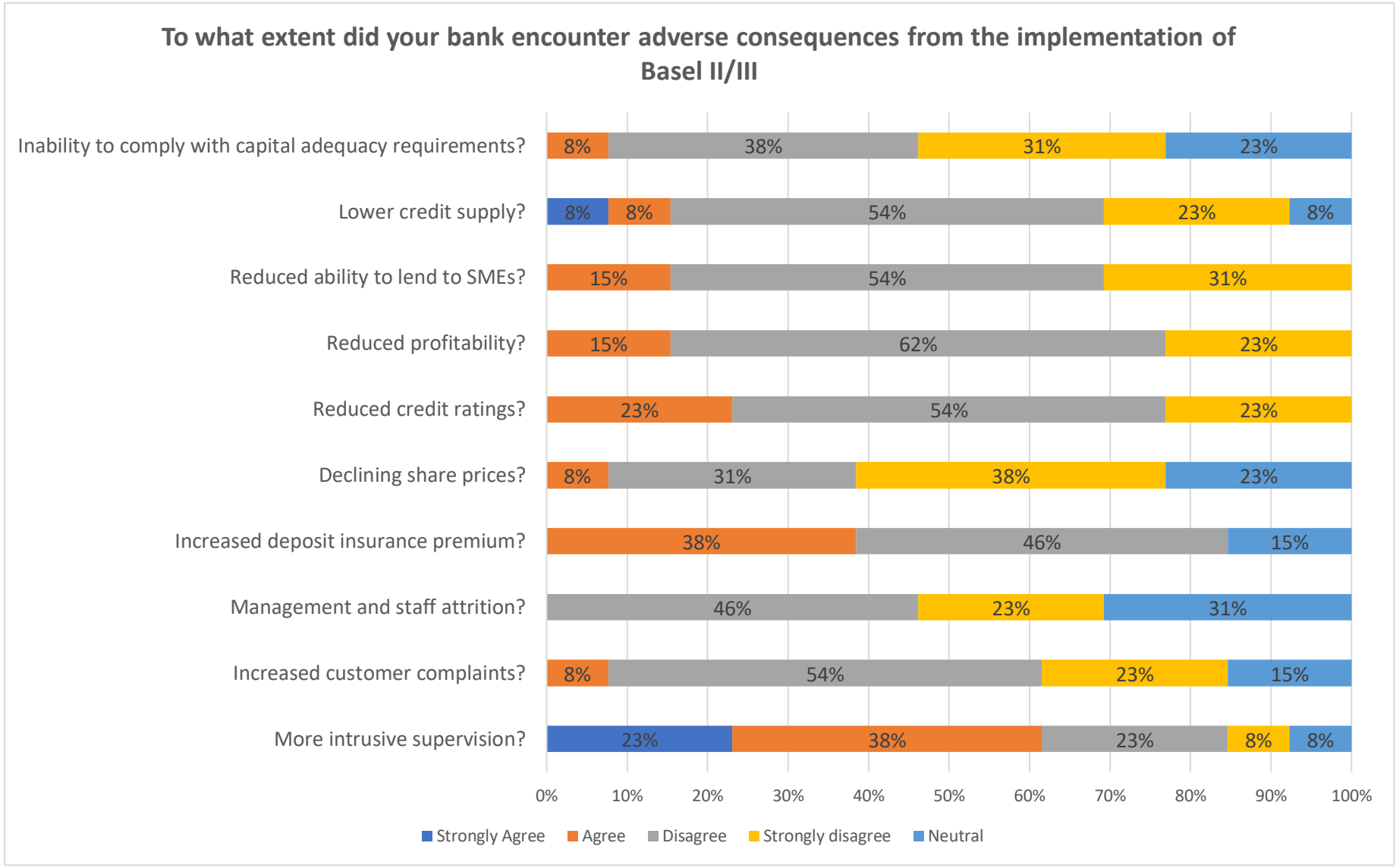


100% of respondents believe that governance in their banks improved at senior management and board levels as a result of the BCF. All respondents agreed that the BCF had led to an improved incentive and ability to identify, measure, and manage risk. Also, all respondents agreed that capital is now better aligned with risk and is of better quality. There is a consensus that business line management as the first line of defence is enhanced, and the risk management function is now more effective than before the BCF. All banks agreed that there was improved safety and soundness in the industry. Likewise, all banks agreed that there was less likelihood of bank failure and that banking system resilience had improved.

However, 8% of respondents did not agree that the BCF led to improved risk pricing and capital adequacy levels. Although this may be bank-specific, ignoring it could be risky because of the possibility of contagion if a bank fails. Additionally, 15% of respondents do not agree that internal audits as an essential aspect of risk management improved. Bank supervisors need to pay attention to isolated cases of capital inadequacy and other control weaknesses which could compromise a resilient banking system.

On credit, 39% of respondents do not agree that the BCF led to improved credit supply, while another 16% do not agree that credit losses have been reduced. 8% and 23% of respondents do not agree that the operational efficiency and profitability of banks improved, respectively. 85% of respondents agree that regulatory risk has been reduced, while 92% agree on improved credit ratings from rating agencies.

Figure 4-3 Survey Responses, adverse consequences – Banking Industry



Discussions

8% of respondents agreed with the inability of banks to comply with capital adequacy requirements, and 23% were neutral. This shows the inability of some banks to comply with the BCF capital requirements. These banks could cause systematic distress for the rest of the industry through contagion effects. 16% of respondents agreed that the BCF led to lower credit supply, especially for SMEs while 8% of respondents were neutral. That a total of 24% were of the view that credit supply had not improved is a red flag. This is contrary to the expectations of Basel III, but then Nigeria is yet to implement the buffers that would support lending during economic downturns. Also, this reduction in credit to SMEs would exacerbate the MSME finance gap thereby limiting output and worsening poverty. 15%, 23% and 8% agreed that the BCF led to reduced profitability, deteriorating credit ratings and share prices respectively. However, these views are in the minority. Although the direct objective of the BCF was to increase resilience, falling profitability could lead to less accretion to reserves thereby weaking resilience. Thus, regulators need to keep a close watch on this minority view. 38% agreed that the BCF led to an increase in deposit insurance premium, while 51% believed it led to more intrusive supervision. The increase in insurance premium is a natural consequence of Pillar 3 of the BCF as the banks are required to be more transparent about their risks and how they are managed. However more intrusive supervision by the regulators is expected and aligns with Pillar 2 of the BCF.

Further comments from the operators are shown in table 4.23.

Table 4.23 Comments on the BCF from Banking Industry Operators

"The prudential ratios required for regulatory approval of maximum distribution payments are restrictive"
"Basel II/III implementation has created the need for better capital quality, stronger levels of capital and strong liquidity positions. It has also moderated risk-taking with the additional requirement to hold high-quality liquid assets. There are also additional regulatory reporting requirements and financial statements disclosure requirements for banks."
"Basel 3 is a step in the right direction. We must continue to improve the quality of capital and liquidity for a more resilient banking system."
"The adoption of the Basel accords has increased the awareness, and, by extension, the resources applied towards risk identification, measurement, and management. This is a result of the requirements under pillar 1 and especially pillar 2 which requires all banks to develop ICAAPs. However, given the fact that the standardised approach for the calculation of credit risk does not differentiate between different corporate obligors, the capital costs for lending to established names are the same as for loans availed to SMEs, thereby leading to a disincentive to lend to the latter. However, resilience has been increased overall as the quantity and quality of regulatory capital have increased since the adoption of the Basel standards."
"We suddenly found out how weak and vulnerable our capital coverage was. This caused a stampede and meaningful communication across stakeholders. We had to unlearn and relearn the Basel requirements."
"More extensive and detailed documentation requirements."
"Basel requirements are generally an excellent mechanism to manage risk and strengthen the financial system if well implemented"
"Implementation has not been universally adopted across the industry. The level of risk mitigants claimed by entities must be standardized by the Central Bank."

Some of the comments give deep insight into the impact of the BCF beyond increasing the quantity and quality of capital. For instance, an operator commented on increased awareness and another on having to unlearn and relearn the Basel requirements. This is a pointer to the fact that the BCF introduced a whole new learning in risk management and banks suddenly

realised that there was a substantial amount of expertise they previously lacked. It shows that the spirit of the regulation and not just the letter had been imbibed. Another operator commented that his bank unexpectedly realised how weak and vulnerable their capital was. There were probably other banks in this category. The discovery of this vulnerability by operators on their own is much more compelling than if pointed out and enforced by regulators. The other comments from the industry further testify to the positive impact of the BCF. The primary concerns are the stringent criteria for maximum distributions which are based on supervisory risk ratings and other financial indicators. It was also pointed out that the use of the standardised approach in the calculation of credit risk is a disincentive to lending to SMEs. Also, risk mitigants employed to reduce capital charges need to be standardised across the industry by the regulator.

In conclusion, most of the respondents from the banking industry, who were mainly Chief Risk Officers and Chief Financial Officers, agreed that the BCF had a positive impact on their banks specifically and the banking system generally in terms of improved resilience. However, the regulator needs to pay special attention to concerns such as the lack of 159standardization of permissible risk mitigants, capital adequacy and risk pricing in some banks. Disincentives to lending to SMEs resulting from the use of the s159tandardised approach and lower credit supply generally is a major concern in view of the 'MSME Finance Gap'. Micro, Small and Medium Enterprises are a major catalyst for economic development and employment. However, the potential of MSMEs is constrained by obstacles in obtaining finance. Increased access to finance for MSMEs is an important means of advancing economic development and reducing poverty in developing countries. It is estimated that 131 million or 41% of formal MSMEs in developing countries have unmet financing needs resulting in a finance gap in the region of $5 trillion which is 130% of the current level of MSME lending[24]. This gap has adverse consequences for job creation which policy makers need to address.

[24] International Finance Corporation. *The SME Finance Forum, MSME Finance Gap*. International Finance Corporation (IFC), World Bank Group. https://www.smefinanceforum.org/data-sites/msme-finance-gap [Accessed April 8. 2022].

4.7.2 **Regulatory Perception of the Impact of the BCF**

Table 4.24 and Figure 4-4 presents the results of the survey on the benefits of the BCF from the perspective of the regulators and bank supervisors, while figure 4-5 shows their views on unintended consequences. The regulators and supervisors comprise the Central Bank of Nigeria and the Nigeria Deposits Insurance Corporation.

From a regulatory perspective to what extent has the banking system benefitted from the implementation of Basel II/III?

Table 4.24

	No of regulators						
Questions	**Strongly Agree**	**Agree**	**Total Agree**	**Disagree**	**Strongly disagree**	**Neutral**	**Total Disagree /Neutral**
Improved governance?	14	16	30	0	0	1	1
Enhanced clarity of objectives?	10	20	30	0	0	1	1
Improved risk identification?	21	10	31	0	0	0	0
Improved risk assessment?	19	12	31	0	0	0	0
Improved risk measurement?	17	14	31	0	0	0	0
Improved monitoring and controls?	12	18	30	0	0	1	1
Enhanced risk management?	0	29	29	0	2	0	2
Improved two-way communication with regulators?	14	16	30	1	0	0	1
Better risk pricing?	7	19	26	1	0	4	5
Enhanced market discipline?	15	12	27	2	0	2	4
Improved alignment of capital with risk?	21	9	30	1	0	0	1
Better quality capital?	20	9	29	1	0	1	2
Improved capital adequacy levels?	12	11	23	3	0	5	8
Reduced asset impairment?	1	9	10	13	1	7	21
Improved safety and soundness?	11	18	29	1	0	1	2
Improved profitability?	2	9	11	7	1	12	20
Improved credit supply?	0	8	8	12	1	11	23
Less likelihood of bank failure?	3	18	21	4	0	6	10
Basel II/III has improved banking system resilience?	12	18	30	1	0	0	1

Figure 4-4 Survey Responses – Regulators and Bank Supervisors

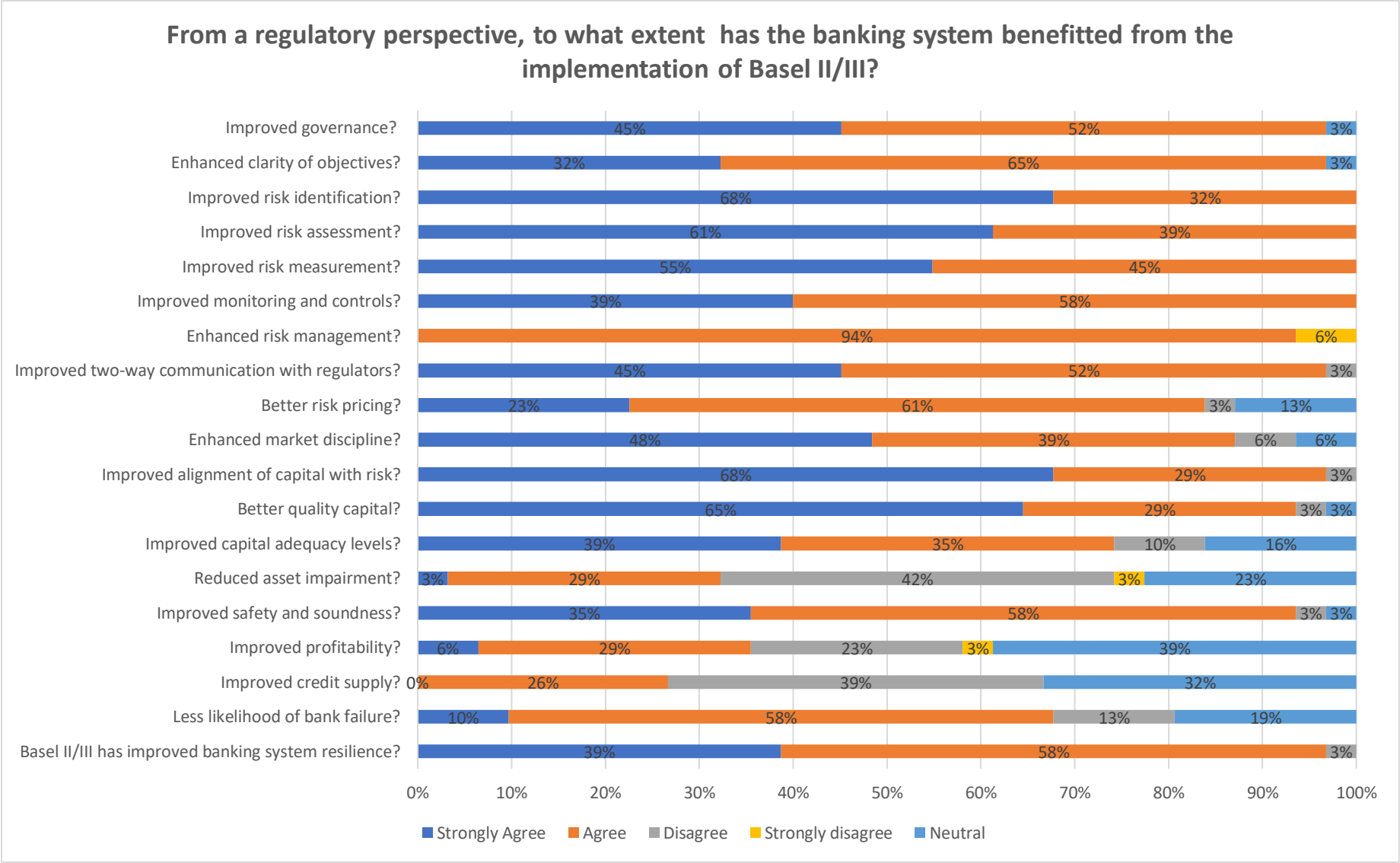
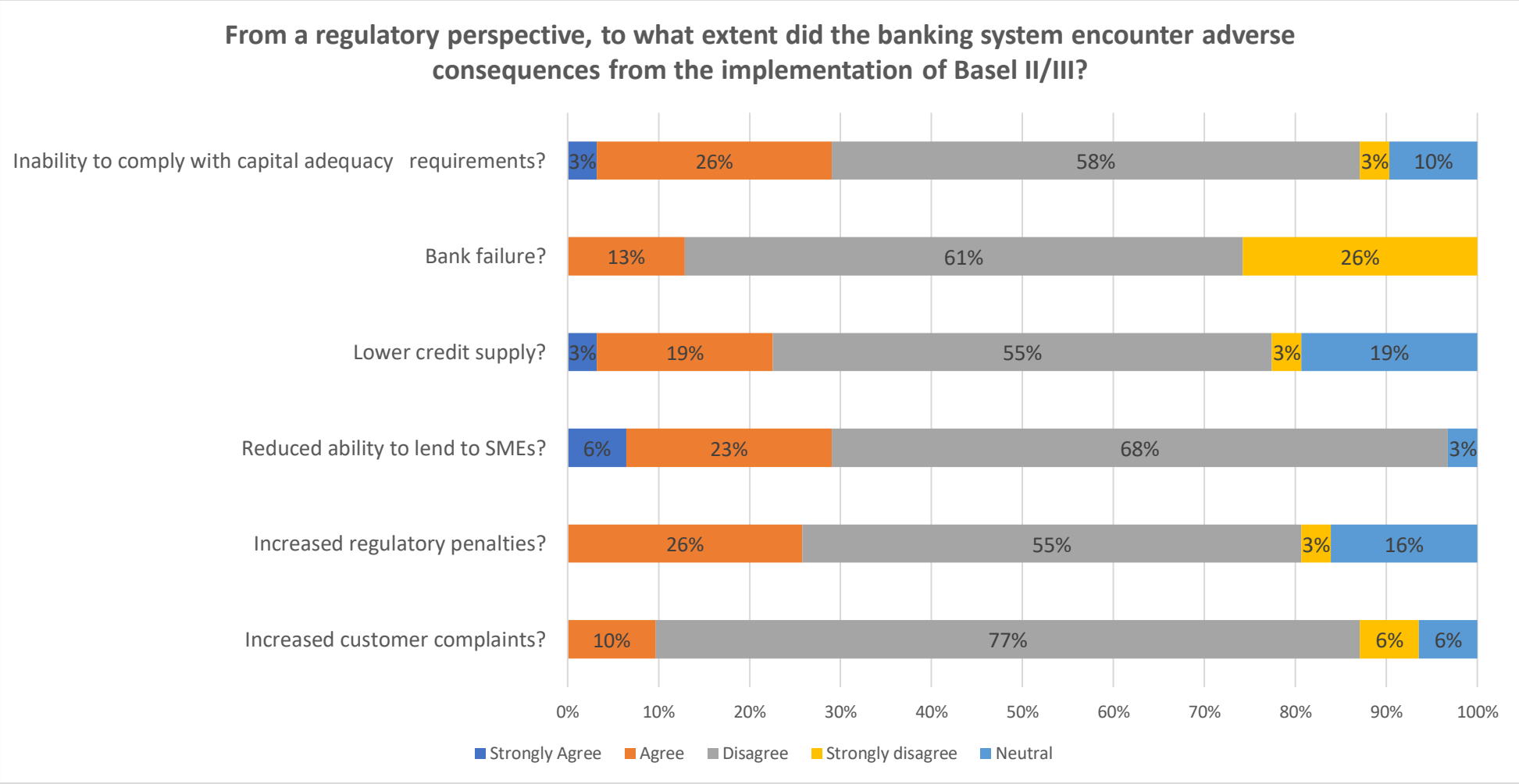


Figure 4-5 Survey Responses, Unintended Consequences – Regulators and Bank Supervisors



All but one respondent agreed that the BCF had improved risk management and banking system resilience. This is considered compliance with the BCF and will lead to improved stability in the banking system. 97% agreed that it had led to improved governance in banks and enhanced clarity of objectives. 100% of respondents agreed that the BCF had led to improved risk identification, assessment, measurement, and control. However, 6% were of the view that it had not enhanced risk management overall. This may relate to a few outlier banks or some at the periphery. 97%, 94%, and 88% of respondents agreed that the BCF had led to an improved alignment of capital with risk, better quality capital and enhanced market discipline. However, 68% disagreed that the BCF had led to reduced asset impairment. This is not surprising as credit losses depend not only on the banks' risk management but also on the macroeconomy and the absence of black swan events such as the GFC and COVID-19. Only 74% of respondents agreed that capital adequacy levels had improved implying that there was still room for improvement in this area. Asset impairments erode capital levels and thus go hand in hand with capital adequacy. 74% and 65% disagreed that the profitability of banks and credit supply to the economy had improved in line with the views of the banking industry. However, the disagreement rate is higher than that of the operators as regulators consider the big picture and not banks in isolation. 68% agreed that bank failure was less likely and 97% agreed that banking system resilience had improved. This view is prevalent, and coming from the regulators, who have a holistic view of the industry, this confirms that the BCF improved resilience. However, 32% and 30% are of the view that the BCF lowered credit supply and ability to lend to SMEs contrary to the expectations of the BCF. Less ability to lend to SMEs raises the same concerns on economic implications discussed under the perceptions of the operators.

Table 4.25 presents other views of the regulators on the unintended consequences of the BCF.

Table 4.25 Comments on the unintended consequences of the BCF from Regulators and Bank Supervisors.

Any other unintended consequence?
"It has made the cost of borrowing higher for most bank customers, especially households and small & medium business entrepreneurs. It has also increased the loanable limits of Directors' related facilities because of the increase of the core capital."
"Generally improved risk management practices in banks"
"Reduced appetite to lend as banks have to hold additional capital for risks borne"
"Increased cost of compliance"
"Stifling of initiatives by banks"
"Reduction in already existing capital levels"
"The higher capital adequacy requirements tend to disadvantage Nigerian banks."
"I'm not sure there's clear evidence that the Basel requirements have a direct relationship to the improvement of the performance of banks. Also, these guidelines may make it more difficult for 'riskier' businesses to have access to finance. For Emerging economies as well, it may be a disadvantage when they are seeking funding because the default is that they are 'riskier' than those operating in developed economies. In a way, the guidelines put the emerging economies at a disadvantage."
"Increased difficulty in accessing international debt capital due to more stringent conditions imposed for such borrowings by regulators."
"Improved risk assessment"
"Increased cost of operations"
"Greater agency and monitoring cost and increased underground/shadow lending."

Table 4.25 reveals some critical issues that could not have been picked up by the quantitative analysis. It highlights that the BCF has increased the cost of lending, especially to SMEs and households. It further draws attention to the reduced appetite to lend, the stifling of initiatives in banks and increased costs of compliance. These unintended consequences are the trade-offs of a resilient banking system. The concerns about reduced lending to MSMEs were raised by both the operators and the regulators. It is therefore critical and urgent that policymakers institute measures to ameliorate these consequences in view of the importance of MSMEs for driving economic development and job creation. Prior to the introduction of

the BCF, a finance gap existed. Exacerbating the gap would be detrimental to countries hence the urgent need for policy makers to act. Policy makers could consider for instance, special banks for lending to SMEs, increased support for microfinance and reduced capital charges for MSME lending if acceptable risk mitigants are in place.

Another point is that the BCF has increased the cost of international funding for banks in emerging economies due to their perceived risk. This is an important macroeconomic issue that governments need to address over time. Another significant issue is the allusion that the BCF has led to increased shadow lending. This is in line with findings of other researchers in other jurisdictions (Kwong and Poon, 2019, Flannery, 2014). Regulators need to be alert to this risk and ensure that arbitrage is not occurring between regulated and non-regulated institutions, as this may negate all benefits of the BCF.

4.7.3 **Summary of findings from the survey research**

In the survey of the Nigerian banking system, the regulators and operators mostly agreed that the BCF had improved resilience and that the probability of systemic distress was much lower. They agreed that risk management had also improved. However, there was little indication of an improvement in credit supply or profitability as a result of the BCF. Rather, there were concerns that the BCF could prompt shadow banking and reduce lending to MSMEs. Reduced lending to MSMEs would be contrary to the objectives of the policy, however tools are available to mitigate these unintended consequences. These include special banks for SMEs, development finance institutions and microfinance.

4.8 Summary and Conclusions

This study confirms the three hypotheses viz that the implementation of the BCF does not improve resilience in all banks; the implementation of the BCF improves resilience in banks with adequate capital only; good corporate governance improves the impact of the BCF on banks. Before introducing controls, the impact of the BCF on Nigeria's banking system was statistically insignificant. However, after controlling for economic growth, inflation and other micro-prudential factors, a positive effect was revealed. This was validated by the survey of operators and regulators in the banking industry. The primary culprit was leverage. It was found that increased leverage and eroded capital buffers of three banks dragged down the industry Z-score. While two of the banks returned to solvency, one remained in a state of

insolvency. The bank, with a negative Z-score of 33.18, dragged down the average industry Z-score to 2.54. This situation, combined with poor corporate governance in some banks, further weakened overall banking sector resilience. Regulators should weigh the pros and cons of regulatory forbearance around balance sheet insolvency in view of the findings of this study.

The increased leverage improved the net interest margin of banks, but its adverse effect showed up in the ROA, showing that banks were taking higher risks to boost returns. As excessive leverage can be destructive, the regulators in Nigeria could consider implementing the Basel III leverage ratio to prevent leverage from destabilising the entire industry.

The survey findings in Nigeria revealed that although it was majorly perceived that the BCF had improved resilience, there were a few dissenting views on the part of the regulators. These findings align with the quantitative analysis, which found that banking system resilience was hampered by a few highly leveraged banks with low capital adequacy ratios. Eliminating those banks from the equation revealed an overall improvement in resilience. The survey findings also support the quantitative findings of a neutral impact on credit supply and performance. However, regulators must address the unintended consequences such as increased cost of lending to SMEs and households and shadow banking.

This chapter shows that the Basel capital reforms improved the resilience of the banking system in Nigeria conditional on controlling leverage, effective macroeconomic management, and an improved business environment. The fact that the 2016 recession did not lead to a systemic banking crisis is indicative of the success of the reforms. Furthermore, the banking system has stayed resilient to the ongoing COVID-19 crisis, albeit with regulatory support. However, the extent of this resilience needs to be tested continuously. Robust reforms are foundational to a resilient banking system, but it is also contingent on sound corporate governance, as well as sound macro and micro economic management. The political will to fully implement the spirit of the reforms is crucial to ensure the system remains robust.

It has also been shown that both micro-prudential and macroprudential approaches are crucial in assessing the resilience of the banking industry, especially in view of the risk of contagion. An over-reliance on one approach could underestimate or exaggerate vulnerabilities. The micro-prudential analysis in this study pinpointed precisely where the

bank-specific strengths and vulnerabilities lay, but a run on one bank could have a domino effect on the others. A tiny spark is enough to ignite a fire in a forest. Again, a macroeconomic shock could affect the entire industry - both weak and strong banks, hence the need for a macroprudential approach. On the one hand, concentrating on individual banks in a micro-prudential approach could lead to a fallacy of composition where it is believed that because all banks are sound, the industry is resilient. On the other hand, industry averages mask the actual position of banks in a fallacy of division, where a small weak bank could transmit a crisis through industry linkages and an erosion of confidence.

The banking industry resilience measured by the Z-score was found to be highly sensitive to volatility, GDP growth and inflation. Thus, this needs to be taken into consideration when determining the size of capital buffers, the industry as a whole should hold against unexpected losses or economic shocks. Crisis preparedness and management through plausible stress testing and scenario analysis are essential in this regard. A multi-pronged approach is an essential prescription for a sound banking system and sustained resilience against financial distress and recessions. This applies to Nigeria and all emerging economies.

Notwithstanding the many strengths of the quantitative study of the impact of the BCF, the possibility of methodological weaknesses that could limit its explanatory power should not be overlooked. Therefore, this study was complemented by a qualitative study which validated the quantitative findings.

This study acknowledges that methods other than the Z-score and CAMELS could have been used in this study. These include SRISK and ΔCOVAR. A study by Christian Brownlees and Robert Engle in 2017 state that SRISK measures the systemic risk contribution of a financial firm. It measures the capital shortfall of a firm conditional on a severe market decline and is a function of its size, leverage, and risk. Aggregate SRISK is expected to provide early warning signals of distress in indicators of real activity.[25] ΔCOVAR is a statistical tail dependency measure and a useful reduced-form analytical tool capturing (tail) co-movements. Adrian and Brunnermeier (2009), define ΔCOVAR as the Value at Risk (VaR) of a financial institution conditional on the VaR of another institution. In this way, if CoVaR increases relative to VaR,

[25] Working Paper Series, No 37 / March 2017 European Systemic Risk Board https://www.esrb.europa.eu/pub/pdf/wp/esrbwp37.en.pdf

so does spill over risk among institutions. This allows the estimation of the contribution of each institution to systemic risk. These measures present useful future research avenues.

Chapter Five

5 The Impact of Microfinance on Poverty – A Global Study

5.1 Introduction

A resilient banking system is critical for reducing poverty by promoting access to credit, financial inclusion, economic growth, and social safety nets. However, almost a third of adults globally (about 1.7 billion people) remain financially excluded, half of whom are from the poorest 40% of the world population.[26] The World Bank defines financial inclusion as the ability of individuals and businesses to have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit, insurance, and are delivered in a responsible and sustainable manner.[27] They further view financial inclusion as a key enabler to reduce extreme poverty and boost shared prosperity. The G20 committed to advancing financial inclusion worldwide as a means of reducing poverty. It has been established that avoidance of banking instability costs from inflation, austerity measures and fiscal retrenchments can improve economic welfare. It is believed that low inflation and access to credit are effective means to poverty reduction. The objective of microfinance is to give access to credit to the financially excluded and reduce poverty.

Poverty has long been a ravaging ailment in several countries across the world, leading to low standards of living, sickness, and social unrest. Various approaches have been employed to address these conditions but without satisfactory success. Impact investing is one of such approaches where the objective is to achieve positive social impact in addition to financial return. While microfinance is a dominant form of impact investing in some countries (Wood, 2015, Agudo et al., 2015), it is not sufficiently leveraged in other jurisdictions. For instance, microfinance is the more dominant form of responsible investing in Tunisia, but the country requires more microfinance institutions (Bouslah, 2015). A similar picture appears in Spain (Agudo et al., 2015).

There are claims that Microfinance can improve conditions in low-income communities, while there are also assertions that it is neither a panacea nor a magic bullet for poverty alleviation

[26] Financial inclusion: an economic opportunity for all - FTAdviser.com
[27] Financial Inclusion Overview (worldbank.org)

(Morduch and Armendariz, 2005). There have been some encouraging reports about the positive impacts of microfinance. These were however marred somewhat in earlier years, within the period 2008 to 2011 (Roodman, 2012), by accounts of over-indebtedness of borrowers and greed of operators thereby pushing the borrowers into further poverty. However, in recent years, attempts have been made to professionalise and strengthen the sector.

After the adoption of the Sustainable Development Goals (SDGs) by the United Nations in 2015, it was claimed that microfinance had the potential to promote access to health, education, and housing (Microfinance Barometer, 2016). Microfinance customers grew by 9.5% in 2018 and it is estimated that 139.9 million low-income and underserved clients have been reached with loans totalling $114billion as of 2019, representing a growth of 43% over the year 2009 (Microfinance Barometer, 2019). 2007 to 2009 was the period of the global financial crisis which inflicted substantial stress on emerging markets. Before 2007, the microfinance industry had enjoyed a decade of exceptional growth with loan portfolios rising by 47% in 2007 alone. However, during the crisis, growth was stagnant with microfinance institutions experiencing deteriorating asset quality and liquidity constraints. The year 2009 was considered a pivotal year to test the resilience of microfinance to macroeconomic turmoil (Consultative Group to Assist the Poor, 2009). A rebound of 43% in the growth of microfinance loans over 2009 by 2019 is indicative of some level of resilience. However, the Barometer points out that the growth rate is slowing at an average of 7% compared to 20% in 2009.

Several countries introduced microfinance as a development tool in the hope that this would improve the living standards of the poor and marginalised people. Slowing microfinance growth raises the questions as to whether poverty reduction goals have been met, whether countries had false hopes, misplaced priorities or that microfinance as a development tool has become obsolete. The issue that needs clarification is whether microfinance is still valuable in poverty alleviation, which dimensions of poverty are impacted, and the relevance of the macroeconomic, business, and political environment. One of the reasons why poverty still exists is financial exclusion. The Global Findex report finds that nearly half of the world's financially excluded population live in 7 countries. China has the largest unbanked population at 225 million, followed by India, Pakistan, and Indonesia with 190 million, 100 million, and

95 million respectively. Nigeria, Mexico, and Bangladesh account for 68 million, 51 million and 51 million respectively (Demirgüç-Kunt et al., 2018). Not surprisingly, these countries have the highest number of MFIs in an attempt to tackle this undesirable situation.

The literature is replete with opposing views on the impact of microfinance – from zero impact on poverty to moderately positive impacts. Some authors see microfinance as an economic misuse of capital, which would be better invested in dynamic medium-size companies rather than in unproductive microbusinesses. This was Korea's model for success (Abdelrahman, 2019, Chang, 2012). Although Hermes (2014) finds a moderately positive impact of microfinance on poverty using data from 70 developing countries, he asserts that it should not be seen as a panacea for reducing inequality between the rich and the poor. However, if microfinance can improve standards of living generally, it is worth governments continuing to pursue it as a policy tool, improving on it with the latest technology available. Cull et al. (2009) find no impact of microfinance at all in northern Thailand. This could however be a contextual issue; another reason careful analysis needs to be made.

The reason for the ambiguity in the findings could be the multidimensional nature of both microfinance and poverty. It could also be because most studies have focused on the micro-level (household or individual). Taking a micro view alone may underestimate the impact of microfinance. With the Sustainable Development Goals aiming to eliminate all forms of poverty by 2030 (United Nations, 2015), it is essential for policy makers to establish with reasonable certainty the contribution of microfinance in this regard. This research seeks to ascertain the extent to which microfinance has been successful on a global basis and how it can continue to support global poverty reduction goals. As the literature review will show, there is no consensus on microfinance's impact at a global level. As critical as the issue of poverty and its alleviation is in contemporary times, there is a dearth of empirical investigation in this area. The United Nations Sustainable Development Goals report of 2020 observed that the global poverty reduction rate has been decelerating. They projected global poverty to rise to 8.8% in 2020 from 8.2% in 2019 because of the COVID-19 pandemic, the first rise in global poverty since 1998. Furthermore, an estimated additional 71 million will be pushed below the international poverty line, with the most significant increases in extreme poverty coming from Southern Asia and Sub-Saharan Africa due to the pandemic (United Nations, 2020b). Probable reasons for this view are the experience of previous crises where

sustained high food prices, severe economic contraction, and massive job losses hurt the poor, as revealed by the survey of CGAP in 2009. With this reality in mind and the goal of zero poverty by 2030 looking off-target, this is certainly a time to deploy all available arsenal and economic tools to get back on track.

This study is unique because it is all-embracing in demonstrating that microfinance contributes to poverty alleviation in terms of income and living standards globally. Earlier studies such as the one by Imai (2012) and the one by Cintina and Love (2018) have concentrated on either income poverty or welfare deprivations but not both. Imai finds that microfinance reduces income poverty globally, while Cintina and Love concentrate on dimensions of poverty in India. This study concentrates on both income poverty and economic welfare unlike previous research, which is a major contribution to the literature. To clarify the current debate on microfinance's impact on poverty and its dimensions, this research employs a broader and more current dataset than has been used in previous studies. Some of the reasons for inconsistencies in the literature have been a lack of clarity on whether changes in poverty levels can actually be attributed to microfinance. For this reason, this study utilises an autoregressive model of data from 95 developing countries between 2013 and 2019 and is estimated using the Generalised Method of Moments (GMM) approach. The GMM is considered a robust empirical basis and sharpens causal inference in the evaluation of the impact of microfinance on poverty. This study distinguishes itself from earlier studies by focusing on a combination of income-level poverty as well as different dimensions of welfare deprivations to establish the impact of microfinance. It also uses different proxies for poverty namely the human development index and the life expectancy index in addition to the standard measures.

Section 2 conducts a literature review into poverty and its dimensions. It further examines findings on the impact of microfinance across the world. The third section conducts an empirical investigation into the global outcomes of microfinance interventions at the country level. Section 4 discusses the results and section 5 concludes.

5.2 Literature review

5.2.1 What is poverty?

The United Nations defines poverty as *"….. a denial of choices and opportunities, a violation of human dignity. It means a lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land to grow one's food or a job to earn one's living, and not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households, and communities. It means susceptibility to violence, and it often implies living in marginal or fragile environments, without access to clean water or sanitation"* (United Nations, 2008).

5.2.1.1 Dimensions of poverty

As seen from the United Nations definition, poverty is multi-dimensional, and no single indicator can capture all its aspects. It includes welfare, the earning potential of households, human capital such as family size, education, occupation, asset ownership, the fulfilment of basic needs such as health status, access to health services, food, shelter, and clothing (Henry et al., 2003). Other dimensions are longevity, access to knowledge and a decent living standard (United Nations Development Programme, 2019). The World Bank includes other dimensions such as the share of children surviving past the age of 5; quantity and quality of education; adult survival and stunting rates of children under five which refers to impaired growth (The World Bank, 2018). A few approaches exist for a multi-dimensional assessment of poverty. One is the Human Capital Index comprising 5 indicators - child survival, school enrolment, quality of learning, healthy growth, and adult survival. The index, which is between 0 and 1, assesses the potential of a child to contribute to future productivity and prosperity. It shows how much an economy is sacrificing by failing to nurture children. This speaks directly to numbers 3 and 4 of the SDGs – health and education. Another means is the Human Development Index which assesses longevity, access to knowledge and living standards. The HDI is the geometric mean of normalised indices for each of the dimensions (United Nations Development Programme). The HDIs of some select countries from 2007 to 2018 are shown below. The values range from 0 to 1, with 1 being the most developed.

HDIs of some select countries from 2007 to 2018.

	Indonesia	Nigeria	Ghana	India	Kenya	Philippines
DATE	**Value**	**Value**	**Value**	**Value**	**Value**	**Value**
2018	0.71	0.53	0.60	0.65	0.58	0.71
2017	0.70	0.53	0.59	0.64	0.57	0.71
2016	0.70	0.53	0.59	0.64	0.57	0.70
2015	0.70	0.53	0.58	0.63	0.56	0.70
2014	0.69	0.52	0.58	0.62	0.56	0.70
2013	0.69	0.52	0.58	0.61	0.55	0.69
2012	0.68	0.50	0.57	0.60	0.55	0.68
2011	0.67	0.49	0.56	0.59	0.54	0.68
2010	0.67	0.48	0.55	0.58	0.53	0.67
2009	0.66	0.49	0.55	0.57	0.52	0.67
2008	0.65	0.49	0.55	0.57	0.52	0.67
2007	0.64	0.48	0.53	0.56	0.51	0.66

United Nations Development Programme, 2019

As these measure improvements in the standard of living in a broader sense than strict poverty measures do, they form suitable metrics to evaluate the effectiveness of microfinance endeavours and are utilised comprehensively in this research.

5.2.2 An Appraisal of the Impact of Microfinance

Microfinance means providing banking services to lower-income people, especially the poor and the very poor (Christen et al., 2003). It has also been defined as attempts to provide financial services to households and micro-enterprises that are excluded from traditional commercial banking services (Beck, 2015). In addition to small-scale loans, it provides savings accounts, insurance, and housing loans. The need for microfinance can be said to have arisen as a result of market failure. This malfunction occurs because the price mechanism fails to allocate resources efficiently, resulting in a loss of social welfare (Bator, 1958, Salanié, 2000). Microfinance enhances financial inclusion by embracing previously excluded households and microenterprises. This inclusion puts them on the path to self-sufficiency (CGAP, 2004, Robinson, 2001). Microfinance advocates expect benefits such as poverty alleviation, employment generation, and economic development. For instance, the World Bank believes

that it fosters education and health while reducing child labour in developing nations. Robinson (2001) further observes that Microfinance can address the gap created by market failure sustainably, thereby reducing poverty globally.

Several reasons have been advanced on why the microfinance industry has yet to achieve the expected level of global financial inclusion and poverty alleviation. Donor funds and subsidies contributed to its early growth, which breeds dependency, inefficiencies and corruption (Morduch, 1999). Other reasons include inadequate regulation and supervision of deposit-taking microfinance institutions, limited product offerings, managerial incompetence, inefficiencies, asymmetric information, collateral requirements, affordability, financial literacy, and unsustainable practices (Beck, 2015, Roodman, 2012). The question this research seeks to establish is whether social and economic objectives of poverty alleviation are being met or not and whether it is beneficial for countries to continue with microcredit interventions as a component of microfinance.

5.2.2.1 The Dimensional Impact of Microfinance

Microfinance is argued to have the ability to improve living conditions (Morduch and Armendariz, 2005). However, several crises in the industry have led researchers to suggest that microfinance as an economic development tool is defective. Instances include Bosnia, Morocco, Nicaragua, Pakistan, Nigeria, and the Andhra Pradesh crisis in India between 2008 and 2010 (Roodman, 2012). Microfinance is made up of various products, including microcredit, micro-savings, microinsurance, micro-pensions and micro-housing finance. Microcredit, which is just a component of microfinance, is both helpful and harmful (Roodman, 2012, Guérin et al., 2015). In 2005 the United Nations held a Year of Microcredit, and in 2006, Yunus and Grameen Bank were awarded the Nobel Peace Prize. However, several subsequent studies on the effects of microfinance yielded inconclusive results, ranging from the assertion of substantial reductions in poverty among microfinance borrowers in Bangladesh to zero effects in northern Thailand (Cull et al., 2009). Earlier empirical findings by Pitt and Khandker (1998) on the impact of microfinance on household consumption expenditure revealed encouraging results. Studies by Morduch (1998) later contradicted these claims. Morduch, however, finds a potential reduction in vulnerability rather than poverty. Coleman (1999) does not find a positive impact of microcredit access in his

evaluation of microfinance in Thailand. Kabeer (2001) observes that micro-credit has an empowerment potential especially for rural women, as the entire family is more likely to benefit economically. Morduch and Armendariz (2005) believe that microfinance can make a real difference in the lives of those served but is not a universal remedy and cannot be expected to work everywhere or for everyone. This research seeks to determine the continued relevance of microfinance and the conditions under which interventions will be successful. This research shares the views of Morduch (2020), that if microcredit is not creating significant, positive impacts, why are poor people continuing to borrow, especially when they are paying relatively high interest rates, year after year? He suggests that economists could be asking the wrong questions or looking in the wrong places.

Banerjee et al. (2015a) observe that microfinance had insignificant effects on consumption expenditure, health, and education. This could be an underestimation in that it was a randomised evaluation in India. Macroeconomic, political, or business constraints may have limited the impact. When the impact of microcredit was assessed across 4 continents, Banerjee et al. (2015b) found a moderately positive impact. Crépon et al. (2015) find an increase in self-employment profits after the deployment of micro-credit in Morocco. This paradox implies that in determining if microfinance has any impact whatsoever, it is necessary to break poverty down into its constituent strands and evaluate them globally. Buera et al. (2021) find that making loans bigger and more widely available generates welfare benefits for the vast majority, especially for the poor, who take out small consumption loans and poor marginal entrepreneurs who take out small production loans. They find that the biggest beneficiaries of economy-wide microfinance are, surprisingly, the very wealthy, as higher interest rates imply a higher return on wealth.

Unlike earlier research, this analysis will comprehensively explore the impacts of microfinance on various dimensions of poverty. Neoclassical economics attributes poverty to market failures that exclude the poor from credit markets. This school of thought emphasise that poverty arises from circumstances beyond an individual's control such as political and social environments (Davis and Sanchez-Martinez, 2015, Bradshaw, 2007). Thus, improving access to credit and the political and social environments should reduce income poverty and improve economic welfare (reduce dimensions of poverty). The Keynesian school of thought believe

that poverty is caused by unemployment and that macroeconomic fluctuations reduce economic well-being (Blinder, 2008). The new Keynesian economists believe that overall income growth is the most effective poverty alleviating mechanism (Davis and Sanchez-Martinez, 2015). These theories imply that employment, the strength of the macroeconomy, and access to credit can reduce poverty. The new Keynesian school further see credit rationing as a source of market failure with destabilising economic effects (Calomiris and Hubbard, 1985, Gordon, 1990). Davis and Sanchez-Martinez (2015) recommend policies that can offset the adverse effects of market failures. These include access to affordable credit. Therefore, putting these factors together microfinance under conducive political and macroeconomic environments should bridge the gap. Consequently, it is expected that microfinance will have a negative relationship with poverty if the political and macroeconomic environment is favourable. In contrast, other theoretical insights suggest that lending to the poor could have adverse impacts such as poverty traps (Banerjee et al., 2015b). However, they concur that the impact of modern microfinance on the poor is still evolving. Furthermore, being trapped in poverty is exacerbated by unfavourable external environments (Ghatak, 2015). Dahal and Fiala (2020) replicate eight RCTs on microfinance and find that the results are insignificant, although the coefficients are large. However, when they run an analysis on a pooled sample, they find significant treatment effects on business profits, business revenue and household assets. In view of the foregoing divisive theories, this study proposes the following hypothesis:

Under conducive macroeconomic, political, and business environments, microcredit has the potential to reduce various dimensions of poverty at the country level.

To achieve unbiased results, this study spans the macroeconomic, political, and business environments of all the countries in the sample.

5.2.2.2 Impact of Microfinance Loans on Income Poverty

This section evaluates the impact of microfinance loans on income poverty only. Income poverty is a special case of poverty but excludes the various dimensions of poverty and economic welfare. Thus, it can be seen as different from hypothesis 1 which assesses the impact on dimensions of poverty and economic welfare but excludes income. Income poverty is handled in hypothesis 2.

Assessing country-wide impacts of microfinance, Imai et al. (2012) investigate the relationship between microfinance loans per capita and the Foster-Greer-Thorbecke (FGT)[28] class of poverty indices in 61 countries. They find that a country with higher microfinance loans per capita tends to have a lower FGT class of poverty indices. They conclude that contrary to recent micro evidence, microfinance appears to significantly reduce poverty at the macro level and thus reinforces the case for channelling funds from development finance institutions and governments of developing countries into MFIs. These findings are supported by hadj Miled and Rejeb (2018) who examine 99 developing countries and find that microfinance loans per capita are significantly and negatively associated with poverty headcount ratio and positively associated with consumption expenditure. Lacalle-Calderon et al. (2018) investigated 57 developing countries and found that microcredit reduces income poverty and benefits even for the most impoverished individuals. On the other hand, Hermes (2014) asserts that microfinance has only modest benefits on poverty. It should not be seen as a resolution for bringing down income inequality in a significant way. Their findings underscore the need to take a holistic view of microfinance's impact as siloed approaches may underestimate its impact. These arguments lead to the following hypothesis:

Microfinance has the potential to reduce income poverty at the country level globally.

5.2.2.3 Social Performance in Microfinance

Social performance measurement in microfinance helps enhance the ability of microfinance to reduce income poverty and improve economic welfare, thus relating to both hypothesis 1 and hypothesis 2. It mainly relates to the governance of microfinance institutions . The better managed the MFIs are, the more they can contribute to poverty reduction and welfare improvement (Cull et al, 2009). Social performance is defined in terms of outcomes and management processes of MFIs. In terms of outcomes, the poverty level of the organisation's beneficiaries or the proportion of women and youth amongst these beneficiaries are key defining factors. On the other hand, social performance can also be defined in terms of internal management processes, which are implemented by organisations to enable them to accomplish their mission and achieve their social goals (Bauwin et al., 2019). Social goals

[28] Poverty is the weighted sum of the income shortfalls of the poor. Foster, J., Greer, J. & Thorbecke, E. 1984a. A Class of Decomposable Poverty Measures. *Econometrica*, 52**,** 761-766. 10.2307/1913475

include providing microcredit, savings, insurance and so forth to the economically active poor, thereby improving their economic welfare. Board diversity has been found to be a key driving factor in social performance especially in the dimensions of social goals, product and services and environment which are critical for achieving the SDGs (Bouslah et al., 2021). The importance of board diversity is further underscored by the finding that it positively impacts corporate performance (Padgett, 2014). Without effective corporate performance, the social mission would be unsustainable especially in the light of declining donor funds. In a similar vein, transparency and market discipline are critical for the performance, effective risk management and stability of microfinance institutions. Similar to commercial banks' compliance with Basel Pillar 3 disclosures to foster transparency and market discipline, MFIs have made moves to adopt a standard methodology for social performance evaluation. In 2012, universal standards for performance evaluation were established through a consultative process with the industry. In 2014, a Social Performance Audit tool called SP14 was created to align with these standards (Microfinance Barometer, 2019). Global scores are awarded covering 6 dimensions: monitoring social goals, the commitment of the board to social goals, appropriateness of products and services, treatment of clients and employees and balancing financial and social performance. In a study conducted by ADA in collaboration with Cerise in 2019, Europe and Central Asia had the highest global score at 78%, followed by South and East Asia, Latin America and the Caribbeans, MENA and Sub-Saharan Africa at 70%, 70%, 65%, and 56% respectively. The MFIs in SSA were found to have the lowest scores (Bauwin et al., 2019), and not surprisingly the highest poverty rate in the world. This suggests that social performance management and monitoring are critical for poverty reduction, therefore governance variables such as the regulatory and business environments are included in this study.

The chapter so far has given an insight into the potential benefits of microfinance at the macro or country-level as posited by earlier research, although the empirical evidence on this is mixed. This research distinguishes itself by using various proxies for poverty and spanning various dimensions in addition to income poverty. The research question is examined with careful consideration of the macroeconomic, political, and business environments. Section 5.3 describes the data and the empirical strategy employed in the paper.

5.3 Data and Empirical Analysis

Indicator analysis is often used in measuring poverty at the country or macro level. Indicators include income and consumption (Henry et al., 2003, Skoufias et al., 2000). Indicators are often combined into tools that can assess poverty or its dimensions at the economic level. The Foster–Greer–Thorbecke (FGT) poverty indices are based on the proximity of income to an established poverty threshold (Foster et al., 1984b). Other indicators measure poverty by dimensions rather than the proximity of consumption and income to a poverty line (The World Bank, 2018). The Human Development Index (HDI) of the United Nations is a summary measure of achievements in three critical dimensions of human development – longevity, education and income (GNI per capita) (United Nations Development Programme, 2019). The Multidimensional Poverty Index (MPI) uses health, education and standard of living indicators to determine the incidence and intensity of poverty experienced by a population (Alkire et al., 2015). The Global Innovation Index (GII) which is co-published by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO, a specialised agency of the United Nations), provides tools that can assist in tailoring policies to promote long-term output growth, improved productivity, and job growth (Global Innovation Index, 2020). This research combines several of these indicators for a comprehensive and in-depth analysis. The study investigates as many countries globally as have deployed microfinance as an economic development tool and have data available. These totalled 95 countries. The countries are shown in figure 1 and details are given in appendix VII.

Figure 5-1 Countries included in the Microfinance Impact Analysis

Source: Data from MIX Market was analysed using Bing maps

The objective was to determine the global benefits of microfinance interventions in poverty alleviation and contribute to earlier literature by clarifying its value. The unit of assessment is country. The main dependent variable is poverty, but to properly assess the impact of microfinance, dimensions of poverty are included as sub-dependent variables. The variables are as follows:

Dependent variables

Data on 95 countries for the period 2013 to 2019 were obtained as follows:

Main Poverty Measures

1. Human Development Index (HDI) measures average achievement in three essential human development dimensions—a long and healthy life, knowledge, and a decent standard of living. It is calculated as the geometric mean of 3-dimensional indices – Health measured by the Life expectancy index, Education measured by the Education Index and Standard of living measured by GNI per capita (United Nations, 2020a). The Human Development Index is calculated and published by the Human Development Report Office (HDRO) and is based on data from the United Nations Department of Economic and Social Affairs (UNDESA), United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics, United Nations Statistics Division, World Bank, Barro and Lee (2018) and the IMF. The HDRO calculates the

Education Index based on expected years of schooling and the mean years of schooling from the UNESCO Institute for Statistics. It also calculates the Life Expectancy Index based on life expectancy values from UNDESA's World Population Prospects database[29]. The HDI is an effective alternative measure of poverty and welfare to per capita income (Jahan, 2002, Aturupane et al., 1994). It has been used in earlier research such as human development and poverty studies in India and Indonesia (Antony and Laxmaiah, 2008, Yolanda, 2017).

2. The multidimensional poverty headcount ratio (% of the total population) is the percentage of multidimensionally poor people. This comprises health, education, and standard of living. Health is determined by nutrition and child mortality. Education is similar to the education index in the HDI. Standard of living focuses on living conditions such as cooking fuel, sanitation, drinking water, electricity, housing and assets (United Nations, 2020a). This is more granular than the standard of living in the HDI which uses GNI per capita.
3. Population living below the income poverty line of $1.90 per day.

Data on the Multidimensional Poverty headcount ratio and Population living below the income poverty line were obtained from World Development Indicators (WDI) of the World Bank.

Dimensions of Poverty

1. The growth rate of GDP per person engaged is a measure of labour productivity. Data were obtained from the GII.
2. Assessment in reading, mathematics, and science indicates the quality of learning outcomes attained worldwide. Data on this was obtained from the GII.
3. Education - the percentage of the population aged 25 and over that attained or completed primary education.
4. The life expectancy index is defined as health measured by life expectancy at birth expressed as an index using a minimum value of 20 years and a maximum value of 85 years. It is calculated as:

$$\frac{Actual\ value - 20}{85 - 20}$$

[29] United Nations Development Programme – http://hdr.undp.org/en/data

5. Employment to population ratio is the percentage of the population aged 15 years and older that is employed.
6. Youth not in school or employment is the percentage of people aged 15 to 24 who are not in employment or education or training.

Data on Employment to Population and Youth not in School or Employment were obtained from WDI and validated using data from Human Development Reports from the United Nations Development Programme (UNDP).

Explanatory Variables

1. Microfinance institutions' gross loan portfolio is defined as the combined gross loan balances of microfinance institutions (current US$) in a country as a percentage of its GDP (current US$). Data on Microfinance as a percentage of GDP were obtained from the GII and validated using data from the Microfinance Information Exchange (MIX) Market of the Consultative Group to Assist the Poor (CGAP)
2. Microfinance institutions' gross loan portfolio per capita was calculated by dividing each country's Microfinance institutions' gross loan portfolio by the country's population from the WDI.

Control Variables

1. Domestic credit to the private sector is the financial resources provided to the private sector by financial corporations as a percentage of GDP.
2. Inflation - Consumer prices (annual %)
3. Business Environment is an index that measures the ease of starting a business and resolving business insolvency.
4. Regulatory Environment is an index that reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development.
5. Political Environment is an index that measures the likelihood and severity of political, legal, operational or security risks impacting business operations.

Data on Domestic credit to the private sector; the Political, Business and Regulatory Environments; Assessment in reading, mathematics, and science; the Growth rate of GDP per person engaged were obtained from the GII.

5.3.1 Empirical Strategy

In designing the empirical strategy, poverty and its dimensions were assumed to depend on previous realisations of themselves. Also, as data on all explanatory variables could not feasibly be obtained, lagged dependent variables were used to address concerns on bias due to omitted variables. The use of lagged dependent variables is known to lead to endogeneity, and therefore, instrumental variables were employed for consistent estimation of the parameters in the model (Wooldridge, 2015). An autoregressive model which relates variables to their past values was therefore considered ideal. To also make use of instrumental variables, the autoregressive model is estimated using the GMM approach. The GMM is a method for estimating parameters by weighting sample moment conditions, minimising the asymptotic variance and obtaining an asymptotically optimal estimator (Wooldridge, 2001). It is a dynamic panel estimator that has the advantage of controlling for the endogeneity of the lagged dependent variable, omitted variable bias and unobserved panel heterogeneity. The method has been demonstrated to improve precision and reduce small sample bias when the dependent variable is persistent, time periods are few and individuals are many (Roodman, 2009). The specification in this research uses the one-step system GMM which is considered appropriate since serial correlation had been ruled out by the value of the AR(2) statistic[30]. Also, Monte Carlo results suggest that inference based on the one-step GMM estimator is much more reliable when either non-normality or heteroskedasticity is suspected (Blundell and Bond, 1998). First difference deviations with cluster-robust standard errors were also used. The first differencing removes a potential source of the omitted variable bias, while the cluster robust standard errors estimates are consistent in the presence of heteroskedasticity within panels. In system GMM, variables in levels are instrumented with suitable lags of their own first differences thereby introducing more instruments and increasing efficiency (Arellano and Bover, 1995). According to Roodman (2009), System GMM is advisable when the variable is persistent (as in this case where poverty is closely related to its previous values), the time period is short (in this case, 7 years), and the panel is large (in this case, 95 countries). These attributes make the system GMM an appropriate method for estimating the parameters in the poverty model. The

[30] Autoregressive statistic measuring the extent to which the current value of the dependent variable is based on the previous two values.

instrumental variables in this specification are one-to-seven-year lags of the endogenous variables. The analysis is based on data from 2013 to 2019. For all dependent variables except Multidimensional poverty headcount and Population living below the income poverty line of $1.90 per day, a panel regression was conducted as follows:

$$\mathbf{y_{it} = \alpha_t + \beta_1 MFL_{it} + \beta_2 X_{it} + \beta_3 timedum_t + \beta_4 regdum + \mu_t} \quad \mathbf{(1)}$$

$$\mathbf{y_{it} = \alpha_t + \beta_1 MFL_{it} + \beta_2 X_{it} + \beta_3 MFL_{it} \# X_{it} + \beta_4 timedum_t + \beta_5 regdum + \mu_t} \quad \mathbf{(2)}$$

where $\mathbf{y_{it}}$ are the various dimensions of poverty or standard of living in each country; $\mathbf{MFL_{it}}$ is the gross microfinance loans portfolio scaled by the GDP of each country at current US$ or by population; $\mathbf{X_{it}}$ is a vector containing all the control variables for each country; $\mathbf{MFL_{it} \# X_{it}}$ is an interaction between microfinance loans and the macroeconomic, political or business environment of each country; $timedum_t$ and regdum are sets of year and geographical region dummies, and μ_t is the error term. Instead of using country-level indicators, regional dummies are employed to demonstrate the contribution of each region to global poverty at a macro level, rather than a micro level.

Due to the limited data on multidimensional poverty headcount and the population living below the income poverty line, the analysis utilised ordinary least squares and instrumental variables to estimate microfinance loans' impact on these variables. Data on poverty is not collected frequently, and only one or two instances per country occur in the data; hence a panel regression was not possible. Instrumental variables were used to address the possibility of reverse causality. Equations 3 and 4 are the structural and reduced-form models, respectively. The structural form equation is based on the underlying economic model of poverty depending on access to credit, macroeconomic factors, and the political, business, and regulatory environments. The reduced form equation is intended to eliminate endogeneity in the structural equation by solving for the dependent variable such that it expresses the endogenous variable as a function of an exogenous variable. Here MFL_{it-1} (in equation 3) is assumed to be endogenous and therefore is expressed as a function of MFL_{it-2} (in equation 4).

$$\mathbf{Pov_{it} = \alpha_t + \beta_1 MFL_{it-1} + \beta_2 X_{it} + \beta_3 timedum_t + \beta_4 regdum + \mu_t} \quad \mathbf{(3)}$$

$$MFL_{it-1} = \alpha_t + \beta_1 MFL_{it-2} + \beta_2 X_{it} + \beta_3 timedum_t + \beta_4 regdum + \mu_t \quad (4)$$

Equation 4 tests for the presence of endogeneity and the suitability of the instruments before progressing to the structural form in equation 3. Table 5.1 shows the summary statistics of the variables. Panel A presents the statistics for the 95 countries in the sample, Panel B presents the statistics on a regional basis, and Panel C shows income poverty on a regional basis.

Table 5.1 Summary Statistics

	Mean	Min	Max	Median	Skew	Mode
Country ID		1	95			
Year		2013	2019			
Dependent Variables						
HDI Score (0 to 1, 1 highest)	0.67	0.36	0.88	0.70	-0.47	0.76
Education index (0 to 1, 1 highest)	0.61	0.21	0.87	0.64	-0.44	0.76
Life expectancy index (0 to 1, 1 highest)	0.77	0.49	0.93	0.79	-0.65	0.87
Youth not in school or employment (% ages 15-24)	21.38	3.50	45.20	20.5	0.18	30.3
Employment to population ratio (% ages 15 and older)	58.31	31.90	87.00	58.6	0.06	62.4
Assessment in reading, mathematics, and science	425	325	585	416	0.83	336
The growth rate of GDP per person engaged	1.85	-31.10	10.80	2.20	-2.82	2.70
Population living below income poverty line, PPP $1.90 a day (%)	15.54	0.00	77.60	4.0	1.35	-
Multidimensional poverty headcount ratio (% of total population)	30.60	5.80	64.80	28.9	0.46	29.10
Explanatory variables						
Microfinance institutions' gross loan portfolio % GDP	1.82	0.00	38.30	0.40	4.66	0.00
Microfinance institutions loans per capita ($)	140.52	0.00	2569.18			
Control Variables						
Domestic credit to private sector (% GDP)	45.25	2.90	161.10	37.4	1.58	14.2
ICT GII Index	41.06	0.00	82.40	40.53	0.11	43.20.
Political environment	46.38	0.00	78.90	45.98	-0.31	45.60
Regulatory environment	56.54	0.00	81.00	58.72	-1.12	70.60
Business environment	62.39	0.00	87.40	62.40	-0.65	65.80
Inflation, consumer prices (annual %) WDI	5.53	-3.75	254.95	3.56	13.51	-
Commercial bank branches (per 100,000 adults)	15.08	0.42	71.23	11.45	1.69	-
Account Ownership/ Mobile Money (%)	47.34	6.45	92.97	45.29	0.13	-

Source: Data from GII 2019 were used in the author's computations

Panel B: Number of Countries and MFIs per Geographic region

Geographic region	No of countries	No of MFIs	Global Score SPM
Europe & Central Asia	22	514	77.7%
East Asia & Pacific	9	441	70.0%
South Asia	6	607	70.0%
Latin America & Caribbean	22	58	69.8%
MENA	7	469	65.0%
Sub-Saharan Africa	29	801	56.0%
Total	95	2890	

Source: Data from the MIX Market database of the World Bank and ADA study[31], 2019 were used in the author's computations. SPM – Social Performance Management

The study did not remove outliers as they are very informative about the impact of poverty and microfinance, and why poverty differs from region to region. It is essential to understand why outliers in microfinance occur and how it impacts poverty reduction in different regions. This was handled by the regional dummies.

Panel B shows that the 6 geographic regions had 2890 MFIs reporting to the MIX Market database. Details of the countries in each geographic region can be found in appendix VII. Sub-Saharan Africa had the highest number of countries and MFIs, followed by South Asia. India in South Asia had the highest number of MFIs reporting to the database at 250. Details of the number of MFIs per country reporting to MIX Market database can be found in Appendix VIII.

[31] Bauwin, M., Ada & Cerise 2019. Social Performance Management in Microfinance: Practices, Results and Challenges

Panel C

Geographical Region Means	SSA	SA	MENA	LAC	ECA	EAP
Dependent Variables						
Population living below income poverty line, PPP $1.90 a day (%)	38.76	9.53	3.88	3.35	2.99	1.88
Multidimensional poverty headcount ratio (% of total population)	41.81	22.30	53.00	25.75	29.57	28.70
HDI Score	0.54	0.63	0.66	0.74	0.77	0.72
Education Index	0.47	0.52	0.55	0.67	0.75	0.66
Life Expectancy Index	0.65	0.78	0.82	0.84	0.82	0.80
Youth not in school or employment (% ages 15-24)	19.45	26.97	29.87	22.07	20.70	17.24
Employment to population ratio (% ages 15 and older)	64.56	58.61	39.17	60.48	50.94	65.53
Assessment in reading, mathematics, and science	N/A	336.00	388.12	408.92	441.18	450.72
Growth rate of GDP per person engaged	1.79	3.76	-0.95	0.91	2.04	4.42
Explanatory & Control Variables						
Microfinance institutions' gross loan Portfolio (% GDP)	1.20	1.37	0.24	2.19	1.42	5.28
Microfinance loans per capita ($)	31.58	94.43	26.92	218.41	147.45	374.05
Domestic credit to private sector	27.53	43.82	58.63	44.87	44.08	90.74
Political environment	40.55	38.61	36.54	51.50	51.14	51.51
Regulatory environment	55.87	45.19	56.29	54.12	64.32	51.61
Business environment	57.10	59.55	62.48	60.52	70.33	63.87
Inflation, consumer prices (annual %) WDI	6.39	5.69	5.07	6.94	4.10	3.10

Notes: SSA – Sub-Saharan Africa; SA – South Asia; MENA – the Middle East & North Africa; LAC – Latin America & Caribbean; ECA – Europe & Central Asia; EAP – East Asia & Pacific
Source: Data from The HDRO (2020), The World Bank (2020b), GII (2020) and MIX Market (2019) were used in the authors' calculations

Panel C shows that Sub-Saharan Africa has the highest percentage of the population living below the international poverty line and MENA has the highest percentage of multidimensionally poor at 39% and 53% respectively. East Asia and the Pacific have the least percentage of the population living below the international poverty line at 1.88%. East Asia and the Pacific also have the highest proportion of microfinance loans per capita and scaled by GDP while MENA has the least.

The international poverty line is defined as $1.90 per day. The percentage of the population living on less than this is defined as the poverty rate. To appreciate the impact of microfinance loans on poverty measured by income, the descriptive statistics of poverty on an income basis are presented in panel D:

Panel D Summary Statistics of Income Poverty by Geographic Region

Geographic region	No of Countries	Global Mean	Contribution	Std. Dev.	Min	Max
East Asia & Pacific	8	0.17	1.09	0.85	0	6.1
MENA	6	0.27	1.74	2.05	0	18.8
Latin America & Caribbean	17	0.66	4.25	2.19	0	16.5
South Asia	6	0.67	4.31	3.21	0	21.2
Europe & Central Asia	20	0.69	4.44	3.20	0	28.2
SSA	29	13.07	84.12	21.92	0	77.6
Total	**86**	**15.53**	**100.00**			

Source: Data from the WDI (The World Bank, 2020b) were used in the author's calculations.

Only 86 of the 95 countries had data available on the population living on less than $1.90 per day. The data shows that Sub-Saharan Africa contributes 84% to the average global poverty rate of 15.53%, with its maximum poverty rate being 77.6%. East Asia and the Pacific region contribute the least at 1.09%, with its maximum poverty rate being 6.1%.

Because multicollinearity undermines the statistical significance of an independent variable, a check was made for correlation between the variables. Table 5.2 presents the matrix of correlation between the explanatory variables.

Table 5.2 Matrix of correlations

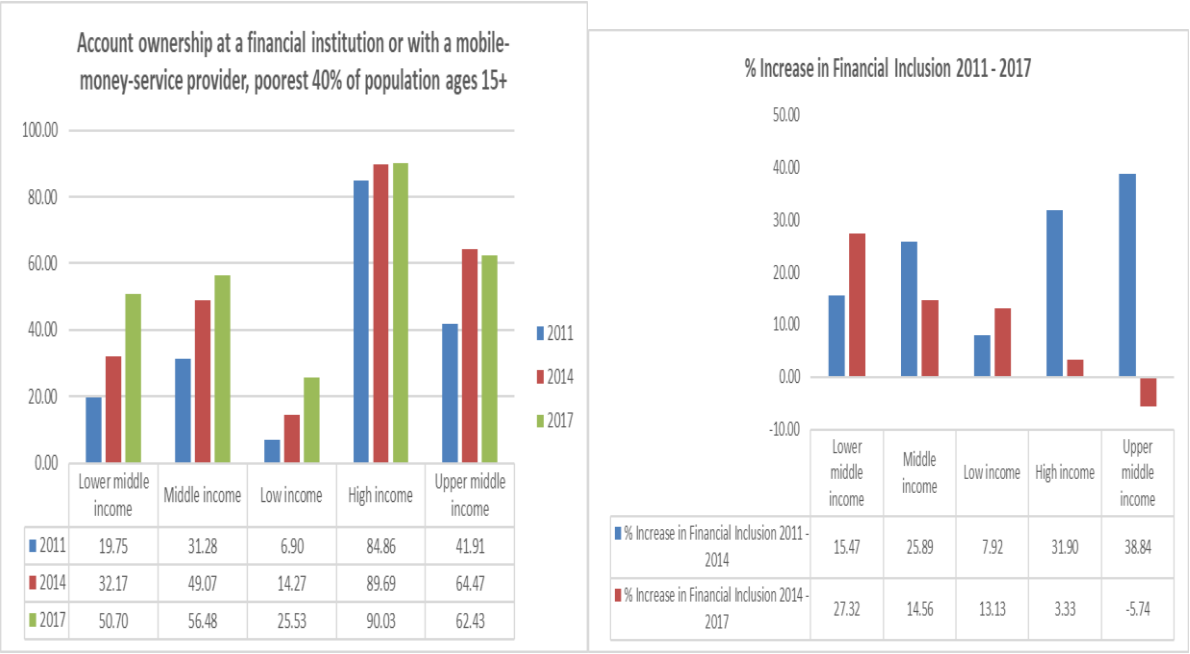
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) MFL/GDP	1.000						
(2) Dom Cred/GDP	0.034	1.000					
(3) Pol Environment	0.048	0.448	1.000				
(4) Reg Env.	-0.190	0.108	0.254	1.000			
(5) Bus Env.	-0.218	0.250	0.332	0.429	1.000		
(6) Inflation	0.035	-0.222	-0.178	-0.232	-0.187	1.000	
(7) MFL per capita	0.670	0.374	0.378	-0.044	0.139	-0.118	1.000
(8) GDP per capita	-0.146	0.619	0.501	0.167	0.448	-0.178	0.431

The table shows that most of the correlation coefficients are low, and thus, multicollinearity is not a concern in these cases. However, Domestic credit and GDP per capita; and the political environment and GDP per capita appear to have relatively high correlation coefficients, and therefore, these variables are used in separate regressions.

5.3.1.1 Trends in Global Financial Inclusion, Microfinance and Poverty

Microfinance is a tool to address failures in financial inclusion, which in turn aims to reduce poverty. Figure 5-2 shows the account ownership and the percentage increase in financial inclusion from 2011 to 2017 by the poorest 40% of the population aged 15 years or more. This is the range of data availability from the World Development Indicators as of April 27, 2022.

Figure 5-2 Global Account Ownership and Percentage Increase in Financial Inclusion 2011 to 2017

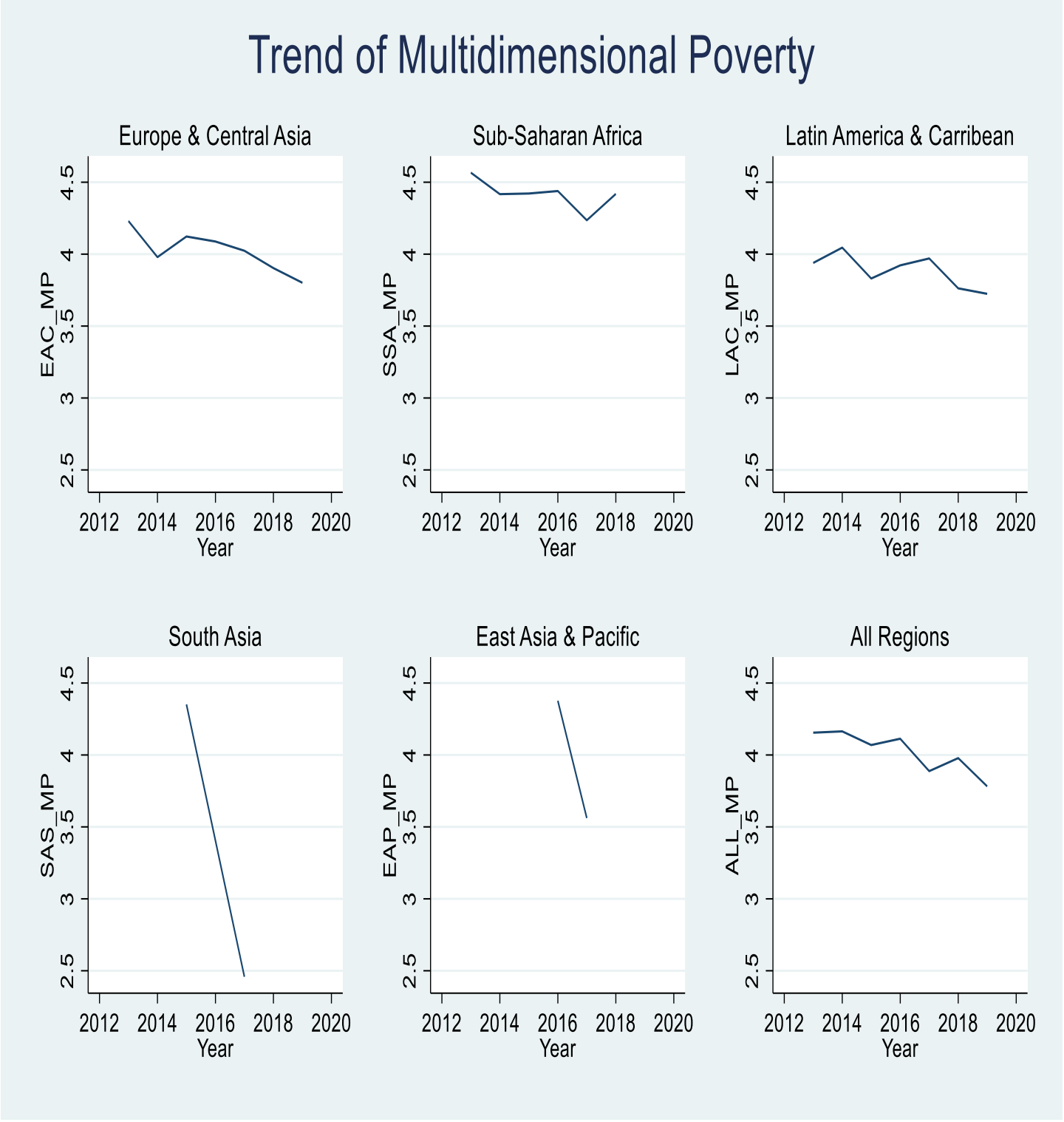


Source: World Development Indicators (World Development Indicators | DataBank (worldbank.org) accessed 12th March 2021)

The graph shows that globally, financial inclusion has increased significantly in all economic classes. It also shows that the higher rates of financial inclusion coincide with the higher income regions, buttressing the importance of financial inclusion, which includes microfinance, for improved standards of living and economic prosperity. The graph further shows that lower-middle-income countries had the highest growth rate of financial inclusion in 2017, while in upper-middle-income countries, the financial inclusion rate declined. However, the low-income countries still have a long way to go with a 74.5% exclusion rate compared to the high-income countries, with only 10% as of 2017.

Figure 5-3 shows that multidimensional poverty has generally been declining. However, Sub-Saharan Africa, with the highest poverty rates, started to trend upwards again in 2017.

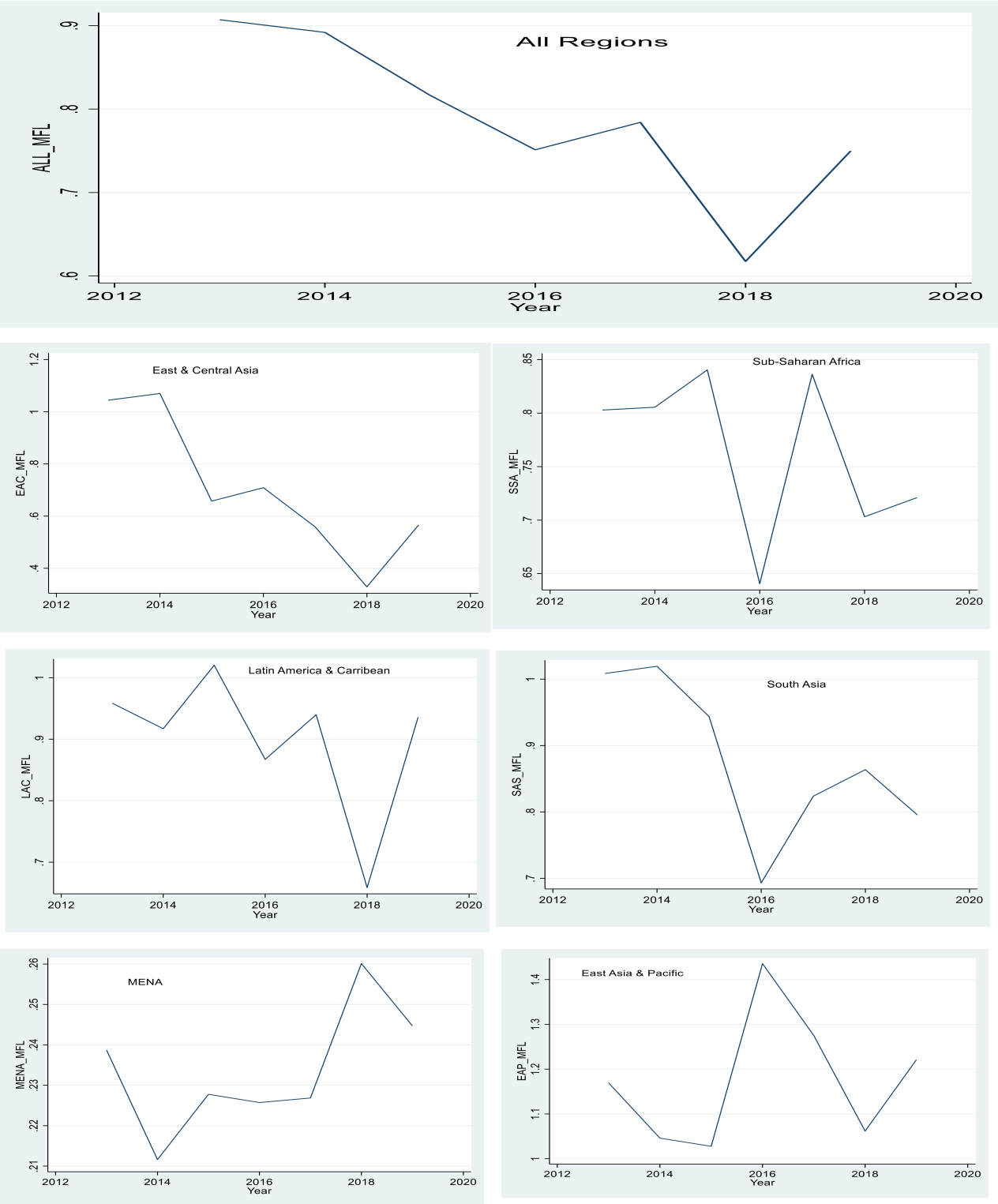
Figure 5-3 Trends of Multidimensional Poverty



Source: Data from the WDI (The World Bank, 2020b) were used in the author's calculations.

Figure 5-4 shows that the trend of Microfinance loans as a percentage of GDP has experienced peaks and troughs with different rates in different regions.

Figure 5-4 Global Trend of Microfinance Loans as a Percentage of GDP from 2013 to 2019



Source: Data from GII and MIX Market were used in the author's calculations.

The declining proportion of microfinance relative to GDP is of concern considering the role it plays in financial inclusion, the gap between low- and high-income countries shown above,

and the poverty alleviation goals of the United Nations SDGs. On average, there was a resurgence in 2019 after the trough in 2018. It remains to be seen the impact of the COVID-19 pandemic.

5.4 Results and discussions

The regression results are estimated using GMM which takes care of fixed effects through differencing. By using a combination of current and lagged values, the regression models capture the short-term and long-term relationships between variables. This leads to more accurate predictions and better understanding of the underlying patterns in the data. The GMM estimation method is appropriate for dependent variables that are restricted between 0 and 1 (Wooldridge, 2010) It is a flexible method that accommodates a wide range of data distributions and model specifications, including non-linear models and models with endogeneity. However, an appropriate GMM model specification and moment conditions that account for the bounds is required. These regressions apply one-step system GMM with the required specifications.

As discussed earlier, the HDI is a measure of achievements in three key dimensions of human development – longevity, education, and income. As the HDI index includes gross national income per capita, microfinance loans per capita are used as the explanatory variable rather than per GDP to avoid endogeneity. The results are presented in Table 5.3.

Table 5.3 The Impact of Microfinance Loans on the Human Development Index

Variables	(1) HDI	(2) HDI	(3) HDI	(4) HDI
Microfinance loans per capita	0.009***	0.009***	0.002**	0.010***
	(0.003)	(0.003)	(0.001)	(0.003)
Microfinance loans per capita (lagged)	-0.000	-0.000**	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Political environment	0.335***	0.232*	0.258**	0.363***
	(0.118)	(0.120)	(0.114)	(0.120)
Regulatory environment	-0.049	0.008	0.011	-0.005
	(0.072)	(0.094)	(0.090)	(0.078)
Business environment	0.378*	0.739***	0.429*	0.426*
	(0.213)	(0.263)	(0.216)	(0.223)
Inflation	0.016	0.021	0.022	0.014
	(0.031)	(0.032)	(0.031)	(0.032)
MFL per cap # political environment	-0.002***			
	(0.001)			
MFL per cap # business environment		-0.002***		
		(0.001)		
MFL per cap # regulatory environment			-0.000**	
			(0.000)	
MFL per cap # political environment (SSA)				-0.003***
				(0.001)
MFL per cap # political environment (RoW)				-0.002***
				(0.001)
HDI (lagged)	0.985***	0.984***	0.985***	0.982***
	(0.004)	(0.005)	(0.005)	(0.005)
Constant	-1.642*	-3.109**	-1.792*	-1.966**
	(0.913)	(1.252)	(0.996)	(0.913)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	366	366	366	366
Number of ids	79	79	79	79
Ar(1)	0.000	0.000	0.000	0.000
Ar(2)	0.428	0.411	0.633	0.601
Hansen	0.346	0.530	0.460	0.280
Number of instruments	54	54	54	54

Notes: MFL per cap - Microfinance loans per capita, # - interaction; SSA – Sub-Saharan Africa, RoW – rest of the world. Cluster robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Estimated using system GMM in Stata

In addition to the explanatory variables and controls, columns 1 to 4 introduce interactions between microfinance loans per capita and the political environment, the business environment, the regulatory environment, the political environment in SSA only and the rest

of the world respectively. The Autoregressive (AR) model of order 2 – AR(2) and Hansen statistics show the absence of autocorrelation after differencing and the validity of the instruments used. Microfinance loans per capita improve the HDI with statistical significance at the 1% level as shown in columns 1 to 4. However, the economic significance is modest (a $1 increase in microfinance loans per capita increases the HDI by 0.01%). This suggests that microfinance needs to be scaled up significantly to achieve an appreciable impact. The political and business environments are also statistically significant and are positively associated with HDI. This implies that the better the political and business environments (the higher the scores), the better the three critical dimensions of human development – longevity, education, and income (HDI). However, when microfinance loans per capita interact with the political and business environments, the coefficient is negative implying adverse environments reduce the potential positive impact of microfinance on the HDI. The political environment in Sub-Saharan Africa reduces the impact of microfinance on the HDI more than in the rest of the world as shown by the coefficient on MFL per cap # Political Environment (SSA). This underscores the need for countries to urgently address political and business constraints while administering abundant microfinance.

Following assessing the impact of MFL per capita on the HDI, the study proceeds to analyse its impact on two dimensions of HDI - Life Expectancy and Education indexes. The results are shown in Table 5.3B

Table 5.3B Variables	(1) LEI	(2) LEI	(3) LEI	(4) EDI
Microfinance loans per capita	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Microfinance loans per capita (lagged)	-0.000	0.003	0.003	-0.000
	(0.000)	(0.004)	(0.003)	(0.000)
Political environment	0.351***	0.377***	0.333***	0.203
	(0.118)	(0.127)	(0.115)	(0.465)
Regulatory environment	-0.150*	-0.128	-0.107	-0.113
	(0.080)	(0.082)	(0.088)	(0.205)
Business environment	0.108	0.124	0.241	0.540
	(0.194)	(0.200)	(0.252)	(0.694)
Inflation	0.019	0.015	0.016	0.200
	(0.017)	(0.018)	(0.017)	(0.165)
MFL per cap # political environment		-0.001		
		(0.001)		
GDP per capita	0.067	0.066	0.065	0.459
	(0.079)	(0.081)	(0.081)	(0.335)
MFL per cap # business environment			-0.001	
			(0.001)	
Constant	1.675*	1.402	0.952	-5.085*
	(0.895)	(1.039)	(1.269)	(2.601)
Observations	366	366	366	366
Number of ids	79	79	79	79
Ar(1)	0.277	0.301	0.293	0.000
Ar(2)	0.049	0.055	0.061	0.371
Hansen	0.072	0.071	0.109	0.344
Number of instruments	27	27	27	40

Cluster robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Estimated using System GMM in Stata

The AR(2) and Hansen statistics show the presence of autocorrelation and the non-validity of the instruments. Lagged microfinance loans per capita do not exhibit a statistically significant impact on life expectancy. In the subsequent analysis, the microfinance loan portfolio for each country is scaled by GDP for economic comparisons to be valid. GDP in current US$ is chosen for the scaling to represent a fair picture of differences in economies (Global Innovation Index, 2020).

5.4.1 The Impact of Microfinance Loans on Dimensions of Poverty

In this analysis, Microfinance loans are scaled by GDP to improve country comparisons. This ratio has a much lower standard deviation and thus does not undermine statistical

significance. The Life Expectancy and the Education Indexes are not based on income; hence endogeneity is not a concern. Table 5.4 shows the global impact of microfinance loans on the LEI and EDI Indexes using GMM.

Table 5.4 Impact of Micro-credits on Life Expectancy (LEI) and Education (EDI)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables (ln)	**LEI**	**LEI**	**LEI**	**LEI**	**EDI**	**EDI**	**EDI**	**EDI**
MFL/GDP	0.072	0.061	0.021	0.068	0.002	0.122	0.092	0.094
	(0.049)	(0.054)	(0.057)	(0.049)	(0.083)	(0.120)	(0.126)	(0.119)
MFL/GDP (L)	0.080**	0.875	4.503*	0.035	-0.079	0.544	3.113	-0.450
	(0.036)	(0.888)	(2.592)	(0.072)	(0.078)	(2.685)	(5.782)	(0.286)
Political environment	0.347***	0.420***	0.249**	0.341***	0.475*	0.161	0.046	0.047
	(0.096)	(0.128)	(0.107)	(0.093)	(0.279)	(0.315)	(0.193)	(0.185)
Regulatory environment	-0.058	-0.053	0.019	-0.065	-0.123	-0.055	-0.006	-0.125
	(0.071)	(0.069)	(0.127)	(0.072)	(0.214)	(0.104)	(0.145)	(0.092)
Business environment	0.495**	0.473**	1.309**	0.483**	0.705	0.417	1.023	0.313
	(0.241)	(0.236)	(0.539)	(0.242)	(0.586)	(0.462)	(1.075)	(0.418)
Inflation	0.049**	0.045**	0.047**	0.026	0.135	0.086	0.088	-0.118
	(0.020)	(0.022)	(0.018)	(0.038)	(0.139)	(0.065)	(0.071)	(0.127)
L.MFL # Political Environment		-0.179				-0.130		
		(0.200)				(0.606)		
L.MFL # Business Environment			-0.918*				-0.654	
			(0.535)				(1.204)	
L.MFL # Inflation				0.026				0.237
				(0.033)				(0.151)
L.LEI	0.962***	0.962***	0.961***	0.962***				
	(0.005)	(0.005)	(0.005)	(0.005)				
L.EDI					0.980***	0.997***	0.996***	0.997***
					(0.015)	(0.006)	(0.005)	(0.006)
Constant	-0.488	-0.725	-4.242*	-0.315	-3.555	-2.165	-4.744	-0.398
	(0.968)	(0.902)	(2.417)	(0.983)	(2.434)	(1.955)	(5.036)	(2.135)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	373	373	373	373	373	373	373	373
Number of ids	83	83	83	83	83	83	83	83
AR(1)	0.562	0.535	0.424	0.466	0.000	0.000	0.000	0.000
AR(2)	0.172	0.169	0.301	0.382	0.304	0.250	0.277	0.157
Hansen	0.173	0.197	0.298	0.147	0.419	0.693	0.623	0.836
Number of instruments	26	26	26	26	40	26	26	26

Notes: MFL/GDP – Microfinance loans/GDP; MFL/GDP (L) – I year lagged Microfinance loans/GDP; L. – 1 year lag; # - interaction. Cluster Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Estimated using system GMM in Stata

The AR(2) and Hansen statistics show the absence of autocorrelation after differencing and the validity of the instruments used. The table shows microfinance credit scaled by GDP with a one-year lag to be positively associated with life expectancy (health) with statistical significance at the 5% level. A 1% increase in microfinance loans increases life expectancy by 0.08% at the 5% significance level on average ceteris paribus. The relationship is, however, inelastic as a 1% increase leads to a less than 1% increase in the poverty dimension. The table further shows the political and business environments are critically important. Both environments are positively associated with life expectancy as the coefficients on Political Environment and Business Environment show in columns 1 to 4 but the interaction terms in columns 2 and 3 show that they reduce the positive impact of microfinance. This implies that if the political and business environments had been better, microfinance loans would have improved life expectancy even more. Columns 5 to 8 show the impact of microfinance loans on the education index. Although there is a positive association, it is not statistically significant. The political, business, and macroeconomic environments also do not reveal a statistically significant association.

Table 5.5 presents the impact of microfinance loans scaled by GDP on employment and youth not in school or employment. Columns 2, 3, 5 and 6 show the impact of microfinance loans given the political and business environments, respectively.

Table 5.5 Impact of Micro-credits on Employment and Youth not in School

Variables	(1) Emp to pop	(2) Emp to pop	(3) Emp to pop	(4) Youth not in school	(5) Youth not in school	(6) Youth not in school
MFL/GDP	0.344*	-0.073	-0.167	-0.215	-0.318	-0.185
	(0.190)	(0.191)	(0.289)	(0.188)	(0.268)	(0.279)
MFL/GDP (L)	0.267**	1.395	8.902	-0.163	5.140	-3.396
	(0.109)	(3.272)	(9.627)	(0.135)	(5.903)	(10.484)
Pol Env	0.076	0.411	0.071	-0.178	0.219	-0.197
	(0.213)	(0.380)	(0.349)	(0.231)	(0.560)	(0.396)
Reg Env	-0.162	-0.004	0.161	0.007	-0.061	-0.148
	(0.237)	(0.146)	(0.345)	(0.196)	(0.201)	(0.349)
Bus Env	1.062	0.357	1.977	-1.633**	-1.832**	-2.253
	(0.677)	(0.673)	(1.794)	(0.626)	(0.859)	(2.196)
Inflation	0.010	0.047	0.055	-0.065	-0.269**	-0.241**
	(0.064)	(0.094)	(0.102)	(0.069)	(0.104)	(0.100)
L.MFL # Pol Env		-0.309			-1.191	
		(0.741)			(1.322)	
L.MFL # Bus Env			-1.846			0.673
			(2.011)			(2.171)
L. Emp to pop	0.951***	0.977***	0.978***			
	(0.017)	(0.010)	(0.011)			
L. Youth Not in School				0.947***	0.933***	0.937***
				(0.030)	(0.032)	(0.032)
Constant	-2.095	-1.969	-9.084	9.970***	10.211**	14.284
	(3.394)	(3.291)	(8.560)	(3.012)	(4.634)	(10.348)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	373	373	373	373	373	373
Number of ids	83	83	83	83	83	83
AR(1)	0.002	0.002	0.000	0.004	0.002	0.003
AR(2)	0.734	0.719	0.430	0.778	0.913	0.704
Hansen	0.330	0.404	0.421	0.402	0.540	0.561
Number of instruments	26.000	26.000	26.000	29.000	26.000	26.000

Cluster Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Estimated using system GMM in Stata

The table shows that microfinance loans with a one-year lag are positively associated with employment at the 5% significance level. A 1% increase in microfinance loans increases employment by 0.28% on average. The relationship is however also inelastic as a 1% increase leads to a less than 1% increase in employment. Thus, policymakers need to consider a substantial increase in microfinance loans or supplement microfinance loans with other

development tools to achieve the desired effect on employment. The political and business environments appear to reduce the potential impact of microfinance on employment but are not statistically significant. Columns 4 to 6 show that the business and macroeconomic environments are inversely related to youth not in school or employment – further evidencing the crucial importance of these environments.

Table 5.6 shows the impact of Microfinance loans, and the political and business environments on Assessment in Reading. However, Sub-Saharan Africa does not have data for this dimension of poverty. Thus, the analysis relates only to East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, MENA, and South Asia.

Table 5.6 Impact of Microfinance loans on Assessment in Reading

Variables (ln)	(1) Assessment in reading	(2) Assessment in reading	(3) Assessment in reading
Microfinance loans	0.010**	0.051	0.000
	(0.004)	(0.049)	(0.030)
Political environment	0.030*	0.035*	0.030*
	(0.016)	(0.018)	(0.016)
Regulatory environment	-0.024	-0.025	-0.024
	(0.023)	(0.024)	(0.023)
Business environment	-0.010	-0.008	-0.011
	(0.037)	(0.037)	(0.039)
ICT	0.057	0.062	0.056
	(0.038)	(0.039)	(0.037)
L.MFL # Pol Env		-0.008	
		(0.009)	
L.MFL # Bus Env			0.002
			(0.005)
Assessment in reading (lagged)	0.881***	0.879***	0.882***
	(0.058)	(0.058)	(0.058)
Constant	0.553*	0.518	0.559*
	(0.312)	(0.328)	(0.313)
Year fixed effects	Yes	Yes	Yes
Observations	112	112	112
R-squared	0.885	0.868	0.886
Endogenous variables	2	2	2
Excluded exogenous	2	2	2
Included exogenous	7	8	8
Cragg-Donald Wald F statistic	181.3	3.983	8.123
Kleibergen-Paap rk Wald F statistic	61.72	2.900	3.445

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The table shows that microfinance loans are significantly positively associated with assessment in reading at the 5% significance level. The political environment is also positively associated at the 10% significance level. The political environment is also seen to reduce the extent to which microfinance loans could have improved assessment in reading. These further emphasise the criticality of the political environment.

5.4.2 The Impact of Microfinance Loans on Multidimensional Poverty

Table 5.7 introduces the impact of microfinance loans on multidimensional poverty. This is a combination of the multiple lacks that poor people suffer such as poor health, lack of education, sub-par living standards, and the threat of violence (Oxford Department of International Development).

Table 5.7 The Impact of Microfinance Loans on Multidimensional Poverty

Variables (ln)	Multipoverty (No Controls)	Multipoverty (+ GDPpc & Inflation)	Multipoverty (+ Business Environment)	Multipoverty (+ Political Environment)	Multipoverty (+ Regulatory Environment)	Multipoverty (Controls & Interaction)
MFL (lag)	-0.015*	-0.039***	-0.055***	-0.055***	-0.053***	-0.065***
	(0.009)	(0.011)	(0.012)	(0.012)	(0.012)	(0.017)
MPOV (L)	1.060***	1.000***	0.993***	1.003***	0.966***	0.980***
	(0.039)	(0.049)	(0.048)	(0.052)	(0.060)	(0.061)
Bus env.			0.190*	0.180	0.062	0.034
			(0.109)	(0.112)	(0.155)	(0.137)
Pol env.				0.021	0.029	0.028
				(0.030)	(0.034)	(0.030)
GDP pc		-0.079***	-0.121***	-0.128***	-0.139***	-0.138***
		(0.025)	(0.029)	(0.032)	(0.031)	(0.033)
Inflation		-0.024***	-0.021**	-0.018**	-0.022**	-0.029**
		(0.008)	(0.009)	(0.009)	(0.009)	(0.011)
L.MFL#Infl						0.013*
						(0.008)
Reg env					0.108	0.119
					(0.150)	(0.117)
Constant	-0.291*	0.812*	0.349	0.331	0.618	0.636
	(0.164)	(0.428)	(0.604)	(0.601)	(0.543)	(0.477)
Year fe	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39	39	39	39	36	36
R-squared	0.955	0.961	0.961	0.961	0.963	0.961
Endogenous variables	2	2	2	2	2	2
Excluded exogenous	2	2	2	2	2	2
Included exogenous	4	6	7	8	8	6
Cragg-Donald Wald f statistic	56.28	41.22	27.82	31.25	25.56	17.98
Kleibergen-paap rk wald f statistic	22.63	20.12	19.43	20.51	17.36	9.104

Notes: MFL (lag) – one-year lagged microfinance loans per GDP, Mpov (L) – one-year lagged multipoverty, GDP pc – GDP per capita, L.MFL#Infl – interaction of lagged microfinance loans and inflation. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Although the number of observations in this table is limited due to the infrequency of poverty data collection, it represents the entirety of the available data. However, since the sample size exceeds 30, statistical theory suggests that the sample mean is approximately normally distributed, enabling the use of F and Z tests. The table shows that microfinance credit is significantly negatively associated with multidimensional poverty. That means it improves the components of multidimensional poverty, which include health, education, and standard of living. Standard of living is made up of cooking fuel, sanitation, drinking water, electricity, housing, and assets. Microfinance reduces poverty the most when the regulatory and business environments, as well as inflation, are controlled. However, the positive relationship between the interaction of MFL and Inflation in Column 6 shows that the combination of microfinance loans and a non-conducive macroeconomic environment increases multidimensional poverty. This could be attributed to a reduction in purchasing power and disposable income as a result of high inflation. Central Banks should therefore endeavour to maintain inflation rates conducive to poverty reduction. The Kleinbergen-Paap and Cragg-Donald tests demonstrate the appropriateness of the instruments used. The regression was done using ivreg2 (Baum et al., 2002).

5.4.3 Impact of Microfinance Loans on Income Poverty

Having explored the impact of microfinance loans on the various dimensions of poverty and the various deprivations that poor people suffer, the research now proceeds to explore its impact on poverty measured by income or expenditure.

Table 5.8 shows the impact of microfinance credit on the most current poverty estimates as of 2018. It is based on the percentage of the population living below the income poverty line of $1.90 a day using 2011 purchasing power parity. These estimates rely on a single dimension of poverty – income. Column 1 shows the impact of Microfinance scaled by GDP on the percentage of the population living below the poverty line. Columns 2 and 3 introduce domestic credit and regional dummies, respectively. Column 4 introduces the number of bank branches as an additional instrumental variable to raise the KP statistic and improve the suitability of the instruments.

Table 5.8 Impact of Microfinance loans/GDP on Population living below the Income Poverty line

Variables (ln)	Population living below income poverty line	+ domestic credit	+ regional dummies	+ additional instrument (no of bank branches)
MFL/GDP 1 yr lag	-4.597***	-3.949***	-2.539***	-2.204**
	(1.508)	(1.398)	(0.928)	(0.878)
Domestic credit 1 yr lag		-5.245**	-0.178	-0.180
		(2.304)	(2.069)	(2.249)
Business environment	-8.744	-12.842	-10.491	-4.455
	(12.101)	(11.590)	(12.689)	(12.491)
Political environment	16.569	21.780**	15.159	9.798
	(10.973)	(10.026)	(10.087)	(10.464)
Inflation	0.449	0.239	2.584	2.127
	(2.061)	(2.004)	(1.979)	(2.254)
GDP per capita	-22.861***	-21.135***	-15.407***	-14.678***
	(2.034)	(1.914)	(3.555)	(4.095)
EAC Dum			6.879*	6.082
			(4.013)	(4.079)
SSA Dum			22.692***	20.872***
			(5.760)	(5.449)
LAC Dum			5.403*	4.408
			(2.849)	(2.883)
SAS Dum			-0.877	-1.678
			(3.756)	(4.709)
MENA Dum			-5.060*	-5.429**
			(3.020)	(2.702)
Constant	208.510***	210.681***	136.850***	126.202***
	(47.063)	(44.922)	(39.976)	(40.957)
Observations	69	69	69	65
R-squared	0.714	0.741	0.826	0.799
Endogenous variables	1	2	2	2
Excluded exogenous	1	2	2	3
Included exogenous	4	4	9	9
Cragg-Donald wald f statistic	273.4	63.43	47.68	84.77
Kleibergen-paap rk wald f statistic	273.8	7.240	5.438	117.6

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5.8 shows that microfinance credit significantly reduces the percentage of the population living on less than $1.90 a day. With the GMM estimation method used, the results unambiguously show a causal relationship between micro-credits and poverty reduction. For instance, a 10% increase in micro-credit (MFI is log-transformed) decreases the proportion of the population living on less than $1.9 per day by about 0.25% (Column 3). The political environment and macroeconomic factors are also seen to be significant. GDP per capita reduces income poverty by 2% on average (Columns 1 – 4). The regional dummies show how much each region influenced global poverty. The table shows that Sub-Saharan Africa contributes the most to global poverty, consistent with the summary statistics. Figure 3 also showed that SSA is the only region where poverty is on the increase. These findings are consistent with the findings of Imai et al. (2012) using data from 61 developing countries between 2003 and 2007, before the global financial crisis. With these findings in mind, it is disturbing that microfinance appears to be on the decline in some countries, as shown in figure 4.

5.4.4 Robustness Tests

The study proceeds to further validate the findings on the impact of microfinance loans on poverty. To ensure the credibility and validity of the earlier results, microfinance loans/GDP is replaced with microfinance loans per capita which take population into account. Table 5.9 applies microfinance loans per capita to the percentage of the population living below the poverty line. Columns 1, 2, 3 and 4 show the influence of Sub-Saharan Africa, South Asia, MENA, and East Asia & Pacific.

Table 5.9 Impact of Microfinance Loans Per Capita on Population Living Below the Poverty Line

Variables	(1) PLBL	(2) PLBL	(3) PLBL	(4) PLBL
Mfl per capita (1 year lag)	-0.007***	-0.007***	-0.008***	-0.008**
	(0.002)	(0.002)	(0.002)	(0.004)
Business environment (ln)	-4.196	-3.105	-3.386	-1.701
	(11.527)	(11.484)	(10.748)	(11.748)
Political environment (ln)	9.576	8.956	13.205	9.352
	(10.134)	(9.949)	(9.652)	(10.120)
Inflation (ln)	0.140	0.327	0.266	-0.122
	(1.802)	(1.767)	(1.802)	(1.860)
GDP per capita (ln)	-19.916***	-20.933***	-21.113***	-20.629***
	(2.104)	(1.902)	(1.851)	(2.026)
SSA # L.MFL per capita	0.086**			
	(0.041)			
SA # L.MFL per capita		-0.228***		
		(0.069)		
MENA # L.MFL per capita			-0.419***	
			(0.052)	
EAP # L.MFL per capita				0.003
				(0.004)
Constant	186.791***	195.073***	179.238***	183.768***
	(42.692)	(43.378)	(41.768)	(44.608)
Observations	71	71	71	71
R-squared	0.736	0.744	0.752	0.730
Endogenous variables	1	1	1	1
Excluded exogenous	1	1	1	1
Included exogenous	5	5	5	5
Cragg-Donald wald f statistic	1415	1366	1362	824.3
Kleibergen-paap rk wald f statistic	159.2	159.9	159.3	125.8

Notes: PLBL – Population living below the poverty line; MFL – Microfinance loans SSA – Sub-Saharan Africa; SA – South Asia; MENA – Middle East & North Africa; EAP – East Asia & Pacific; # - Interaction

The coefficients on MFL per capita (1-year lag) are negative and statistically significant at the 1% level supporting the conclusion that microfinance reduces the proportion of the population living below the international poverty line. However, microfinance as a percentage of GDP reduces poverty more. The table further shows in column 1 that Sub-Saharan Africa reduces the positive impact of microfinance loans on poverty, while South Asia and MENA increase it.

Table 5.10 applies microfinance loans per capita to multidimensional poverty. Column 1 is without controls, while columns 2 to 6 introduce the macroeconomic environment, the Business Environment, the political environment, the regulatory environment, and the interaction between microfinance loans and inflation.

Table 5.10 Impact of Microfinance Loans Per Capita on Multidimensional Poverty

Variables	(1) Multipoverty	(2) Multipoverty	(3) Multipoverty	(4) Multipoverty	(5) Multipoverty	(6) Multipoverty
MFL pc (1 year lag)	-0.001	-0.003**	-0.006***	-0.006***	-0.006***	-0.005***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Bus env (ln)			4.792*	4.921*	2.108	0.571
			(2.765)	(2.835)	(3.533)	(2.825)
Pol env (ln)				-0.377	-0.116	0.245
				(0.885)	(1.014)	(0.882)
GDP per capita (ln)		-2.275***	-3.643***	-3.500***	-3.979***	-3.778***
		(0.828)	(0.954)	(0.931)	(0.971)	(0.935)
Inflation (ln)		-0.755***	-0.816***	-0.866***	-0.959***	-0.717**
		(0.236)	(0.228)	(0.261)	(0.268)	(0.322)
Reg env (ln)					3.393	5.680**
					(3.533)	(2.812)
L.MFL pc # Inflation						-0.000
						(0.001)
Constant	-2.135*	23.954**	15.216	15.007	17.169	9.944
	(1.289)	(10.139)	(12.065)	(12.028)	(11.013)	(9.812)
Observations	40	40	40	40	36	36
R-squared	0.960	0.969	0.971	0.971	0.972	0.970
Endogenous variables	2	2	2	2	2	2
Excluded exogenous	2	2	2	2	2	2
Included exogenous	4	6	7	8	8	6
Cragg-Donald wald f statistic	22.84	14.69	8.365	8.414	7.103	6.818
Kleibergen-paap rk wald f statistic	7.305	7.038	4.375	3.936	3.739	2.781

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

MFL pc (1-year lag) and GDP per capita are statistically significant and negatively associated with multidimensional poverty, confirming the earlier results.

Microfinance loans are regressed on Education to assess its impact thereon. Data was not available for assessment in reading for Sub-Saharan Africa. However, the Education variable covers all the geographic regions. The impact of microfinance loans on productivity is also tested. The results are presented in Table 5.11.

Table 5.11 Impact of Microfinance loans on Education and Productivity

Variables (ln)	Education	Education	Growth rate of GDP per person employed
Microfinance loans	0.002	-0.001	0.061
	(0.005)	(0.003)	(0.164)
Political environment	0.021	0.030	0.337
	(0.021)	(0.023)	(0.538)
Regulatory environment	0.040		0.128
	(0.026)		(0.396)
Business environment	-0.032	-0.002	-0.956
	(0.028)	(0.016)	(1.280)
ICT	-0.014	-0.009	-0.225
	(0.012)	(0.015)	(0.398)
SSA # MFL		0.030*	
		(0.017)	
Education (lagged)	0.953***	0.948***	
	(0.026)	(0.025)	
Growth rate of GDP per person(L)			0.708***
			(0.113)
Inflation			0.002
			(0.130)
Constant	0.184*	0.188**	4.335
	(0.095)	(0.095)	(5.456)
Observations	29	29	234
R-squared	0.995	0.995	0.357
Endogenous variables	2	2	2
Excluded exogenous	2	2	2
Included exogenous	6	6	8
Cragg-Donald wald f statistic	132.8	224	30.51
Kleibergen-paap rk wald f statistic	248	107.3	11.24

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The table shows that microfinance loans are positively associated with education and productivity but does not show statistical significance. However, the interaction of SSA and microfinance loans in column 2 are positively associated with education at the 10% level. This supports the finding that microfinance loans positively impact education.

As a further test of the robustness of the results, Employment and Youth Not in School were used as explanatory variables and Microfinance loans as the dependent variable. The results are shown in Table 5.12.

Table 5.12 Impact of Employment and Schooling on demand for microfinance loans

Variables (ln)	MFL	MFL
Employment to population (%)	-0.058***	
	(0.022)	
Youth not in school		0.051***
		(0.016)
Pol env	0.232*	0.226
	(0.139)	(0.140)
Reg env	-0.002	0.013
	(0.073)	(0.075)
Bus env	-0.030	-0.021
	(0.283)	(0.274)
Inflation	-0.004	-0.001
	(0.027)	(0.028)
Constant	3.418	-1.154
	(2.384)	(1.425)
Observations	466	466
R-squared	0.119	0.113
Number of ids	88	88

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The coefficient on employment to population ratio in column 1 shows a statistically significant negative relationship. This implies that when a higher proportion of the population is employed, the amount of microfinance loans *reduces*, while a greater proportion of youth not in school in column 2 *increases* the amount of microfinance loans. This further demonstrates the positive impact of microfinance loans on employment. Further tests are shown in appendix IX.

5.5 Summary and Conclusions

This chapter empirically examines the impact of microfinance on poverty as measured by income lower than the international poverty line of $1.90 per day and multidimensional poverty comprising poor health, lack of education, living standards, and the threat of violence. It further deconstructs poverty into various dimensions and examines the impact of microfinance on each dimension. Microfinance participation is measured by Microfinance institutions' gross loan portfolio in each country as a percentage of its GDP in current US$ and Microfinance loans per capita. The research uses data from 95 developing countries and performs regressions using GMM, ordinary least squares and instrumental variables. It rigorously analyses the role of the political, business and macroeconomic environments in

amplifying or diminishing the positive impact of microfinance. The political, business and macroeconomic environments are also seen to be significant as these factors constrain the potential positive impact of microfinance. The results confirm the hypotheses that under conducive political, business and macroeconomic environments, microfinance has the potential to reduce both income poverty and the various dimensions of poverty. Microfinance credit was found to significantly reduce the percentage of the population living on less than 1.90 dollars a day, the international poverty income threshold. In the same vein, it positively impacts the human development index. Microfinance reduces multidimensional poverty and reduces it the most when the regulatory and business environments, as well as inflation, are controlled. Poverty dimensions such as life expectancy, employment and assessment in reading are also positively impacted. The results are robust to controlling for a large set of control variables and potential endogeneity problems.

This research lends support to the argument that microfinance can be an effective development tool globally under the right political, regulatory and macroeconomic conditions. However, the values of the microfinance coefficients are small, suggesting that a significant amount of microfinance needs to be deployed, or a combination with other development tools is required to have a transformative impact on poverty. FinTech could be significantly beneficial in this regard considering its significant growth in Africa. Research by the Financial Times and Statista revealed that companies in the fintech sector are rapidly growing by seeking to tap Africa's unbanked population and markets previously underserved[32]. Of all the segments of finTech, digital payments have the highest volume[33]. Volume and speed is required to reach the last mile of financial inclusion as shown in a survey by Enhancing Financial Innovation and Access (EFInA) in 2020. The survey revealed the effectiveness of mobile money in reducing financial exclusion in Africa.[34]

This study is the first to combine both holistic and granular approaches in the assessment of the value of microfinance as a development tool and also examine the specific impact of the environment thereon. An additional novelty is that it examines each geographic region globally within its environmental contexts. Sub-Saharan Africa has the highest population living in poverty and contributes the most to global poverty. It also has the least microfinance

[32] FT ranking: Africa's Fastest Growing Companies 2022 | Financial Times
[33] • In-depth Report: FinTech 2021 | Statista
[34] EFInA Report on Financial Inclusion Experiences of other countries that have gone ahead of Nigeria

loans both per capita and as a percentage of GDP. On the other hand, East Asia and the Pacific have the highest volume of microfinance loans, contribute the least to global poverty and have the lowest percentage of their population living in poverty. The same findings apply to the Human Development Index. The study recommends the deployment of substantial microfinance by financial institutions, accompanied with well controlled macroeconomic environments, if a positive transformative impact on poverty and standards of living is to be achieved. The impact could also be augmented and accelerated using finTech. In view of the encouraging findings of this study, Microfinance still appears to be a relevant and effective tool to help achieve the Sustainable Development Goals and put the world back on track to meet the target of ending extreme poverty by 2030. However, considering the moderate impact, it is worth considering its combination with other development tools. It is hoped that these findings will motivate governments, policymakers, development agencies and donors to sustain their efforts in this direction.

Chapter Six

6 The Impact of Microfinance and Economic Shocks on Households: Micro-Level Evidence from Nigeria

6.1 Introduction

The effects of poverty in Nigeria have been significant and long-lasting, leading to poor standards of living and widespread social unrest. Consequently, the country embarked on an aggressive developmental agenda, including microfinance, to cure this undesirable situation. Microfinance is important in Nigeria for several reasons:

1. Providing access to finance: Microfinance institutions (MFIs) offer small loans and financial services to low-income individuals and microenterprises who lack access to traditional banking services (Matyaqubovich and Ugli, 2016). In Nigeria, where almost 50% of the population live below the poverty line, microfinance is crucial for providing access to finance, enabling people to start and grow small businesses and improve their economic situation.
2. Promoting entrepreneurship: Nigeria is home to many talented entrepreneurs, but they often face significant obstacles in accessing capital. Microfinance institutions can help bridge this gap by providing loans and other financial services to aspiring entrepreneurs, allowing them to start and grow their businesses (Oluwatoyin O. and Ogundipe A., 2017, Oluwagbemiga O. and Adegbemi O., 2014).
3. Supporting financial inclusion: Microfinance institutions play an important role in promoting financial inclusion by providing basic financial services to underserved communities (Ledgerwood and White, 2006). This can help to improve financial literacy, increase savings, and reduce poverty in Nigeria.
4. Empowering women: Women in Nigeria often face significant economic and social barriers, including limited access to education and financial resources. Microfinance institutions can help empower women by providing them with the tools and resources they need to start and grow their own businesses, improving their economic standing and social status (Halkias et al. 2011)

Overall, microfinance can be a powerful tool for promoting economic development and reducing poverty in Nigeria. By providing access to finance, promoting entrepreneurship,

supporting inclusion, and empowering women, microfinance can help to create a more inclusive and prosperous society.

Based on the foregoing, this chapter:

(i) Explores trends in microfinance and poverty in Nigeria from 2005 to 2021

(ii) Evaluates the impact on poverty/ poverty dimensions/ household welfare of:

   a. microfinance savings
   b. microfinance credit/ loans

(iii) Explores the impact of 3 specific economic shocks on the resilience of microfinance institutions in Nigeria, namely:

   a. The banking crisis from 2010 to 2012
   b. The recession from 2016 to 2017
   c. COVID-19 from 2020

These research objectives are motivated by the desire of Nigeria to improve the standard of living of the economically active poor and the aspirations of the Sustainable Development Goals (SDGs). The SDGs aim to eradicate extreme poverty by 2030, and countries have put several policies in place to accomplish this goal. The most essential and desirable duty of any well-intentioned government is the well-being of its citizens. However, sometimes such plans may not achieve the desired results or could be met with unexpected detours or shocks, such as the COVID-19 pandemic that started unexpectedly globally towards the end of 2019. Historically, several countries have embarked on financial inclusion missions, one of the policy tools being microfinance. The ability of microfinance to lift economies out of poverty has been under debate for several years. Some researchers believe that there is a positive impact on households; otherwise, they would not keep borrowing, and the microfinance industry would not keep growing. Nevertheless, questions remain on the value offerings that keep households patronising microfinance, the extent to which economic inclusion is being attained and the extent to which these may have been derailed by economic shocks such as the pandemic. These questions are pertinent and relevant because if the areas where households derive positive benefits can be established, governments, multilateral and pro-poor organisations can scale these up and finetune areas where the policy is not working so well. To put the scale of microfinance in Nigeria into context, between 2008 and 2021, there were 859 microfinance banks, 11 million depositors and 2 million borrowers on average.

Within this period, microcredit and deposits grew annually by approximately 6% and 4% respectively. On average, total credit was N196 billion ($471million) and total deposits N161billion ($387million), at an exchange rate of N416.33 to USD as of 31 January 2022 (www.cbn.gov.ng).

This research investigates the impact of microcredit and micro-savings on various dimensions of household welfare using the propensity score matching methodology. The novelty of this research is that it empirically investigates the impact of these microfinance products concurrently. It compares the welfare benefit of microfinance relative to those with access to other forms of finance (the banked or financially included) and relative to those excluded from the formal banking system (the unbanked or financially excluded). Also, as economic shocks could cause a setback to economic inclusion progress, poverty likelihoods of households before and within the period of the COVID-19 pandemic lockdown and other restrictions are evaluated using a Poverty Assessment Tool. This will provide guidance on whether vulnerable households need to build resilience against future shocks. Economic shocks could also impair the ability of financial intermediaries such as microfinance institutions to provide credit or savings facilities. Thus, this study investigates the impact of economic shocks, including COVID-19 on microfinance banks. Nigeria is used as the setting for this evaluation, but the findings would apply to similar developing nations. Nigeria has been chosen because it is the largest economy in Sub-Saharan Africa, and it adopted microfinance in 2005 as a development tool. Even though Nigeria has the highest GDP in Africa, it also has one of the highest poverty rates at 43%[35]. Although now overtaken by India, Nigeria since 2016 was considered as the poverty capital of the world[36]. Nigeria is, therefore, an exemplary case from which policy implications for the rest of the developing world and poor countries can be drawn. Specifically, the objectives are to determine the extent to which: (i) Microfinance has contributed to the ultimate objective of poverty reduction and improved standards of living (ii) Economic shocks have impacted households and microfinance banks. The investigation looks at two units of analysis – households and microfinance banks.

[35] Poverty Rate by Country 2023 (worldpopulationreview.com)
[36] India 'overtakes' Nigeria as world's poverty capital | TheCable

6.1.2 Background Information on Nigeria

Nigeria is a federation of 36 states and a federal capital territory (FCT) grouped into 6 geopolitical zones. The states and their capitals are shown in figure 1.

Figure 6-1 Map of Nigeria with states

Source: Administrative Map of Nigeria - Nations Online Project

The grouping of the 36 states and the FCT into six geopolitical zones is as shown below:

Geopolitical zone	***States***
North Central (Middle belt)	Benue, Kogi, Kwara, Nasarawa, Niger, Plateau and the FCT
North East	Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe
North West	Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, Zamfara
South East	Abia, Anambra, Ebonyi, Enugu, Imo
South South (Niger Delta region)	Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Rivers
South West	Ekiti, Lagos, Ogun, Ondo, Osun, Oyo

Nigeria introduced its microfinance policy, regulatory and supervisory framework in 2005. Its Central Bank (CBN) conducted a baseline study of Bangladesh, India, Pakistan, Indonesia, Philippines and Uganda before the policy's commencement (Central Bank of Nigeria, 2005). The framework was expected to promote financial services for micro and small enterprises (MSMEs). It was also expected to stimulate growth and development by providing microfinance on a sustainable basis for the poor and low-income earners. Expectations included improving financial inclusion, improving employment generation by MSMEs, and poverty reduction. These objectives are similar to those of other countries across the world that deployed microfinance as a developmental tool. In Nigeria, the specific targets of the policy were: to cover the majority of the poor but economically active population by 2020; to increase the share of microcredit as a percentage of total credit to the economy from 0.9 per cent in 2005 to at least 20 per cent in 2020; and the share of microcredit as a percentage of GDP from 0.2 per cent in 2005 to at least 5 per cent in 2020; to eliminate gender disparity by improving women's access to financial services by 5% annually (Central Bank of Nigeria, 2005).

The policy was reviewed in 2011 to better support low-income groups and small businesses. In six years, between 2005 and 2011, outreach had only grown by a meagre 1.3% - from 35% to 36.3% (Central Bank of Nigeria, 2011b). The subsector had been characterised by poor corporate governance and impaired asset quality. Some troubled commercial banks had taken advantage of the new policy and converted to microfinance banks. Furthermore, some community banks of doubtful viability that had been in existence before the policy had been allowed to convert into microfinance banks, thus starting on faulty foundations. The global financial crisis in 2007 had a crippling effect as it caused credit lines and donor funds to dry up. Finally, the Nigerian banking crisis of 2009 had a contagion effect on the subsector as it eroded consumer confidence. The revisions increased the categories of microfinance banks and reviewed the minimum capital requirements. It also included additional targets – the growth of financial services to the economically active poor and women at 10% and 15% annually, respectively (Central Bank of Nigeria, 2011b). The strategies to be adopted were extending licensing and strengthening supervision of microfinance banks, continued professional development for managers, government participation, and collaboration with development partners.

6.1.3 Poverty in Nigeria

The National Bureau of Statistics (NBS) in Nigeria defines poverty based on the availability of basic needs such as food, clothing, shelter, sanitation facilities, pipe-borne water, education, good healthcare and access to information (National Bureau of Statistics, 2012).

Nigeria is noted to be a country with high levels of poverty. A survey by the NBS in 2009, using the international poverty line of $1.90 per person per day (2011 PPP), estimated extreme poverty to be 53.5%. In 2018, poverty was projected at 50%, indicating only a slight improvement in the incomes of the bottom half of the population over the past ten years (National Bureau of Statistics, 2012, World Bank, 2019). The World Bank poverty and equity assessment of Nigeria observed that the poverty trend is exacerbated by the non-diversification of the economy, regional differences, and a high population growth rate. High oil prices led to significant economic growth from 2010 to 2014, but this was mainly to the advantage of the coastal areas and the capital. Oil prices began to fall towards the end of 2014, and the country fell into a recession in 2016. Although there was a weak rebound in 2017, it was not enough to reduce poverty as unemployment remained high. High food inflation persisted, which affected the poor to a more significant extent. Another hindrance to poverty reduction was increased violent conflict, which led to population displacement, and disruption in farming and services, especially in the North East and Middle Belt (World Bank, 2019).

The World Health Organisation (WHO) declared COVID-19 a global pandemic on March 11, 2020, following a report of clustered cases of pneumonia by the Wuhan Municipal Health Commission, China. This later turned out to be the novel coronavirus (World Health Organisation, 2020). Several countries instituted lockdowns and other restrictions to curtail the ravaging spread of the virus. This involved the closure of businesses, schools, and other forms of economic and commercial activities. A lockdown was announced in Nigeria on 30 March 2020 in three states - Lagos, Ogun, and Abuja (Mbah, 2020). This was later extended to Kano state on 27 April 2020. Ultimately, this would trigger a macroeconomic shock. The harsh economic consequences that ensued resulted in the government announcing a gradual easing of the lockdown in Abuja, Lagos, and Ogun states with effect from 5 May 2020. The easing was done in phases, with the third phase concluded on July 27, 2020 (Ridwan et al.,

2020). Economic activity had yet to return to normal as of December 2020 as gradual easing continued with social distancing measures, constraints on travel, and prohibition of social gatherings still in force.

Some studies have predicted that the economic implications of the pandemic will be extensive, with differing effects on employment, supply chains, financial markets, and GDP. The adverse impacts may vary by the severity and length of lockdowns and the degree of compliance (Brodeur et al., 2021). To put Nigeria's response to the pandemic into context, the stringency of its response is compared to other countries in Africa and globally using the Oxford COVID-19 Government Response Stringency Index. This index attempts to compare country responses to the pandemic using nine metrics comprising school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls (Ritchie et al., 2022). Nigeria is 30.56 on a scale of 0 to 100 (where 100 = strictest). The strictest response in Africa is Uganda at 78.7. The UK is 48.62, while the strictest response in Europe and globally is Germany at 84.26. As of June 2020, the IMF in the World Economic Outlook forecasted a contraction of economic growth of 4.9% for 2020. Although global growth is predicted at 5.4% for 2021, this is 6.5 percentage points lower than pre- COVID-19 forecasts. The report anticipates the low-income households to be the hardest hit (IMF, 2020b).

The COVID-19 pandemic affected Nigeria's economy to a significant extent. Oil prices fell sharply, and the country continuously lowered the daily production of crude oil. In January 2019, the price of oil was $57 per barrel, but by April 2020, it had fallen by $15. Crude oil, petrol, and fuel are Nigeria's main exports (Statista, 2021a). Thus, Nigeria started experiencing the impact of the pandemic before the lockdown and other restrictions in March 2020. Nigeria slipped into another recession like the one in 2016. In the second quarter of 2020, GDP decreased by about six per cent, showing the impact of the pandemic on the economy. 90% of the country's foreign exchange comes from crude oil, but the pandemic had cut average output from 2 million barrels per day to approximately 1.4 million. In the third quarter of 2020, real GDP contracted for the second consecutive quarter by 3.62%. Cumulative GDP for the first nine months of 2020 thus stood at -2.48% (Aljazeera, 2021,

National Bureau of Statistics, 2021). In the first three months of 2021, Nigeria's real GDP recorded a slight increase compared to the first quarter of 2020. It further increased by 5.4% in the second quarter of 2021 (NBS, 2021).

Having reviewed the background on the state of poverty in Nigeria and the possible exacerbation by the pandemic and other economic shocks, the research proceeds to review the impact of microfinance on poverty alleviation as contained in earlier studies. Section 6.2 conducts a literature review; Section 6.3 describes the data, its sources, and the empirical approach. Section 6.4 provides the results of the empirical analysis, and section 5 concludes.

6.2 Literature review

6.2.1 The Impact of Microfinance on Poverty Alleviation

Microfinance is made up of various products, including microcredit, micro-savings, microinsurance, micro-pensions and micro-housing finance. Due to controversies on the value of microfinance and its impact on the poor, several researchers began to explore other means of evaluation in addition to deconstructing microfinance and poverty. These include different identification strategies and randomised control trials (RCT). However, Morduch (2020) suggests that even though these recent studies may yield unbiased estimates of impacts, they may be understated. This suggests that microfinance may be performing much better or worse than the empirical findings imply. Beck (2015), in a survey of the impact literature over ten years, finds modest but not transformative effects of microcredit, with effects being dependent on individuals' characteristics. He further finds from his survey that micro-savings effects are encouraging; microinsurance interventions suffer from inadequate patronage, while the most significant impact seems to come from expanding payment services. Statistics reveal that digital payments are intensifying this impact (Statista, 2021b). Banerjee et al. (2015b) evaluated the causal effects in six RCTs from Bosnia, Ethiopia, India, Mexico, Morocco, and Mongolia from 2003 to 2012. They also attested to a lack of transformative effects but noted a consistent pattern of moderately positive outcomes. They further noted that micro-credit could potentially afford people more freedom of choice, such as choice of occupation and make them more self-reliant. Similar to Beck (2015), they noted the lack of focus on other microfinance products such as micro-savings which they suggest could be promising. Meager (2019), in an assessment of the average impact of microfinance

across seven randomised evaluations, does not find transformational effects as was initially hoped. However, he finds little evidence that microcredit causes over-indebtedness or destroys livelihoods due to credit bubbles. Cull and Morduch (2017) suggest that a broad definition of microfinance reveals benefits such as the provision of liquidity for a wide range of needs rather than exclusively improving business income. On the other hand, Banerjee et al. (2020), in an RCT involving the poorest Indian households, find that large asset transfers rather than microfinance positively affect consumption, food security, income, and health.

Roodman (2012) sees the main strength of Microfinance as industry building through increased financial inclusion, improved efficiency through technology, and increasing diversity of offerings. He further maintains that on its own, Microfinance cannot lift people out of poverty but can only help give control over their lives in addition to helping with basic needs such as the provision of food and education. His view further supports the importance of decomposing poverty and looking at microfinance's impact on its various dimensions. 2019 Nobel prize laureates in Economic Sciences[37] adopted this approach. Their methodology dissects poverty into components – for example, improving education or health, and using judiciously crafted experiments among the most affected people (The Royal Swedish Academy of Sciences, 2019). This study proceeds to review the impact of microcredit and micro-savings.

6.2.2 The Impact of Microcredit on Poverty

The findings on the impact of microcredit have been mixed. Some researchers found moderate positive impacts, while some found none. Positive impacts were reported by Van Rooyen et al. (2012), in a review of evidence from Sub-Saharan Africa. However, aspects of welfare other than income need to be considered. Positive impacts were also reported by Buera et al. (2013), who report that welfare gains from microcredit resulted in increased wages for the poor and marginalised. Cotler and Woodruff (2008), in their study of the Fincomun-Bimbo credit program for micro-enterprises in Mexico, find positive impacts on the smallest firms and sizeable effects on investment in fixed assets. Wydick (1999), in his study in Guatemala, finds that access to credit increases schooling investment in children. Karlan

[37] Abhijit Banerjee and Esther Duflo, Massachusetts Institute of Technology, and Michael Kremer of the Harvard University, Cambridge, USA

and Zinman (2010) find that consumer credit has significant positive effects on food consumption, economic self-sufficiency, and some aspects of mental health in South Africa. Hermes (2014) finds that microfinance leads to a downward trend in income inequality. Bruhn and Love (2014) find significant positive effects of increased access to finance on income and employment in Mexico.

Some researchers find negative or combination effects. For instance, Augsburg et al. (2015) studied the impacts of microcredit in Bosnia and Herzegovina and found evidence of higher self-employment, increases in inventory, and increases in profits but a reduction in consumption and savings. However, there was no evidence that the program increased overall household income. Banerjee et al. (2015a), in a randomised evaluation of a microcredit program in Hyderabad, India, find an increase in its take-up, small business investment and profits of pre-existing businesses. However, consumption, health and education did not increase significantly. Similarly, in the same locality, Banerjee et al. (2019) find that heterogeneity in entrepreneurial ability is essential and persistent. For talented but low-wealth entrepreneurs, short-term access to credit can facilitate escape from a poverty trap.

In a review of evidence from Sub-Saharan Africa, Van Rooyen et al. (2012) reported negative impacts of microcredit on the incomes of poor people. This research therefore proposes the hypothesis:

Hypothesis 1: Households with access to microcredit have better living standards than those without. The positive impact is expected to be stronger or weaker for some aspects of welfare.

6.2.3 The Impact of Micro-savings on Poverty

On the impact of micro-savings, there have been some interesting findings. Some studies reveal a neutral impact. For instance, micro-savings intervention on its own appears to offer no impact on poverty (Van Rooyen et al., 2012). Some papers have found positive impacts. Dupas and Robinson (2013), in a field experiment in Kenya, find a positive impact of the expansion of savings accounts on female microentrepreneurs enabling them to save more and increase their productive investment and private expenditures. Brune et al. (2016), in a field experiment in Malawi, found that the provision of a savings product for agriculture led

to increased savings and positive effects on subsequent crop sale proceeds and household expenditures. Other studies that find positive effects of micro-savings are Ashraf et al. (2010) in the Philippines and Prina (2015) in Nepal. Pande et al. (2012), in a review of twelve studies on the impact of poor people's access to formal banking services in low and lower-middle-income countries, deduce that it raises incomes by allowing households to accumulate assets. Similarly, some papers have found both positive and negative impacts. For instance, Stewart et al. (2010) in reviewing the impact of microfinance on the poor from four studies in Sub-Saharan Africa, detect no effects on income, varied effects on education, and positive impacts on housing. Another hypothesis to be explored emanating from the foregoing discussions is:

Hypothesis 2: Households with micro-savings have better living standards than those without. The positive impact is expected to be stronger or weaker in some aspects.

6.2.4 Microfinance and Economic shocks

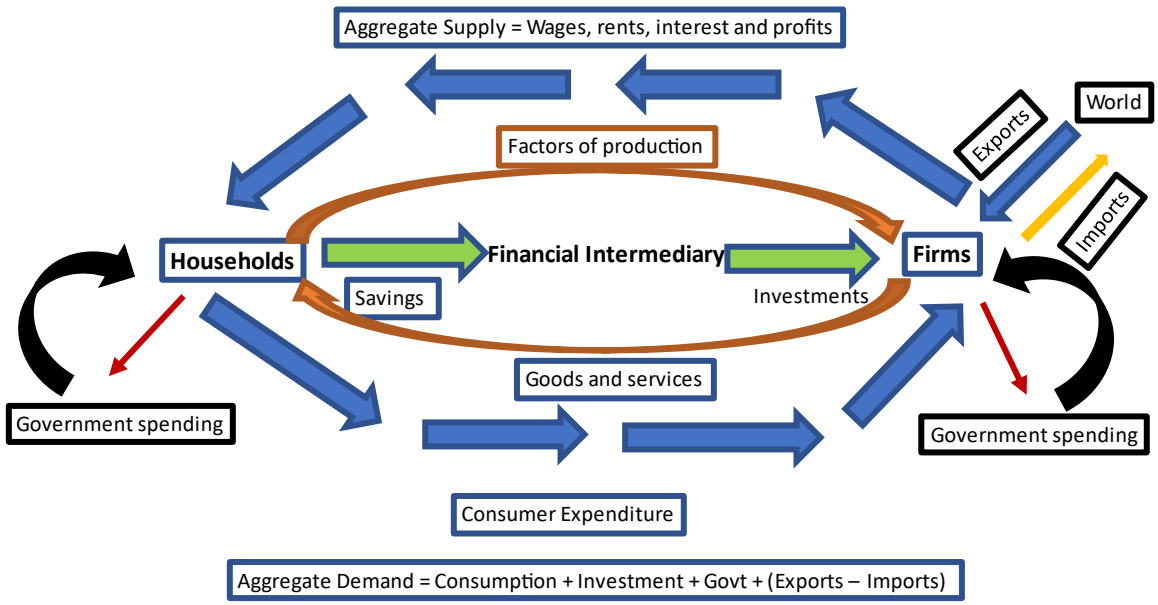
The World Bank reckons that inequality in income and opportunities has adversely affected poverty reduction in Nigeria. Unemployment is the major contributor to high poverty levels, regional inequality, and social and political unrest. Without the COVID-19 shock, about 2 million Nigerians were expected to fall into poverty in 2020 as population growth outpaced economic growth. With COVID-19, the recession is likely to push an additional 5 million Nigerians into poverty in 2020, bringing the total newly poor to 7 million (The World Bank, 2020a). The United Nations estimates Nigeria's population to be 206,139,589, with a median age of 18.1 as of 2020 (United Nations, 2020c).

Several news articles have reported the adverse impact of COVID-19 on microfinance. *The Economist* reports that loan repayments made by microfinance customers had plunged since the beginning of the crisis. Lending portfolios of microfinance institutions (MFIs) totalled $124billion to 140 million customers globally (Micro loans may be granted to the same customer several times). However, several MFIs do not have enough cash to make new loans. Without microcredit, the situation of the already vulnerable would deteriorate (The Economist, 2020). Other newspaper articles give insight into microfinance customers in Cambodia and in India struggling to keep businesses alive and make ends meet. At 38%, Cambodia has the highest microfinance loan portfolio as a percentage of GDP in the world

(Global Innovation Index, 2020). In addition to affecting the liquidity of the institutions, asset quality is also affected as a result of non-performing loans. Some MFBs in India have seen nonperforming loans rise from 2% before the pandemic to 8.2% (The Economist, 2020, The Financial Times, 2021). These reports imply that COVID-19 has a dual impact – on the financial service provider and the customer. A survey conducted by the European Microfinance Platform in 2021 revealed that COVID-19 had implications for the cash flows of households as well as the liquidity and resilience of financial service providers (Mendelson, 2021).

According to Baldwin (2020), there are three channels of transmission through which the COVID-19 economic shock could cascade through an economy. First is the sickness of workers, thereby reducing output. Second, the containment measures aimed at flattening the epidemiological curve leading to the closure of firms, travel bans, and quarantines. The third is the expectations shock, where people are in a state of uncertainty and hesitancy. The author further observes that the COVID-19 crisis has simultaneously struck the circular flow of income in several places. Mainstream macroeconomics models the interrelation between actors in an economy through the circular flow of income. The dynamics of the circular flow model are shown in figure 6-2.

Figure 6-2 Circular flow of income



Source: Adapted from Elson (1998) and Bouman (2010).

The model shows that households receive wages, rent and profits for factors of production from firms operating in the economy. Households also pay taxes and receive benefits from the government. Households spend part of their income on goods and services from firms and save the rest. The greater the flow of funds, the more prosperous the economy (Bouman, 2010, Elson, 1998). Baldwin (2020) maintains that as a result of the crisis, households experience financial distress due to a lack of wages leading to a reduction in consumption and the flow of money from households to the government and firms. The global reduction in demand has an adverse effect on the nation's imports and exports, leading to a disruption in supply chains, bankruptcies, and redundancies. As shown in the diagram, a fall in net exports as a result of the fall in oil prices in Nigeria is also anticipated to have an adverse effect on the economy and households. Inegbedion (2021) argues that the COVID-19-induced lockdown has significantly constrained economic activities, the circular flow of income and economic growth in Nigeria.

Imai et al. (2012) conducted simulations of a mild recession to corroborate previous anecdotal evidence that reductions in microfinance tend to worsen poverty. Their simulations

supported this view. This investigation will use empirical data to establish the validity of this assertion since we are currently in the middle of a global pandemic.

Using the FGT poverty measures, Onuka (2021) studies the Ido local government area in Oyo state in Nigeria and finds that subsequent to the outbreak of the COVID-19 pandemic, the incidence of poverty was higher for households without access to microcredit. However, this research is not nationally representative, examines income poverty only and does not evaluate the impact on the suppliers of microfinance – the microfinance institutions. This study, therefore, investigates the following hypotheses:

Hypothesis 3: The COVID-19 crisis has led to reduced resilience in households, thereby aggravating poverty in Nigeria.

Hypothesis 4: Economic crises, including COVID-19, have weakened resilience in Microfinance institutions and thus reduced the positive impact of microfinance in Nigeria.

The following section moves on to describe the empirical strategy of this research.

6.3 Data and empirical analysis

6.3.1 Underestimation of the Impact of Microfinance

Morduch (2020) argues that as RCTs focus on marginal customers and locations, the idiosyncratic nature of these experiments could impair the ability to measure the average impact of microfinance. In line with this view on an underestimation possibility, Cintina and Love (2019) argue that RCTs are limited, and there is still some element of non-randomisation. Because the take-up of microfinance is usually low, comparing a treated area with a non-treated area can be misleading. Consequently, they contend that RCTs are only able to arrive at intention to treat estimates but are unable to establish the average treatment effect on the treated, i.e., an estimate of the impact of microfinance on individuals or households. Using data from the randomised experiment of Banerjee, Duflo, Glennerster, and Kinnan in Hyderabad, India (Banerjee et al., 2015a), they performed a re-evaluation of microfinance and found a significant increase in durable purchases, home repairs, festivals and temptation goods contrary to the earlier findings. However, there was no significant increase in total expenditure as these categories of expenditure only form a minute proportion (Cintina and

Love, 2019). The difference between the studies of Cintina and Love (2019) and Banerjee et al (2015a) is that while the former compared those that received microfinance loans with those that *potentially could* but did not, the latter compared those that received microfinance loans within the locality with those that did not. Thus, Cintina and Love arrived at Average Treated Effects on the Treated (ATET), whilst Banerjee et al arrived at only Average Treated Effects (ATE) which underestimates the impact of microfinance.

Cintina and Love findings show that microfinance has benefits at the micro-level in India. However, due to the mixed empirical evidence, this research will use more recent data and explore a different part of the globe.

6.3.2 Sources of Data

Data on households was obtained from the General Household Survey (GHS-Panel) 2018/2019 conducted by the World Bank Living Standards Measurement Study (LSMS) team and the Nigerian National Bureau of Statistics (NBS). The GHS-Panel is a nationally representative survey of approximately 5,000 households, which are representative of the six geopolitical zones in Nigeria. Households were visited between July 2018 and February 2019 (The World Bank & National Bureau of Statistics, 2021b). Post COVID-19 data on households were obtained from the National Longitudinal Phone Survey (COVID-19 NLPS) conducted by the National Bureau of Statistics in collaboration with the World Bank. The World Bank is enabling the assessment of the economic and social implications of the pandemic on households through high-frequency phone surveys in 5 African countries – Nigeria, Ethiopia, Uganda, Tanzania, and Malawi, to help to inform evidence-based policies. The phone surveys were conducted on a nationally representative sample of 1,950 households drawn from the sample interviewed in 2018/2019. The comprehensive information collected a year before the pandemic provides a suitable background on households that can be used to evaluate the impacts of the pandemic in the country (The World Bank & National Bureau of Statistics, 2021a). The first round of surveys was implemented in April-May 2020. 7 other waves had been conducted as of the date of this study. The survey includes questions on food insecurity, non-food consumption, dwelling, access to electricity, drinking water, access to health, education, savings, and borrowings. Food insecurity is computed based on the Food Insecurity Experience Scale (FIES). FIES takes on values of 0 if the probability of being food insecure is greater or equal to 50%, and 1 otherwise. It captures household behaviour and difficulties

related to access to food due to resource constraints. The FIES is a statistical scale like other widely accepted scales of psychometric tests designed to measure unobservable traits such as intelligence, personality, and a broad range of social psychology and health-related conditions. The Nigeria LSMS measures the probability that moderate and severe food insecurity is higher than 50% (Living Standards Measurement Study team, 2021). The global reference scale comprises 8 questions that cover a range of food insecurity issues:

- During the last 12 months, was there a time when because of a lack of money or resources:
    1. You were worried you would not have enough food to eat?
    2. You were unable to eat healthy and nutritious food?
    3. You ate only a few kinds of foods?
    4. You had to skip a meal?
    5. You ate less than you thought you should?
    6. Your household ran out of food?
    7. You were hungry but did not eat?
    8. You went without eating for a whole day?

The impact of COVID-19 on microfinance banks was assessed by obtaining data on their assets and liabilities from the Central Bank of Nigeria Quarterly Statistical Bulletin (Central Bank of Nigeria, 2021). Microfinance banks are often funded by foreign donors. Therefore, data on development aid from the Development Assistance Committee (DAC) of the Organisation of Economic Development (OECD) was obtained from the World Development Indicators. DAC is made up of 30 member countries that focus on aid, development, and poverty reduction in developing countries (OECD, 2006). Data on the number of microfinance banks, depositors and borrowers were obtained from the Federal Reserve Bank of St. Louis database (FRED, 2021).

6.3.3 Impact of Microfinance Savings and Loans on Households

Following the strategy in Cintina and Love (2019), a propensity score matching approach is adopted. The authors argue that randomised control trials (RCTs) cannot estimate the average treatment effect on the treated (ATET), that is, the households that take the loans. Instead, they can only assess the effect of the general availability of microfinance, i.e.,

Intention to Treat estimates (ITT). They claim that the ATET is the appropriate approach to evaluate the impact of credit on individuals. Unlike their research, this study explores the impact of both loans and savings. The Propensity Score Matching (PSM) method produces ATET estimates by generating a control group of individuals without any microfinance products who share mutual features with the treated group. Studies have found that if a good set of controls, the same survey instrument, and the same local market is used, PSM produces reasonably accurate results. The PSM estimator is also effective in eliminating bias due to invariant omitted variables (Heckman et al., 1997, Dehejia and Wahba, 1999, Dehejia and Wahba, 2002). According to Ravallion (2008) in Cintina and Love (2019), the PSM method has been successfully used to evaluate the impact of various interventions (Cintina and Love, 2019).

The propensity score is the conditional probability of receiving treatment given pre-treatment characteristics. In this case, treatment is receiving a microfinance product. The matching of treatment and control observations is based on these characteristics. A propensity score, which satisfies the balancing property, is specified using a probit model as follows:

$$T_i = \alpha + \beta X_i + \mu_i$$

where T is a binary variable that takes on a value of 1 if treated and 0 otherwise; X_i is a vector of household characteristics, and μ_i is the error term. The standard errors for PSM estimates are calculated using bootstrap simulation with 100 replications bearing in mind that the propensity scores are estimated. Studies have shown that the bootstrap resampling technique leads to more accurate estimates of parameters than a single sample (Nisbet et al., 2018).

According to the literature, bootstrapping is useful when there is no analytical form to help estimate the distribution of the parameters of interest. However, the standard bootstrap provides valid inference only when the independent variables are discrete with a finite number of outcomes. It is not valid where the model consists of continuous covariates as these matching estimators are not differentiable (Abadie and Imbens, 2008). The authors provide AI (Amadie and Imems) robust standard errors which are root-N consistent and asymptotically normal as a valid alternative to the bootstrap for inference with matching

estimators. As the covariates in this study are both discrete and continuous, the study uses both approaches for the estimation of standard errors. It uses bootstrapping where covariates are discrete and AI otherwise.

The average treatment effect on the treated (ATET) is estimated by matching the characteristics of each treated household to the characteristics of non-treated households that have the closest propensity score. The ATET is estimated using the observations within the common support region and the propensity score. The average difference in outcomes is obtained as follows:

ATET = $E(y_1 | p(x), T = 1) - E(y_0 | p(x), T = 0)$

where y_1 and y_0 are the outcomes of the treated and non-treated units respectively, and p(x) is the propensity score. Empirically this translates to:

ATET = $\frac{1}{n} \sum_i [y_{1i} - \sum_j w_{ij} y_{0j}]$

w_{ij} is the weight based on the propensity scores where matching is done to multiple nearest neighbours.

6.3.4 Impact of Economic Shocks and COVID-19 on Microfinance Banks

The impact of COVID-19 and other economic shocks on microfinance banks is evaluated using the Z-score and the CAMEL (Capital, Assets, Earnings, Liquidity) approach. A regression adjustment (RA) treatment effect estimator is used on data from Q1 of 2008 to Q1 of 2021. Economic shocks could affect the resilience, deposits representing the savings of households, credit supply and funding of the microfinance banks. Some years during the period were afflicted by economic crisis (the treatment years), and the others were not (the control years). The crises in question were the Nigerian banking crisis, which affected the microfinance sector from 2010 to 2011; the recession due to the fall in oil prices from 2016 to 2017; and the COVID-19 pandemic and consequent fall in oil prices from Q1 2020. As economic shocks are not randomly assigned to periods, the outcome and the shocks may not be independent. For instance, the level of resilience (Z-score) could be related to the level of savings (deposits), income (GDP), leverage and returns. The model conditions on various covariates to make the years identical so that the only difference between the crisis and normal years is the crisis.

The RA method fits separate regression lines for normal and crisis periods. The differential effect of the crisis is the vertical difference between the two regression lines. For each year, the model provides two values, representing predictions of the Z-score assuming normal times or a crisis. The RA estimator predicts three parameters using a potential outcome or counterfactual framework. A potential outcome is what the outcome would have been for the crisis years if there was no crisis or what the outcome would have been for the normal years if there had been a crisis (StataCorp., 2019). In the former, we observe the crisis years (y_1) and predict the counterfactual (y_0). In the latter, we observe the normal years (y_0) and predict the counterfactual (y_1). The RA estimates:

- the potential-outcome means (POMs), which are the means of the y_1 and the y_0 in the population, which comprise both observed and predicted values:
  $\alpha_t = E(y_t)$
- the average treatment effect (ATE) is the mean of the difference ($y_1 - y_0$):
  $\tau_t = E(y_t - y_0)$
- the average treatment effect on the treated (ATET) is the mean of the difference ($y_1 - y_0$) among the years that experienced the shock:
  $\delta_t = E(y_t - y_0 | t = \tilde{t})$

Valid inferences about the effect parameters are made by ascertaining that the essential preconditions are in place – (i) conditional mean independence (CMI) to enable the estimation of the potential outcome means from the observed outcomes in the sample (ii) overlap to ensure data exists for each year within normal and crisis periods (iii) independent observations between crisis and normal periods. The estimator is implemented as estimating equations (EE), also known as the generalised method of moments (GMM). It is consistent and asymptotically normally distributed under the CMI, overlap and independence assumptions (StataCorp., 2019). The outcome model determines the mean of the outcome variable conditional on covariates x and treatment level t:

$E(y|x,t) = \mu(x,t,\beta_t)$

where β_t are the parameters of the conditional mean model at treatment level t.

Regression adjustment (RA) with covariates is intended to improve precision over a simple difference in means between the treated and control outcomes. Studies have observed that

the RA estimator is consistent and improves asymptotic efficiency. In the case of small samples, the bias is negligible (Negi and Wooldridge, 2021), making this estimator appropriate for this study. The following linear regression model is fitted to investigate the effects of economic shocks on microfinance banks:

$$Y_i = \beta_0 + \beta_t C_i + \beta X_i + e_i$$

where Y_i denotes the outcome, which could be resilience, credit or funding, C_i is a dummy variable denoting the economic shock periods (C = 1 Crisis; C = 0 Normal), and X_i is a vector denoting the covariates. The regression coefficient β_t denotes the adjusted difference in the mean outcome between the crisis and normal years. The RA estimator estimates the effect parameters using means of the observation-level predictions of the conditional means of the outcomes. It uses unweighted quasi maximum likelihood (QML) estimators to estimate the parameters of the conditional mean model. Appendix XI contains a correlation matrix of the covariates and shows that multicollinearity is not a concern.

6.3.5 Summary Statistics

Table 6.1 summarises the statistics on the zones and households that were sampled in the General Household Survey Wave 4 2018/2019. A total of 5051 households with a total of 27,607 individuals in six geopolitical zones were surveyed.

Table 6.1 Nigeria Geopolitical Zones and Households 2018/2019

Geopolitical Zones	No of Households	Individuals	Urban	Rural
North Central	848	4,515	249	599
North East	828	5,887	125	703
North West	866	6,372	166	700
South East	839	3,642	216	623
South South	830	4,003	251	579
South West	840	3,188	611	229
Total	5051	27607	1618	3433

Source: The World Bank https://microdata.worldbank.org/index.php note: Individuals represent the no of individuals within households

67% of the households surveyed were in rural areas. Table 6.2 shows the savings and borrowing statistics by households, individuals, and sectors.

Table 6.2 Savings and Credit 2018/2019

Savings and loans	Households	Individuals	Urban	Rural
Savings with Microfinance institutions	70	78	36	34
Savings with Commercial banks	1,662	2,842	802	860
Loans from Microfinance institutions	97	516	59	38
Loans from Commercial banks	91	587	35	56
Loans from Friends, Coop societies, Savings Associations, ROSCA, Money lenders	4,874	26,505	1,531	3,343

Source: The World Bank https://microdata.worldbank.org/index.php note: Individuals represent the no of individuals within households

Of the 5051 households surveyed, only 70 had savings in microfinance institutions and 1,662 in commercial banks, translating to only 34% of the sample. The picture is even more dismal when it comes to loans. 97 households and 91 households had loans from microfinance institutions and commercial banks, respectively, translating to only 3.7% of the sample. Most of the households – about 97%, obtained loans from cooperative societies, savings associations, ROSCAs and money lenders, and mainly in rural areas. This points to a high rate of financial exclusion. Table 6.3 provides socioeconomic data and the proportions of each demographic characteristic.

Table 6.3 Household demographic information 2018/2019

Demographics	No of Households	No of Individuals within households	Yes %	No %
Sex (Male -yes, Female -no)	5,051	26,802	46	54
Married/ not married	5,051	14,111	25	75
Age 17 and below	5,051	26,802	67	33
Age 18 to 25 years	5,051	26,802	11	89
Age 26 to 50 years	5,051	26,802	12	88
Age 51 to 75 years	5,051	26,802	8	92
Age 76 and above	5,051	26,802	2	98
Education:				
Read and write	4,980	21,788	61	39
Attended school	4,980	21,788	75	25
JSS2 or higher[38]	5,051	27,607	58	42
Financial Inclusion:				
Bank account ownership	2,400	15,787	30	70
Saved in the last 12 months:	5,051	15,786	24	76
Cooperative Society	1,952	3,321	7	93
Savings Association	1,952	3,321	9	91
Microfinance Institution	1,952	3,321	2	98
Commercial Bank	1,952	3,321	14	86
Informal Savings groups	5,051	15,787	26	74
Borrowers	5,051	27,607	15	85
Food insecurity - in the last 30 days:				
Worried about not having enough food	5,047	27,581	52	48
Unable to eat healthy and nutritious foods	5,047	27,581	59	41
Ran out of food	5,047	27,581	38	62
Hungry but went without eating for a whole day	5,047	27,581	13	87
Borrowed food	5,047	27,581	18	82
Faced with a situation of insufficient food	5,047	27,581	43	57
Health:				
Purchase of drugs over the counter	4,979	27,237	35	65
Hospital admissions	4,979	27,237	3	97
Non-Food Purchases:				
Non-food purchase past 30 days	5,051	27,607	68	32
Non-food purchase past 6 months	5,051	27,607	7	93
Type of dwelling:				
Electricity	5,047	27,581	55	45

[38] 9 years of basic education or more

Demographics	No of Households	No of Individuals within households	Yes %	No %
Type of dwelling (house or flat)	5,051	27,581	50	50
Owned/ not owned	5,051	27,581	63	37
Safe source of drinking water	5,051	27,581	58	42
Modern toilet	5,051	27,607	23	77

46% of the population is male and 67% below the age of 18, which indicates a relatively young population. 75% are not married, and more than 50% are literate. The data shows that more than 50% had faced food sufficiency worries. More than half of the population had electricity, lived in a house or flat that they owned and had a safe drinking water source. However, only 23% had modern toilet facilities. The details of non-food (household) items are shown in appendix X.

Table 6.4 presents loan amounts, the value of dwellings and assets, and expenditure on education, health, food, and non-food items.

Table 6.4 Loans, assets, food, and non-food expenditure 2018/2019

Variable	Obs	Mean	Std. dev.	Min	Max
Credit (NGN):					
Loan amount requested	84,633	241,150	759,256	500.00	10,000,000
Loan amount	65,390	108,111	240,150	500.00	3,000,000
Cost of loan to be repaid	65,280	128,308	304,280	500.00	4,500,000
Dwelling and assets:					
No of household items owned	136,266	2	142	1	50000
Value of assets (NGN)	136,266	20,037	95734	0.00	15,000,000
Worth of dwelling (NGN)	350,061	3,719,876	24,300,000	7.00	1,200,000,000
No of rooms	555,101	4	2	1	25
Amount paid for water (30 days) (NGN)	552,571	475.64	1,110	0.00	25,000
Education (NGN):					
Total education expenditure	43,023	23,647	63,409	0.00	1,100,000
Health (NGN):					
Cost of drugs	192,540	1,507	2,506	20.00	117,000.00
Cost of hospital	15,226	37,066	212,502	0.00	2,500,000
Food expenditure:					
Quantity of food consumed	94,609	13.80	60.23	0.05	4,000
Quantity purchased	64,376	21.79	98.78	0.06	7,200
Spend food (most recent) (NGN)	66,732	510.67	1226.19	10.00	66,000
Spend amount (NGN)	64,376	652.51	3451.26	1.00	800,000
Non-food expenditure (NGN):					
Non-food spend planting (7 days)	11,982	1030.06	3110.32	2.00	45,000
Non-food spend planting (30 days)	60,768	1653.90	5985.27	4.00	800,000
Non-food spend planting (6 months)	37,253	6,132	31,363	1.00	4,200,000
Non-food spend Harvest (7 days)	11,079	807.88	1317.90	10.00	11,000
Non-food spend Harvest (30 days)	46,353	1,533	5,990	20.00	800,000
Non-food spend Harvest (6 months)	33,142	5,181	16,775	50.00	300,000
Non-food spend Harvest (1 year)	38,869	56,562	139,079	25.00	3,000,000

Notes: NGN – Nigerian Naira - $1 = 306NGN in 2019 (www.cbn.gov.ng), planting – planting season, harvest – harvest season

Table 6.5 Panel A compares household characteristics pre-COVID-19 and during the period of lockdowns and other restrictions.

Table 6.5 Nigeria COVID-19 National Longitudinal Phone Survey Statistics

Panel A	Obs	Mean	Std. Dev.	Min	Max
Household size pre-COVID	4976	5	3.301	1	29
Household size - COVID	1950	7	3.906	1	34
No of Rooms	4976	4	2.325	1	25
No of Rooms pre-COVID	3026	3	2.304	1	20
No of Rooms - COVID	1950	4	2.354	1	25
Moderate food insecurity r0	4976	0.332	0.471	0	1
Severe food insecurity r0	4976	0.048	0.215	0	1
Moderate food insecurity r2	1821	0.736	0.441	0	1
Severe food insecurity r2	1821	0.428	0.495	0	1
Moderate food insecurity r4	1792	0.719	0.449	0	1
Severe food insecurity r4	1792	0.217	0.412	0	1
Financial Inclusion	4976	0.502	0.500	0	1

Notes: rounds end dates r0 – Feb 2019, r2 – June 2020, r4 – August 2020

The data shows that the average household size before the COVID-19 lockdown was 5. However, within the restrictions period, it grew to 7. This could be due to households taking in more dwellers owing to hardship or additional births. The data further shows that moderate food insecurity grew from 33% to 74% between February 2019 and June 2020. It, however, fell to 72% by August 2020. Severe food insecurity grew from 5% to 43% in June 2020 but had fallen to 22% by August. 50% of the sample had an account in a formal financial institution (banked). This estimate of financial inclusion is also supported by the findings of Enhancing Financial Innovation and Access in their 2020 survey of access to finance in Nigeria (EFInA, 2021).

Table 6.5 panel B provides comparative poverty indicator frequencies pre and post lockdown and restrictions:

Poverty indicators pre and post lockdown

Table 6.5 Panel B	**Pre-lockdown**		**Post-lockdown**		**% Change**
	Freq.	%	Freq.	%	
Urban/ rural					
Urban	2189	72.34	1195	61.28	-11.06
Rural	837	27.66	755	38.72	11.06
Ownership of dwelling					
0. No	1064	35.16	767	39.33	4.17
1. Yes	1962	64.84	1183	60.67	-4.17

Table 6.5 Panel B	**Pre-lockdown**		**Post-lockdown**		**% Change**
	Freq.	%	Freq.	%	
Modern roof					
0. No	429	14.18	163	8.36	-5.82
1. Yes	2597	85.82	1787	91.64	5.82
Access to improved toilet					
0. No	1454	48.05	643	32.97	-15.08
1. Yes	1572	51.95	1307	67.03	15.08
Access to improved water source					
0. No	2592	85.66	1617	82.92	-2.74
1. Yes	434	14.34	333	17.08	2.74
Modern exterior walls					
0. No	1467	48.48	710	36.41	-12.07
1. Yes	1559	51.52	1240	63.59	12.07
Connection to electricity					
0. No	1563	51.65	699	35.85	-15.8
1. Yes	1463	48.35	1251	64.15	15.8
Ownership of television					
0. No	1841	60.84	872	44.72	-16.12
1. Yes	1185	39.16	1078	55.28	16.12
Ownership of radio					
0. No	1668	55.12	947	48.56	-6.56
1. Yes	1358	44.88	1003	51.44	6.56
Ownership of bicycle					
0. No	2563	84.7	1681	86.21	1.51
1. Yes	463	15.3	269	13.79	-1.51
Ownership of refrigerator					
0. No	2586	85.46	1493	76.56	-8.9
1. Yes	440	14.54	457	23.44	8.9
Ownership of motorcycle					
0. No	2171	71.74	1300	66.67	-5.07
1. Yes	855	28.26	650	33.33	5.07
Ownership of car or other vehicle					
0. No	2780	91.87	1707	87.54	-4.33
1. Yes	246	8.13	243	12.46	4.33
Ownership of mobile phone					
0. No	837	27.66	314	16.1	-11.56
1. Yes	2189	72.34	1636	83.9	11.56
Ownership of computer					
0. No	2920	96.5	1843	94.51	-1.99
1. Yes	106	3.5	107	5.49	1.99

Table 6.5 Panel B	Pre-lockdown		Post-lockdown		% Change
	Freq.	%	Freq.	%	
Access to Internet					
0. No	1987	65.66	1034	53.03	-12.63
1. Yes	1039	34.34	916	46.97	12.63
Ownership of generator					
0. No	2352	77.73	1318	67.59	-10.14
1. Yes	674	22.27	632	32.41	10.14
Account with financial institutions					
0. No	1715	56.68	763	39.13	-17.55
1. Yes	1311	43.32	1187	60.87	17.55
Observations	3026	100	1950	100	

Source: Authors' estimates based on data from the World Bank Living Standards Measurement Study LSMS 2018 to 2020 COVID\nga_hh.dta.

Figure 6-3 below shows the change in frequencies of the poverty indicators in a graphical form.

Figure 6-3 Poverty Indicators pre and post COVID-19 lockdown

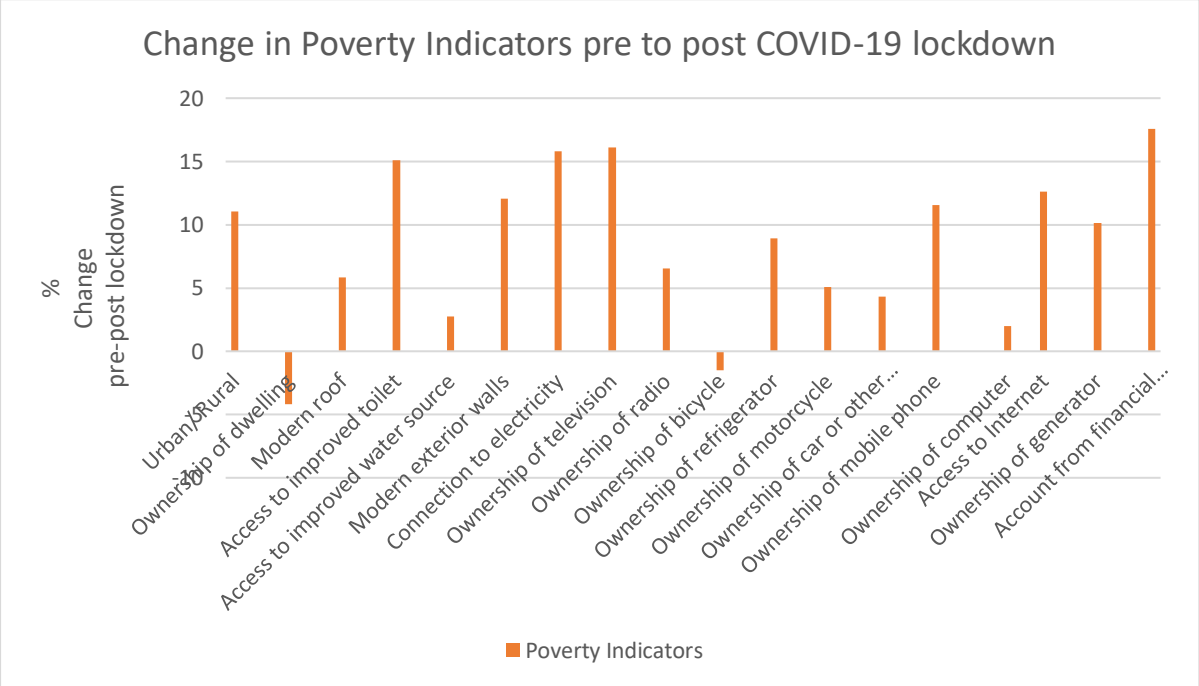


Table 6.5 Panel B and figure 6-3 suggest that most of the poverty indicators relating to dwelling or asset ownership improved after the lockdown was relaxed, although this does not infer causality. The only exceptions to improvement were ownership of dwelling and ownership of bicycles. The decline in the ownership of dwellings supports the assumption that the increase in household sizes resulted from households who lost their homes during

the lockdown and moved in with family and friends. Ownership of televisions and access to electricity increased the most while ownership of computers and access to improved water increased the least. Of all the poverty indicators, financial inclusion rose the most, with the financially included increasing by 18% post lockdown suggesting the increased use of digital means.

Table 6.5 Panel C shows the consumption quintiles of the sample by regional zone.

Consumption quintile by zone

Table 6.5 Panel C	North Central	North East	North West	South East	South-South	South West	Total
1. POOREST	160	399	275	69	77	38	1,018
2. POORER	233	217	222	152	130	89	1,043
3. MIDDLE	186	94	149	178	182	160	949
4. RICHER	137	69	118	215	196	236	971
5. RICHEST	129	46	79	210	230	301	995
Total	845	825	843	824	815	824	4,976

The South-west part of the country had the highest number in the “Richest” consumption quintile and the least in the “poorest”. The North-East zone had the highest number of “poorest” and the least number of “richest”.

Table 6.6 panel D presents the descriptive statistics of the microfinance industry and the economic environment.

Table 6.6 Summary statistics of microfinance banks and economy

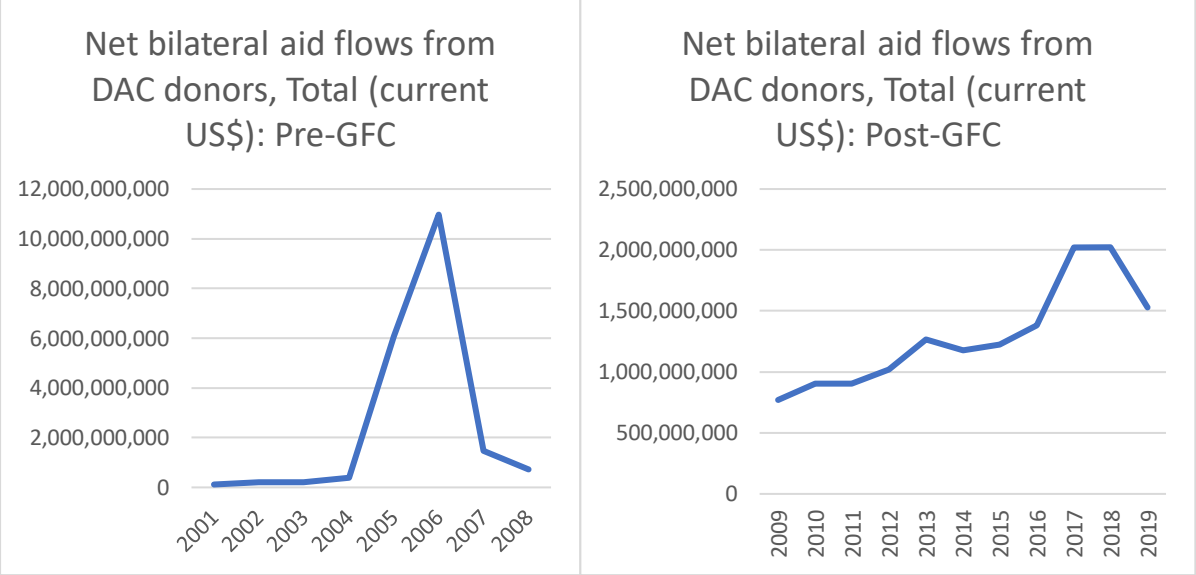
Panel D	Obs.	Mean	Min	Max
Year	13		2008	2021
Quarters	53		1	53
No of MFBs (FRED)		859	709	1002
No of depositors (FRED)		11,396,659	7,770,654	15,328,464
No of borrowers (FRED)		2,184,375	1,082,218	3,109,986
Crisis Dum (Economic Crisis)	8		2016	2020
Crisis Dum2 (with banking crisis)	16		2010	2020
GDP growth (annual %) WDI	52	3.81	-1.79	8.04
GDP per capita growth (annual%)	52	1.11	-4.26	5.20
GDP growth (quarterly %) NBS	9	0.22	-6.04	2.46
Liquid Assets (Nmillion)	53	89,819.83	33,201.82	162,348.00
Domestic Credit (Nmillion)	53	195,807.70	26,322.72	810,203.10
Fixed Assets (Nmillion)	53	23,633.78	6,214.38	89,046.90
Total Assets (Nmillion)	53	346,833.70	74,291.00	1,116,681.00
Shareholder' Fund (Nmillion)	53	71,732.72	23,059.73	200,514.00
Paid - Up Capital (Nmillion)	53	72,630.83	15,839.79	173,000.40
Reserves (incl. current year losses)	53	19,431.79	-2,116.30	74,869.07
Deposit (Nmillion)	53	160,729.00	38,838.79	423,123.60
Long Term Loans (Nmillion)	53	16,771.76	553.70	39,647.40
Total Liabilities (Nmillion)	53	346,833.70	74,291.00	1,116,681.00
Capital: Total Assets	53	0.24	0.09	0.46
Liquid Assets: Deposits	53	0.65	0.25	0.99
Credit Growth	53	0.06	-1.00	0.91
Deposit Growth	53	0.04	-1.00	0.84
Z-score	52	51.23	0.86	376.99
lnZscore	52	3.71	0.78	6.63
GDP (constant LCU)	13	63.3 trillion	46.8 trillion	72.1 trillion
GDP (current LCU)	13	91.3 trillion	40.0 trillion	154.0 trillion
GDP per capita (constant LCU)	13	356,329.00	311,458.60	385,349.00
GDP per capita (current LCU)	13	500,471.40	265,883.50	748,290.60
GDP per cap (constant LCU) growth	13	0.01	0.04	0.05
Net bilateral aid flows from DAC donors (current US$) Annual	19	1,810,633,158	117,090,001	10,970,389,990

Source: The author's calculations are based on data from the Central Bank of Nigeria, World Development Indicators, and the Federal Reserve Bank of St. Louis (FRED).

The data is quarterly data from Q1 2008 to Q1 2021. Within this period, there were approximately 859 microfinance banks with 11 million depositors and 2 million borrowers. CrisisDum and CrisisDum2 are dummy variables that take on values of 0 and 1 for normal periods and crisis periods, respectively. CrisisDum denotes 8 quarters of crisis during the period 2016 and 2020 as a result of the economic recession and COVID-19 lockdown. CrisisDum2 represents 16 quarters of shocks which include the commercial banking sector crisis spill-over from 2010 to 2011, in addition to the other crises covered in the CrisisDum.

Aid from donor countries that partly went to support the microfinance industry ranged from US$117 million to US$ 11billion and averaged US$1.8million per annum. Figure 6-4 shows the net bilateral aid flows from DAC donors.

Figure 6-4 Aid flows from donor countries pre and post the global financial crisis (GFC)



The graph shows that after the GFC economic shock, foreign aid declined significantly and never recovered to the pre-crisis level. At the onset of the COVID-19 shock in 2019, another reversal of flows was witnessed.

6.3.6 Impact of Economic Shocks and COVID-19 on Household Poverty

The impact of COVID-19 on poverty is measured using the Simple Poverty Scorecard tool for Nigeria (Schreiner, 2015)[39]. The scorecard is applied to the data on households from the COVID-19 National Longitudinal Phone Survey. The scorecard is a predictive model that scores the answers to 10 questions about a household's characteristics and asset ownership to compute the likelihood that the household is living below the national poverty line of N226.14 per person per day (Schreiner, 2015). The scorecard has been implemented successfully in 83 countries as of 2020 (Schreiner, 2021), demonstrating its transparency, simplicity and statistical soundness (Innovations for Poverty Action, Schreiner, 2015). It covers countries that are home to 90% of the world's poorest people (Progress out of Poverty, 2014). The Nigerian scorecard is based on data from 9,122 interviews with households in the 2012/13 GHPS. Indicators were selected based on their sensitivity to poverty. The coefficients obtained from logit regressions were converted into scores ranging from 0 representing the most likely to be below the poverty line, to 100, representing the least likely. Poverty likelihoods are estimated as the proportion of households who have a particular score and have per-capita consumption below the poverty line. The precision of the scorecard is proven by the closeness of the poverty estimates to the World Bank and Nigerian Government estimates (Schreiner, 2015). The scorecard has variables as follows:

i. Poverty rates are weighted averages of households' poverty statuses (or estimated poverty likelihoods)
ii. Size score – is assigned to the number of household members. It ranges from 0 to 32, with higher scores assigned to smaller households.
iii. Room score – is assigned to the number of separate rooms excluding bathrooms, toilets, storerooms, or garage. It ranges from 0 to 7. The higher the number of rooms, the higher the score.
iv. Roof score – A roof of grass or clay is scored 0, while a roof of concrete, zinc or iron is scored 4.

[39] Schreiner, M. 2015. *Simple Poverty Scorecard® Poverty-Assessment Tool Nigeria* SimplePovertyScorecard.com [Accessed 22 February 2021].

v. Toilet score – A household with a toilet is scored 15, while a household with none is scored 0.
vi. Gas cooker score - A household with a cooker is scored 3, while a household with none is scored 0.
vii. Mattress score - is assigned to the number of mattresses. It ranges from 0 to 10. The higher the number of mattresses, the higher the score.
viii. TV score - A household with a TV is scored 8 while a household with none is scored 0.
ix. Mobile Phone score - A household with a mobile phone is scored 7, while a household with none is scored 0.
x. Car score - A household with a car is scored 11, while a household with none is scored 0.

Comparability in the estimation of poverty likelihoods is achieved by applying the 2012/13 definition of poverty to the 2018 and 2020 data from the General Household Panel Survey and the Longitudinal telephone surveys. This is because the definition of poverty and consumption changed between 2012 and 2018. Consumption in 2012 was based on 3000 calories per capita, while in 2018, it was based on 2225 (Schreiner, 2015, NBS, 2020). However, using the same scorecard produces poverty likelihood had calorie consumption, and the cost of living remained constant. Since inflation has been increasing in Nigeria, the poverty likelihood estimates are considered as the minimum. The weighted average of the scores on household assets obtained from the household survey was used to estimate the poverty likelihoods of each household where data on all 10 questions in the Simple Poverty Scorecard was unavailable. The Simple Poverty Scorecard is shown in Appendix XII.

This research further uses the National Longitudinal Phone Survey of 2020 to evaluate the impact of the twin economic shocks, specifically the fall of oil prices and the COVID-19 pandemic lockdown/restrictions on households. As the questionnaire used in this survey is not directly comparable to the questionnaire of the General Household Survey of 2018, a comparison using the Simple Poverty Scorecard may produce an inaccurate assessment of the change in poverty. For instance, questions on the ownership of cookers and mattresses were included in the 2018 questionnaire but omitted from the 2020 questionnaire, while ownership of assets more currently indicative of poverty status such as refrigerators, computers, and internet access were included. For that reason, comparisons are made across

the poverty indicators using a logit or a probit estimator. These estimators are appropriate when the response variable is limited or binary, e.g., in the case of ownership of assets, living standards, or the presence or absence of a particular condition. The logit and probit functions are nonlinear models that estimate the probability of the response variable given certain independent variables. Logit is derived from the cumulative distribution function for a standard logistic random variable, while probit is from the cumulative distribution function for a standard normally distributed random variable (Brooks, 2019, Wooldridge, 2015). The coefficients of the parameters are estimated using maximum likelihood, that is, choosing values of coefficients that maximise the joint probability of attaining the outcomes we observe. Mathematically, this is represented as follows:

$$P(Y = 1|\, X) = G(\beta_0 + X\beta)$$

Logit:

$$= \frac{e^{x\beta}}{1 + \ e^{x\beta}}$$

Probit:

The cumulative distribution function of a random variable X is denoted by F(x), which the Probit function uses, is defined as F(x) = Pr(X ≤ x) or

$$= \int (2\pi)^{-2} e^{(-x^2 \ \ \beta)/2}$$

where G is a function taking on values between zero and one. This is the probability that the response variable Y equals yes (1), given the explanatory variables (X). β is the coefficient to be estimated. The models give similar results except where the split between the response variable is very skewed. For this reason, results are shown from both estimators. The coefficients inform us whether the COVID-19 shock had a positive or negative effect on welfare. The magnitude is determined by estimating the marginal effects. This is the derivative of G(Xβ) with respect to X. The derivative changes as X changes and allows for non-linear relationships.

6.4 Results and discussions

Before presenting the results of the empirical investigation, an analysis of the related trends of poverty in Nigeria is presented in section 4.1 to set the scene and as a precursor to the results.

6.4.1 Poverty trends in Nigeria

The National Bureau of Statistics (NBS) captures poverty rates in Nigeria using the Absolute Poverty Approach, which aggregates the cost of minimum food requirements at 3000/2225 calories per day and non-food needs to arrive at an absolute poverty line. This approach is to make the measure internationally comparable. Table 6.7 shows the poverty rates at the national, urban, and rural levels from 2003 to 2019.

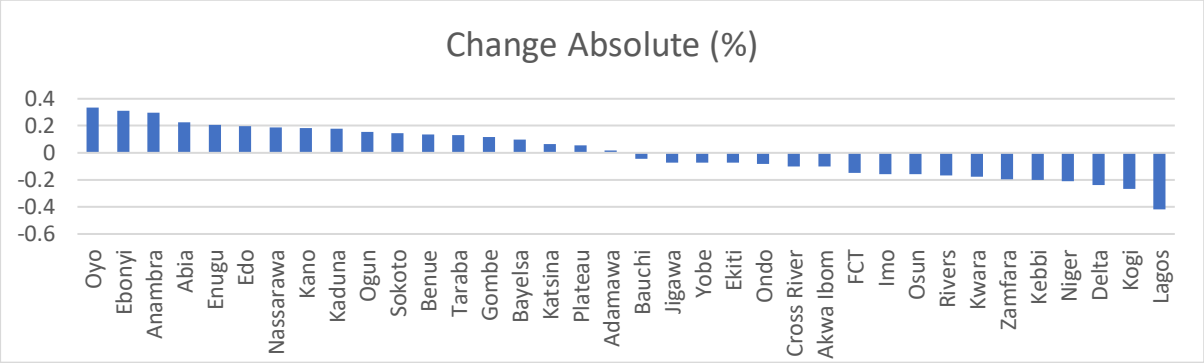
Table 6.7 Absolute Poverty rates in Nigeria from 2003 to 2019

	2003/04		2009/10		2018/19
Absolute poverty (Per Capita methodology)	%	No of absolute poor (Million)	%	No of absolute poor (Million)	%
National	64.20	80.00	62.60	102.20	42.40
Rural	73.40	51.50	69.00	71.90	52.10
Urban	52.20	28.50	51.20	30.30	18.0

(NBS, 2020, Nigeria Data Portal, 2015)

In calculating the poverty line for 2003-04, the threshold for poverty was ₦28,836.70 per person per year. In 2009-10, the poverty line was defined at ₦55,235.20 per person per year, while in 2018-19, it was defined as N137,400.00 per person per year. Figure 6-5 shows the percentage change in poverty in Nigerian states between 2003 and 2010 using the absolute figures.

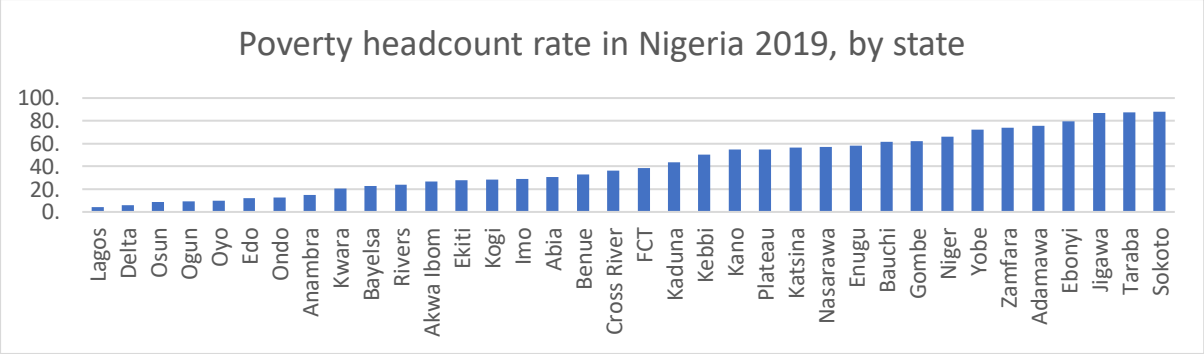
Figure 6-5 Percentage Change in Poverty in Nigerian States 2003 - 2010



Source: Data from the National Bureau of Statistics were used in Author's calculations

The data reveals that the change in poverty within the states between 2003 and 2010 varied significantly. While Oyo state's poverty rate grew by 34%, Lagos state's poverty reduced by 42%. The trend points to wide disparities in living standards among states (National Bureau of Statistics, 2012; World Bank 2019). Figure 6-6 shows the poverty rate by State as of 2019.

Figure 6-6 Poverty rate by State in Nigeria as of 2019



Source: Data from the National Bureau of Statistics were used in Author's calculations

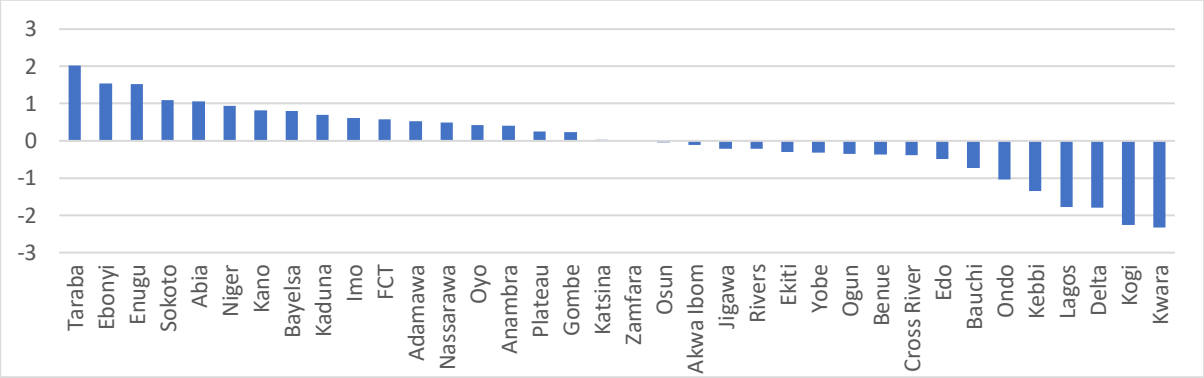
Lagos State had the lowest poverty rate at 4.5%, while Jigawa, Taraba, and Sokoto states had the highest at 87.02%, 87.72%, and 87.73%, respectively.

The National Bureau of Statistics cautions that the 2018-2019 poverty rates are not comparable with earlier ones due to changes in the methodology of capturing the data. Hence to aid comparison, the data for each year is standardised as follows:

$$S = \frac{x - \bar{x}}{\sigma} \quad \text{.....(1)}$$

where $\bar{x}$ is the mean of the sample, and σ is the standard deviation. A positive score indicates that the state has a higher-than-average poverty rate, whilst a negative score indicates a lower-than-average poverty rate. Therefore, the more negative the score, the better. The graph below shows the change in standardised scores of each state for the period 2004 to 2019.

Figure 6-7 Change in standardised poverty scores of each state between 2004 and 2019

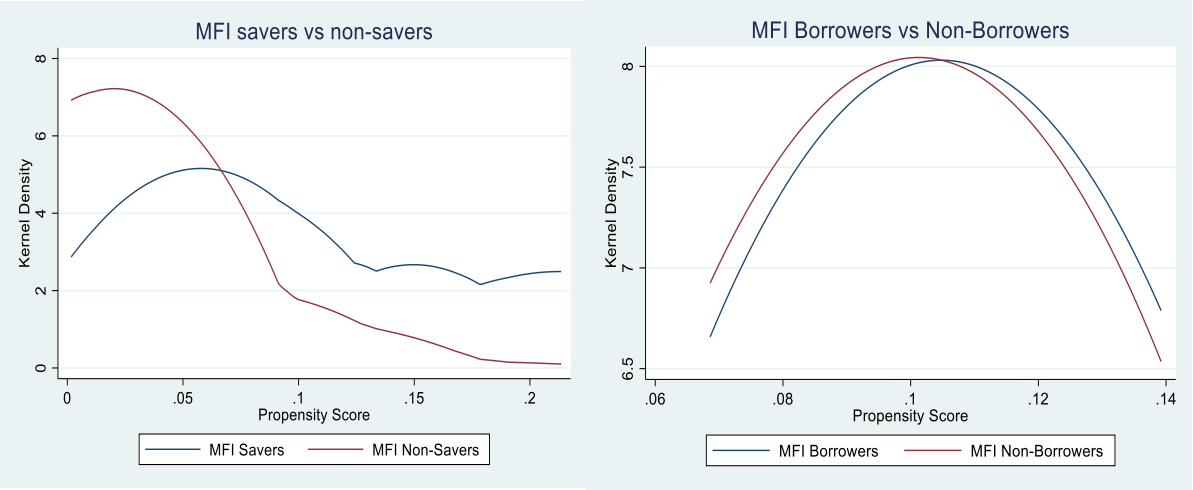


Source: Data from the National Bureau of Statistics were used in Author's calculations

Of the 36 states in Nigeria and the FCT, 17 states had relative increases in poverty, 16 states had relative declines, and 3 states remained unchanged. Data on Borno state was not captured. Taraba state had the most significant change in its score, showing that its poverty rate increased the most compared to the other states within the period. Kwara state's poverty rate reduced the most compared to the other states. This research investigates the contribution of microfinance to changes in poverty in geographical regions.

As described in the empirical strategy, the estimation of the impact of microfinance on poverty utilises a propensity score matching approach. The graphs in figure 8 demonstrate the appropriateness of the approach:

Figure 6-8 Kernel density propensity to save and borrow



The model effectively separates the treatment and control groups and provides adequate common support, balancing and overlap, as shown by the graphs.

In addition to establishing the impact of microfinance on poverty and its dimensions, it is vital to have an insight into the characteristics of microfinance users to enable effective policy making. Table 6.8 shows a summary of the characteristics of most likely microfinance savers estimated using the probit model.

Table 6.8 Characteristics of likely microfinance savers

Household Characteristic	Predicted probability of saving
Sector	
1. Urban	0.017***
	(0.001)
2. Rural	0.022***
	(0.002)
Religion	
1. Christianity	0.001***
	(0.000)
2. Islam	0.129***
	(0.007)
Marital Status	
Married (monogamous)	0.026***
	(0.002)
Married (polygamous)	0.001
	(0.001)
Never married	0.016***
	(0.001)
Age	
0 – below 50	0.014***
	(0.001)
1 – between 50 & 75	0.066***
	(0.006)
Education	
0 – JSS 1 or lower	0.037***
	(0.002)
1 – JSS 2 or higher	0.011***
	(0.001)
Observations	19,126

Notes: JSS – Junior Secondary School (9 years of basic education), Standard errors in parentheses,
*** p<0.01, ** p<0.05, * p<0.1

The results show that the rural sector has a higher probability of saving in a microfinance institution. Moslems are predicted to be more likely to save than Christians. This is not contrary to the Islam religion, as many microfinance institutions do not pay interest on savings, as shown by a survey on the pricing of loans in Nigerian Microfinance Banks (Attah et al., 2015). Monogamous marriages, individuals between the ages of 50 to 75 and less educated people are also more likely to save. Table 6.9 provides the characteristics of likely microfinance borrowers.

Table 6.9 Characteristics of likely microfinance borrowers

Household Characteristic	Predicted probability of borrowing
Sector	
1. Urban	0.091***
	(0.002)
2. Rural	0.108***
	(0.001)
Religion	
Christianity	0.103***
	(0.001)
Islam	0.099***
	(0.002)
Traditional	0.094***
	(0.008)
Sex	
1. Male	0.117***
	(0.002)
2. Female	0.093***
	(0.001)
Age	
0 – below 25 or above 50	0.094***
	(0.001)
1 – between 25 and 50	0.113***
	(0.002)
Education	
JSS1 or lower	0.125***
	(0.002)
JSS2 or higher	0.091***
	(0.001)
Observations	81,109

Notes: JSS – Junior Secondary School (9 years of basic education), Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The rural sector, Christians, males, and people aged 25 to 50 have the highest propensity to borrow. Now that the microfinance scene in Nigeria has been set, the following section moves on to investigate the impact of microfinance savings.

6.4.2 The Impact of Microfinance Savings on Poverty Dimensions

Tables 6.10 to 6.12 are estimated using AI standard errors but include the propensity score as covariate.

Table 6.10 panel A provides the average treatment effect of microfinance savings on food insecurity relative to non-MFI savers (i.e., those not saving in microfinance institutions). It also

shows the average treatment effect relative to the unbanked. Panel B shows the average treatment effect of microfinance savings on food expenditure.

Table 6.10 Impact of Microfinance Savings on Food Security

Food insecurity	(1)	(2)	(3)	(4)
Panel A	Non-MFI	Unbanked	Non-MFI Savers	Unbanked with no
MFI Savers vs:	Savers		with no loans	loans
ATET	-0.120***	0.477***	0.272**	0.312**
	(0.0402)	(0.0340)	(0.123)	(0.145)
Observations	14,094	2,263	11,733	1,681

Panel B	**Quantity of food purchased**		**Food expenditure**		**Recent Expenditure**	
	(1)	(2)	(3)	(4)	(5)	(6)
MFI Savers vs:	Non-MFI Savers	Unbanked	Non-MFI Savers	Unbanked	Non-MFI Savers	Unbanked
ATET	0.648**	0.782**	-0.113	-1.128***	-0.063	-0.227
	(0.293)	(0.362)	(0.205)	(0.292)	(0.167)	(0.294)
Observations	1,804	278	1,673	249	1,804	278

Notes: MFI – Microfinance Institution. AI robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Panel A, column 1 shows that relative to other savings, MFI savings reduce food insecurity. This could be because savers in MFIs also have access to loans that could be deployed to meet food needs. Most microfinance loans require compulsory savings, which cannot be accessed during the loan period (Attah et al., 2015). Columns 3 and 4 reveal that without borrowings, savings increase food insecurity. Furthermore, columns 2 and 4 indicate that relative to the unbanked, microfinance savings increase food insecurity. A possible explanation is that money is more readily accessible for spending on immediate needs when not saved in a bank and especially when not saving compulsorily towards obtaining a loan. The literature reveals that poor people tend to save their money where it is easily retrievable for immediate needs (Collins et al., 2009). To summarise, the results suggest that savings only reduce food insecurity when there are prospects of borrowing. In addition, the unbanked or financially excluded appear to be more food secure.

Panel B columns 1 and 2 show a causal increase in the quantity of food purchased as a result of microfinance savings. However, column 4 suggests that relative to the unbanked,

microfinance savers spend less on food. This could be due to the need to save compulsorily towards obtaining a loan or because a savings culture fosters discipline in expenditure. Thus, the savers try to get more food for less money by bulk purchase or cheaper products. Overall, the results reveal an interesting behavioural impact of microfinance.

The impact of microfinance savings on non-food consumption is shown in table 6.11. Panel A presents the impact versus the financially included and Panel B, the financially excluded. A breakdown of non-food consumption (all household assets) is presented in appendix X.

Table 6.11 Impact of Microfinance Savings on Non-food Consumption

Panel A **Financially Included**	(1) All	(2) Furniture, bed, kitchen	(3) Spend non-food (7days)	(4) Spend non-food (30days)	(5) Spend non-food (6 months)	(6) Spend non-food (1 year)
ATET	0.001	0.031*	-1.115	-0.344	-0.490	-0.196
	(0.008)	(0.018)	(0.724)	(0.298)	(0.335)	(0.691)
Observations	14,093	5,457	178	1,310	687	647
Panel B **Financially Excluded**	(1) All	(2) Furniture, bed, kitchen	(3) Spend non-food (7days)	(4) Spend non-food (30days)	(5) Spend non-food (6 months)	(6) Spend non-food (1 year)
ATET	0.004	0.026	-2.315	-0.316	0.123	-0.515
	(0.011)	(0.020)	(2.316)	(0.521)	(0.408)	(1.047)
Observations	2,261	816	29	172	114	119

AI robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The results show that microfinance savings do not have a significant impact on non-food expenditure generally. However, when decomposed, microfinance savings have a weak statistically positive effect on ownership of basic assets such as furniture, bed, and kitchen relative to the rest of the banked population. Microfinance savings also have a positive effect on non-food consumption and basic household assets relative to the financially excluded, although not statistically significant.

The impact of microfinance savings on dwellings is highlighted in table 6.12. Panel A shows the impact on the type, ownership and value of dwelling, and access to electricity for

microfinance savers versus other savers. Panel B reflects the impact for microfinance savers versus the unbanked, while panel C shows the impact for savers versus the banked only.

Table 6.12 Impact of Microfinance Savings on Dwelling

Panel A **All other Savers**	(1) Type of dwelling (flat or apartment)	(2) Ownership of dwelling	(3) Worth of dwelling	(4) Access to electricity
ATET	-0.315*** (0.0155)	-0.177*** (0.0149)	-1.236** (0.615)	-0.115*** (0.0338)
Observations	14,094	14,094	5,326	14,094

Panel B **MFI vs Unbanked**	(1) Type of dwelling (Flat or apartment)	(2) Ownership of dwelling	(3) Worth of dwelling	(4) Access to electricity
ATET	-0.911*** (0.020)	-0.455*** (0.034)	0.660 (1.032)	0.000 (0.005)
Observations	2,263	2,263	601	2,263

Panel C **MFI vs CB**	(1) Type of dwelling (Flat or apartment)	(2) Ownership of dwelling	(3) Worth of dwelling	(4) Access to electricity
ATET	-0.379*** (0.130)	-0.300*** (0.116)	-0.615 (0.748)	0.009 (0.0996)
Observations	8,542	8,542	3,679	8,542

Notes: CB – Commercial Bank. AI robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The results in the three panels suggest that microfinance savings do not have a positive impact on the type, ownership, or value of the dwelling.

Table 6.13 presents the impact of microfinance savings on healthcare controlling for sector, religion, marital status, and age. Standard errors are estimated through bootstrapping as analytical, and AI robust standard errors could not be estimated due to insufficient nearest neighbour matches for a few observations.

Table 6.13 Impact of Microfinance Savings on Access to Healthcare

	Consultation		Cost of drugs		Cost of hospital	
MF savers vs:	(1) Other savers	(2) Non savers	(3) Other savers	(4) Non savers	(5) Other savers	(6) Non savers
attnd	-2.789***	2.174	-1.838***	0.695	2.634***	1.792***
	(1.056)	(1.940)	(0.078)	(0.441)	(0.262)	(0.247)
Observations	4,866	262	4,866	262	930	262

Notes: attnd – average treatment effect on the treated (Nearest neighbour) Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6.13 shows that relative to other savers, microfinance savers spend less on hospital consultations and drugs (columns 1 and 3). However, compared to non-savers, microfinance savers have higher expenditure on hospital consultation, drugs, and cost of hospital (columns 2, 4 and 6). Hospital expenditure is more by 2.6% and 1.7% (columns 5 and 6) compared to the expenditure by other savers and non-savers, respectively. This shows that microfinance savings have a positive effect on the household's access to healthcare.

The impact of microfinance savings on total education expenses is shown in table 6.14. Column 1 shows the impact for microfinance savers versus all other savers; column 2 shows microfinance savers versus the unbanked and column 3 shows microfinance savers versus the banked.

Table 6.14 Impact of microfinance savings on Education

Total Educational Expenses	(1) MFI vs other savers	(2) MFI vs unbanked	(3) MFI vs banked
ATET	-0.439***	1.155***	-0.493***
	(0.0411)	(0.422)	(0.0474)
Observations	2,514	304	1,584

Microfinance savers spend less on education relative to the banked of similar ages, marital status, educational level, and geographical sector (column 3). However, relative to the unbanked, expenditure increases by 1.16% (column 2). This suggests that access to savings facilities better positions households to provide education for their families as they can save towards it rather than consuming all their income on other needs.

In conclusion, the key results in this section suggest that microfinance savings reduce food insecurity and encourage savers to carry out bulk food purchases, thereby reducing expenditure on food relative to both the banked and the unbanked. This could be due to the discipline imposed by a savings culture. Also, as microfinance savers tend to be older people, they are more concerned about prudently applying their savings to essential needs. This finding conforms to the life-cycle hypothesis of Franco Modigliani which stipulates that through savings, people spread their wealth over their expected lifetime to maintain their standard of living (Mankiw, 2019, Bodie and Kane, 2020). For low-income earners, that would most likely consist of the most basic needs in line with Maslow's hierarchy of needs (McLeod, 2007), such as food, health, and education for children. Household assets and other luxuries are not likely to be a priority. This may explain why no impact was found on non-food consumption. Microfinance savings appears to enable higher spending on health care and education relative to the unbanked. Thus the 2nd hypothesis that households with micro-savings have better living standards than those without is not fully established – while positive impacts were found for food security, health and education, no impacts were found for dwelling and household assets.

The research proceeds to examine the impact of microfinance borrowings on food security, non-food consumption, education, and health (the 1st hypothesis) in the following section.

6.4.3 The Impact of Microfinance Credit on Poverty Dimensions

Having examined the impact of microfinance savings on poverty dimensions, this section investigates the impact of microfinance borrowings in line with the 1st hypothesis. As before, the impact on food security, non-food consumption, dwelling, health care and education are examined. Table 6.15 presents the impact of microfinance borrowing on food security, the quantity of food purchased and recent food expenditure. Column 1 shows the impact for microfinance borrowers relative to all other borrowers; column 2 shows microfinance borrowers compared to the unbanked, and column 3 shows microfinance borrowers compared to the banked. Columns 4 and 5 show the impact of borrowing on quantity of food and recent food expenditure respectively.

Table 6.15 Impact of Microfinance Borrowing on Food Security

	Food insecurity			**Qty food Purchased**	**Recent food Spend**
MF borrowers vs	Other borrowers	Unbanked	Banked (CB)		
	(1)	(2)	(3)	(4)	(5)
ATET	0.170***	0.084***	0.197***	0.101	-0.064
	(0.016)	(0.025)	(0.075)	(0.153)	(0.119)
Observations	8,242	6,835	2,291	991	991

AI robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The statistically significant positive coefficients in columns 1 to 3 suggest that microfinance borrowers are more food insecure than all other borrowers, both banked and unbanked. A potential reason for this is the high interest rates microfinance institutions charge on loans relative to other types of borrowings. The German Agency for International Cooperation (GIZ) finds that the monthly nominal interest rates range from 1.75% to 9% (Attah et al., 2015). Worries on repayment of such loans would compound food worries and reduce funds available for new food purchases.

Column 1 of panel A in table 6.16 highlights the impact of MF borrowings on total non-food expenditure. Columns 2, 3, 4 and 5 show the amount spent within 7 days, 30 days, 6 months and 1 year, respectively. In panel B, non-food consumption is broken down into components.

Table 6.16 Impact of Microfinance Borrowing on Non-food Consumption

Panel A	(1) Non-food _purchase	(2) Spend non-food _7days	(3) Spend non-food _30days	(4) Spend non-food _6months	(5) Spend non-food _1year
ATET	0.129***	0.473	-0.0560	0.460**	3.289***
	(0.012)	(0.693)	(0.161)	(0.208)	(0.133)
Observations	8,240	116	519	427	849

Panel B	(1) Furniture	(2) Beds/mats	(3) Smartphones & computer	(4) Smartphones, computers, TV
ATET	0.107*	0.0451	0.122*	0.111*
	(0.063)	(0.048)	(0.071)	(0.058)
Observations	403	882	477	572

AI robust standard errors Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
All variables are log-transformed

Microfinance borrowers have significantly higher non-food consumption compared to those without borrowings. Consumption is 0.13% higher generally, as shown in panel A, column 1. Within 6 months and 1 year, it is 0.5% and 3.3% higher respectively. Non-food consumption includes items that make life more comfortable such as furniture, beds, electronics, computers, and mobile phones. Panel B shows that expenditure on furniture, mobile phones, computers, and televisions is significantly higher than those without MFI borrowings, but only at the 10% significance level.

Table 6.17 reports the impact of microfinance borrowings on dwellings. Panel A shows the impact of microfinance borrowings on the type, ownership and value of dwelling, and access to electricity compared to those without borrowings. Panel B shows the impact for microfinance borrowers versus the unbanked and microfinance borrowers versus the banked in commercial banks.

Table 6.17 Impact of Microfinance Borrowings on Dwelling

Panel A	(1) Type of	(2) Ownership	(3) Worth of dwelling	(4) Electricity

	dwelling			
ATET	0.038***	-0.129***	0.626***	0.212***
	(0.005)	(0.016)	(0.084)	(0.014)
Observations	8,242	8,242	3,698	8,242

Panel B	Type of dwelling		Ownership	
	MF borrowers vs the unbanked	MF borrowers vs banked (CB)	MF borrowers vs the unbanked	MF borrowers vs banked (CB)
ATET	0.049***	0.101*	-0.218***	-0.230***
	(0.005)	(0.055)	(0.025)	(0.054)
Observations	6,835	2,291	6,835	2,291

Panel A shows that relative to non-borrowers, microfinance borrowers live in better quality dwellings of higher value and have greater access to electricity. Panel B shows that relative to the banked, microfinance borrowers live in better dwellings. However, they are less likely to own their homes relative to commercial bank borrowers and the unbanked. This could be due to the fact that microfinance institutions do not give housing loans. Housing microfinance is still very new in the industry and was recently piloted by the World Bank. Also, the unbanked are more likely to live in huts or improvised homes, making ownership much cheaper.

The impact of microfinance borrowings on access to health care is shown in table 6.18. It shows the impact of microfinance borrowings on hospital consultations, cost of drugs and hospital expenses compared to the unbanked and borrowers from commercial banks.

Table 6.18 Impact of Microfinance Borrowings on Access to Health Care

	Consultation		**Cost of drugs**		**Cost of hospital**	
MF borrowers vs:	Unbanked	Banked	Unbanked	Banked	Unbanked	Banked
ATET	-2.859***	-6.077***	-0.470***	-1.273***	-0.799	1.050***
	(0.243)	(0.751)	(0.155)	(0.458)	(0.536)	(0.391)
Observations	2,140	497	3,254	955	482	113

Microfinance borrowers had a significantly lower spending on drugs over the counter and at kiosks than both the banked and unbanked. However, they spent significantly more on hospital care, suggesting less resort to self-medication and increased access to health care. Table 6.19 presents the impact of microfinance on education relative to the banked and unbanked.

Table 6.19 Impact of microfinance borrowings on Education

Total Education Expenses	MF borrowers vs all	MFI borrowers vs unbanked	MFI borrowers vs banked
ATET	-0.286***	0.235	-0.620**
	(0.0415)	(0.466)	(0.304)
Observations	2,461	290	428

The results suggest that microfinance borrowings do not have a positive impact on education relative to the financially included. Relative to the unbanked, the impact is positive but not statistically significant.

In conclusion, microfinance borrowings enable higher spending on health care with statistical significance. It also appears to enable higher investment in education relative to the unbanked but without statistical significance. Microfinance borrowings appear to lead to higher food insecurity probably due to high-interest rates and worries about loan repayment. Microfinance borrowings make possible higher non-food consumption such as furniture, mobile phones, and computers. Microfinance borrowers are younger and, therefore, probably more risk tolerant. Microfinance borrowers also live in better quality dwellings. Neither microfinance savings nor credit positively impacted home ownership probably due to limited mortgage products. Here the unbanked fare better because they live in cheaper

dwellings, and thus, they can finance ownership from their limited income. However, living in huts or improvised dwellings is not the ideal living condition for households. Thus the 1st hypothesis that households with access to microcredit have better living standards than those without is established as a positive impact was found on household assets, quality of dwelling and health care.

Based on the positive impacts revealed, microfinance as a policy intervention tool is worth sustaining. Also, following these results, it would be advisable for policymakers and regulators to support and encourage housing microfinance as a product. This research has not investigated interest rates, but it would be helpful to assess the extent to which interest rates cause food insecurity.

Having established the need to sustain microfinance, it is important to consider factors that could stem its flow and limit its impact. These include economic shocks and poor risk management. The following section explores the impact of COVID-19 on poverty in line with the 3rd hypothesis to ascertain the need for enhanced microfinance intervention by policymakers, government, and donors.

6.4.4 Impact of COVID-19 Economic Shock on Poverty

The 3rd hypothesis of this research postulates that the COVID-19 crisis led to reduced resilience in households, thereby aggravating poverty. The impact of COVID-19 on poverty is estimated using the Simple Poverty Scorecard. The results are presented in Table 6.20. Panel A presents the estimated poverty rate as of February 2019 based on 9 variables before the COVID-19 lockdown. The table is reproduced using the weighted average of 7 indicators to compare the poverty rate of 2019 to that of 2020. This is because the questionnaire has changed over the years, and data is not available for all 10 indicators. The weighting is based on the scores of each indicator in the poverty scorecard. The scores for each indicator are shown in Appendix II. These results are shown in panel B. The estimated poverty rate for 2020 post-COVID-19 lockdown but with other restrictions still in place is shown in panel C.

Table 6.20 Poverty Likelihood from the Simple Poverty Scorecard

Panel A (2018/2019)	Observations	Mean	Std. Dev.	Min	Max
Size score	5051	14.928	10.417	0	32
Room score	5051	4.702	2.254	0	7
Roof score	5051	0.392	1.189	0	4
Toilet score	5051	1.137	3.971	0	15
Cooker score	5051	0.327	0.935	0	3
Mattress score	5051	8.157	1.691	6	10
TV score	5051	3.632	3.983	0	8
Mobile phone score	5051	4.605	3.321	0	7
Car score	5051	1.095	3.294	0	11
Household score	5051	40.182	13.569	6.186	92.784
Poverty Likelihood	5051	0.374	0.258	0	1
Poverty rate	5051	0.374	0.000		
Panel B (2018/2019)	Observations	Mean	Std. Dev.	Min	Max
Size score	5051	14.928	10.417	0	32
Room score	5051	4.702	2.254	0	7
Roof score	5051	0.392	1.189	0	4
Toilet score	5051	1.137	3.971	0	15
TV score	5051	3.632	3.983	0	8
Mobile phone score	5051	4.605	3.321	0	7
Car score	5051	1.095	3.294	0	11
Household score	5051	36.300	15.430	0	95.238
Poverty Likelihood	5051	0.439	0.289	0	1
Poverty rate	5051	0.439			

Source: Author's calculations based on data from Nigeria - General Household Survey, Panel 2018-2019, Wave 4 ddi pp 2

Panel C (2020)	Observations	Mean	Std. Dev.	Min	Max
Size score	4976	4.465	8.422	0	32
Room score	4976	4.703	2.246	0	7
Roof score	4976	3.524	1.295	0	4
Toilet score	4976	8.679	7.408	0	15
TV score	4976	3.638	3.984	0	8
Mobile phone score	4976	5.381	2.952	0	7
Car score	4976	1.081	3.275	0	11
Household score	4976	37.464	19.813	0	100
Poverty Likelihood	4165	0.446	0.329	0	1
Poverty rate	4976	0.446			

Source: Author's calculations based on data from Longitudinal Phone Survey, 2020

Panel A shows that the estimated poverty rate in 2018/2019 is 37.4%. Schreiner (2015) had estimated the poverty rate to be 25.6% in 2013; thus, the poverty rate had grown by 11.8% over the 6 years. The estimated poverty rate pre-COVID-19 using 7 variables is 43.9%, as

shown in panel B. Panel C shows a poverty rate of 44.6% as of 2020, implying that the poverty status pre and post formal COVID-19 lockdown period of 1 year had grown by approximately 0.7%. Schreiner (2015) observes that the values of poverty indicators for a given household are unlikely to change in a short time between rounds. Thus 0.7% can be considered as a minimum value of growth in poverty. Economic shocks are likely to be slow in impacting household assets that are already owned as they may have a long lifespan. Notably, the size score deteriorated from 14.9 to 4.5 suggesting that households got larger probably due to having to take in relatives that had hit hard times during the pandemic. The average household size before the lockdown was 5 with a maximum of 29, while after the lockdown, the average was 7 with a maximum of 34. It is also possible that the relationships between the indicators and poverty have changed over time. Also, the Simple poverty scorecard may underestimate changes in poverty as food insecurity is less sticky than non-food consumption and changes much more quickly.

Bearing in mind the possibility of an underestimation of the impact of COVID-19 on poverty holistically, the research investigates the impact of the shock on various dimensions using a logit model. Table 6.21 highlights the results of regressions of home ownership in the post-lockdown period, controlling for the banked, sector, consumption quintile, and geographic zone.

Table 6.21 Impact of COVID-19 on Poverty and Living Standards

Panel A Ownership of dwelling	(1) Probit	(2) Logit	(3) OLS
Post Lockdown	0.059	0.102	0.018
	(0.061)	(0.104)	(0.019)
Banked	-0.158***	-0.258***	-0.0506***
	(0.053)	(0.089)	(0.017)
Post Lockdown # Banked	-0.031	-0.051	-0.007
	(0.081)	(0.139)	(0.025)
Rural/ Urban	-0.756***	-1.238***	-0.276***
	(0.045)	(0.075)	(0.015)
cons_quint	-0.108***	-0.175***	-0.0332***
	(0.015)	(0.027)	(0.005)
Zone	-0.172***	-0.293***	-0.0586***
	(0.013)	(0.022)	(0.004)
Constant	1.616***	2.686***	1.043***
	(0.059)	(0.104)	(0.018)

Panel A Ownership of dwelling	(1) Probit	(2) Logit	(3) OLS
Observations	4,976	4,976	4,976
R^2			0.207
Goodness of Fit (GoF)	2.67	2.80	
Prob > F =	0.0044	0.0028	

Notes: cons-quint – consumption quintile

The goodness-of-fit (GOF) test uses the Pearson χ2. This test under the Probit and Logit regressions (columns 1 and 2) in panel A measures the ratio of the explained variance to the unexplained variance in the model. The usual range of the GOF is from 0 to infinity, with higher values indicating a better fit of the model to the data. It is commonly evaluated using the deviance or the likelihood ratio test statistic[40] (Agresti, 2002, McCullagh & Nelder, 1989, Cameron, & Trivedi, 2013). In this case, the χ2-statistic for the probit model of the variable "dwelling" is F(9, 4967) = 2.67. The first number in parentheses (9) represents the degrees of freedom for the model, which is equal to the number of predictors in the model minus 1. The second number (4967) represents the residual degrees of freedom, which is equal to the total number of observations minus the number of parameters estimated in the model. The χ2-statistic of 2.67 indicates that the explained variance is larger than the unexplained variance in the model. This is not quite the same as an R^2 under the OLS regression which ranges from 0 to 1. The R2 value of 0.207 means that the independent variable in the OLS regression model explains 20.7% of the variance in the dependent variable. Like R2 in OLS regression, the GOF in the logistic and probit regressions provide an estimate of how well the model fits the data. The p-value in the case of the probit and logit regressions is less than the 0.01 significance level, suggesting that there is strong evidence against the null hypothesis that the observed data does not fit the expected distribution very well. The R^2 under the OLS regression shows a 21% fit of the data.

The results show that post the COVID-19 lockdown, there was no impact on home ownership, although the banked were less likely to own their homes compared to renting. This could be due to the shortage of mortgage facilities for the banked.

Impact of COVID-19 shock on Type of Dwelling and Utilities

[40] Stata Base Reference Manual - Release 17

Panel B	(1)	(2)	(3)	(4)	(5)
Variables	roof	floor	walls	water	elect
Post Lockdown	0.0436	0.142*	0.0588	0.0359	0.128**
	(0.112)	(0.0769)	(0.0640)	(0.0595)	(0.0595)
Financially Excluded	-0.818***	-0.672***	-0.821***	-0.106*	-0.832***
	(0.0842)	(0.0609)	(0.0564)	(0.0605)	(0.0536)
Post Lockdown#unbanked	0.130	-0.0159	0.0739	0.0995	0.160*
	(0.131)	(0.0965)	(0.0876)	(0.0897)	(0.0840)
Sector	0.771***	0.910***	0.829***	0.197***	0.817***
	(0.0965)	(0.0674)	(0.0530)	(0.0506)	(0.0488)
Zone	0.166***	0.0175	0.205***	0.0187	0.0261**
	(0.0184)	(0.0147)	(0.0141)	(0.0134)	(0.0131)
Consumption quintile	0.185***	0.199***	0.252***	5.55e-05	0.259***
	(0.0227)	(0.0181)	(0.0164)	(0.0174)	(0.0160)
Constant	0.599***	0.306***	-1.085***	-1.133***	-0.604***
	(0.104)	(0.0777)	(0.0738)	(0.0778)	(0.0698)
Observations	4,976	4,976	4,976	4,976	4,976

Panel B reveals that the financially excluded are less likely to have modern roofs, floors, and walls in their homes. They are also less likely to have access to clean water and electricity. Notwithstanding, the lockdown did not significantly worsen their situation.

Impact of COVID-19 Shock on Household Assets

Panel C	(1) TV	(2) radio	(3) refrigerator	(4) bicycle	(5) mcycle	(6) car
Post L/down	0.194***	0.139***	0.112**	-0.101	0.0585	0.0529
	(0.0558)	(0.0504)	(0.0539)	(0.0660)	(0.0528)	(0.0606)
Unbanked	-1.052***	-0.335***	-1.013***	-0.112*	-0.468***	-1.008***
	(0.0539)	(0.0494)	(0.0750)	(0.0601)	(0.0535)	(0.0966)
PLD#UB	0.00597	-0.0528	0.0906	0.187**	0.206***	0.0144
	(0.0841)	(0.0746)	(0.116)	(0.0928)	(0.0789)	(0.160)
Sector	0.552***	-0.0770*	0.522***	-0.603***	-0.429***	0.309***
	(0.0461)	(0.0428)	(0.0509)	(0.0604)	(0.0473)	(0.0572)
Zone	0.0404***	-0.0166	-0.0687***	0.00559	-0.0872***	-0.0909***
	(0.0129)	(0.0115)	(0.0146)	(0.0128)	(0.0122)	(0.0162)
Cons. Quint	0.212***	-0.00365	0.250***	-0.0396**	-0.0596***	0.277***
	(0.0158)	(0.0144)	(0.0197)	(0.0177)	(0.0154)	(0.0236)
Constant	-0.651***	0.148**	-1.432***	-0.737***	0.253***	-1.781***
	(0.0694)	(0.0645)	(0.0837)	(0.0761)	(0.0684)	(0.106)
Observations	4,976	4,976	4,976	4,976	4,976	4,976

Notes: PLD#UB - Post Lockdown # unbanked, Cons. Quint – Consumption quintile

Panel D	(1) mphone	(2) computer	(3) internet	(4) generator
Post Lockdown	0.0914	0.0240	0.0767	0.103**
	(0.0754)	(0.0790)	(0.0518)	(0.0513)
Financially Excluded	-1.021***	-1.424***	-1.156***	-0.932***
	(0.0616)	(0.251)	(0.0539)	(0.0593)
Post Lockdown#unbanked	0.213**		0.0821	0.0845
	(0.0946)		(0.0834)	(0.0917)
Sector	0.261***	0.354***	0.444***	0.0920**
	(0.0554)	(0.0828)	(0.0455)	(0.0464)
Zone	0.0705***	-0.0856***	-0.0843***	0.0497***
	(0.0136)	(0.0219)	(0.0129)	(0.0131)
Consumption quintile	0.0720***	0.478***	0.121***	0.206***
	(0.0173)	(0.0442)	(0.0159)	(0.0168)
Constant	0.786***	-3.168***	-0.0168	-1.190***
	(0.0806)	(0.204)	(0.0687)	(0.0734)
Observations	4,976	4,213	4,976	4,976

The lockdown did not adversely affect the ownership of assets. The likelihood of the ownership of TVs, radios and refrigerators increased with statistical significance post the formal lockdown (panel C, columns 1 to 3). However, the financially excluded are less likely

to own these assets, thus worsening their standards of living. The status of the financially excluded did not significantly change after lockdown as far as radios and refrigerators are concerned. Conversely, after the strict lockdown, they were more likely to own bicycles and motorcycles (panel C, columns 4 and 5). The lower consumption quintiles use these as a means of private and commercial transport, and coming out of a lockdown, these are likely to be essential to earn a living and recoup losses resulting from being unable to conduct petty trade. The financially excluded were less likely to purchase mobile phones, computers, and generators or have access to the internet. However, after the lockdown, the likelihood of owning mobile phones increased for the financially excluded (panel D, column 1). None of the financially excluded owned computers after lockdown and access to the internet, and ownership of generators was statistically insignificant.

Impact of COVID-19 Shock on Land and other Sources of Income

Panel E Variables	(1) land	(2) rent	(3) remit	(4) assist	(5) any_work
Post Lockdown	-0.0222	0.0284	-0.0644	0.0205	0.0520
	(0.0540)	(0.0766)	(0.0523)	(0.0776)	(0.0746)
Financially Excluded	0.0232	-0.413***	-0.127**	0.0335	-0.309***
	(0.0539)	(0.0961)	(0.0514)	(0.0710)	(0.0679)
Post Lockdown#unbanked	0.0895	0.161	0.116	0.0373	0.0841
	(0.0816)	(0.140)	(0.0780)	(0.106)	(0.103)
Sector	-0.918***	0.254***	-0.0617	-0.173***	0.103*
	(0.0446)	(0.0721)	(0.0444)	(0.0660)	(0.0598)
Zone	-0.0501***	0.00927	0.0959***	-0.0123	0.0534***
	(0.0127)	(0.0204)	(0.0119)	(0.0153)	(0.0151)
Consumption quintile	-0.111***	0.146***	0.114***	-0.187***	-0.0231
	(0.0156)	(0.0265)	(0.0150)	(0.0211)	(0.0199)
Constant	1.263***	-2.170***	-1.048***	-0.755***	1.222***
	(0.0716)	(0.124)	(0.0682)	(0.0888)	(0.0903)
Observations	4,976	4,976	4,976	4,976	4,732

Panel F Variables	(1) ag_work	(2) nfe_work	(3) ext_work	(4) nfe	(5) crop	(6) livestock
Post Lockdown	-0.114**	0.129**	0.107**	0.135***	0.0127	0.00102
	(0.0536)	(0.0514)	(0.0521)	(0.0512)	(0.0564)	(0.0549)
Financially Excluded	0.0865*	-0.0958*	-0.903***	-0.136***	0.169***	0.115**
	(0.0523)	(0.0511)	(0.0615)	(0.0494)	(0.0584)	(0.0516)
Post Ldown#unbanked	0.108	0.0427	-0.0741	0.0767	0.0888	0.0789
	(0.0800)	(0.0765)	(0.0957)	(0.0751)	(0.0913)	(0.0795)
Sector	-0.875***	0.291***	0.387***	0.250***	-1.227***	-0.568***
	(0.0465)	(0.0440)	(0.0481)	(0.0430)	(0.0459)	(0.0456)
Zone	0.0212*	0.0539***	0.00264	0.0590***	-0.0649***	-0.149***
	(0.0123)	(0.0118)	(0.0134)	(0.0115)	(0.0136)	(0.0122)
Consumption quintile	-0.146***	-0.0148	0.0685***	-0.0245*	-0.234***	-0.186***
	(0.0155)	(0.0150)	(0.0173)	(0.0146)	(0.0172)	(0.0150)
Constant	0.567***	-0.231***	-0.732***	-0.0660	1.866***	1.075***
	(0.0684)	(0.0661)	(0.0737)	(0.0647)	(0.0825)	(0.0683)
Observations	4,732	4,732	4,732	4,976	4,976	4,976

The financially excluded were less likely to receive income from rent, remittances, or any other work. They were, however, more likely to be in agricultural work and own crops and livestock than any other occupation. The lockdown did not change this position.

Impact of COVID-19 shock on Food Security

Panel G Variables	(1) Food Insecurity (Moderate)	(2) Food Insecurity (Severe)
Post Lockdown	1.320***	1.512***
	(0.0565)	(0.0715)
Financially Excluded	0.0247	0.175**
	(0.0515)	(0.0804)
Post Lockdown#unbanked	0.337***	0.178*
	(0.0886)	(0.0971)
Sector	-0.0573	0.0572
	(0.0476)	(0.0545)
Zone	0.162***	0.0543***
	(0.0128)	(0.0142)
Consumption quintile	-0.0422***	-0.0842***
	(0.0157)	(0.0190)
Constant	-0.868***	-1.673***
	(0.0702)	(0.0871)
Observations	4,976	4,976

Impact of COVID-19 shock on Food security by Geographic Zone

Panel H Variables	(1) Food Insecurity (Moderate)	(2) Food Insecurity (Severe)
Post Lockdown	1.304***	1.424***
	(0.0977)	(0.117)
Post Lockdown #1b.zone	0.747***	1.233***
	(0.148)	(0.276)
Post Lockdown #2.zone	0.332**	0.441**
	(0.144)	(0.172)
Post Lockdown #3.zone	0.593***	0.480***
	(0.148)	(0.176)
Post Lockdown #4.zone	-0.185	-0.125
	(0.145)	(0.158)
Post Lockdown #5.zone	-0.217	-0.214
	(0.152)	(0.162)
Post Lockdown #6o.zone	0	0
	(0)	(0)
1b.zone#Unbanked	0.193*	0.310**
	(0.110)	(0.140)

Panel H Variables	(1) Food Insecurity (Moderate)	(2) Food Insecurity (Severe)
2.zone# Unbanked	0.231**	0.306**
	(0.109)	(0.125)
3.zone# Unbanked	0.511***	0.609***
	(0.129)	(0.149)
4.zone# Unbanked	0.151	0.201*
	(0.0999)	(0.108)
5.zone# Unbanked	0.289***	0.365***
	(0.103)	(0.116)
6.zone# Unbanked	0.0518	0.0911
	(0.102)	(0.118)
Sector	0.114**	0.113**
	(0.0510)	(0.0571)
Consumption quintile	-0.0738***	-0.0787***
	(0.0169)	(0.0201)
Constant	-1.012***	-2.709***
	(0.108)	(0.254)
Observations	4,976	4,976

Notes: Zones 1, 2, 3, 4, 5, 6 – North-Central, North East, North West, South East, South South, South West

Controlling for zones, sectors and consumption quintiles, the combination of the lockdown and financial exclusion adversely affected moderate food insecurity with statistical significance at the 1% level. Severe food insecurity was also adversely impacted but significant only at the 10% level.

In summary, the Simple Poverty Scorecard estimation suggests that poverty grew by 0.7% in the 1-year post the strict COVID-19 lockdown. The results of the probit regressions show that the crisis has a delayed impact on home ownership, type of dwelling and asset ownership. The financially excluded are less likely to own many assets but the lockdown did not impact them extensively. This could be due to the fact that the lockdown was not very long in Nigeria, or the full impact had yet to be manifested. Moderate and severe food insecurity were however immediately impacted. These increased after the lockdown with statistical significance and most especially for the financially excluded. There were differential impacts for different zones of the country with the North-Central, North-East, North-West, and South-South zones (Columns 1, 2, 3 and 5) being the worst hit. This may relate to the socio-economic situation in the northern part of the country and the restiveness in the South-South. Thus the

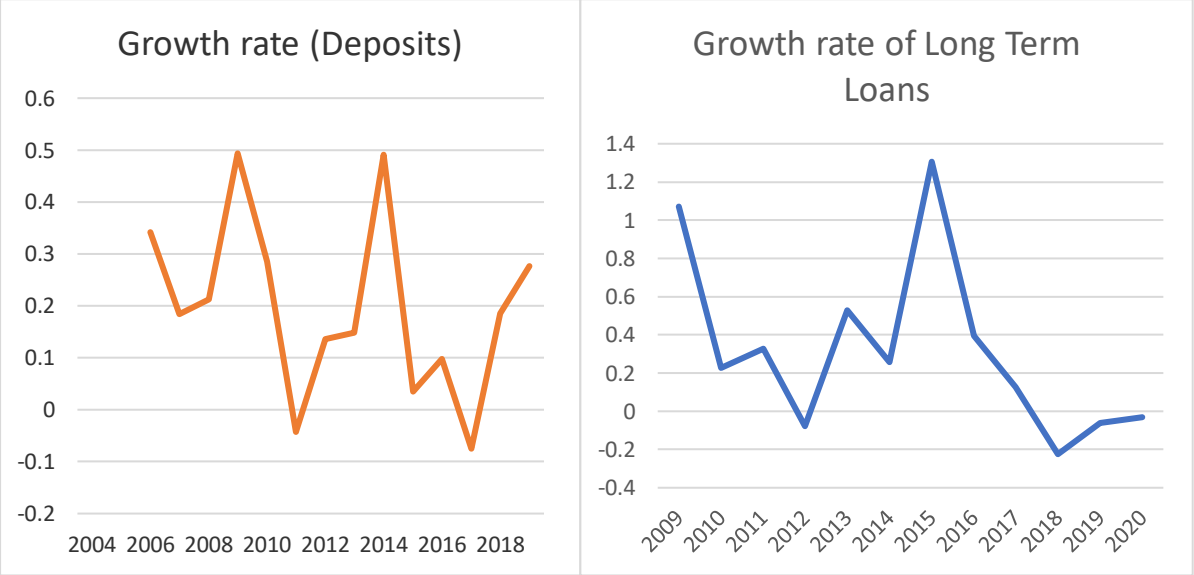
3rd hypothesis that the COVID-19 crisis led to reduced resilience in households thereby aggravating poverty, was only partially established. Poverty appears to have increased post strict lockdown, and food insecurity worsened but the specific impact on household assets has yet to manifest. The negative impact of the crisis was worse for the financially excluded and in zones that were already relatively poor.

The research will now proceed to the impact of the COVID-19 lockdown and other economic shocks on microfinance banks – the financial intermediaries that cater for the lower rungs of society.

6.4.5 Impact of Economic Shocks on Microfinance Banks

The 4th hypothesis of this chapter postulates that economic crises, including the COVID-19 pandemic, have led to reduced resilience in microfinance institutions and thus reduced the positive impact of microfinance in Nigeria. The data shows that in addition to the decline in donor funds to microfinance banks after the GFC, there were declines in other sources of funds such as long-term loans and deposits. Figure 6-9 shows the growth rate of loans and deposits during the period.

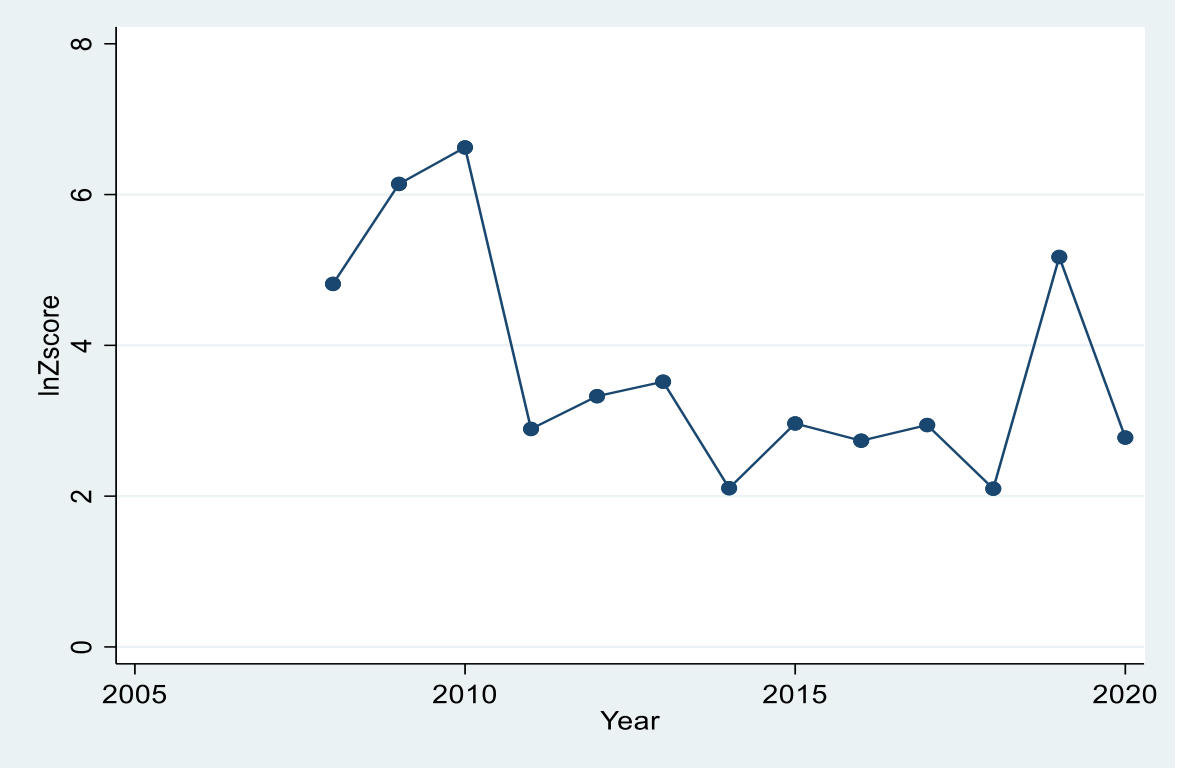
Figure 6-9 Growth of deposits and long-term loans



The growth rate of deposits plummeted each time there was an economic shock, first during the banking crisis of 2009 to 2011 and next during the economic recession of 2016 to 2017. Long term loans as a source of funding also demonstrated the same tendency.

Figure 6-10 shows the quarterly Z-scores of the microfinance industry. The Z-score measures the resilience of the industry or its proximity to insolvency.

Figure 6-10 Microfinance banking sector Z-score trend



The periods where the Z-score plummeted steeply coincided with periods of economic shocks from the banking crisis and COVID-19 lockdown in 2010 and 2019, respectively. After the fall in the Z-score in 2010, the industry resilience never returned to the pre banking crisis level. Tests were conducted to ensure the absence of multicollinearity between explanatory variables, absence of endogeneity and absence of serial correlation in the outcome variables. Details of these are shown in appendix XI.

A t-test was conducted to find out if the average Z-scores were equal pre and post the crisis. CrisisDum1 includes the years of economic recession resulting from the fall in oil prices and the COVID-19 lockdown. These are Q1 2016 to Q4 2016 and Q1 2020 to Q4 2020. CrisisDum2 includes the same periods but also the period of the banking sector crisis contagion from Q1 2010 to Q4 2011. The results of the test are shown below.

Two-sample t test

Z-score	Pre-crisis Obs	Post-crisis Obs	Pre-crisis Mean	Post-crisis Mean	Diff	p value
CrisisDum1	44	8	3.776	3.365	-0.411	0.429
CrisisDum2	37	15	3.685	3.780	0.095	0.820

The results for CrisisDum1 show that the average level of resilience in the microfinance industry (Z-score) after the onset of an economic crisis was lower by 0.411 than before the crisis. CrisisDum2 results show that when we include the period of the contagion from the commercial banking sector crisis, the level of resilience after the onset of the shock was higher by 0.095. This may be due to the fact that the Central Bank pumped a substantial amount of liquidity into the economy during the banking crisis to save the commercial banks and the economy at large. Thus, a recession was averted. Some of this liquidity would have found its way into the microfinance banks and into the hands of consumers.

Table 6.22 shows the results of the regression adjustment estimation of the average effects of the economic shocks on the resilience of the industry. Panel A shows the effects of the 2016 economic recession and 2020 COVID-19 lockdown, and panel B includes the period of the banking crisis - Q1 2010 to Q4 2011 as well as the periods of the other economic shocks. The crisis periods are represented by dummy variables which take on values of 0 during normal times and 1 during crisis times. The regressions control for capital to total assets ratio, return on assets, and deposits scaled by growth in GDP per capita. The literature shows that savings, as well as growth in GDP per capita, positively affects the health of financial intermediaries. A broad base of bank deposits that come from savings makes banks more resilient in times of financial stress. Savings depends on consumption which is related to growth in GDP. Consequently, savings have been found to be highly correlated with GDP per capita (Han and Melecky, 2013, Cull et al., 2012, Papanek, 1973, Cochrane, 2009).

The regression adjustment (RA) estimation shown in tables 7.21-26 fit separate regression lines for normal and crisis periods. For each year, the model provides two values, representing predictions of the Z-score assuming normal times or a crisis. The RA estimator predicts three parameters using a potential outcome (POM) or counterfactual framework. A potential outcome is what the outcome would have been for the crisis years if there was no crisis or

what the outcome would have been for the normal years if there had been a crisis. Column 1 (ATE) of each of these tables show the average impact of the crises from 2010 to 2020. Column 2 (POmean) shows the potential outcome had there been no crises. Columns 3 and 4 (OME0 and OME1) of each table show the outcome means of capital to total assets ratio and return on assets during normal and crisis times respectively.

Table 6.22 Impact of economic shocks on microfinance industry resilience

Panel A Z-Score	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			1.105	33.344***		
			(5.213)	(7.173)		
ROA			-4.621	9.609		
			(7.128)	(6.663)		
Deposit#GDPpcgr			0.000	-0.000***		
			(0.000)	(0.000)		
Ec.CrisisDum	-4.062***				-0.239	
	(0.919)				(0.962)	
CrisisDum = 0		3.807***				3.604***
		(0.209)				(0.881)
Constant			3.567***	-8.657***		
			(1.262)	(2.591)		
Observations	51	51	51	51	51	51

Panel B Z-Score	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			2.387	8.637		
			(4.891)	(8.192)		
ROA			-3.678	-7.243		
			(7.200)	(13.601)		
Deposit#GDPpcgr			-0.000	0.000		
			(0.000)	(0.000)		
Ec.CrisisDum	0.208				-0.092	
	(0.417)				(0.529)	
CrisisDum2 = 0		3.797***				3.872***
		(0.214)				(0.416)
Constant			3.221***	1.941		
			(1.186)	(2.052)		
Observations	51	51	51	51	51	51

Notes: All variables are in logs. ATE – average treatment effect, POmean – Potential Outcome mean, OME0 – Outcome mean in normal times, OME1 – Outcome mean in crisis times, ATET – Average treatment effect on the treated, CapTA – Capital to total assets ratio, ROA – return on assets, Deposit#GDPpcgr – Deposits and GDP per capita growth, CrisisDum – Crisis dummy, Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Panel A column 2 reveals that if there had not been an economic crisis in the country, the average Z-score (in logs) for the entire period 2016 to 2020 would have been 3.8 on average. As a result of the crisis, the Ec.CrisisDum variable in col 1 row 4 shows that the Z-score was reduced by approximately 4.06. This is the overall impact, which is statistically significant at the 1% level. The coefficients in the OME0 and OME1 columns are from the linear equations used to estimate the Z-score of the normal years (nontreated potential outcome mean (POM)) and the Z-score of the crisis years (treated POM), respectively. The Average Treatment Effect on the Treated gives the amount by which microfinance banking resilience was reduced in the crisis years only, that is 2016 and 2020. This is estimated to be 0.239 (col.5 row 4) although not statistically significant. The Z-score of the crisis years could potentially have been 3.6 (column 6 row 5).

Panel B column 1 shows that the potential Z-score during the period 2010 to 2020 was higher by 0.208 than during the normal years. This was probably due to the substantial liquidity pumped into the system during the banking crisis. The coefficient is, however, not statistically significant.

It can be concluded that the economic shocks from the recession and the COVID-19 lockdown adversely affected the resilience of the microfinance banking sector. However, due to the injection of liquidity, the banking crisis years (2010-2011) were not negatively affected.

Turning to the impact of the shocks on domestic credit, the results are shown in Table 6.23, with panel A showing the impact of the 2016 recession and the 2020 lockdown and panel B showing the impact of these in addition to the banking crisis of 2011.

Table 6.23 Impact of Economic Shocks on Domestic Credit

Panel A Domestic credit	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			-5.046**	-0.319		
			(1.990)	(1.543)		
ROA			-0.975	2.844*		
			(3.450)	(1.496)		
Deposit#GDPpcgr			-0.000***	-0.000***		
			(0.000)	(0.000)		
Ec.CrisisDum	-0.657***				-0.444*	
	(0.182)				(0.245)	
CrisisDum = 0		12.593***				13.819***
		(0.132)				(0.337)
Constant			13.796***	11.949***		
			(0.462)	(0.537)		
Observations	52	52	52	52	52	52

Panel B Domestic credit	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			-5.868***	-1.521		
			(1.711)	(1.028)		
ROA			-1.623	-0.496		
			(3.256)	(1.929)		
Deposit#GDPpcgr			-0.000***	-0.000***		
			(0.000)	(0.000)		
Ec.CrisisDum	-0.499***				-0.447***	
	(0.090)				(0.112)	
CrisisDum2 = 0		12.662***				13.023***
		(0.122)				(0.218)
Constant			14.078***	12.497***		
			(0.379)	(0.259)		
Observations	52	52	52	52	52	52

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Panel A columns 1 and 5 show that the 2016 recession and the 2020 lockdown reduced domestic credit by approximately 0.65 and 0.44 overall and in the crisis years, respectively. When the banking crisis year of 2011 is included, domestic credit reduces but to a lower extent as seen in Panel B. Overall reduction in credit was 0.49 and 0.45 in the crisis years. A probable explanation as stated earlier is the massive liquidity injection during the banking crisis.

The investigation proceeds to show the impact of economic shocks on industry liquidity in table 6.24. Table 6.24 is made up of panels A, B, C and D. Panels A and B show the impacts of the 2016 recession, 2020 lockdown and the 2011 banking crisis on liquidity generally, while panels C and D show the impact of the shocks on the liquidity ratio. The liquidity ratio is measured by the ratio of liquid assets to deposits and is a prudential measure that shows the extent to which a financial institution is able to meet its obligations to depositors.

Table 6.24 Impact of economic shocks on industry liquidity

Panel A Liquid Assets	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			-0.514	5.369***		
			(1.190)	(1.208)		
ROA			-0.240	-2.790*		
			(2.015)	(1.505)		
Deposit#GDPpcgr			-0.000***	-0.000***		
			(0.000)	(0.000)		
Ec.CrisisDum	-0.509***				-0.343*	
	(0.181)				(0.197)	
CrisisDum = 0		12.063***				12.664***
		(0.076)				(0.184)
Constant			12.169***	10.220***		
			(0.264)	(0.451)		
Observations	52	52	52	52	52	52

Panel B Liquid Assets	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			-0.601	3.486***		
			(1.106)	(0.881)		
ROA			-0.175	-6.050**		
			(1.988)	(3.044)		
Deposit#GDPpcgr			-0.000***	-0.000***		
			(0.000)	(0.000)		
CrisisDum2	-0.239**				-0.280**	
	(0.115)				(0.115)	
CrisisDum2 = 0		12.096***				12.301***
		(0.073)				(0.130)
Constant			12.223***	11.014***		
			(0.234)	(0.271)		
Observations	52	52	52	52	52	52

Panel C LA/Dep	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			2.063***	2.441***		
			(0.229)	(0.236)		
ROA			0.087	-1.218		
			(0.322)	(0.760)		
CrisisDum	0.001				-0.020	
	(0.030)				(0.031)	
CrisisDum = 0		0.652***				0.542***
		(0.027)				(0.058)
Constant			0.155***	0.069		
			(0.059)	(0.044)		
Observations	53	53	53	53	53	53

Panel D LA/Dep	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
CapTA			2.015***	3.050***		
			(0.178)	(0.284)		
ROA			0.268	-2.423*		
			(0.257)	(1.246)		
CrisisDum2	0.119***				0.107***	
	(0.039)				(0.038)	
CrisisDum2 = 0		0.617***				0.577***
		(0.022)				(0.034)
Constant			0.130***	0.010		
			(0.047)	(0.047)		
Observations	53	53	53	53	53	53

Panels A and B show that there was a statistically significant decline in liquid assets during the banking, recession, and lockdown crisis, while panel D shows that the liquid assets as a percentage of deposits improved during the period suggesting that deposits also declined during the period. A t-test on the equality of means of deposits within normal and the crisis periods, including the banking crisis, shows that deposits were lower in the crisis periods by about 1.12%. This explains the results and is indicative of customer apathy or increased risk aversion during the crisis. It could also suggest that customers had less income and thus less money to save.

The investigation now proceeds into examining the impact of shocks on the earnings of the microfinance industry proxied by the return on assets. Table 6.25 provides the findings.

Table 6.25 Impact of Economic Shocks on Industry Return on Assets

Panel A ROA	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
lnCapTA			-0.237	-0.063		
			(0.201)	(0.135)		
DomesticCredit#GDPpcgr			0.000	0.000		
			(0.000)	(0.000)		
CrisisDum	0.012				0.037	
	(0.022)				(0.041)	
CrisisDum (Ec Crisis) = 0		-0.001				-0.032
		(0.006)				(0.041)
Constant			0.061	0.027		
			(0.049)	(0.054)		
Observations	52	52	52	52	52	52

Panel B ROA	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
lnCapTA			-0.249	-0.002		
			(0.206)	(0.104)		
DomesticCredit#GDPpcgr			0.000	-0.000		
			(0.000)	(0.000)		
CrisisDum2	-0.001				0.015	
	(0.008)				(0.020)	
CrisisDum2 (Ec Crisis) = 0		0.000				-0.014
		(0.007)				(0.019)
Constant			0.067	-0.000		
			(0.050)	(0.026)		
Observations	52	52	52	52	52	52

The results do not show any significant effect of the crisis on the return on assets. The research proceeds to study the impact of shocks on shareholders' funds. The shareholders' funds show the extent to which the industry has capital to absorb unexpected losses. The results are shown in Table 6.26.

Table 6.26 Impact of economic shocks on shareholders' funds

Panel A Shareholders' Funds	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
lnCapTA			0.838	6.011***		
			(1.579)	(0.520)		
ROA			-1.098	1.763***		
			(2.747)	(0.520)		
DomCred#GDPpc			-0.000***	-0.000***		
			(0.000)	(0.000)		
CrisisDum	-0.550***				-0.387*	
	(0.092)				(0.203)	
CrisisDum = 0		11.832***				12.508***
		(0.080)				(0.197)
Constant			11.608***	9.765***		
			(0.362)	(0.192)		
Observations	52	52	52	52	52	52

Panel B Shareholders' Funds	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
lnCapTA			0.378	4.612***		
			(1.397)	(0.672)		
ROA			-1.398	-2.086		
			(2.639)	(2.560)		
DomCred#GDPpc			-0.000***	-0.000***		
			(0.000)	(0.000)		
CrisisDum2	-0.358***				-0.361***	
	(0.094)				(0.098)	
CrisisDum2 = 0		11.884***				12.077***
		(0.075)				(0.124)
Constant			11.778***	10.381***		
			(0.306)	(0.207)		
Observations	52	52	52	52	52	52

Panels A and B show that shareholders' funds declined significantly during all shocks – the banking crisis, the recession, and the COVID-19 lockdown. This is indicative of less resilience in the industry. We turn next to the impact of shocks on long term loans which strengthen the ability of microfinance institutions to supply microcredit in table 6.27.

Table 6.27 Impact of economic shocks on long term funding

Panel A Long term loans	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
lnCapTA			-2.321	-1.086		
			(2.330)	(1.669)		
ROA			1.759	0.135		
			(3.422)	(2.205)		
DomCred#GDPpc			-0.000***	0.000		
			(0.000)	(0.000)		
CrisisDum	1.162***				-1.576***	
	(0.346)				(0.512)	
CrisisDum = 0		10.193***				12.565***
		(0.226)				(0.490)
Constant			10.671***	11.634***		
			(0.523)	(0.599)		
Observations	52	52	52	52	52	52

Panel B Long term loans	(1) ATE	(2) POmean	(3) OME0	(4) OME1	(5) ATET	(6) POmean
lnCapTA			-2.672	7.568***		
			(2.255)	(1.755)		
ROA			1.621	3.290		
			(3.370)	(5.675)		
DomCred#GDPpc			-0.000***	-0.000***		
			(0.000)	(0.000)		
CrisisDum2	-0.523***				-0.914***	
	(0.195)				(0.293)	
CrisisDum2 = 0		10.231***				11.002***
		(0.226)				(0.447)
Constant			10.800***	7.787***		
			(0.510)	(0.415)		
Observations	52	52	52	52	52	52

Panel A shows that long term loans increased during the recession and the lockdown of 2016 and 2020; however, when the banking crisis of 2011 is included in panel B, an adverse effect is revealed. A probable explanation is that the banking crisis was an offshoot of the global financial crisis. During the GFC, the country witnessed significant fund reversals as foreign investors recalled funds due to heightened risk aversion. Also, the consequences of the COVID-19 lockdown have not entirely played out yet.

6.5 **Summary**

This chapter explored the impact of microfinance savings, microcredit, and the COVID-19 pandemic on poverty in Nigeria. It further examined the impact of economic shocks on the microfinance banks that provide savings and credit facilities. The study is extended to microfinance banks because the positive impact of microfinance could reduce if the banks experience shocks that lead to insolvency. In setting the scene, the analysis finds that there has been an uneven change in poverty rates in Nigeria over the years. As of 2019, Lagos state had the least poverty headcount while Sokoto state had the highest. Between 2004 and 2019, poverty increased the most in Taraba state and reduced mostly in Kwara state. The rural sector, Moslems, monogamous marriages, people between ages 50 and 75, and the less educated are most likely to save in microfinance banks. Similarly, the rural sector, Christians, males, and people between the ages of 25 and 50 had the highest propensity to borrow.

The study investigated 4 hypotheses:

Hypothesis 1: Households with access to microcredit have better living standards than those without.

Hypothesis 2: Households with micro-savings have better living standards than those without.

Hypothesis 3: The COVID-19 crisis has led to reduced resilience in households, thereby aggravating poverty in Nigeria.

Hypothesis 4: Economic crises, including COVID-19, have led to reduced resilience in Microfinance institutions and thus reduced the positive impact of microfinance in Nigeria.

The impact of micro-savings and microcredit on various elements of poverty are summarised below:

Dimension	*Micro-savings*	*Microcredit*
Food security	Positive	Negative
Food consumption	No impact	Positive
Non-food consumption	No impact	Positive
(Household assets)		
Quality of dwelling	No impact	Positive
Ownership of dwelling	No impact	No impact
Health care	Positive	Positive
Education	Positive	No impact

MFI savers were found to be less food insecure relative to non-MFI savers but more food insecure than the financially excluded. This finding could be due to easier accessibility to savings for the financially excluded as they do not have to go through the hurdles of a formal financial institution to access their money. It could also be because most of the financially excluded are engaged in agriculture for livelihoods and thus have immediate access to their food needs. The results suggest that Microfinance institutions need to increase the ease of access and attractiveness of their services to the financially excluded. Microfinance savings were found to lead to prudence in food expenditure but do not significantly impact expenditure on household assets. This result is not surprising as microfinance savers are older and less likely to incur non-priority expenditures. Microfinance savers have higher spending on healthcare and education and spend less on self-medication than the financially excluded. This finding supports the likelihood that microfinance savers spend more on quality-of-life priorities.

Microfinance borrowers were found to be more food insecure than all other borrowers. Microfinance borrowers also spend significantly more on household assets such as furniture, electronics, computers, and mobile phones. Even though microfinance borrowers live in better quality dwellings, they are less likely to own their homes than the financially excluded. This highlights the need for housing microfinance as an essential product. Microfinance borrowers like the savers have increased access to healthcare relative to the unbanked.

Using the Simple Poverty Scorecard, poverty rates in Nigeria grew by 0.7% from the pre to the post strict lockdown period between 2019 and 2020. However, the scorecard is based on asset ownership and may underestimate the impact of the shock within a short time. Further analysis revealed that food insecurity immediately increased due to the lockdown, especially for the financially excluded. There were differential impacts for different country zones, with the North-Central, North-East, North-West, and South-South zones being the worst hit.

Turning to the general impact of shocks and the COVID-19 pandemic on microfinance institutions, the results show that resilience measured by the Z-score was adversely impacted. However, during the earlier banking crisis years from 2010 to 2011, the adverse effect was mitigated probably due to the massive liquidity injection by the Central Bank of Nigeria. This underscores the need for government support and intervention during crises periods to sustain the poverty alleviating mission of microfinance. Using the CAMEL criteria, capital proxied by shareholders' funds, assets measured by microcredit, and liquidity were all negatively affected by economic shocks.

In conclusion, the study empirically confirms the 1st, 3rd, and 4th hypothesis that households with microcredit have better living standards than those without; the COVID-19 crisis has led to reduced resilience in households, thereby aggravating poverty in Nigeria and economic crises, including COVID-19, have led to reduced resilience in Microfinance institutions and thus reduced the positive impact of microfinance in Nigeria. The 2nd hypothesis is not confirmed as micro-savings did not reveal a positive impact on household assets and quality of dwelling. The study finds that microfinance savers derive benefits in food security, while generally, microfinance positively affects healthcare and education for households. However, microfinance banks need to address hurdles that make them unattractive, such as ease of access to savings and high interest rates. Also, new products such as micro-mortgages would be beneficial as homes usually constitute a substantial portion of wealth. The economic shock from COVID-19 had an adverse impact and although it may appear to have been stemmed, there is no telling yet the far-reaching implications this shock may have on low-income and vulnerable households. For the financially excluded, vulnerability is even more extensive. What is crucial is the prevention of this shock from destroying years of positive impacts of microfinance. Respondents in the Financial Inclusion 2021 survey observed that the

sustenance of financial inclusion for tackling the health, financial and economic impacts of COVID-19 is a significant concern (Mendelson, 2021). In view of the benefits offered by microfinance and potential household instability if discontinued, the government, regulators and donors are encouraged to sustain and deepen support for the industry.

Chapter Seven

7 Global Conclusion

7.1 Introduction

Developing countries seek to improve the welfare of their citizens through financial development and the implementation of top-notch financial policies. However, quite often, the same rigour is not applied to probe whether the policies have the intended outcomes. Resilient banking systems and access to credit are considered a pathway to economic development by policy makers and academics. That notwithstanding, limited research has been conducted in developing countries. Specifically, the impact of the whole suite of the Basel II/III reforms in Africa has never been assessed. Although there have been several studies on the impact of microfinance on poverty reduction, a consensus on its benefits has not been reached. The divergent views leave policy makers in a state of uncertainty as to whether to continue to adopt international best practice banking reforms. It is also unclear whether to sustain and improve microfinance delivery or abandon it altogether. When one considers the potential of Africa to contribute to global markets, trade, and investments at a time when this potential is stagnating in other parts of the world, the importance of this study becomes even more compelling. On the other hand, the potential spill-over effect of unabated poverty in developing countries on the rest of the world intensifies the necessity of this research.

This thesis comprehensively and rigorously investigated the impact of banking reforms and microfinance on economic welfare in developing nations. Precisely the thesis examined the impact of the Basel II/III reforms on banking system resilience in Africa and the impact of microfinance on poverty alleviation in developing countries globally. The study commenced with a review of the relationship between banking crises and poverty and how preventing banking crises contributes to economic welfare. It then examined the nature and sources of risk and how they can be managed. The causes of financial crises in various jurisdictions and the kind of regulation in place before the implosion of their financial systems were also appraised. While various crises were attributed to numerous causes, it was apparent that regulatory lapses, political and economic regimes, and the quality of institutions contributed significantly to differing severity of crises impact. The post-crisis reforms in the Nigerian

banking sector and other jurisdictions were also explored. The literature is divided on the benefits of regulation and whether recovery after the crisis can be attributed to the reforms. The literature review further delved into microfinance as a development tool and how it has fared in poverty alleviation and economic welfare improvement. There is also no consensus in the literature that microfinance has significant positive effects on poverty reduction.

The literature review revealed gaps and incongruities that this thesis attempted to clarify by answering the following research questions (i) Did the implementation of Basel II/III capital framework improve banking system resilience in Africa generally and in South Africa and Nigeria specifically? (ii) What is the global impact of microfinance on poverty and economic welfare? (iii) What is the impact of microfinance on poverty and economic welfare in Nigeria? (iv) Do economic shocks, including the COVID-19 shock, affect the resilience of microfinance institutions and households? The findings and conclusions of the studies are summarised in the following sections.

7.2 Did the implementation of Basel II/III improve banking system resilience in Africa?

Twenty-nine out of fifty-four African countries had implemented the capital framework to varying degrees as of June 2021. Of these, only twelve countries had implemented the framework by 2017 and the study was limited to these to allow for sufficient post implementation data. The first step was to examine the impact of risk and prudential behaviour on resilience. The study finds that NPLs negatively influence resilience in Africa, while lower leverage has a positive impact. Regulatory capital has a lagged positive impact on resilience. Higher liquidity has adverse effects due to lower returns from risk free assets and lower investment in high return assets such as lending. The second step in the analysis revealed that the BCF improved banking system resilience in seven countries but only five exhibited statistical significance after controlling for macroeconomic factors, the business environment, and concentration. These were Kenya, Egypt, Algeria, Botswana, and Mozambique. The impact of the implementation of the Basel II/III Capital Framework on the resilience of banking systems in Africa is not uniform across all countries and depends on macroeconomic factors, the regulatory environment, and idiosyncratic factors. This hypothesis has been confirmed through this research. Failure to find statistically significant positive impacts in other countries are possibly due to the varying degrees of implementation

of the BCF, idiosyncratic factors, and limitations in quantitative research. This possibility motivated further exploration into South Africa and Nigeria.

In addition to the impact of the BCF on resilience, the study investigated its impact on credit supply. The study did not find a positive effect as there was no increase in either the Credit/GDP ratio or annual credit growth rate after the BCF adoption. Contrarily, the study found that credit scaled by GDP per capita increased in 7 countries - Nigeria, Kenya, Algeria, Botswana, Liberia, Morocco, and Mozambique implying declining GDP or increasing population. Thus, GDP growth and population control are essential to a positive impact of banking reforms on credit supply. An investigation was similarly conducted into the impact of the BCF on banking system performance and efficiency but did not reveal positive results. Performance may have failed to improve due to bank portfolio reallocation from high-risk assets such as credit to the private sector to lower risk and lower return investments such as sovereign debt to avoid higher capital charges. The conclusion drawn from this facet of the research is that implementing the BCF can significantly improve resilience in developing countries if the macroeconomy, the business environment and other idiosyncratic factors are well controlled. For the BCF to positively affect credit supply, Credit/GDP growth must outpace population growth.

7.3 Did the implementation of Basel II/III improve banking system resilience in Nigeria specifically?

The general analysis of the impact of the BCF on African countries surprisingly did not reveal a statistically positive result in respect of Nigeria, South Africa and five other countries. The case study of Nigeria illuminated how country and bank-specific factors could influence results. The study found that implementing the BCF does not improve resilience in all banks but only in well capitalised banks compliant with regulatory requirements, and with good corporate governance. The primary reasons for the initial finding of a non-positive impact of the BCF in Nigeria were high leverage and poor corporate governance in some banks. Increased leverage and eroded capital buffers dragged down the industry Z-score, weakening overall banking sector resilience. Regulators need to weigh the pros and cons of regulatory forbearance on balance sheet insolvency and consider implementing the Basel III leverage ratio to prevent leverage from destabilising the entire industry.

The research further demonstrated that both micro-prudential and macroprudential approaches are crucial in assessing the banking industry's resilience, especially given the risk of contagion. The micro-analysis aspect of the study detected that a few banks were balance sheet insolvent, which could lead to instability in the rest of the industry. Micro-prudential analysis pinpoints precisely where bank-specific vulnerabilities exist, and this is critical as a run on one bank could have a domino effect on the rest of the industry. Again, a macroeconomic shock could affect weak and strong banks, necessitating a macroprudential approach. Concentrating on individual banks could lead to the erroneous belief that because all banks are sound, the industry is safe. At the same time, central tendency measures of financial soundness could conceal the actual position of individual banks and lead to the inaccurate conclusion that the average is representative of the industry. It should be borne in mind that a small weak bank could transmit a systemic crisis through industry linkages and erosion of confidence.

Banking system resilience exhibited high sensitivity to GDP growth and inflation in the analysis. These factors need to be considered in determining how much capital the industry should hold against economic shocks. Crisis preparedness through plausible stress testing and scenario analysis are essential in this regard. A multi-pronged approach is a vital prescription for a sound banking system and sustained resilience against financial distress and recessions.

The findings infer that the BCF improved the banking system's resilience in Nigeria subject to controlled leverage, good corporate governance, effective macroeconomic management, and a conducive business environment. The fact that the 2016 recession did not lead to a systemic banking crisis is consistent with the assertion of the success of the reforms. Furthermore, the banking system has stayed resilient to the ongoing COVID-19 crisis, albeit with regulatory support. However, the degree of this resilience needs to be stress-tested continuously. Robust reforms are a precursor to a resilient banking system, but sound macro and microeconomic management are imperative. The political will to fully implement the spirit of the reforms is crucial to ensuring the system remains resilient.

7.4 Impact of the BCF on banking system resilience in Nigeria and South Africa – A qualitative approach

To further validate the findings, a qualitative approach was employed to evaluate the impact of the BCF on Africa's two largest economies – Nigeria and South Africa. The aim was to obtain

further evidence of the impact of the BCF on banking system resilience especially as these countries initially displayed results contrary to expectations. The approach involved document content analysis and signal (factor/event) screening in the case of South Africa and an Industry survey in the case of Nigeria.

The study of South Africa revealed that despite the increase in the growth rate of capital post-BCF, the stock of capital did not increase significantly as economic shocks and losses countered the accumulation of reserves. However, this demonstrates that the capital buffers were absorbing unexpected losses as intended. Despite the GFC and other economic shocks, there were no signs of bank runs or systemic distress, lending support to the success of the BCF. Nevertheless, the effectiveness of risk management, the vigilance of the bank supervisors, and the support of the regulator during the crisis periods assisted to a large extent.

In the survey of the Nigerian banking system, the regulators and operators were mainly of the view that the BCF had improved resilience and reduced the probability of systemic distress. They also mostly reckoned that risk management in banks had improved. Similar to the quantitative findings, a significant number of respondents believed there was no evidence of improving credit supply or profitability. Instead, there were concerns that the BCF could prompt shadow banking and reduce lending to MSMEs. Reduced lending to MSMEs would harm economic welfare as MSMEs employ 80% of the population on average[41]. A survey conducted by PricewaterhouseCoopers International (PWC) in 2020 revealed that access to finance was the most pressing problem for MSMEs with the financing gap estimated to be N617 billion annually ($1.5 billion).[42] The report finds that less than 5% of SME's have access to credit despite contributing more than 50% to the country's GDP (PwC, 2020). Therefore, specific banks for MSMEs, development finance institutions and microfinance should be instituted and empowered to give more credit support.

[41] PwC. 2020. *MSME Survey 2020, Building to Last, Nigeria report*. https://www.pwc.com/ng/en/assets/pdf/pwc-msme-survey-2020-final.pdf [Accessed April 16,2022].
[42] NGN/$ = 416.2 as of Mar 1, 2022. www.cbn.gov.ng

7.5 Impact of Microfinance on Poverty Globally

In chapter 6, the impact of microfinance on poverty measured by the income shortfall from the international poverty line of $1.90 per day was examined. Its impact on health, education, employment, and living standards was also analysed. The study finds that microfinance reduces income poverty and other dimensions of poverty under conducive political, business, and macroeconomic environments. Microfinance credit was found to significantly reduce the percentage of the population living on less than $1.90 a day. By the same token, a positive impact on the Human Development Index was demonstrated. Evidently, microfinance reduces multidimensional poverty and reduces it the most when the regulatory and business environments, as well as inflation, are controlled.

The research supports the argument that microfinance can be an effective development tool globally under favourable political, regulatory and macroeconomic conditions. However, the values of the coefficients were low, suggesting that a significant amount of microfinance needs to be deployed for it to have a phenomenal impact on welfare. Augmenting the distribution of microfinance through digital means would also be beneficial. The study further finds that Sub-Saharan Africa has the highest population living in poverty and contributes the most to global poverty. Not surprisingly, it also has the least amount of microfinance loans per capita and as a percentage of GDP. East Asia and the Pacific have the highest volume of microfinance loans, contribute the least to global poverty and have the lowest percentage of the population living in poverty. These findings also apply to the Human Development Index and are consistent with the evidence of a positive relationship between microfinance and poverty reduction. The study, therefore, recommends the substantial deployment of microfinance if economic welfare is to be massively improved. The substantial deployment of microfinance should be supported with technology such as mobile money and fintech to make processes more efficient and lower their cost to the financially excluded. Microfinance still appears to be a relevant and effective tool to contribute to the achievement of the Sustainable Development Goals and put the world back on track to meet the target of ending extreme poverty by 2030. However, considering the moderate impact, governments, policymakers and development agencies might best consider its combination with other development tools for substantial transformation.

7.6 Impact of Microfinance on Poverty in Nigeria

Chapter 7 deconstructed microfinance and explored the impact of savings, credit, and the COVID-19 pandemic on poverty in Nigeria. It further examined the impact of economic shocks on microfinance banks. The use of a Propensity Score Matching estimator made the findings generalisable to other developing countries under the same conditions as treated households were compared with non-treated households with similar predispositions. The initial analysis found that the rural sector, Moslems, monogamous marriages, people between ages 50 and 75, and the less educated are most likely to save in microfinance banks. Similarly, the rural sector, Christians, males, and people between the ages of 25 and 50 had the highest propensity to borrow. These characteristics are likely to apply to the financially excluded anywhere in the world. It would therefore be helpful for policy makers and microfinance practitioners to bear these features in mind in designing microfinance products for the financially excluded.

The study further finds that there has been an uneven change in poverty rates in Nigeria over the years. As of 2019, Lagos State had the least poverty headcount while Sokoto State had the highest. Between 2004 and 2019, poverty increased the most in Taraba state and reduced to the greatest extent in Kwara State. Lagos state has the highest number of microfinance banks in Nigeria[43], suggesting that higher financial inclusion contributed to its lower poverty status.

The study investigated (i) Whether households with access to microcredit have better living standards than those without, (ii) Whether households with micro-savings have better living standards (iii) Whether the COVID-19 crisis led to reduced resilience in households, thereby aggravating poverty in Nigeria and (iv) Whether economic crises, including COVID-19, led to reduced resilience in Microfinance institutions and thus reduced the benefits of microfinance in Nigeria. The results revealed that micro-savings positively impact food security, health care, and education but do not seem to influence food consumption, household assets, and the quality and ownership of dwelling. Microcredit adversely impacted food security but positively impacted food and non-food consumption. It further had a positive impact on the

[43] The List of 882 CBN-Licensed Microfinance Banks in Nigeria As At Sept 30, 2018 (proshareng.com)

quality of dwelling and health care but does not appear to boost the ownership of dwelling and spending on education.

MFI savers were found to be less food insecure relative to non-MFI savers but more food insecure than the financially excluded. This is surprising and could be due to easier access to savings for the financially excluded as they do not have to go through the hurdles of a formal financial institution to retrieve their money. The results suggest that Microfinance institutions need to enhance the ease of access and attractiveness of their services to the financially excluded. Only 34% of the households surveyed saved with formal financial institutions while 96% of the households' obtained loans from friends, cooperative societies, savings associations, and money lenders. The low percentage obtaining finance from formal financial institutions raises questions about the reasons for the skewness. Possible explanations include easier access and less stringent documentation and collateral requirements of informal institutions. High interest rates could also be a reason, but then money lenders reportedly charge even more exorbitant rates. Thus, increasing the provision of savings and loans facilities and relaxing the constraints to access are opportunities that microfinance institutions could exploit to benefit both the institutions and the economically active poor.

The study further revealed some remarkable behavioural insights. Microfinance savings were found to lead to prudence in food expenditure, as savers endeavoured to purchase higher quantities at a lower cost. The prudence could be due to the need for compulsory savings to obtain a loan, providing an incentive for frugality in expenditure. Microfinance savers also exhibited higher spending on healthcare and education than the financially excluded. Microfinance borrowers were found to spend significantly higher on household assets such as furniture, electronics, computers, and mobile phones. However, even though microfinance borrowers live in better quality dwellings, they are less likely to own their homes than the financially excluded. A contributory factor could be that the financially excluded live in lower quality but more affordable homes. The lack of affordability of high-quality homes highlights the need for housing microfinance as an essential product for raising living standards.

Using the Simple Poverty Scorecard, poverty rates in Nigeria grew by 0.7% from the pre to the post strict lockdown period from 2019 to 2020. However, the scorecard is based on asset ownership and may underestimate the impact of the shock within a short period. Further

analysis revealed that food insecurity immediately increased due to the lockdown, especially for the financially excluded. There were differential impacts for different country zones, with the North-Central, North-East, North-West, and South-South zones being the worst hit.

The investigation into the impact of shocks and the COVID-19 pandemic revealed that the resilience of microfinance institutions was adversely affected. However, during the earlier banking crisis years from 2010 to 2011, the adverse effect was mitigated probably due to the massive liquidity injection by the Central Bank of Nigeria. This containment underscores the need for government support and intervention during crises to sustain the poverty alleviating mission of microfinance.

Microfinance institutions need to address hurdles that make them unattractive, such as accessibility and high-interest rates, in order to capture the vast financially excluded population. Also, introducing new products such as micro-mortgages would be beneficial as homes usually constitute a substantial portion of wealth. Micro-education loans may also be helpful as micro-credit did not positively influence education. Microfinance institutions usually give small loans for trading and entrepreneurial purposes that will yield a quick return. Education only yields long-term benefits and therefore not typically in the remit of microfinance banks. However, microfinance could offer indirect benefits through increased income which can later be deployed to education.

The economic shock from COVID-19 was detrimental for all and there is no telling yet the far-reaching implications this shock may have on low-income and vulnerable households. For the financially excluded, the impact would be even more extensive. It is essential to prevent this shock from destroying years of positive impacts of microfinance. Given the benefits offered by microfinance and potential household instability if discontinued, the government, regulators and donors are encouraged to sustain and deepen support for the industry.

7.7 Final words

This research makes explicit the connection between the issue of bank regulation/reform and the issue of microfinance, and how these both interact with the issue of poverty and poverty reduction.

Overall, this research has produced strong evidence that the Basel II/III capital reforms conditionally strengthen banking system resilience. The reforms revealed a statistically positive impact in five African countries. Where a positive impact was not found, further analysis showed that the reasons were mainly idiosyncratic, which, if controlled, would result in improved resilience. Banking system resilience implies diminished loss of economic output from crises and improved economic welfare. The research also produced consistent and robust evidence that microfinance has the potential to reduce poverty and improve economic welfare for the vulnerable and financially excluded in developing countries. However, a combined strategy of substantial deployment and other developmental tools is required for a truly transformative effect.

7.7.1 The strengths and limitations of the research

This research applies both quantitative and qualitative means of investigation. It uses new data and advanced econometric specifications. It also conducts a considerable amount of robustness checks. Through thorough and comprehensive analysis, it uncovers the impact of the whole suite of Basel reforms on Africa which has never been done before.

Furthermore, this research uncovers the multidimensional impact of microfinance on dimensions of economic welfare through robust methods and is the first study to link resilient banking systems and access to credit to improved economic welfare.

However, some limitations exist. In the quantitative research, there were a few methodological challenges. For instance, the fixed effects estimator has its advantages and takes care of time invariant omitted variables but is not as accurate as the random effects estimator. The random effects estimator was found to be unsuitable in some instances in this research. Alternative quantitative models of systemic risk rather than the Z-score, such as quantile regression with fixed effects, SRISK, and ΔCovariance could have been used. This is left for future research.

Other limitations include not investigating the impact of high interest rates in the microfinance industry. This is also left for future research. The post COVID data was insufficient and thus further research needs to be conducted when more data is available.

The failure to include consumer perceptions of the microfinance impact is also considered a limitation. Also, bootstrapping standard errors in the microfinance study required a lot of computer time and this study may not have conducted sufficient bootstrapping in some instances.

On the part of the qualitative research, it provided more detailed information to explain complex issues and fill in the gaps in the quantitative research. There were also multiple methods for gathering data. This study utilised document screening and analysis for signs, factors, events, and indicators that support or disagree with the efficacy of the BCF. It also used survey data. However, document analysis is more difficult to analyse as the data do not fit into standard quantitative categories. That is why an adaptation of the signal screening methodology was used in this study. Secondly, the analysis is only as good as the documents obtained and screened. There is a possibility that some important documents were overlooked. However, in this study, the search for relevant documents was as exhaustive as possible.

Similar limitations apply to survey data. While surveys enable the collection of personal views and other factors that cannot be picked quantitatively, the collection was time consuming. Other limitations include the risk that respondents may not provide accurate and honest answers; respondents may not respond leading to incomplete data; and there might be acquiescence bias where respondents get bored and agree or disagree randomly with the questions. However, the response rate was satisfactory in this study and some of the questions were reversed coded to limit acquiescence bias as much as possible.

7.8 Future Research

This research investigated the impact of the BCF on banking resilience in Africa using data from the 12 African countries that had implemented the BCF as of 2017. Between 2018 and 2022, another 17 countries had implemented the BCF thus providing sufficient post implementation data to extend this study. Also, this study was restricted to the BCF, which is only one out of several reforms impacting the banking sector. It would be beneficial to explore the impact of other reforms such as new international financial reporting standards that emanated from the GFC. A case in point is IFRS 9 on loan loss provisioning. Proactive loan loss

provisioning based on IFRS 9 appears to have affected South Africa's Z-score. The impact of the BCF on banking system resilience was estimated using the Z-score and CAMELS in this study. Future studies could be strengthened by applying SRISK and ΔCOVAR models.

The impact of high interest rates and accessibility on microfinance is also crucial. This research revealed the financially excluded to be better off in a few respects. Accessibility and interest rates could be contributory factors. For instance, why are the financially excluded more food secure than those with microfinance? The impact of other products such as micro-insurance, micro-pensions and housing microfinance on poverty alleviation is also worth exploring. As technology is now taking centre stage, it would be beneficial to investigate how this improves microfinance delivery and efficiency. Finally, it is too soon after COVID-19 to thoroughly explore its impact on financial exclusion, poverty alleviation and microfinance institutions. More time needs to elapse. It would be worthwhile extending the impact analysis in this study when more data is available.

Appendix XIII lists some surprising findings that may be worth exploring in future research.

References

Abadie, A. & Imbens, G. W. 2008. On the Failure of the Bootstrap for Matching Estimators. *Econometrica,* 76**,** 1537-1557. https://doi.org/10.3982/ECTA6474

Abba, G. O., Zachariah P., Inyang E., 2013. Research Journal of Finance and Accounting ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online) Vol.4, No.17, 2013

Abdel-Baki, M. (2012). Forecasting the Costs and Benefits of Implementing Basel III for North African Emerging Economies: An Application to Egypt and Tunisia. African Development Bank Economic Brief - Forecasting the Costs and Benefits of Implementing Basel III for North African Emerging Economies: An Application to Egypt and Tunisia | African Development Bank - Building today, a better Africa tomorrow (afdb.org)

Abdelrahman, M. 2019. A Conversation with Ha-Joon Chang. *Development and Change*. University of Cambridge *0* (2), 573-591. https://doi.org/10.1111/dech.12482

Abercrombie, N., Hill, S. & Turner, B. S. 2006. *The Penguin Dictionary of Sociology (5th ed., pp. 74-75),* Penguin.

Acerbi, C., Nordio, C. & Sirtori, C. 2001. Expected shortfall as a tool for financial risk management. *arXiv preprint cond-mat/0102304*.

Adesina, A. A. 2017. Keynote speech delivered by Akinwumi A. Adesina, President of the African Development Bank Group, at the Annual Meeting of the African Development Bank Group, Ahmedabad, India, May 22-25, 2017.

Adesina, K. S. 2019. Basel III liquidity rules: The implications for bank lending growth in Africa. *Economic Systems,* 43**,** 100688. https://doi.org/10.1016/j.ecosys.2018.10.002

Adesina, K. S. & Mwamba, J. M. 2016. Do Basel III Higher Common Equity Capital Requirements Matter for Bank Risk-taking Behaviour? Lessons from South Africa. *African Development Review,* 28**,** 319-331.

Adeyemo, F. 2022. Banking Regulation in Africa: The Case of Nigeria and Other Emerging Economies *(1st ed.).,* United Kingdom, Routledge.

Admati, A. & Hellwig, M. 2012. *The Bankers' New Clothes: What's wrong with banking and what to do about it.*, Princeton University Press.

Admati, A. R., Demarzo, P. M., Hellwig, M. & Pfleiderer, P. 2010. Fallacies, irrelevant facts, and myths in the discussion of capital regulation: Why bank equity is not expensive. Preprints of the Max Planck Institute for Research on Collective Goods.

Adrian, T. & Brunnermeier, M. K. (2009). "CoVaR", Staff Reports 348, Federal Reserve Bank of New York.

Agbonkpolor, T. 2010. Risk management and regulatory failures in banking: Reflections on the current banking crisis in Nigeria. *Journal of Banking Regulation,* 11**,** 146-155.

Aghion, P. & Bolton, P. 1997. A Theory of Trickle-Down Growth and Development. *The Review of Economic Studies,* 64**,** 151-172. 10.2307/2971707

Agresti, A. (2002). Categorical data analysis (2nd ed.). Wiley.

Agudo, F. L., Daza, J. G. & Querol, S. S. 2015. Responsible investment in Spain. *The Routledge Handbook of Responsible Investment.*

Ahmed, I. & Kitenge, E. 2021. Microfinance outreach and aggregate welfare. *Journal of International Development*, pp. 652-669

Aigbokhan, B. E. & Asemota, A. E. 2011. An assessment of microfinance as a tool for poverty reduction and social capital formation: Evidence on Nigeria. *Global Journal of Finance & Banking Issues,* 5, pp. 38 - 48.

Alhammadi, S., Archer, S., Padgett, C. & Karim, R. a. A. 2018. Perspective of corporate governance and ethical issues with profit sharing investment accounts in Islamic banks. *Journal of Financial Regulation and Compliance*, pp. 406-424

Aljazeera 2021. Nigeria slips into recession.
Alkire, S., Roche, J. M., Ballon, P., Foster, J., Santos, M. E. & Seth, S. 2015. *Multidimensional poverty measurement and analysis*, Oxford University Press, USA.
Allen, S. L. 2012. *Financial Risk Management: A Practitioner's Guide to Managing Market and Credit Risk*, John Wiley & Sons.
Allen, W. A. & Wood, G. 2006. Defining and achieving financial stability. *Journal of Financial Stability,* 2**,** 152-172. https://doi.org/10.1016/j.jfs.2005.10.001
Altman, E. I. 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance,* 23**,** 589-609.
Altunbas, Y., Carbo-Valverde, S., & Marques-Ibanez, D. (2011). Bank risk and monetary policy. Journal of Financial Stability, 7(4), 196-204.

Ang, A. 2014. *Asset management: A systematic approach to factor investing*, Oxford University Press.
Angrist, J. D. & Pischke, J. 2008. *Mostly harmless econometrics: An empiricist's companion*, Princeton university press.
Anthony Colegrave Allen & Overy (South Africa) Llp 2021. Banking Regulation in South Africa: Overview. *Thomson Reuters Practical Law*.
Antoniades, A., Widiarto, I. & Antonarakis, A. S. 2020. Financial crises and the attainment of the SDGs: an adjusted multidimensional poverty approach. *Sustainability Science,* 15**,** 1683-1698.
Antony, G. & Laxmaiah, A. 2008. Human development, poverty, health & nutrition situation in India. *Indian Journal of Medical Research,* 128**,** 198.
Arch, L. 2018. *The Regulation of the London Clearing Banks, 1946-1971 : Stability and Compliance,* Cham, SWITZERLAND, Palgrave Macmillan UK.
Arch, L. 2020. "If competition has any virtue, we ought not to have a system that stifles it": Competition in London Clearing Banking, 1946–1971. *Enterprise & Society, 22, 770-807*. https://doi.org/10.1017/eso.2020.21
Arellano, M. & Bover, O. 1995. Another look at the instrumental variable estimation of error-components models. . *Journal of Econometrics* 68: 29-51.
Ashraf, N., Karlan, D. & Yin, W. 2010. Female empowerment: Impact of a commitment savings product in the Philippines. *World development,* 38**,** 333-344.
Attah, G. S., Björn Bernhardt, Anselm Dannecker, Brock Hoback & Ulrich, S. 2015. Loan Pricing of Nigerian Microfinance Banks: Survey & Methods of Assessment. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
Aturupane, H., Glewwe, P. & Isenman, P. 1994. Poverty, human development, and growth: an emerging consensus? *The American Economic Review,* 84**,** 244-249.
Augsburg, B., De Haas, R., Harmgart, H. & Meghir, C. 2015. The impacts of microcredit: Evidence from Bosnia and Herzegovina. *American Economic Journal: Applied Economics,* 7**,** 183-203.
Babihuga, R. 2007. *Macroeconomic and financial soundness indicators: An empirical investigation*, International Monetary Fund.
Baesens, B., Roesch, D. & Scheule, H. 2016. *Credit risk analytics: Measurement techniques, applications, and examples in SAS*, John Wiley & Sons.
Baker, M. & Wurgler, J. 2015. Do Strict Capital Requirements Raise the Cost of Capital? Bank Regulation, Capital Structure, and the Low-Risk Anomaly. *American Economic Review: Papers and proceedings,* 105**,** 315-320.
Baldacci, E., De Mello, L. & Inchauste, G. 2002. Financial crises, poverty, and income distribution. *Macroeconomic Policies and Poverty Reduction,* 269.
Baldwin, R. 2020. Keeping the lights on: Economic medicine for a medical shock. *VoxEU. org,* 13.
Banerjee, A., Breza, E., Duflo, E. & Kinnan, C. 2019. Can microfinance unlock a poverty trap for some entrepreneurs? : National Bureau of Economic Research.

Banerjee, A., Duflo, E., Glennerster, R. & Kinnan, C. 2015a. The miracle of microfinance? Evidence from a randomized evaluation. *American Economic Journal: Applied Economics,* 7**,** 22-53.
Banerjee, A., Duflo, E. & Sharma, G. 2020. Long-term Effects of the Targeting the Ultra Poor Program. National Bureau of Economic Research.
Banerjee, A., Karlan, D. & Zinman, J. 2015b. Six randomized evaluations of microcredit: Introduction and further steps. *American Economic Journal: Applied Economics,* 7**,** 1-21.
Banerjee, A. V. & Newman, A. F. 1993. Occupational choice and the process of development. *Journal of political economy,* 101**,** 274-298.
Banks Act 1990. Banks Act 94 oF 1990.
Barakat, A. & Hussainey, K. 2013. Bank governance, regulation, supervision, and risk reporting: Evidence from operational risk disclosures in European banks. *International Review of Financial Analysis,* 30**,** 254-273.
Barinaga, E. 2014. Microfinance in a developed welfare state: A hybrid technology for the government of the outcast. *Geoforum,* 51**,** 27-36.
Barth, James R. and Caprio, Gerard and Levine, Ross Eric, The Evolution and Impact of Bank Regulations (December 1, 2012). World Bank Policy Research Working Paper No. 6288, Available at SSRN: https://ssrn.com/abstract=2188801
Barro, R. J. & Gordon, D. B. 1983. Rules, discretion and reputation in a model of monetary policy. *Journal of monetary economics,* 12**,** 101-121.
Barro, R. J. & Lee, J.-W. 2018. Dataset of Educational Attainment, June 2018 Revision.
Basel Committee on Banking Supervision. 2006. *Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version. BIS*. https://www.bis.org/publ/bcbs128.htm [Accessed April 23, 2020].
Basel Committee on Banking Supervision 2008. Principles for Sound Liquidity Risk Management and Supervision
Basel Committee on Banking Supervision. 2011. *Basel III: Global Regulatory Framework for more Resilient Banks and Banking Systems. BIS*. https://www.bis.org/publ/bcbs189.htm [Accessed March 30, 2020].
Basel Committee on Banking Supervision 2014. Supervisory framework for measuring and controlling large exposures
Basel Committee on Banking Supervision 2019. Calculation of RWA for operational risk.
Bator, F. M. 1958. The anatomy of market failure. *The quarterly journal of economics,* 72**,** 351-379.
Baum, C. F., Schaffer, M. E. & Stillman, S. 2002. IVREG2: Stata module for extended instrumental variables/2SLS and GMM estimation. Boston College Department of Economics.
Bauwin, M., Ada & Cerise 2019. Social Performance Management in Microfinance: Practices, Results and Challenges
Beck, T. 2015. Microfinance—A Critical Literature Survey. *Independent Evaluation Group, The World Bank Group*.
Beck, T. 2016. Finance, Institutions and Development: Literature Survey and Research Agenda *Economic Development Institutions - EDI working paper series WP16/7*
Beck, T., Da-Rocha-Lopes, S. & Silva, A. F. 2020. Sharing the Pain? Credit Supply and Real Effects of Bank Bail-ins. *The Review of Financial Studies,* 34**,** 1747-1788. 10.1093/rfs/hhaa067
Beck, T., Demirgüç-Kunt, A. & Levine, R. 2006. Bank concentration, competition, and crises: First results. *Journal of Banking & Finance,* 30**,** 1581-1603. https://doi.org/10.1016/j.jbankfin.2005.05.010
Beck, T., Demirgüç-Kunt, A. & Levine, R. 2007. Finance, inequality and the poor. *Journal of Economic Growth,* 12. DOI: 10.1007/s10887-007-9010-6
Beck, T., Jones, E. & Knaack, P. 2018. Mind the gap: Making Basel standards work for developing countries. *GEG Policy Brief. Oxford: Global Economic Governance Programme, University of Oxford. Accessed August,* 11**,** 2019.

Beltratti, A. & Stulz, R. M. 2012. The credit crisis around the globe: Why did some banks perform better? *Journal of financial economics,* 105**,** 1-17.

Ben Naceur, S. & Kandil, M. 2009. The impact of capital requirements on banks' cost of intermediation and performance: The case of Egypt. *Journal of Economics and Business,* 61**,** 70-89. https://doi.org/10.1016/j.jeconbus.2007.12.001

Ben Naceur, S. & Kandil, M. 2013. Has the Basel capital requirement caused credit crunch in the MENA region? *Middle East Development Journal,* 5**,** article 1350014, 1-33. https://doi.org/10.1142/S1793812013500144

Berger, A. N., Herring, R. J. & Szegö, G. P. 1995. The role of capital in financial institutions. *Journal of Banking & Finance,* 19**,** 393-430.

Bergh, D., Connelly, B., Kitchen, D., & Shannon, L. (2014). Signalling theory and equilibriumin strategic management research: An assessment and research agenda. Journal of Management Studies, 51, 1334–136

Berglöf, E. & Claessens, S. 2006. Enforcement and good corporate governance in developing countries and transition economies. *The World Bank Research Observer,* 21**,** 123-150.

Berry, C., Ryan-Collins, J. & Greenham, T. 2015. *Financial System Resilience Index. New Economics Foundation*. https://neweconomics.org/2015/06/financial-system-resilience-index [Accessed March 4, 2020].

Bessis, J. 2011. *Risk management in banking*, John Wiley & Sons.

Better Regulation Task Force 2003. Principles of Good Regulation. *In:* CABINET-OFFICE.X.GSI.GOV.UK (ed.). UK: Crown.

Bhorat, H., Hirsch, A., Kanbur, R. & Ncube, M. 2014. *The oxford companion to the economics of South Africa*, OUP Oxford.

BIS 2003. A glossary of terms used in payments and settlement systems Bank for International Settlements. This publication is available only on the BIS website (www.bis.org)

BIS Central Bankers' Speeches. 2014. *Gill Marcus: Press conference in connection with African Bank Limited*. https://www.bis.org/review/r140812a.pdf [Accessed February 10, 2022].

BIS: Bank for International Settlements. 2014. *History of the Basel Committee. BIS.* https://www.bis.org/bcbs/history.htm [Accessed April 01, 2020].

Bitar,M., Saad W., Benlemlih M., Bank risk and performance in the MENA region: The importance of capital requirements, Economic Systems, Volume 40, Issue 3, 2016, Pages 398-421, ISSN 0939-3625, https://doi.org/10.1016/j.ecosys.2015.12.001.

Black, F. & Scholes, M. 1973. The pricing of options and corporate liabilities. *Journal of political economy,* 81**,** 637-654.

Black, J. 2001. Decentring Regulation: Understanding the Role of Regulation and Self-Regulation in a 'Post-Regulatory' World. *Current Legal Problems,* 54**,** 103-146. 10.1093/clp/54.1.103

Blinder, A. S. 2008. Keynesian economics. *The concise encyclopedia of economics,* 2.

Bloom, D. E., Kuhn, M. & Prettner, K. 2017. Africa's prospects for enjoying a demographic dividend. *Journal of Demographic Economics,* 83**,** 63-76.

Bloom, D. E. & Williamson, J. G. 1998. Demographic transitions and economic miracles in emerging Asia. *The World Bank Economic Review,* 12**,** 419-455.

Blundell, R. & Bond, S. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics,* 87**,** 115-143.

Bó, E. D. 2006. Regulatory Capture: A review. *Oxford Review of Economic Policy,* 22**,** 203-225. 10.1093/oxrep/grj013

Boateng, A., Boateng, G., Acquah, H. 2014. Literature Review of Fraud Risk Management in Micro Finance Institutions in Ghana (June 30, 2014). Research Journal of Finance and Accounting, Vol. 5, No. 11, 2014, Available at SSRN: https://ssrn.com/abstract=2537768

Bodie, Z. & Kane, A. 2020. Investments, McGraw−Hill Primis ISBN: 0−390−32002−1

BOFIA 1991. Banks and Other Financial Institutions Act 1991 (as Amended In 1997, 1998, 1999 and 2002)

Borio, C. 2009. 1.3 The macroprudential approach to regulation and supervision. *Post-Crisis Banking Regulation,* Centre for Economic Policy Research press, pp.23 - 30

Boudriga, A., Taktak, N. B. & Jellouli, S. 2009. Banking supervision and nonperforming loans: a cross-country analysis. *Journal of Financial Economic Policy, 1, 286-318.* . https://doi.org/10.1108/17576380911050043

Bouman, J. 2010. *Principles of Microeconomics*, Kendall Hunt.

Bouslah, K. 2015. Responsible investment in Tunisia. *The Routledge Handbook of Responsible Investment.* Routledge.

Bouslah, K., Li, Q. & Mobarek, A. What Drives the Social Performance of Microfinance Institutions? The Role of Gender Board Diversity. Academy of Management Proceedings, 2021. Academy of Management Briarcliff Manor, NY 10510, 13849.

Bouteille, S. & Coogan-Pushner, D. 2012. *The handbook of credit risk management: originating, assessing, and managing credit exposures*, John Wiley & Sons.

Bouvatier, V., Lepetit, L., Rehault, P.-N. & Strobel, F. 2018. Bank insolvency risk and Z-score measures: caveats and best practice. *Available at SSRN 2892672*.

Boyd, J. H. & Graham, S. L. 1986. Risk, regulation, and bank holding company expansion into nonbanking. *Quarterly Review***,** 2-17.

Boyd, J. H. & Runkle, D. E. 1993. Size and performance of banking firms: Testing the predictions of theory. *Journal of monetary economics,* 31**,** 47-67.

Bradshaw, T. K. 2007. Theories of poverty and anti-poverty programs in community development. *Community Development,* 38**,** 7-25.

Brodeur, A., Gray, D., Islam, A. & Bhuiyan, S. 2021. A literature review of the economics of COVID-19. *Journal of economic surveys,* Volume 35, Issue 4**,** 1007-1044. https://doi.org/10.1111/joes.12423

Brooks, C. 2019. *Introductory Econometrics for Finance*, Cambridge University Press.

Brown, C. O. & Dinç, I. S. 2011. Too many to fail? Evidence of regulatory forbearance when the banking sector is weak. *The Review of Financial Studies,* 24**,** 1378-1405.

Bruhn-Leon, B., Eriksson, P.-E. & Kraemer-Eis, H. 2012. Progress for microfinance in Europe. EIF Working Paper.

Bruhn, M. & Love, I. 2014. The real impact of improved access to finance: Evidence from Mexico. *The Journal of Finance,* 69**,** 1347-1376.

Brune, L., Giné, X., Goldberg, J. & Yang, D. 2016. Facilitating savings for agriculture: Field experimental evidence from Malawi. *Economic Development and Cultural Change,* 64**,** 187-220.

Buera, F. J., Kaboski, J. P. & Shin, Y. 2013. The Macroeconomics of Microfinance. *National Bureau of Economic Research*.

Buera, F. J., Kaboski, J. P. & Shin, Y. 2021. The macroeconomics of microfinance. *The Review of Economic Studies,* 88**,** 126-161.

Businesstech. 2018. *All the South African banks that have failed in the last 30 years*. https://businesstech.co.za/news/banking/231009/all-the-south-african-banks-that-have-failed-in-the-past-30-years/ [Accessed February 09, 2022].

Busse, M. & Hefeker, C. 2007. Political risk, institutions and foreign direct investment. *European journal of political economy,* 23**,** 397-415.

Caliendo, M. & Kopeinig, S. 2008. Some practical guidance for the implementation of propensity score matching. *Journal of economic surveys,* 22**,** 31-72.

Calomiris, C. W. & Haber, S. H. 2015. *Fragile by design: The political origins of banking crises and scarce credit*, Princeton University Press.

Calomiris, C. W. & Hubbard, R. G. 1985. Price Flexibility, Credit Rationing, and Economic Fluctuations: Evidence from the US, 1879-1914. *NBER Working Paper*.

Cameron, A. C., Trivedi, P. K., Trivedi, P. K., Trivedi, P. K., Press, C. U., Library, E. & Corporation, E. 2005. *Microeconometrics: Methods and Applications*, Cambridge University Press.

Campbell, A. 2020. *The Adoption and Implementation of the Recommendations from Basel in the Context of the African Financial system [PowerPoint presentation]*. Standard Bank Group. http://www.abanc.ao/content/files/12.2_-abanc_presentation_12_november_2020_a_schnaar-campbell.pdf [Accessed June 01, 2021].

Campbell, S. 2005. Determining overall risk. *Journal of risk research,* 8**,** 569-581.

Carter, S.M. 2006. The interaction of top management group, stakeholder, and situational factors on certain corporate reputation management activities. *Journal of Management Studies*, 43: 1146-1176

Casu, B., Deng, B. & Ferrari, A. 2017. Post-crisis regulatory reforms and bank performance: lessons from Asia. *The European Journal of Finance,* 23**,** 1544-1571. 10.1080/1351847X.2016.1177566

Certo, S.T., Daily, C.M., & Dalton, D.R. 2001. Signalling firm value through board structure: An investigation of initial public offerings. *Entrepreneurship Theory and Practice*, 26(2): 33-50.

CBN 2010a. CBN scope, conditions and minimum standards for Commercial Banks Regulations No. 01.

CBN 2010b. Financial Stability Report Central Bank of Nigeria.

CBN. 2011. *Banking Sector Reforms In Nigeria*. Central Bank of Nigeria. https://www.cbn.gov.ng/Out/2015/MPD/UNDERSTANDING%20MONETARY%20POLICY%20SERIES%207.pdf [Accessed 19/11/2019].

CBN 2014. Consolidated Banking Supervision Annual Reports 2009 to 2014. Central Bank of Nigeria.

CBN 2018. LIST OF DEPOSIT MONEY BANKS AND FINANCIAL HOLDING COMPANIES OPERATING IN NIGERIA AS AT SEPTEMBER 30, 2018.

CBN 2020a. Central Bank of Nigeria Communiqué no. 131 of the 274th Monetary Policy Committee meeting of 20th July 2020.

CBN 2020b. Central Bank of Nigeria Communiqué No. 133 of the Monetary Policy Committee of the 24th of November 2020

Central Bank of Liberia 2017. Annual Report.

Central Bank of Nigeria 2005. Microfinance Policy, Regulatory and Supervisory Framework for Nigeria

Central Bank of Nigeria 2009. Annual Report and Statement of Account for the year ended 31st December 2009.

Central Bank of Nigeria 2010. Prudential Guidelines for Deposit Money Banks in Nigeria

Central Bank of Nigeria. 2011a. *Annual Report 2011*. https://www.cbn.gov.ng/Out/2012/publications/reports/rsd/arp-2011/Chapter%201%20-%20Corporate%20Activities%20of%20the%20CBN.pdf [Accessed March 26, 2022].

Central Bank of Nigeria 2011b. MICROFINANCE POLICY FRAMEWORK FOR NIGERIA Revised April 2011.

Central Bank of Nigeria 2011c. Supervisory Intervention Framework for the Nigerian Banking System.

Central Bank of Nigeria 2013. Guidance Notes on Regulatory Capital.

Central Bank of Nigeria 2018. Financial Stability Report- December 2018.

Central Bank of Nigeria 2021. Quarterly Statistical Bulletin. 12 July 2021 ed.

CGAP 2004. Financial Institutions with a "Double Bottom Line": Implications for the future of Microfinance.

Chaibia, H. & Ftiti, Z. 2015. Credit risk determinants: Evidence from a cross-country study. *Research in International Business and Finance,* 33**,** 1 -16.

Chang, H.-J. 2012. *23 things they don't tell you about capitalism*, Bloomsbury Publishing USA.

Chapelle, A. 2019. *Operational Risk Management Best Practices in the Financial Services Industry*, John Wiley & Sons, Ltd.

Chen, W., Hamori, S. & Kinkyo, T. 2016. Banking sector resilience to financial spillovers. *Applied Economics Letters,* 24**,** 422-426. https://doi.org/10.1080/13504851.2016.1200173
Chiaramonte, L., Liu, H., Poli, F. & Zhou, M. 2016. How accurately can Z-score predict bank failure? *Financial Markets, Institutions & Instruments,* 25**,** 333-360. https://doi.org/10.1111/fmii.12077
Chortareas, G. E., Girardone, C. & Ventouri, A. 2012. Bank supervision, regulation, and efficiency: Evidence from the European Union. *Journal of Financial Stability,* 8**,** 292-302. https://doi.org/10.1016/j.jfs.2011.12.001
Christen, R. P., Lyman, T. R. & Rosenberg, R. 2003. Microfinance Consensus Guidelines. *CGAP/The World Bank Group*.
Cihak, M., Demirgüç-Kunt, A., Feyen, E. & Levine, R. 2012. Benchmarking financial systems around the world [Policy Research Working Paper No. WPS 6175]. http://documents.worldbank.org/curated/en/868131468326381955/Benchmarking-financial-systems-around-the-world
Čihák, M. & Schaeck, K. 2010. How well do aggregate prudential ratios identify banking system problems? *Journal of Financial Stability,* 6**,** 130-144. https://doi.org/10.1016/j.jfs.2010.03.001
Cintina, I. & Love, I. 2019. Re-evaluating microfinance: evidence from propensity score matching. *The World Bank Economic Review,* 33**,** 95-115.
Claessens, S. 2006. Access to financial services: A review of the issues and public policy objectives. *The World Bank Research Observer,* 21**,** 207-240.
Claessens, S., 1993. *Risk management in developing countries* (Vol. 235). World Bank Publications.
Cochrane, J. H. 2009. *Asset pricing: Revised edition*, Princeton university press.
Coleman, B. E. 1999. The impact of group lending in Northeast Thailand. *Journal of development economics,* 60**,** 105-141.
Collins, D., Morduch, J., Rutherford, S. & Ruthven, O. 2009. Princeton University Press.
Connelly, B., Certo,T., Ireland, D., & Reutzel, C.(2011). Signaling theory:A review and assessment. Journal of Management, 37, 39–6
Cameron, A. C., & Trivedi, P. K. (2013). Regression analysis of count data (2nd ed.). Cambridge University Press.
Consultative Group to Assist the Poor 2009. The Impact of the Financial Crisis on Microfinance Institutions and Their Clients. *FinDev Gateway - a program of CGAP*.
Corsetti, G., Pesenti, P. & Roubini, N. 1999. What caused the Asian currency and financial crisis? *Japan & The World Economy,* 11**,** 305-373. 10.1016/S0922-1425(99)00019-5
Cotler, P. & Woodruff, C. 2008. The impact of short-term credit on microenterprises: evidence from the Fincomun-Bimbo program in Mexico. *Economic Development and Cultural Change,* 56**,** 829-849.
Crépon, B., Devoto, F., Duflo, E. & Parienté, W. 2015. Estimating the impact of microcredit on those who take it up: Evidence from a randomized experiment in Morocco. *American Economic Journal: Applied Economics,* 7**,** 123-50.
Crockett, A. 2000. Marrying the micro-and macro-prudential dimensions of financial stability. *BIS speeches,* 21.
Crouhy, M., Galai, D. & Mark, R. 2006. *The essentials of risk management*, McGraw-Hill New York.
Cull, R., Demirgüç-Kunt, A. & Lyman, T. 2012. Financial inclusion and stability: What does research show?
Cull, R., Demirgüç-Kunt, A. & Morduch, J. 2009. Microfinance meets the market. *Journal of Economic perspectives,* 23**,** 167-92.
Cull, R. & Morduch, J. 2017. Microfinance and economic development. The World Bank.
D'amico, G., Di Biase, G., Janssen, J. & Manca, R. 2017. *Semi-Markov Migration Models for Credit Risk*, Wiley Online Library.

Dahal, M. & Fiala, N. 2020. What do we know about the impact of microfinance? The problems of statistical power and precision. *World Development,* 128**,** 104773.
Danisewicz, P., Mcgowan, D., Onali, E. & Schaeck, K. 2018. The real effects of banking supervision: Evidence from enforcement actions. *Journal of Financial Intermediation,* 35**,** 86-101. 10.1016/j.jfi.2016.10.003
Davis, E. P. & Sanchez-Martinez, M. 2015. *Economic theories of poverty*, Joseph Rowntree Foundation.
De Haan, J., Pleninger, R. & Sturm, J.-E. 2021. Does financial development reduce the poverty gap? *Social Indicators Research***,** 1-27.
De Haas, R. & Van Horen, N. 2012. International shock transmission after the Lehman Brothers collapse: Evidence from syndicated lending. *American Economic Review,* 102**,** 231-37.
De Jongh, E., De Jongh, D., De Jongh, R. & Van Vuuren, G. 2013. A review of operational risk in banks and its role in the financial crisis. *South African Journal of Economic and Management Sciences,* 16**,** 364-382.
Dehejia, R. & Lleras-Muney, A. 2007. Financial Development and Pathways of Growth: State Branching and Deposit Insurance Laws in the United States, 1900–1940. *The Journal of Law and Economics,* 50**,** 239-272. 10.1086/511322
Dehejia, R. H. & Wahba, S. 1999. Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs. *Journal of the American statistical Association,* 94**,** 1053-1062.
Dehejia, R. H. & Wahba, S. 2002. Propensity score-matching methods for nonexperimental causal studies. *Review of Economics and statistics,* 84**,** 151-161.
Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. & Hess, J. 2018. The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution.
Devinaga, R. 2010. Journal of Performance Management, Mar 2010, Vol. 23 Issue 1, p23-49.
Diamond, D. W. & Dybvig, P. H. 1983. Bank runs, deposit insurance, and liquidity. *Journal of political economy,* 91**,** 401-419.
Diamond, D. W. & Rajan, R. G. 2000. A theory of bank capital. *the Journal of Finance,* 55**,** 2431-2465.
Dimaggio, P. J. & Powell, W. W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review,* 48**,** 147-160. https://doi.org/10.2307/2095101
Dooley, M. & Hutchison, M. 2009. Transmission of the US subprime crisis to emerging markets: Evidence on the decoupling–recoupling hypothesis. *Journal of International Money and Finance,* 28**,** 1331-1349.
Dreyer, M. 2021. Malaysia: Pengurusan Danaharta Nasional Berhad. *The Journal of Financial Crises,* 3, pp. 450 -484
Dupas, P. & Robinson, J. 2013. Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya. *American economic journal. Applied economics,* 5**,** 163-192. 10.1257/app.5.1.163
Durand, P., Gaëtan Le Quang, 2022. Banks to basics! Why banking regulation should focus on equity, European Journal of Operational Research, Volume 301, Issue 1, 2022, Pages 349-372.
Dwumfour, R. A. 2017. Explaining banking stability in Sub-Saharan Africa. *Research in International Business and Finance,* 41**,** 260-279. https://doi.org/10.1016/j.ribaf.2017.04.027
Dzomira, S. 2014. Analysis of bank failures during financial tumult in Africa-Zimbabwe: A historical review. *Journal of Governance and Regulation,* 3**,** 75-80.
EFInA 2021. EFInA Access to Financial Services in Nigeria 2020 Survey.
Ehigiamusoe, G. 2021. *Touching Lives - My LAPO Journey*, Narrative Landscape Press.
Elekdag, S. & Wu, Y. 2011. Rapid Credit Growth. International Monetary Fund.
Elliott, D. & Santos, M. A. 2012. *Assessing the cost of financial regulation*, International Monetary Fund.

Elson, D. 1998. The economic, the political and the domestic: Businesses, states and households in the organisation of production. *New Political Economy,* 3**,** 189-208.
Erfani, G. & Vasigh, B. 2018. The impact of the global financial crisis on profitability of the banking industry: a comparative analysis. *Economies,* 6**,** pp. 66.
Eryigit, S. B. & Dulgeroglu, E. 2015. How to Measure the Level of Financial Development. *Handbook of Research on Strategic Developments and Regulatory Practice in Global Finance.* IGI Global.
Eryılmaz, F., Bakır, H. & Mercan, M. 2015. Financial Development and Economic Growth: Panel Data Analysis. *Handbook of Research on Strategic Developments and Regulatory Practice in Global Finance.* IGI Global.
Evans, O., Leone, A. M., Gill, M., Hilbers, P., Blaschke, W., Krueger, R., Moretti, M., Nagayasu, J., O Brien, M. & Berge, J. T. 2000. Macroprudential indicators of financial system soundness.
Federal Republic of Nigeria. 2020. *Bank and Other Financial Institutions Act 2020*. https://www.cbn.gov.ng/out/2021/ccd/bofia%202020.pdf [Accessed April 8, 2022].
Financial Policy and Regulation Dept. CBN 2020. CBN Policy Measures in Response to COVID-19 Outbreak.
Financial Stability Board. 2020. *Peer Review of South Africa*. https://www.fsb.org/2020/03/peer-review-of-south-africa/ [Accessed February 20, 2022].
Financial Stability Institute. 2015. *FSI Survey - Basel II, 2.5 and III Implementation*. Bank for International Settlements (BIS). https://www.bis.org/fsi/fsiop2015.htm [Accessed March 15, 2020].
Fisher, I. 1933. The debt-deflation theory of great depressions. *Econometrica: Journal of the Econometric Society***,** pp.337-357.
Flannery, M. J. 2014. Maintaining adequate bank capital. *Journal of Money, Credit and Banking,* 46**,** 157-180.
Foster, J., Greer, J. & Thorbecke, E. 1984. A class of decomposable poverty measures. *Econometrica: journal of the econometric society***,** vol 52., pp. 761-766.
Fratzscher, M., König, P. J. & Lambert, C. 2016. Credit provision and banking stability after the Great Financial Crisis: The role of bank regulation and the quality of governance. *Journal of International Money and Finance,* 66**,** 113-135. https://doi.org/10.1016/j.jimonfin.2016.02.015
Fred 2021. Use of Financial Services, Assets at Deposit Taking Microfinance Institutions (MFIs) for Nigeria NGAFCSODMFXDC. Federal Reserve Bank of St. Louis.
Fuchs, M., Losse-Mueller, T. & Witte, M. 2012. The reform agenda for financial regulation and supervision in Africa. *Financial sector development in Africa: opportunities and challenges', World Bank, Washington, DC***,** 153-176.
G20 Finance Ministers 2008. Communique.
Galor, O. & Zeira, J. 1993. Income distribution and macroeconomics. *The review of economic studies,* 60**,** 35-52.
Gande, A., & Paudyal, K. (2010). Determinants of bank Z-score in Europe and the United States: A comparative analysis. Journal of International Financial Markets, Institutions and Money, 20(5), 556-573.
George, A. L. & Bennett, A. 2005. *Case studies and theory development in the social sciences*, MIT Press.
Ghanem, A. 2017. The impact of Basel II on the banking strategies in the Middle East and North African (MENA) region. *Journal of Banking Regulation,* 18**,** 48-60. https://doi.org/10.1057/jbr.2016.1
Ghatak, M. 2015. Theories of poverty traps and anti-poverty policies. *The World Bank Economic Review,* 29**,** S77-S105.
GII 2020. Global Innovation Index Copyright © 2020 Cornell INSEAD WIPO. . https://www.globalinnovationindex.org/analysis-indicator [Accessed September 11, 2021]

Gilchrist, S. a. M., B. 2016. Credit Risk in the Euro Area. *The Economic Journal,* 128**,** 118 - 158.
Global Innovation Index. 2020. *The Global Innovation Index*. Copyright © 2020 Cornell INSEAD WIPO. https://www.globalinnovationindex.org/ [Accessed 22 February 2021].
Goldstein, M. & Kim, Y. 1999. The Asian financial crisis: causes, cures, and systemic implications. *Growth and change,* 30.
Goodhart, C. A. 1988. *The Evolution of Central Banks*, Cambridge, Mass. : MIT Press.
Gordon, E. A., Henry, E. & Palia, D. 2004. Related Party Transactions and Corporate Governance. *In:* MARK, H., KOSE JOHN, A. & ANIL, K. M. (eds.) *Corporate Governance.* Emerald Group Publishing Limited.
Gordon, R. J. 1990. What is new-Keynesian economics? *journal of Economic Literature,* 28**,** 1115-1171.
Gordy, M. B. & Howells, B. 2006. Procyclicality in Basel II: Can we treat the disease without killing the patient? *Journal of financial intermediation,* 15**,** 395-417. https://doi.org/10.1016/j.jfi.2005.12.002
Gorton, G. & Winton, A. 2003. Financial intermediation. *Handbook of the Economics of Finance.* Elsevier.
Greve, N. 2014. *Africa Bank collapse prompts drop in SA financial sector confidence 3rd September 2014*. South Africa. https://m.polity.org.za [Accessed February 20, 2022].
Guérin, I., Labie, M. & Servet, J.-M. 2015. *The Crises of Microcredit*, University of Chicago Press.
Hadj Miled, K. B. & Rejeb, J.-E. B. 2018. Can microfinance help to reduce poverty? A review of evidence for developing countries. *Journal of the Knowledge Economy,* 9**,** 613-635.
Hallegatte, S., Economic Resilience: Definition and Measurement (May 1, 2014). World Bank Policy Research Working Paper No. 6852, Available at SSRN: https://ssrn.com/abstract=2432352
Halkias, D., Nwajiuba, C., Harkiolakis, N. and Caracatsanis, S.M., 2011. Challenges facing women entrepreneurs in Nigeria. *Management research review*, *34*(2), pp.221-235.
Han, R. & Melecky, M. 2013. Financial inclusion for financial stability: Access to bank deposits and the growth of deposits in the global financial crisis*. World bank policy research working paper*.
Hartwell, M. 1972. Consequences of the industrial revolution in England for the poor. *IEA (Institute of Economic Affairs) The long debate on poverty, Unwin, London*.
Hausmann, R. 2019. Growth & Inclusion - A Cutting Edge of Development Thinking. : Center for International Development, Harvard University.
Havemann, R. 2021. The South African small banks' crisis of 2002/3. *Economic History of Developing Regions,* 36**,** 313-338. https://journals.co.za/doi/full/10.1080/20780389.2021.1943348 Accessed February 09, 2022
Havemann, R. C. 2019. *Lessons from South African bank failures 2002 to 2014.* Stellenbosch: Stellenbosch University.
Hdro 2020. Human Development Reports, United Nations Development Programme. http://hdr.undp.org/en/data [Accessed September 11, 2021]
He, Z. & Xiong, W. 2012. Rollover Risk and Credit Risk. *The Journal of Finance,* 67**,** 391-430. 10.1111/j.1540-6261.2012.01721.x
Heckman, J. J., Ichimura, H. & Todd, P. E. 1997. Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *The review of economic studies,* 64**,** 605-654.
Heffernan, S. 2005. *Modern Banking*. John Wiley & Sons, 5 May 2005
Henry, C., Lapenu, C., Zeller, M. & Sharma, M. 2003. *Microfinance poverty assessment tool*, The World Bank.
Hermes, N. 2014. Does microfinance affect income inequality? *Applied Economics,* 46**,** 1021-1034.
Highhouse, S., Thornbury, E., & Little, I. (2007). Social-identity functions of attraction to organizations. Organizational Behavior and Human Decision Processes, 103, 134–14

Hohl, S., Sison, M. C., Stastny, T. & Zamil, R. 2018. The Basel framework in 100 jurisdictions: implementation status and proportionality practices.
Holt, J. 2009. A summary of the primary causes of the housing bubble and the resulting credit crisis: A non-technical paper. *The Journal of Business Inquiry,* 8**,** 120-129.
Honohan, P. 2005. *Banking sector crises and inequality*, World Bank Publications.
Honohan, P. & Klingebiel, D. 2000. *Controlling the fiscal costs of banking crises*, World Bank Publications.
House of Lords & House of Commons 2013. Changing banking for good: Report of the Parliamentary Commission on Banking Standards.
Hughes, P. and Mester, J., 2013.Measuring the Performance of Banks: Theory, Practice, Evidence, and Some Policy Implications (August 1, 2013). Oxford Handbook of Banking, 2nd edition, 2013, Forthcoming, FRB of Philadelphia Working Paper No. 13-31, Available at SSRN: https://ssrn.com/abstract=2306003 or http://dx.doi.org/10.2139/ssrn.2306003
Ibtissem, B. and Bouri, A., 2013. Credit risk management in microfinance: The conceptual framework. *ACRN Journal of Finance and Risk Perspectives*, *2*(1), pp.9-24.
Igan, D. & Pinheiro, M. 2011. Credit growth and bank soundness: fast and furious? *IMF Working Papers***,** 1-27.
Igbinosa, S., Sunday, O. & Babatunde, A. 2017. Empirical Assessment on Financial Regulations and Banking Sector Performance. *Journal of Central Banking Theory and Practice,* 6**,** 143-155.
Ikhide, S. I. & Alawode, A. A. 1994. 'Financial Sector Reforms, Macroeconomic Instability and the Order of Economic Liberalisation: The Evidence from Nigeria'. African Economic Research Consortium (AERC) Final Report.
Imai, K. S., Gaiha, R., Thapa, G. & Annim, S. K. 2012. Microfinance and poverty—a macro perspective. *World development,* 40**,** 1675-1689.
IMF. *Financial Soundness Indicators: Compilation Guide*. https://data.imf.org/?sk=51B096FA-2CD2-40C2-8D09-0699CC1764DA [Accessed May 20, 2020].
IMF 2000. Macroprudential Indicators of Financial System Soundness.
IMF 2004a. Are credit booms in emerging markets a concern? *World Economic Outlook*.
IMF 2004b. Financial Markets.
IMF. 2015a. *South Africa Financial Sector Assessment Program, IMF Country Report No. 15/53,* . https://www.imf.org/en/Publications/CR/Issues/2016/12/31/South-Africa-Financial-Sector-Assessment-Program-Financial-Safety-Net-Bank-Resolution-and-42755 [Accessed February 10, 2022].
IMF. 2015b. *South Africa Financial Sector Assessment Program, IMF Country Report No. 15/55* https://www.imf.org/external/pubs/ft/scr/2015/cr1555.pdf [Accessed March 24, 2022].
IMF 2017a. Liberia: Seventh and eighth reviews under the extended credit facility arrangement, and request for waiver of nonobservance of performance criteria
IMF. 2017b. *South Africa 2017 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for South Africa*. http://www.treasury.gov.za/publications/other/imf/2017/IMF%20Art%20IV%20report.pdf [Accessed February 03, 2022].
IMF 2019. Nigeria : 2019 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Nigeria.
IMF 2020a. Financial Soundness Indicators.
IMF 2020b. World Economic Outlook Update, June 2020.
Inegbedion, H. 2021. Impact of COVID-19 on economic growth in Nigeria: opinions and attitudes. *Heliyon,* 7**,** e06943.
Innovations for Poverty Action. *Poverty Probability Index*. https://www.povertyindex.org/ppi-team [Accessed 17/06/2021 2021].

International Finance Corporation. *The SME Finance Forum, MSME Finance Gap*. International Finance Corporation (IFC), World Bank Group. https://www.smefinanceforum.org/data-sites/msme-finance-gap [Accessed April 8. 2022].
Jahan, S. 2002. Measuring living standard and poverty: Human development index as an alternate measure. *University of Massachusetts Political Economy Research Institute. URL: http://www. umass. edu/peri/pdfs/glw_jahan. pdf*.
Jones, E. & Zeitz, A. O. 2019. Regulatory Convergence in the Financial Periphery: How Interdependence Shapes Regulators' Decisions. *International Studies Quarterly,* 63**,** 908-922. https://doi.org/10.1093/isq/sqz068
Jorgensen, B. N. & Morley, J. 2017. Discussion of "Are Related Party Transactions Red Flags?". *Contemporary Accounting Research,* 34**,** 929-939. 10.1111/1911-3846.12304
Kabeer, N. 2001. Conflicts over credit: Re-evaluating the empowerment potential of loans to women in rural Bangladesh. *World development,* 29**,** 63-84.
Kane, E. J. 2009. Ethical Failures in Regulating and Supervising the Pursuit of Safety-Net Subsidies. *European business organization law review,* 10**,** 185-211. 10.1017/S1566752909001852
Kaplan, R. S. & Mikes, A. 2012. Managing Risks: A New Framework. *Harvard Business Review volume* 90.6 (2012): pp 48-60.
Karlan, D. & Zinman, J. 2010. Expanding credit access: Using randomized supply decisions to estimate the impacts. *The Review of Financial Studies,* 23**,** 433-464.
Kasekende, L., Bagyenda, J. & Brownbridge, M. 2012. Basel III and the global reform of financial regulation: How should Africa respond? A bank regulator's perspective. *Bank of Uganda mimeo*.
King, G. & Nielsen, R. 2019. Why propensity scores should not be used for matching. *Political Analysis,* 27**,** 435-454.
Kirkpatrick, C., Sirageldin, I. & Aftab, K. 2000. Financial development, economic growth, and poverty reduction [with Comments]. *The Pakistan development review***,** 363-388.
Klingebiel, D. & Laeven, L. 2002. *Managing the real and fiscal effects of banking crises*, World Bank Publications.
Koehn, M. & Santomero, A. M. 1980. Regulation of Bank Capital and Portfolio Risk. *The Journal of Finance,* 35**,** 1235-1244. https://doi.org/10.1111/j.1540-6261.1980.tb02206.x
Köksal, B. & Orhan, M. 2013. Market Risk of Developed and Emerging Countries During the Global Financial Crisis. *Emerging Markets Finance and Trade,* 49**,** 20-34. 10.2753/REE1540-496X490302
Koop, C. & Lodge, M. 2017. What is regulation? An interdisciplinary concept analysis. *Regulation & Governance,* 11**,** 95-108. 10.1111/rego.12094
Kotzé, A. & Labuschagne, C. C. 2014. The dilemma of a central counterparty versus a qualified central counterparty in a developing country. *Procedia Economics and Finance,* 14**,** 349-358.
Kwong, C. C. & Poon, T. S. 2019. On the Path to Liberalization: Emerging Issues of China's Banking Reform After Global Financial Crisis. Taylor & Francis.
Lacalle-Calderon, M., Perez-Trujillo, M. & Neira, I. 2018. Does microfinance reduce poverty among the poorest? A macro quantile regression approach. *The Developing Economies,* 56**,** 51-65.
Laeven, L. & Valencia, F. 2012. Systemic banking crises database: An update.
Lakens, D. 2021. Sample size justification.
Ledgerwood, J. and White, V., 2006. *Transforming microfinance institutions: providing full financial services to the poor*. World Bank Publications.
Lepetit, L. & Strobel, F. 2013. Bank insolvency risk and time-varying Z-score measures. *Journal of International Financial Markets, Institutions and Money,* 25**,** 73-87.
Levine, R. 2004. *The corporate governance of banks: A concise discussion of concepts and evidence*, World Bank Publications.
Levine, R. 2005. Finance and growth: theory and evidence. *Handbook of economic growth***,** 865-934.

Liikanen, E., Bänziger, H., Campa, J. M. & Gallois, L. 2012. High-level Expert Group on reforming the structure of the EU banking sector. *Final Report, Brussels,* 2.

Lindgren, C.-J., Baliño, T. J. T., Enoch, C., Gulde, A.-M., Quintyn, M. & Teo, L. 1999. Financial Sector Crisis and Restructuring Lessons from Asia. INTERNATIONAL MONETARY FUND Washington DC

Lintner, J. 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics,* 47**,** 13-37. 10.2307/1924119

Lipton, M. & Ravallion, M. 1995. Poverty and policy. *Handbook of development economics,* 3**,** 2551-2657.

Living Standards Measurement Study Team 2021. Harmonized Datafiles and Variables for High-Frequency Phone Surveys on COVID-19 February 2021 ed.: The World Bank.

Lybeck, J. A. 2016. *The future of financial regulation: who should pay for the failure of American and European banks?*, Cambridge University Press.

Makanjuola, Y. 2016. *Banking reform in Nigeria: The aftermath of the 2009 financial crisis*, Springer.

Mankiw, N. G. 2019. *Macroeconomics*, New York, NY : Macmillan International, [2019].

Markowitz, H. 1952. Portfolio Selection. *The Journal of Finance,* 7**,** 77-91. 10.1111/j.1540-6261.1952.tb01525.x

Matyaqubovich, R.A. and Ugli, I.I.S., 2016. Importance of the microfinance institutions in economy. *Евразийский союз ученых*, (4-1 (25)), pp.94-96.

Mbah, F. 2020. Nigeria announces lockdown of major cities to curb coronavirus, Aljazeera, http://aljazeeranews. com

Mbuya, J. C. 2005. *The rise and fall of Saambou Bank*, Dr John Chibaya Mbuya.

McConnell, P. & Blacker, K. 2013. Systemic operational risk: does it exist and, if so, how do we regulate it? *The Journal of Operational Risk,* 8**,** pp. 59.

McCullagh, P., & Nelder, J. A. (1989). Generalized linear models (2nd ed.). Chapman and Hall.

McLeay, M., Radia, A., & Thomas, R. (2014). Money creation in the modern economy. Retrieved from Bank England: https://www.bankofengland.co.uk/-/media/boe/files/quarterlybulletin/2014/money-creation-in-the-moderneconomy.pdf?la=en&hash=9A8788FD44A62D8BB927123544205CE476E01654

McLeod, S. 2007. Maslow's hierarchy of needs. *Simply psychology,* 1.

Meager, R. 2019. Understanding the Average Impact of Microcredit Expansions: A Bayesian Hierarchical Analysis of Seven Randomized Experiments. *American Economic Journal: Applied Economics,* 11**,** 57-91. 10.1257/app.20170299

Mendelson, S. 2021. The Financial Inclusion Compass 2021, the e-MFP Survey of Financial Inclusion Trends, European Microfinance Platform.

Merchantec Capital. 2018. *All eyes on the 2019 National Election*. www.financialregulationjournal.co.za [Accessed February 20, 2022].

Microfinance Barometer 2016. extension://elhekieabhbkpmcefcoobjddigjcaadp/https://www.convergences.org/wp-content/uploads/2016/09/BMF-EN-FINAL-2016-Version-web.pdf

Microfinance Barometer. 2019. [Accessed 6th June 2021]. extension://elhekieabhbkpmcefcoobjddigjcaadp/https://www.convergences.org/wp-content/uploads/2019/09/Microfinance-Barometer-2019_web-1.pdf

Minsky, H. P. 1977. A theory of systemic fragility.

Minsky, H. P. 1982. The financial-instability hypothesis: capitalist processes and the behavior of the economy.

Mishkin, F. S. 1999. Global financial instability: framework, events, issues. *Journal of economic perspectives,* 13**,** 3-20.

MIX Market 2019. *The World Bank Group*. https://datacatalog.worldbank.org/dataset/mix-market [Accessesd September 11, 2021]
Mo Ibrahim Foundation 2019. Ibrahim Index of African Governance (IIAG).
Moody's Investors Service. 2014. *Rating Action: Moody's downgrades four South African banks; on review for further downgrade*. https://www.moodys.com/research/Moodys-downgrades-four-South-African-banks-on-review-for-further--PR_306571 [Accessed February 10, 2022].
Morduch, J. 1998. *Does microfinance really help the poor?: New evidence from flagship programs in Bangladesh*, Research Program in Development Studies, Woodrow School of Public and ….
Morduch, J. 1999. The role of subsidies in microfinance: evidence from the Grameen Bank. *Journal of development economics,* 60**,** 229-248.
Morduch, J. 2020. Why RCTs failed to answer the biggest questions about microcredit impact. *World Development,* 127**,** 104818. https://doi.org/10.1016/j.worlddev.2019.104818
Morduch, J. & Armendariz, B. 2005. *The economics of microfinance*, MIT Press.
Morgan, B., Yeung, K. & Twining, W. 2007. *An Introduction to Law and Regulation: Text and Materials,* Cambridge, Cambridge University Press.
Motau, T. 2018. *VBS Mutual Bank - The Great Bank Heist. Investigator's Report to the Prudential Authority*. https://www.resbank.co.za/en/home/publications/publication-detail-pages/media-releases/2018/8830 [Accessed April 25, 2022].
Motto, R., Altavilla, C. & Carboni, G. 2015. Asset purchase programmes and financial markets: lessons from the euro area. ECB Working Paper, No. 1864, ISBN 978-92-899-1677-6, European Central Bank (ECB), Frankfurt a. M., https://doi.org/10.2866/999633
Moudud-Ul-Huq, S. 2019. Banks' capital buffers, risk, and efficiency in emerging economies: are they counter-cyclical? *Eurasian Economic Review,* 9**,** 467-492.
Mutezo, A. 2013. Credit rationing and risk management for SMEs: The way forward for South Africa. Corporate Ownership and Control, 10 (2): 153-163.
Myburgh, J. 2016. *Release of Myburgh Report on African Bank Limited*. https://www.resbank.co.za/en/home/publications/publication-detail-pages/media-releases/2016/7288 [Accessed April 25, 2022].
National Bureau of Statistics 2012. National Poverty Rates for Nigeria: 2003-04 (Revised) and 2009-10.
National Bureau of Statistics 2020. Nigeria Capital Importation Report Q1 2020.
National Bureau of Statistics 2021. Nigerian Gross Domestic Product Report Q3 2020.
National Treasury Dept. Republic of South Africa. 2011. *A safer financial sector to serve south africa better*. https://www.resbank.co.za/content/dam/sarb/what-we-do/financial-stability/A%20safer%20financial%20sector%20to%20serve%20South%20Africa%20better.pdf [Accessed February 08, 2022].
National Treasury Republic of South Africa. 2018. *Treasury's response to the VBS Mutual Bank matter*. http://www.treasury.gov.za/comm_media/press/2018/2018031401%20TREASURYS%20RESPONSE%20TO%20THE%20VBS%20MUTUAL%20BANK%20MATTER.pdf [Accessed February 02, 2022].
NBS 2020. 2019 Poverty and Inequality in Nigeria: Executive Summary.
NBS 2021. Nigerian Gross Domestic Product Report, page 99.
Negi, A. & Wooldridge, J. M. 2021. Revisiting regression adjustment in experiments with heterogeneous treatment effects. *Econometric Reviews,* 40**,** 504-534.
Nigeria Data Portal. 2015. *Revised Absolute Poverty 2003/04 and 2009/10*. https://nigeria.opendataforafrica.org/lcpafse/revised-absolute-poverty-2004-and-2010-nigeria Original data http://www.nigerianstat.gov.ng/ [Accessed].
Nikoloski, Z. 2011. Impact of financial crises on poverty in the developing world: an empirical approach. *Journal of Development Studies,* 47**,** 1757-1779.

Nisbet, R., Miner, G. & Yale, K. 2018. Chapter 11 - Model Evaluation and Enhancement. *In:* NISBET, R., MINER, G. & YALE, K. (eds.) *Handbook of Statistical Analysis and Data Mining Applications (Second Edition).* Boston: Academic Press.

Nwogugu, M. 2006. Further critique of GARCH/ARMA/VAR/EVT Stochastic-Volatility models and related approaches. *Applied mathematics and computation,* 182**,** 1735-1748.

Obstfeld, M. & Rogoff, K. 2009. Global imbalances and the financial crisis: products of common causes.

Odeleye, A. T. 2014. Pre-consolidation and post-consolidation of Nigerian banking sector: A dynamic comparison. *International Journal of Economics and Financial Issues,* 4**,** 27-34.

OECD 2006. DAC in Dates, the History of OECD's Development Assistance Committee. https://www.oecd.org/dac/1896808.pdf

OECD Competition Commission 2010. *Competition, Concentration and Stability in the Banking Sector*. Retrieved from https://www.oecd.org/daf/competition/sectors/46040053.pdf [Accessed March 05, 2020]

Ogunleye, G. 2018. *The Emabttled Bank Regulator,* Nigeria, Kachifo Limited.

Ogus, A. 2004. *Regulation: Legal Form and Economic Theory*, Bloomsbury Publishing.

Ojo, M. 1991. Deregulation in the Nigerian banking industry: a review and appraisal.

Ojo, M. O. 1993. A Review and Appraisal of Nigeria's Experience with Financial Sector Reforms. *In:* Central Bank of Nigeria, DEPARTMENT, R. & 8, O. P. N. (eds.).

Oke, D. M. & Poloamina, I. 2012. Further analysis of bank efficiency correlates: The Nigerian experience. *Journal of Applied Finance and Banking,* vol.2, no.4, 2012, pp.1-11 ISSN: 1792-6580

Okeahalam, C. C. 1998. The Political Economy of Bank Failure and Supervision in the Republic of South Africa. *African Journal of Political Science / Revue Africaine de Science Politique,* 3**,** 29-

Oluwagbemiga Oluwadare and Adegbemi Babatunde Onakoya, Microfinance and Entrepreneurship Development in Nigeria, Journal of Economics and Sustainable Development, 2014:48.

Oluwatoyin M. Ogundipe and Adeyemi A. Ogundipe, Entrepreneurship Development in Nigeria: Prospects and Challenges, International Journal of Academic Research in Business and Social Sciences, 2017

Onoh, J. O. & Iheanacho, E. 2016. Banking Reforms and Credit Creation in the Nigerian Banking Sector: Pre-Reform Era versus Post-Reform Era. *International Journal of Banking and Finance Research,* 3**,** 15-39.

Onuka, O. I. 2021. Microcredit and Poverty Alleviation in Nigeria in COVID-19 Pandemic. *Asia-Pacific Journal of Rural Development***,** 10185291211007925.

Orazalin, N. & Mahmood, M. 2019. "The financial crisis as a wake-up call: corporate governance and bank performance in an emerging economy". *CORPORATE GOVERNANCE ©Emerald Publishing Limited,* VOL.19 NO.1 80-101.

Orlowski, L. T. 2008. Stages of the 2007/2008 Global Financial Crisis Is There a Wandering Asset-Price Bubble? *Economics discussion paper No. 2008-43, Kiel Institute for the World Economy (IfW)*

Ouenniche, J., Bouslah, K., Cabello, J. M. & Ruiz, F. 2017. A new classifier based on the reference point method with application in bankruptcy prediction. *Journal of the Operational Research Society***,** 1-8.

Owojori, A. A., Akintoye, I. R. & Adidu, F. A. 2011. The challenge of risk management in Nigerian banks in the post consolidation era. *Journal of Accounting and Taxation,* 3**,** 23-31.

Oxford Department of International Development. *Oxford Poverty & Human Develoment Initiative (OPHI)*. University of Oxford. https://ophi.org.uk/policy/multidimensional-poverty-index/#:~:text=Multidimensional%20poverty%20encompasses%20the%20various,are%20environmentally%20hazardous%2C%20among%20others. [Accessed 5th April 2021].

Oyetade, D., Obalade, A. A. & Muzindutsi, P.-F. 2022. The Impact of Changes in Basel Capital Requirements on the Resilience of African Commercial Banks. *Scientific Annals of Economics and Business*, *69(1), pp.111-132.*

Ozili, P. K. 2018. Banking stability determinants in Africa. *International Journal of Managerial Finance*.

Padgett, C. 2011. *Corporate Governance: Theory and Practice,* Palgrave Macmillan, United Kingdom,

Padgett, C. 2014. Variety is the Spice of Life-and Boardrooms. *Available at SSRN 2514413*.

Padgett, C. & Shabbir, A. 2005. The UK code of corporate governance: Link between compliance and firm performance. *ICMA Centre Discussion Papers in Finance DP,* 17.

Paice, E. 2021. YouthQuake*: Why African Demography should matter to the world,* London, UK, Head of Zeus Ltd. An Apollo book.

Palmer, J. & Cerruti, C. Is there a need to rethink the supervisory process. International Conference "Reforming Financial Regulation and Supervision: Going back to Basics", Madrid, June, 2009.

Pande, R., Cole, S., Sivasankaran, A., Bastian, G. & Durlacher, K. 2012. Does poor people's access to formal banking services raise their incomes?–A systematic review. *DFID Systematic Review EPPI-Centre, Social Science Research Unit, Institute of Education, University of London, London*.

Papanek, G. F. 1973. Aid, foreign private investment, savings, and growth in less developed countries. *Journal of political Economy,* 81**,** 120-130.

Parliamentary Monitoring Group. 2016. *African Bank and the Myburgh Report: SARB briefing*. https://pmg.org.za/committee-meeting/22601/ [Accessed February 20, 2022].

Pawley, M., Winstone, D. & Bentley, P. 1991. *UK Financial Institutions and Markets*, Macmillan.

Pazarbasioglu, C., Johnsen, G., Hilbers, M. P. L. C. & Ötker, M. I. 2005. *Assessing and managing rapid credit growth and the role of supervisory and prudential policies*, International Monetary Fund.

Peltzman, S. 1989. The Economic-Theory of Regulation After A Decade of Deregulation. *Brookings Papers On Economic Activity***,** 1-59.

Pitt, M. M. & Khandker, S. R. 1998. The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *Journal of political economy,* 106**,** 958-996.

Posner, R. A. 1971. Taxation by Regulation. *The Bell Journal of Economics and Management Science,* 2**,** 22-50. 10.2307/3003161

Posner, R. A. 1974. Theories of Economic Regulation. *Bell Journal of Economics and Management Science,* 5(2)**,** 335–358.

Prina, S. 2015. Banking the poor via savings accounts: Evidence from a field experiment. *Journal of development economics,* 115**,** 16-31.

Progress out of Poverty 2014. Global Report on Poverty Measurement with the Progress out of Poverty Index.

PwC. 2020. *MSME Survey 2020, Building to Last, Nigeria report*. https://www.pwc.com/ng/en/assets/pdf/pwc-msme-survey-2020-final.pdf [Accessed April 16,2022].

Reinhart, C. M. & Rogoff, K. S. 2011. From financial crash to debt crisis. *American Economic Review,* 101**,** 1676-1706.

Repullo, R. & Suarez, J. 2008. The procyclical effects of Basel II *[CEPR Discussion Paper No. DP6862]. VoxEU*. https://voxeu.org/pages/about-vox [Accessed April 24, 2020]

Reuters. 2014. https://www.reuters.com/article/ozabs-uk-safrica-african-bank-inv-idAFKBN0GB0HT20140811 [Accessed February 20, 2022].

Ridwan, L. I., Kazeem, B. A. & Omokanmi, O. J. B. 2020. Easing of lockdown measures in Nigeria: Implications for the healthcare system. *Health Policy and Technology*. https://doi.org/10.1016/j.hlpt.2020.09.004

Ritchie, H., Edouard Mathieu, Lucas Rodés-Guirao, Cameron Appel, Charlie Giattino, Esteban Ortiz-Ospina, Joe Hasell, B. M. & Roser, D. B. a. M. 2022. COVID-19: Stringency Index. *Our World in Data*.

Robinson, M. S. 2001. *Microfinance Revolution: Sustainable Finance for the Poor,* Washington, World Bank Publications.

Rochet, J.-C. 1992. Capital requirements and the behaviour of commercial banks. *European economic review,* 36**,** 1137-1170.

Rogaly, B. 1996. Micro-finance evangelism,'destitute women', and the hard selling of a new anti-poverty formula. *Development in practice,* 6**,** 100-112.

Roodman, D. 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal,* 9**,** 86-136.

Roodman, D. 2012. *Due Diligence: An Impertinent Inquiry into Microfinance,* Washington, Brookings Institution Press.

Rossi, C. 2014. *A Risk Professionals Survival Guide: Applied Best Practices in Risk Management*, John Wiley & Sons.

Rutherford, D. 2013. Routledge Dictionary of Economics (3rd ed., p.77). Routledge

Salanié, B. 2000. *Microeconomics of Market Failures,* Cambridge, MIT Press.

Sanderson, L. B., De Jongh, D. C. & Maré, E. 2017. Banking regulations: An examination of the failure of African Bank using Merton's structural model. *South African Journal of Science,* 113**,** 15-21.

Santos, J. A. 1999. Bank capital and equity investment regulations. *Journal of Banking & Finance,* 23**,** 1095-1120.

Santos, J. a. C. 2000. Bank capital regulation in contemporary banking theory: A review of the literature. *BIS working papers No 90*.

Sanusi, S. L. 2011. Global financial meltdown and the reforms in the Nigerian Banking sector. *CBN Journal of Applied Statistics,* 2**,** 93-108.

Saunders, A. & Allen, L. 2010. *Credit risk management in and out of the financial crisis: new approaches to value at risk and other paradigms*, John Wiley & Sons.

Schaeck, K., Cihak, M. & Wolfe, S. 2009. Are competitive banking systems more stable? *Journal of Money, Credit and banking,* 41**,** 711-734. https://doi.org/10.1111/j.1538-4616.2009.00228.x

Schreiner, M. 2015. *Simple Poverty Scorecard® Poverty-Assessment Tool Nigeria* SimplePovertyScorecard.com [Accessed 22 February 2021].

Schreiner, M. 2021. *Microfinance and Microenterprise: Ways to Help the Poor Accumulate Resources*. https://www.microfinance.com/ [Accessed 17/06/21 2021].

Schroek, G. 2002. *Risk Management and Value Creation in Financial Institutions*, John Wiley & Sons.

Securities and Exchange Commission. 2011. *Annual Report and Accounts 2011*. https://sec.gov.ng/files/Annual%20reports/SEC%20ANNUAL%20REPORTS%20%20ACCOUNTS%202011.pdf [Accessed March 26, 2022].

Selgin, G. 1996. *Bank Deregulation and Monetary Order,* London, United Kingdom, Routledge.

Selznick, P. 1985. "Focusing Organisational Research on Regulation," *in Regulatory Policy and the Social Sciences, ed. Roger G. Noll, (Berkeley, CA: University of California Press)*.

Shah, A. 2018. "asdoc: Create high-quality tables in MS Word from Stata output".

Sharpe, W. F. 1964. Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance,* 19**,** 425-442.

Shiller, R. J. 2015. *Irrational exuberance: Revised and expanded third edition*, Princeton university press.

Shleifer, A. 2005. Understanding Regulation. *European Financial Management,* 11**,** 439-451. 10.1111/j.1354-7798.2005.00291.x

Silver, L., Lerpold, L., Romani, L., Persson, A., Brytting, T., Hellgren, L., Mårtensson, R., Sjöblom, L. & Wijkström, F. 2009. Microfinance; towards a small-scale solution for increased Swedish welfare. *Katarina Tryck, Stockholm*.

Sironi, A. (2003). Testing the relationship between risk and capital in European Banks. Journal of Banking & Finance, 27(8), 1439-1459.

Skoufias, E., Davis, B. & Soto, H. 2000. Practical alternatives to consumption-based welfare measures. *International Food Policy Research Institute, Washington, DC Photocopy*.

Snowden, P. N. 2012. *Emerging Risk in International Banking (RLE Banking & Finance): Origins of Financial Vulnerability in the 1980s*, Routledge.

South Africa Reserve Bank. 2008. *Financial Stability Review 2008*. https://www.resbank.co.za/en/home/publications/publication-detail-pages/reviews/finstab-review/2008/3947 [Accessed February 08, 2022].

South Africa Reserve Bank. 2012. *Financial Stability Review March 2012*. https://www.resbank.co.za/en/home/publications/review/financial-stability-review [Accessed March 02, 2022].

South Africa Reserve Bank. 2014. *Financial Stability Review September 2014*. https://www.resbank.co.za/en/home/publications/publication-detail-pages/reviews/finstab-review/2014/6470 [Accessed May 09, 2022].

South Africa Reserve Bank. 2016. *Financial Stability Review First edition March 2016*. https://www.resbank.co.za/en/home/publications/review/financial-stability-review [Accessed March 03, 2022].

South Africa Reserve Bank. 2017a. *Financial Stability Review March 2017* https://www.resbank.co.za/en/home/publications/review/financial-stability-review [Accessed March 03, 2022].

South Africa Reserve Bank. 2017b. *Financial Stability Review second edition September 2017*. https://www.resbank.co.za/en/home/publications/review/financial-stability-review [Accessed March 03, 2022].

South Africa Reserve Bank. 2018. *VBS Mutual Bank investigators report to the Prudential Authority*. https://www.resbank.co.za/en/home/publications/publication-detail-pages/media-releases/2018/8830 [Accessed February 20, 2022].

South Africa Reserve Bank. 2019. *Financial Stability Review Sept 2019*. https://www.resbank.co.za/en/home/publications/review/financial-stability-review [Accessed March 03, 2022].

Spence, M. 1974. *Market signaling: Informational transfer in hiring and related screening processes*, Cambridge: Harvard university press.

Spence, M. 2002. Signaling in retrospect and the informational structure of markets. *American Economic Review,* 92**,** 434-459.

Spiegelhalter, D. 2019. *The art of statistics: Learning from data*, Penguin UK.

Srivastav, A. & Hagendorff, J. 2016. Corporate governance and bank risk-taking. *Corporate Governance: An International Review,* 24**,** 334-345.

Starkey, M. (2018). Credit creation theory of banking. The economics network. Available from Sheffield Hallam University Research Archive (SHURA) at: http://shura.shu.ac.uk/23013/

Statacorp. 2019. Stata: Release 16. Statistical Software. College Station, TX: StataCorp LLC. .

Statista 2021a. Impact of Coronavirus on oil price in Nigeria.

Statista. 2021b. *In-depth: FinTech 2021, Statista Digital Market Outlook, November 2021*. www.statista.com [Accessed May 12, 2022].

Stewart, R., Van Rooyen, C., Dickson, K., Majoro, M. & De Wet, T. 2010. What is the impact of microfinance on poor people?: a systematic review of evidence from sub-Saharan Africa.

Steyn, E., De Beer, A. S., Steyn, T. D. & Schreiner, W. N. 2004. Enron and Saambou Bank in South Africa: a case study of insufficient relationship management. *Public Relations Review,* 30**,** 75-86.

Stigler, G. J. 1971. The Theory of Economic Regulation. *The Bell Journal of Economics and Management Science,* 2**,** 3-21. 10.2307/3003160

Stulz, R. M. 2008. Rethinking Risk Management. *In:* CHEW, D. H. (ed.) *Corporate Risk Management.* Columbia University Press.
Sundararajan, V., Enoch, C., San José, A., Hilbers, P., Krueger, R., Moretti, M. & Slack, G. 2002. *Financial soundness indicators: analytical aspects and country practices*, International Monetary Fund Washington, DC.
Suss, J. & Treitel, H. 2019. Bank of England Staff Working Paper No. 831 Predicting bank distress in the UK with machine learning https://www.bankofengland.co.uk/working-paper/2019/predicting-bank-distress-in-the-uk-with-machine-learning [Accessed May 05, 2020]
Tarullo, D. K. 2019. Financial regulation: Still unsettled a decade after the crisis. *Journal of Economic Perspectives,* 33**,** 61-80.
Taylor, A. & Goodhart, C. 2006. Procyclicality and volatility in the financial system: The implementation of Basel II and IAS 39. *Procyclicality of financial systems in Asia***,** 9-37. https://doi.org/10.1057/9781137001535_2
Taylor, A. M. 2015. Credit, financial stability, and the macroeconomy. *Annu. Rev. Econ.,* 7**,** 309-339.
The Banker 2020. Top 1000 World Banks.
The Economist 2020. Covid-19 is causing a microcredit crunch. https://www.economist.com/leaders/2020/08/15/covid-19-is-causing-a-microcredit-crunch
The Federal Republic of Nigeria 1991. Banks and Other Financial Institutions Act 1991 (As Amended In 1997, 1998, 1999 And 2002)
The Federal Republic of Nigeria 2006. Nigerian Deposit Insurance Corporation Act.
The Financial Crisis Inquiry Commission. 2011. *The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States*. https://www.govinfo.gov/content/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf [Accessed 27 December 2019].
The Financial Times 2021. Covid and poverty: the struggles of India's microfinance industry. https://www.ft.com/content/0ea25486-5b47-4a07-8d63-34e8d0dec208
The Group of Central Bank Governors and Heads of Supervision 2010. Group of Governors and Heads of Supervision announces higher global minimum capital standards. *Basel Committee on Banking Supervision, Bank for International Settlements (BIS)*.
The IMF/ World Bank 2013. Financial Sector Assessment Program Nigeria
The Royal Swedish Academy of Sciences 2019. The Prize in Economic Sciences 2019 - "for their experimental approach to alleviating global poverty". Stockholm, Sweden
The World Bank 2013. Global Financial Development Report: Rethinking the role of the State in Finance [Publication]. World Bank Group. http://documents.worldbank.org/curated/en/853761468326979957/Global-Financial-Development-Report-2013-rethinking-the-role-of-the-state-in-finance [Accessed April 06, 2020]
The World Bank. 2016. *Banking competition*. https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/banking-competition [Accessed 16 April 2020].
The World Bank. 2019. *Global Financial Development Database. The World Bank*. https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database [Accessed March 10, 2020].
The World Bank. 2020a. *Nigeria Overview*. https://www.worldbank.org/en/country/nigeria/overview [Accessed].
The World Bank. 2020b. *World Development Indicators*. https://datacatalog.worldbank.org/dataset/world-development-indicators [Accessed April 16, 2020].
The World Bank & National Bureau of Statistics 2021a. COVID-19 National Longitudinal Phone Survey 2020 19 August 2021 ed.

The World Bank & National Bureau of Statistics 2021b. General Household Survey, Panel 2018-2019, Wave 4, Nigeria, 2018 - 2019 Living Standards Measurement Study (LSMS). 05 October 2021 ed.
The World Bank, G. 2018. *The Human Capital Project*. https://openknowledge.worldbank.org/bitstream/handle/10986/30498/33252.pdf?sequence=5&isAllowed=y [Accessed 25 February 2020].
Trading Economics. 2022. *South Africa Credit Rating*. https://tradingeconomics.com/south-africa/rating [Accessed February 20, 2022].
Trenca, I., Pece, A. M. & Mihuţ, I. S. 2015. The Assessment of Market Risk in the Context of the Current Financial Crisis. *Procedia Economics and Finance,* 32**,** 1391-1406. 10.1016/S2212-5671(15)01516-6
Triki, T., Kouki, I., Dhaou, M. B. & Calice, P. 2017. Bank regulation and efficiency: What works for Africa? *Research in International Business and Finance,* 39**,** 183-205. https://doi.org/10.1016/j.ribaf.2016.07.027
Turner, J. D. 2014. *Banking in Crisis: The Rise and Fall of British Banking Stability, 1800 to the Present*, Cambridge University Press.
Uche, C. U. 1997. Bank share capital regulation in Nigeria. *Journal of International Banking Law,* 13**,** 30-34.
Unctad 2020. *World Investment Report 2020*, United Nations Conference on Trade and Development

United Nations - Department of Economic and Social Affairs. *Sustainable Development*. https://sdgs.un.org/goals [Accessed 31 Jan 2022].
United Nations. *Millenium Development Goals and Beyond 2015*. www.un.org/millenniumgoals/bkgd.shtml [Accessed 31 Jan 2022].
United Nations. 2008. *"Statement of Commitment for Action to Eradicate Poverty", issued by the Administrative Committee on Coordination (ACC)*. https://www.un.org/press/en/1998/19980520.eco5759.html [Accessed 19 February 2020].
United Nations 2015. Transforming our World: The 2030 Agenda for Sustainable Development.
United Nations 2020a. Human Development Report.
United Nations 2020b. The Sustainable Development Goals Report 2020.
United Nations. 2020c. *World Population Prospects*. https://population.un.org/wpp/DataQuery/ [Accessed 1 November 2021].
United Nations Development Programme. 2019. *Human Development Index (HDI)*. hdr.undp.org/en/content/human-development-index-hdi [Accessed 26 Feb 2020].
United Nations Economic Commission for Africa. 2020. *Regional Economic Communities*. https://archive.uneca.org/oria/pages/regional-economic-communities [Accessed March 05, 2020].
Van Der Veer, R. A. & Haverland, M. 2018. The politics of (de-) politicization and venue choice: A scoping review and research agenda on EU financial regulation and economic governance. *Journal of European Public Policy***,** volume 26, 2019, Issue 9 pp.1-22.
Van Greuning, H. & Brajovic Bratanovic, S. 2009. *Analyzing Banking Risk : A Framework for Assessing Corporate Governance and Risk Management*, The World Bank.
Van Rooyen, C., Stewart, R. & De Wet, T. 2012. The Impact of Microfinance in Sub-Saharan Africa: A Systematic Review of the Evidence. *World Development,* 40**,** 2249-2262. https://doi.org/10.1016/j.worlddev.2012.03.012
Visser, D. & Vuuren, G. V. 2014. Evaluating illiquidity and systemic contagion in South African banks. *Journal of Economic and Financial Sciences,* 7**,** 697-720. doi:10.10520/EJC164679
Wall, L. D. 1987. Has bank holding companies' diversification affected their risk of failure? *Journal of Economics and Business,* 39**,** 313-326.
Watkins, G. P. 1922. Knight's Risk, Uncertainty and Profit. Harvard University Press.

Welle-Strand, A., Sitter, N. & Kjøllesdal, K. 2010. Assessing microfinance: the Bosnia and Herzegovina case. International Research Journal. 2010 Jun 1 vol 8(2)

Werner R. 2016. A lost century in economics: Three theories of banking and the conclusive evidence, International Review of Financial Analysis, Volume 46, 2016, Pages 361-379, ISSN 1057-5219,

White, E. N. 2014. *The regulation and reform of the American banking system, 1900-1929*, Princeton University Press.

Wood, D. 2015. Society as a stakeholder in responsible investment. *The Routledge Handbook of Responsible Investment.* Taylor and Francis.

Wooldridge, J. M., 2010. Econometric analysis of cross section and panel data. MIT Press.

Wooldridge, J. M. 2001. Applications of Generalized Method of Moments Estimation. *Journal of Economic Perspectives—Volume 15, Number 4—Fall 2001—Pages 87–10,* 15**,** 87 - 100.

Wooldridge, J. M. 2015. *Introductory Econometrics: A Modern Approach (6th ed)*, Cengage Learning.

World Bank 2016. Global Financial Development Report.

World Bank. 2019. *Poverty & Equity Brief Nigeria 2019*. https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Archives-2019/Global_POVEQ_NGA.pdf . [Accessed 19 February 2020].

World Health Organisation. 2020. *WHO Timeline - COVID-19*. https://www.who.int/news/item/27-04-2020-who-timeline---covid-19 [Accessed 12 October 2021].

Wydick, B. 1999. The effect of microenterprise lending on child schooling in Guatemala. *Economic development and cultural change,* 47**,** 853-869.

Wyk, J., Dahmer, W., Custy, M., Risk Management and the Business Environment in South Africa, Long Range Planning, Volume 37, Issue 3, 2004

Xiong W., Li B., Wang Y., Stanley H., 2020, The versatility of money multiplier under Basel III regulations, Finance Research Letters, Volume 32, 2020, 101167, ISSN 1544-6123, https://doi.org/10.1016/j.frl.2019.04.024. (https://www.sciencedirect.com/science/article/pii/S1544612318309140)

Yakubu, I. N. & Bunyaminu, A. 2021. Regulatory capital requirement and bank stability in Sub-Saharan Africa. *Journal of Sustainable Finance & Investment***,** 1-13. https://doi.org/10.1080/20430795.2021.1961558

Yin, R. K. 2018. *Case study research and applications: Design and methods*, Sage publications.

Yolanda, Y. 2017. Analysis of factors affecting inflation and its impact on human development index and poverty in Indonesia. European Research Studies Journal Volume XX, Issue 4B, 2017

Youssef, C., Catherine, S., Richard, G. & Catherine, S. 2016. Bank Regulation and Supervision. Oxford University Press.

Zhang, R. & Ben Naceur, S. 2019. Financial development, inequality, and poverty: Some international evidence. *International Review of Economics & Finance,* 61**,** 1-16. https://doi.org/10.1016/j.iref.2018.12.015

Zhuang, J., Gunatilake, H. M., Niimi, Y., Khan, M. E., Jiang, Y., Hasan, R., Khor, N., Martin, A. L., Bracey, P. & Huang, B. 2009. Financial sector development, economic growth, and poverty reduction: A literature review. *Asian Development Bank Economics Working Paper Series*. Series no 173,

Appendices

Appendix I: Basel II/III Implementation: Chronology of Events

Dates	Event
2003	Nigeria adopts a 10% minimum capital ratio under Basel 1
2007 - 2009	Global Financial Crisis
2009 – 2012	Nigeria Banking Crisis
December 2013	Nigeria announces intention to adopt Basel II/III
January 2014	Test Implementation commences
October 2014	Nigeria implements the Basel II/III capital framework

Appendix II: Commercial Banks operating in Nigeria as of September 30, 2018

Commercial Banking Licence with International Authorization - Minimum Regulatory Capital of N50 Billion

1 Access Bank Plc
2 Diamond Bank Plc
3 Fidelity Bank Plc
4 First City Monument Bank Plc
5 First Bank of Nigeria Limited
6 Guaranty Trust Bank Plc
7 Union Bank of Nigeria Plc
8 United Bank of Africa Plc
9 Zenith Bank Plc

Commercial Banking Licence with National Authorization - Minimum Regulatory Capital of N25 Billion

10 Citibank Nigeria Limited
11 Ecobank Nigeria Plc
12 Heritage Bank Limited
13 Keystone Bank Limited
14 Polaris Bank Plc
15 Stanbic IBTC Bank Plc
16 Standard Chartered Bank Limited
17 Sterling Bank Plc
18 Unity Bank Plc
19 Wema Bank Plc

Commercial Banking Licence with Regional Authorization - Minimum Regulatory Capital of N10 Billion

20 Suntrust Bank Nigeria Limited
21 Providus Bank Plc

Non-Interest Banking Licence with National Authorization - Minimum Regulatory Capital of N15 Billion

22 Jaiz Bank Plc

Merchant Banking Licence with National Authorization - Minimum Regulatory Capital of N15 Billion

23 Coronation Merchant Bank
24 FBN Merchant Bank
25 FSDH Merchant Bank
26 Rand Merchant Bank
27 Nova Merchant Bank

Source: www.cbn.gov.ng

Appendix III: Financial Soundness Indicators

	Core Financial Soundness Indicators (FSIs)
	Capital Adequacy
1	Regulatory Capital to Risk-Weighted Assets, %
2	Regulatory Tier 1 Capital to Risk-Weighted Assets, %
3	Non-performing loans net of Provisions to Capital, %
	Asset Quality
4	Non-performing Loans to Total Gross Loans, %
	Liquidity
5	Liquid Assets to Short Term Liabilities, %
6	Liquid Assets to Total Assets (Liquid Asset Ratio), %
	Earnings and Profitability
7	Return on Assets, %
8	Return on Equity, %
9	Interest Margin to Gross Income, %
10	Non-interest Expenses to Gross Income, %

	Encouraged Financial Soundness Indicators (FSIs)
1	Spread Between Reference Lending and Deposit Rates, Basis Points
2	Capital to Assets %
3	Foreign-Currency-Denominated Liabilities to Total Liabilities %
4	Large Exposures to Capital %
5	Personnel Expenses to Non-interest Expenses %
6	Trading Income to Total Income %

Source: IMF, 2019

Appendix IV: Difference-in-Differences Identification Strategy - Nigeria vs Ghana

Following the strategy of Draca et al. (2011) and Fratzscher et al. (2016), a difference-in-differences identification strategy was used to establish a causal link between the BCF implementation and banking system resilience in Nigeria. Difference-in-differences estimators are popular in the policy evaluation literature on causal inferences (Angrist and Pischke, 2008). It examines the effect of a treatment on a treated group and establishes causality by comparison to a control group that did not receive the treatment. Nigeria and Ghana share many similarities. They are both English speaking countries; they have similar colonial origins; they both belong to ECOWAS, the West African Monetary Zone (WAMZ), and the College of Supervisors of the WAMZ. Thus, geographically, and culturally they have a lot in common. Regulatory and supervisory practices are likely to be similar considering that they both belong to the same college of supervisors in line with findings on regulatory convergence (Jones and Zeitz, 2019). Ghana had not implemented the BCF as of 2017 and thus served as a suitable control group to explore the impact of the BCF implementation on Nigeria's banking system.

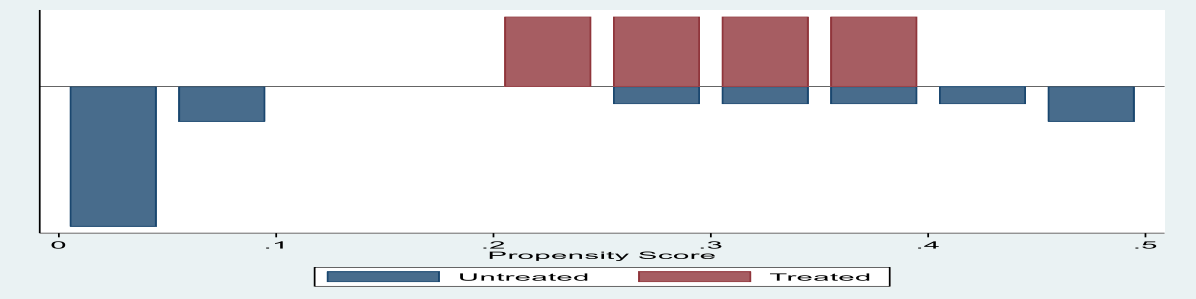
The figure below demonstrates the parallel trend assumption in banking sector resilience between the two countries which is a necessary pre-condition for a difference-in-differences estimator to be valid.

Parallel Trend Assumption

In using Ghana as a control group and ensuring sufficient similarity between the two countries, propensity score matching was used to confirm an adequate overlap of the covariates. Following the strategies of Caliendo and Kopeinig (2008) and Dehejia and Wahba (2002), Stata software was used to determine an appropriate propensity score using a logit

model. Variables included in the model were those macroeconomic and governance variables determined to be relevant by the literature. The logit model gave a log-likelihood of -7.56 and a pseudo R^2 of 0.25, indicating a reasonable quality of matching. Matching was first done based on the propensity score; thus, treatment effects are estimated only in regions of common support. However, full regression estimates were also obtained as PSM has been criticised as being sub-optimal and increasing imbalance by throwing away observations (King and Nielsen, 2019). Annual inflation and business environment were chosen as covariates as they provided the best overlap. The result of the propensity score matching is shown in the following figure.

Propensity Score Matching – Nigeria versus Ghana



The graph shows a reasonable level of common support between the covariates of the treated country (Nigeria) and the untreated (Ghana) with a propensity score between 0.2 and 0.4.

The model for the difference-in-differences estimator is specified as follows:

$$y_{it} = \beta_0\, treat_{it} + \beta_1 countrydum_{it} + \beta_2(treat_{it} \times countrydum_i) + X_i + \varepsilon_{it}$$

where y_{it} stands for the measure of resilience, treat are the years after the BCF implementation in Nigeria, i.e., 2014, countrydum is a dummy variable that takes on the value of 1 for the treated country (Nigeria) and 0 for the control country (Ghana), $treat_{it}$ x $countrydum_i$ is an interaction term that captures the change in resilience after the BCF implementation. X_i is a vector that contains the covariates that also influence resilience. As the literature indicates, macroeconomic factors and governance are of great importance. Babihuga (2007) finds that the FSIs are strongly influenced by the macroeconomy, thus annual inflation and the business environment are used as controls.

Tables 1 to 6 show the results of the full regressions and the regression based on the propensity score matching. Table 1 shows the causal effect of the BCF on various resilience measures. The dependent variables are the Bank Z-score (column 1), non-performing loans

to gross loans ratio (column 2), regulatory capital to risk-weighted assets (column 3), capital to total assets (column 4), return on assets (column 5), return on equity (column 6), liquid reserves to assets ratio (column 7) and the standard deviation of the return on assets (column 8). Table 2 shows the results after controlling for inflation. Table 3 introduces the business environment as a control. Table 4 shows the results after controlling for both inflation and the business environment. Table 5 is a summary of the full regression results and Table 7 shows the regression results based on the propensity score matching.

Table 1: Causal effect of the BCF on Resilience, Capital Adequacy, Asset quality, Earnings, Liquidity, and volatility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Variables (ln)	Bank Z_Score	NPL/GL	Reg cap/RWA	Cap/Tot Assets	ROA	ROE	Liquid Res/Assets ratio	SD of ROA
treat	0.191***	0.0674***	0.162***	0.171***	-0.0811***	-0.365***	0.414***	-1.155***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
countrydum	0.786***	-0.0867***	-0.140***	-0.266***	-0.831***	-1.131***	-0.227***	-0.0615***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
treat x countrydum	-0.157***	-0.827***	0.0636***	-0.119***	0.0260***	0.309***	0.376***	-1.531***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Constant	1.930***	2.585***	2.719***	2.468***	1.645***	3.883***	3.005	0.451***
	(0)	(0)	(0)	(0)	(0)	(0)		(0)
Observations	38	33	32	32	35	36	36	36
R-squared	0.850	0.156	0.041	0.107	0.284	0.378	0.394	0.358

*Table 2 - **C**ausal effect of the BCF on Resilience, Capital Adequacy, Asset quality, Earnings, Liquidity, and volatility controlling for inflation*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Variables (ln)	Bank Z_Score	NPL/GL	Reg cap/RWA	Cap/Tot Assets	ROA	ROE	Liquid Res/Assets ratio	SD of ROA
treat	0.187***	-0.00607	0.217**	0.200*	-0.0869**	-0.388**	0.418***	-1.178**

	(0.00283)	(0.0441)	(0.0169)	(0.0289)	(0.00220)	(0.00774)	(0.00236)	(0.0215)
countrydum	0.750**	0.0608	-0.241*	-0.340	-0.809***	-1.045**	-0.266*	0.0251
	(0.0276)	(0.0885)	(0.0311)	(0.0725)	(0.00832)	(0.0291)	(0.0227)	(0.0808)
treat x countrydum	-0.148**	-0.729*	-0.0193	-0.151	0.0288**	0.320***	0.372***	-1.519***
	(0.00721)	(0.0589)	(0.0254)	(0.0314)	(0.00105)	(0.00387)	(0.00218)	(0.0107)
Inflation annual	-0.149	0.525	-0.393	-0.246	0.0885	0.349	-0.234	0.352
	(0.112)	(0.315)	(0.121)	(0.241)	(0.0336)	(0.118)	(0.137)	(0.329)
Constant	2.329*	1.182	3.770*	3.130	1.409**	2.951*	3.621*	-0.490
	(0.299)	(0.843)	(0.323)	(0.649)	(0.0899)	(0.317)	(0.360)	(0.879)
R-squared	0.867	0.251	0.126	0.143	0.285	0.398	0.425	0.366

Table 3 - Causal effect of the BCF on Resilience, Capital Adequacy, Asset quality, Earnings, Liquidity, and volatility controlling for the business environment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Variables (ln)	Bank Z_Score	NPL/GL	Reg cap/RWA	Cap/Tot Assets	ROA	ROE	Liquid Res/Assets ratio	SD of ROA
treat	0.101	0.282	-0.00124	0.0925	0.310	0.205	0.124	-0.869*
	(0.0566)	(0.289)	(0.0613)	(0.185)	(0.249)	(0.175)	(0.0923)	(0.128)
countrydum	0.685	0.736	-0.699	-0.432	-0.652	-0.837	-1.550	3.115
	(0.489)	(1.698)	(0.360)	(1.088)	(2.221)	(1.518)	(0.798)	(1.106)
treat x countrydum	-0.141	-0.839	0.542	0.350	0.0149	0.228	0.943	-2.566*

	(0.129)	(0.535)	(0.114)	(0.343)	(0.634)	(0.401)	(0.211)	(0.292)
Business Environment	-0.331	3.053	-0.307	0.474	0.588	0.748	-2.429	7.507
	(1.262)	(4.380)	(0.928)	(2.806)	(5.565)	(3.915)	(2.059)	(2.852)
Observations	20	18	18	18	19	20	20	20
R-squared	0.909	0.286	0.193	0.265	0.252	0.361	0.595	0.424

Table 4 - Causal effect of the BCF on Resilience, Capital Adequacy, Asset quality, Earnings, Liquidity, and volatility controlling for inflation and the business environment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Variables (ln)	Bank Z_Score	NPL/GL	Reg cap/RWA	Cap/Tot Assets	ROA	ROE	Liquid Res/Assets ratio	SD of ROA
treat	0.123*	-0.0334	0.420	0.524	0.414	0.288	0.311	-1.568
	(0.0175)	(0.291)	(0.441)	(0.488)	(0.101)	(0.0842)	(0.118)	(0.665)
countrydum	0.730	0.140	0.0957	0.383	-0.423	-0.667	-1.167	1.683
	(0.339)	(0.880)	(0.779)	(1.374)	(1.916)	(1.329)	(0.970)	(1.873)
treat x countrydum	-0.168	-0.390	-0.0580	-0.265	-0.118	0.128	0.716	-1.716
	(0.0394)	(0.261)	(0.622)	(0.744)	(0.448)	(0.290)	(0.262)	(0.892)
Inflation annual	-0.0589	0.585	-0.780	-0.800	-0.268	-0.218	-0.492**	1.843
	(0.196)	(1.205)	(0.842)	(0.695)	(0.392)	(0.240)	(0.0219)	(1.548)
Business Environment	-0.208	1.471	1.805	2.640	1.184	1.201	-1.403	3.668

	(0.859)	(2.175)	(2.076)	(3.599)	(4.767)	(3.409)	(2.505)	(4.954)
R-squared	0.910	0.317	0.261	0.351	0.257	0.365	0.648	0.478

Table 5 - Summary of causal effects of the BCF on Resilience, Capital Adequacy, Asset quality, Earnings, Liquidity, and volatility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Variables (ln)	Bank Z_Score	NPL/GL	Reg cap/RWA	Cap/Tot Assets	ROA	ROE	Liquid Res/Assets ratio	SD of ROA
treat x countrydum (unconditional)	-0.157***	-0.827***	0.0636***	-0.119***	0.0260***	0.309***	0.376***	-1.531***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
treat x countrydum (+ inflation)	-0.148**	-0.729*	-0.0193	-0.151	0.0288**	0.320***	0.372***	-1.519***
	(0.00721)	(0.0589)	(0.0254)	(0.0314)	(0.00105)	(0.00387)	(0.00218)	(0.0107)
treat x countrydum (+ inflation, bus env)	-0.168	-0.390	-0.0580	-0.265	-0.118	0.128	0.716	-1.716
	(0.0394)	(0.261)	(0.622)	(0.744)	(0.448)	(0.290)	(0.262)	(0.892)

Table 6 - Propensity Score Matching – causal effect of the BCF on Resilience, Capital Adequacy, Asset quality, Earnings, Liquidity, and volatility controlling for inflation and the business environment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Variables	Bank Z_Score	NPL/GL	Reg cap/RWA	Cap/Tot Assets	ROA	ROE	Liquid Res/Assets ratio	SD of ROA
treat x countrydum	-0.201**	-0.142	-0.0987	-0.0486	-0.441***	0.422	1.558***	-4.533***
	(0.0852)	(0.232)	(0.217)	(0.246)	(0.113)	(0.493)	(0.454)	(0.321)

The results in Table 1 confirm the earlier results of the analysis on all banks that the implementation of the BCF in Nigeria in 2014 did not have a significant impact on bank stability. This is not surprising as highly leveraged banks are not excluded. Bank stability reduced by 0.16 after implementation as the interaction term coefficient (treat x countydum) in column 1 shows. An additional explanation as suggested by Calomiris and Haber (2015) is that the stability of a country's banking system is dictated by the political structures from which its governing institutions evolve. Holding inflation constant in table 2, the Z-score improves slightly, and in table 3, where the business environment is controlled for, it improves even more but loses its statistical significance. This shows that the business environment is an essential factor in resilience. A comparatively worse business environment in Nigeria appears to have dampened the positive impact of the implementation of the BCF. As only a partial overlap was found between Nigeria and Ghana, a propensity score match was performed to achieve better precision. These estimates are shown in table 6. According to this estimator, the bank Z-score reduced by 0.2, approximately the same as the full regression. Table 5 summarises the causal effects of the BCF implementation on Nigeria Bank Z-score and its FSIs under all conditions – raw difference-in-differences, controlling for inflation, controlling for the business environment, and propensity score matching estimations.

Increasing leverage, macroeconomic factors and the business environment constrained the response of the Nigerian banking system to the reforms going by the Z-score indicator. Although some of the FSIs point to soundness, it is essential to take a holistic view of all FSIs and the Z-score, as individual FSIs may show a country's banking system to be sound, but it is not enough to infer resilience. A macro-prudential approach is also crucial as the Z-score and the FSIs may not highlight the inter-connections and sentiments in the industry which may cause contagion and amplify shocks. Turning to the financial soundness indicators the results are presented as follows:

Capital Adequacy

Regulatory capital to risk-weighted assets is a measure of capital adequacy captured by the IMF in its financial soundness indicators (FSIs). Capital adequacy determines the ability of financial institutions to withstand shocks. The ratio of regulatory capital to risk-weighted assets is the leading indicator of capital adequacy, in line with the methodology stipulated by the BCBS in 1988 (BIS: Bank for International Settlements, 2014). Under all the estimators, as

shown in column 3 of tables 1 to 6, the regulatory capital to risk-weighted assets declined after the BCF when controlling for inflation and the business environment.

Leverage

The capital to total assets indicator captures the ratio of capital to total assets not weighted by risk. Thus, it is not distorted by subjective or inaccurate measures of risk. It further measures the extent to which assets are funded by borrowed funds and thereby measures leverage as well as the quantum of capital in the banking sector. Table 1 column 4 shows that the capital to assets ratio fell by 0.12 and was statistically significant before controlling for inflation and the business environment. This ratio feeds directly into the Bank Z-score and may explain why the BCF seems to have had a negative impact on the bank Z-score.

Asset Quality

Asset quality impairment could occur because of the deteriorating financial health of borrowers, and this could result in the insolvency of a financial institution. The ratio of non-performing loans (NPLs) to total gross loans is often used as a proxy for asset quality (IMF, 2020). Table 1 column 2 shows that the BCF positively impacted asset quality by reducing the ratio of non-performing loans to risk-weighted assets by 0.83 before controls and 0.73 when inflation is controlled for in table 2 column 2. The importance of the business environment is underscored as the value of the NPL coefficient drops to 0.4 when the business environment is controlled for in table 4. The PSM estimator in table 6 reduces the value of the coefficient, i.e., the improvement in asset quality to 0.14.

Earnings

The return on equity (ROE) and return on assets (ROA) ratios are financial soundness indicators that capture profitability. It is based on the accounting data of banks. However, an analysis of profitability based exclusively on ROEs would tend to disregard the inefficiencies of banks and the more significant risks associated with high leverage (IMF, 2020). ROA showed a statistically significant increase of 0.3 before and after controlling for inflation (tables 1 and 2). However, when the business environment is introduced, this reduces to an insignificant 0.01. The PSM estimator further reduces it to a significant decline of 0.4.

Liquidity

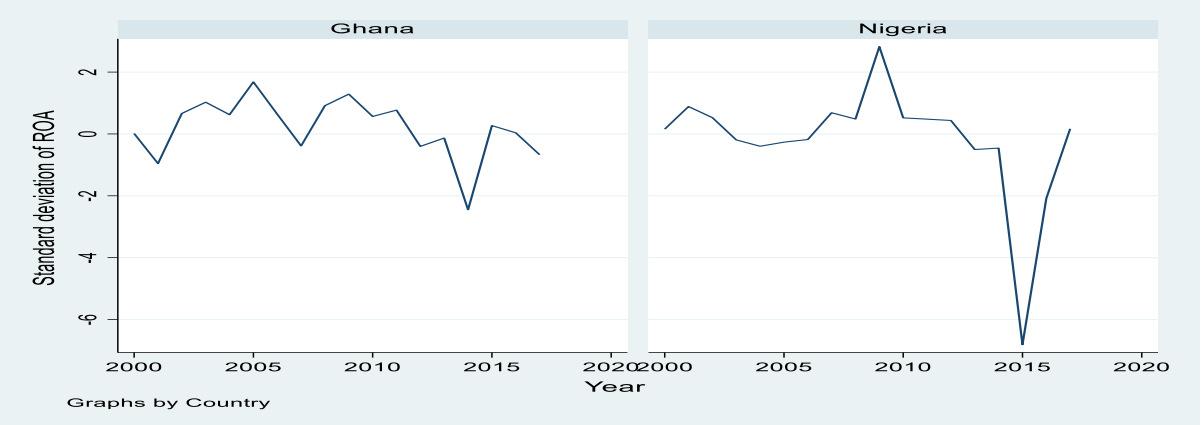
The level of liquidity influences the ability of a banking system to withstand shocks. A liquidity crisis has the potential to push solvent banks into insolvency because if they lose access to funding, they could be forced to sell assets at depressed prices to obtain liquidity (Evans et

al., 2000, IMF, 2020). A common measure of liquidity is liquid assets to total assets (liquid asset ratio), which indicates how much balance sheet shrinkage the sector could absorb before being forced to sell illiquid assets (IMF, 2020). Liquidity improved significantly after the BCF as shown by tables 1, 2 and 6.

Volatility of returns

The Bank Z Score is highly sensitive to the volatility of returns, which is a proxy for risk in the banking sector. Tables 1 to 6 show a statistically significant reduction in the standard deviation of the ROA after the BCF implementation. The following graphs compare the volatility in ROA in Ghana and Nigeria:

Volatility in return on assets (ROA) in Ghana and Nigeria



The graph shows that for the period of analysis, although the ROA of Nigeria was more volatile than that of Ghana, indicating higher risk, it reduced post BCF indicating a reduction in risk. The reason for the sharp dip in the graph in Nigeria in 2015 was probably due to a currency devaluation of 17% from N167 to the dollar to N196 (www.cbn.gov.ng). The analysis in this study showed that this resulted in a 35% reduction in the return on assets from 2.3% to 1.7% in the same year.

The core financial soundness indicators as a measure of resilience showed mixed results. There is a statistically significant improvement in asset quality of 0.83 but which progressively declines as inflation and the business environment are introduced. Restricting results to the PSM estimation, Nigeria's capital adequacy, leverage measured by capital to total assets, and return on assets deteriorated post-BCF. However, the return on equity and liquidity improved. Risk is also reduced as measured by the volatility of returns.

Appendix V: Details of documents reviewed.

Document	Description/ Purpose	Source
South African Reserve Bank Financial Stability Review (FSR) Reports Years 2006 to 2021 – 29 reports	The SARB endeavours to contribute to a banking system that is highly resilient. To that end, the Bank publishes semi-annual Financial Stability Reviews. The publication aims to identify and analyse potential risks to financial system stability, communicate such assessments and stimulate debate regarding pertinent issues.	https://www.resbank.co.za/en/home/publications/review/financial-stability-review
The Global Financial Development Database Years 2001 to 2021	The GFDD contains an extensive set of financial system prudential ratios and measures of banking system stability including the bank Z-score	Global Financial Development Database (worldbank.org)
National Treasury Policy Document Republic of South Africa A safer financial sector to serve South Africa better. 23 February 2011	Discussions of the National Treasury with stakeholders on building a safer financial sector to serve South Africa better. Although the financial sector successfully weathered the GFC, a million people still lost their jobs. The National Treasury was committed to ensuring financial and economic stability going forward	A safer financial sector to serve South Africa better.pdf (resbank.co.za)
The South African small banks' crisis of 2002/3 Lessons from South African bank failures 2002 to 2014	The article and the PhD thesis by the same author (Havemann, R. 2021) reviews causes and lessons from bank failures from 2002 to 2014	The South African small banks' crisis of 2002/3 | Economic History of Developing Regions (journals.co.za)
The News Media Businesstech, 2018 REUTERS CNBC Africa	All the South African banks that have failed in the last 30 years – Lists and describes the circumstances around all banks that failed in South Africa from 1988 to 2017 Extensively reviewed to find evidence of corporate governance and contagion effects	https://businesstech.co.za/news/banking/231009/all-the-south-african-banks-that-have-failed-in-the-past-30-years/ (No contagion risk as bailed-out South African bank's shares halted | Reuters). (VBS curator says the bank's 2017 audited results are not reliable - CNBC Africa)

Document	Description/ Purpose	Source
Bank of International Settlements (BIS) Central Bankers' Speeches. 2014	Press conference of the Governor of the South African Reserve Bank in connection with the failure of African Bank Limited.	https://www.bis.org/review/r140812a.pdf
National Treasury Republic of South Africa, 2018	The Treasury's response to the VBS Mutual Bank matter – discusses how the National Treasury of South Africa responded to the failure of VBS bank in 2018	http://www.treasury.gov.za/comm_media/press/2018/2018031401%20TREASURYS%20RESPONSE%20TO%20THE%20VBS%20MUTUAL%20BANK%20MATTER.pdf
VBS Mutual Bank investigators report to the Prudential Authority. African Bank and the Myburgh Report: SARB briefing.	Reports of investigators and reports to South Africa Parliament on reasons for failure of African Bank Ltd and VBS Mutual Bank	https://www.resbank.co.za/en/home/publications/publication-detail-pages/media-releases/2018/8830 https://pmg.org.za/committee-meeting/22601/
The South African Financial Regulation Journal Merchantec Capital CEO Confidence Index	Reviewed for evidence of weakening public confidence	www.financialregulationjournal.co.za
Credit Rating Agencies Moody's Investors Service	Reviewed for evidence of heightened risk in South Africa's banking system	https://www.moodys.com/research/Moodys-downgrades-four-South-African-banks-on-review-for-further--PR_306571
Trading Economics database	Reviewed for credit ratings of South Africa	https://tradingeconomics.com/south-africa/rating
South Africa Financial Sector Assessment Program 2015: Financial Safety Net, Bank Resolution, and Crisis Management Framework – IMF Country Report No. 15/53 Detailed Assessment of Compliance with the Basel Core Principles for Effective	Prepared by the Monetary and Capital Markets Department of the IMF and discusses recommendations made during the Financial Sector Assessment Program (FSAP) for South Africa in the areas of contingency planning, crisis management, and bank resolution. Extensive reviews were made on the macroeconomic environment, financial	https://www.imf.org/en/Publications/CR/Issues/2016/12/31/South-Africa-Financial-Sector-Assessment-Program-Financial-Safety-Net-Bank-Resolution-and-42755 https://www.imf.org/external/pubs/ft/scr/2015/cr1555.pdf

Document	Description/ Purpose	Source
Banking Supervision - IMF Country Report No. 15/55	stability oversight, systemic protection, and compliance with the BCBS	
South Africa 2017 Article IV Consultation - IMF Country Report No. 17/189	Under Article IV of the IMF's Articles of Agreement, the IMF holds bilateral discussions with members, usually every year. The discussions cover economic developments and policies. In the 2017 edition the IMF noted the need to further buttress resilience, need for greater competition in the banking system, strengthening the integrity of the financial system, greater access to finance with proper supervision to help reduce inequality. The IMF commended South Africa's resilience, which owes to its flexible exchange rate, low reliance on foreign currency debt, large domestic investor base, and broadly balanced international investment position.	http://www.treasury.gov.za/publications/other/imf/2017/IMF%20Art%20IV%20report.pdf
Peer Review of South Africa - 2020	Conducted by the Financial Stability Board, the report reviews how members match up to peers in various financial stability issues such as FSB Key Attributes of Effective Resolution Regimes for Financial Institutions and IADIs Core Principles for Effective Deposit Insurance Systems. The review finds that the South African authorities have applied the lessons from recent bank failures to inform reforms.	Peer Review of South Africa - Financial Stability Board (fsb.org)
Stress testing Years 2006 to 2021	The SARB's common scenario stress test is conducted every two years and estimates potential losses and capital shortfalls in the banking sector resulting from severe and plausible scenarios over a period of time. The tests are conducted on bottom-up and top-down bases and include sensitivity analyses intended to assess the effects of specific risk factors that might adversely affect the solvency position or liquidity profile of a financial institution. Banks receive the scenarios to conduct stress tests based on their internal models, while the SARB simultaneously	Financial Stability Review (resbank.co.za) Stress Testing (resbank.co.za)

Document	Description/ Purpose	Source
	conducts a top-down stress test to validate and benchmark the results from each bank. Both approaches are designed to assess the effect of the scenarios on the solvency position (including, credit risk, market risk and interest rate risk in the banking book) and the liquidity profile of the South African banking sector. For each scenario, new capital and liquidity ratios are calculated and compared to their minimum prudential regulatory requirements. The ongoing COVID-19 pandemic posed unprecedented risk to financial stability in 2020. The SARB responded by conducting a top-down stress test which was designed to assess the vulnerability of the banking system to the economic disruptions that resulted from lockdowns across the globe. The results of the stress test demonstrated that South African banks' balance sheets were well positioned to weather the crisis.	

Appendix VI: Questionnaire

What impact has the Basel II/III capital reforms had on the Nigerian Banking System?

The Central Bank of Nigeria introduced the Basel II/III reforms into the banking system in October 2014. The objective of this survey is to determine the extent to which the expected and maybe unexpected benefits and/or challenges have been encountered. Data collected will be used for research purposes only, and thus shall be treated with strict confidence. Your participation in this survey is highly appreciated.

1. **General**
   a) Designation of respondent .....
      Please tick as appropriate:
   b) Is the bank:
      i. locally incorporated? ☐
      ii. Is it a subsidiary of a foreign bank? ☐
   c) What kind of authorisation does the bank have?

International	National	Regional

   d) Is the bank considered a domestic systemically important bank?

2. To what extent has your bank benefitted from the implementation of Basel II/III?

	Benefit	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
1	Improved governance – Board and senior management				
2	Enhanced clarity of objectives				
3	Improved risk identification				
4	Improved risk assessment				
5	Improved risk measurement				
6	Improved monitoring and controls				
7	Enhanced risk management				
8	Better communication				
9	Better risk pricing				
10	Enhanced market discipline				
11	Improved alignment of capital with risk				
12	Better quality capital				
13	Improved capital adequacy levels				
14	Improved defence from business line management				
15	Improved independence of the risk management function				
16	Improved internal audit reviews				
17	Promotes safety and soundness				
18	Reduced asset impairment				
19	Improved operational efficiency				
20	Improved profitability				
21	Improved credit supply				
22	Enhanced customer relationships				
23	Reduced regulatory risk				
24	Improved credit ratings				
25	Less likelihood of bank failure				
26	Basel II/III has improved banking system resilience				

3. **To what extent did your bank encounter adverse consequences from the implementation of Basel II/III?**

	Benefit	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
1	Inability to comply with capital adequacy requirements				
2	Lower credit supply				
3	Reduced ability to lend to SMEs				
4	Reduced profitability				
5	Reduced credit ratings				
6	Declining share prices				
7	Increased regulatory penalties				
8	Increased deposit insurance premium				
9	Management and staff attrition				
10	Increased customer complaints				
11	More intrusive supervision				
12	Any other unintended consequence				

Appendix VII: Geographic Regions, Countries, and Economic Classes

Country	Ec Class	Country	Ec Class	Country	Ec Class
Europe & Central Asia		East asia & pacific		Mena	
Albania	UMI	Cambodia	LMI	Egypt, Arab rep.	LMI
Armenia	UMI	China	UMI	Jordan	UMI
Azerbaijan	UMI	Fiji	UMI	Lebanon	UMI
Belarus	UMI	Indonesia	UMI	Morocco	LMI
Bosnia and Herzegovina	UMI	Malaysia	UMI	Syrian Arab republic	LI
Bulgaria	UMI	Mongolia	LMI	Tunisia	LMI
Croatia	HI	Philippines	LMI	Yemen, rep.	LI
Georgia	UMI	Thailand	UMI		
Hungary	HI	Vietnam	LMI	Sub-Saharan Africa	
Kazakhstan	UMI			Angola	LMI
Kyrgyz republic	LMI	Latin America & Caribbean		Benin	LMI
Moldova	LMI	Argentina	UMI	Burkina Faso	LI
Montenegro	UMI	Belize	UMI	Burundi	LI
North Macedonia, Fyr	UMI	Bolivia	LMI	Cameroon	LMI
Poland	HI	Brazil	UMI	Cote D'Ivoire	LMI
Romania	HI	Chile	HI	Eswatini	LMI
Russian federation	UMI	Colombia	UMI	Ethiopia	LI
Serbia	UMI	Costa Rica	UMI	Gabon	UMI
Tajikistan	LI	Dominican Republic	UMI	Gambia, the	LI
Turkey	UMI	Ecuador	UMI	Ghana	LMI
Ukraine	LMI	El Salvador	LMI	Guinea	LI
Uzbekistan	LMI	Guatemala	UMI	Kenya	LMI
		Guyana	UMI	Madagascar	LI
South asia		Honduras	LMI	Malawi	LI
Bangladesh	LMI	Jamaica	UMI	Mali	LI
Bhutan	LMI	Mexico	UMI	Mozambique	LI
India	LMI	Nicaragua	LMI	Namibia	UMI
Nepal	LMI	Panama	HI	Niger	LI
Pakistan	LMI	Paraguay	UMI	Nigeria	LMI
Sri Lanka	LMI	Peru	UMI	Rwanda	LI
		Trinidad and Tobago	HI	Senegal	LMI
		Uruguay	HI	South Africa	UMI
		Venezuela, RB	UMI	Sudan	LI
				Tanzania	LMI
				Togo	LI
				Uganda	LI
				Zambia	LMI
				Zimbabwe	LMI

Notes: Ec Class – Economic Class; HI – High Income; UMI – Upper Middle Income; LMI – Lower Middle Income; LI – Low Income

Appendix VIII: Number of Microfinance Institutions in Each Country

Europe & Central Asia	No of MFIs	East Asia & Pacific	No of MFIs	MENA	No of MFIs	South Asia	No of MFIs	Latin America & Caribbean	No of MFIs	Sub-Saharan Africa	No of MFIs
Albania	7	Cambodia	90	Egypt, Arab Rep.	16	Bangladesh	86	Argentina	19	Angola	2
Armenia	18	China	81	Jordan	9	Bhutan	1	Belize	1	Benin	37
Azerbaijan	46	Fiji	1	Lebanon	6	India	250	Bolivia	29	Burkina Faso	32
Belarus	3	Indonesia	78	Morocco	12	Nepal	47	Brazil	54	Burundi	22
Bosnia And Herzegovina	18	Malaysia	1	Syrian Arab Republic	3	Pakistan	57	Chile	7	Cameroon	34
Bulgaria	26	Mongolia	15	Tunisia	1	Sri Lanka	28	Colombia	48	Cote D'ivoire	33
Croatia	2	Philippines	121	Yemen, Rep.	11			Costa Rica	18	Eswatini	2
Georgia	21	Thailand	3					Dominican Republic	19	Ethiopia	28
Hungary	1	Vietnam	51					Ecuador	77	Gabon	1
Kazakhstan	48							El Salvador	20	Gambia, The	4
Kyrgyz Republic	49							Guatemala	27	Ghana	86
Moldova	12							Guyana	1	Guinea	8
Montenegro	4							Honduras	28	Kenya	53
North Macedonia, Fyr	4							Jamaica	8	Madagascar	18
Poland	4							Mexico	115	Malawi	10
Europe & Central Asia	No of MFIs	East Asia & Pacific	No of MFIs	MENA	No of MFIs	South Asia	No of MFIs	Latin America & Caribbean	No of MFIs	Sub-Saharan Africa	No of MFIs
Romania	8							Nicaragua	37	Mali	23
Russian Federation	128							Panama	8	Mozambique	12
Serbia	4							Paraguay	7	Namibia	2

Tajikistan	70								Peru	76	Niger	22
Turkey	2								Trinidad And Tobago	4	Nigeria	89
Ukraine	3								Uruguay	2	Rwanda	52
Uzbekistan	36								Venezuela, Rb	2	Senegal	86
											South Africa	18
											Sudan	2
											Tanzania	23
											Togo	37
											Uganda	46
											Zambia	10
											Zimbabwe	9
22	514	9	441	7	58	6	469	22	607	29	801	

Appendix IX: Impact of Micro-credits on Human Development, Life Expectancy, Education, Employment and Youth not in School using Two-Step System GMM

Variables	HDI	LEI	EDI	Emp to pop	Youth not in school
Microfinance loans	0.003	0.054	-0.043	0.420**	-0.191
	(0.051)	(0.043)	(0.101)	(0.169)	(0.252)
Microfinance loans (1 yr lag)	-0.041	0.029	-0.065	0.285***	-0.186
	(0.035)	(0.026)	(0.073)	(0.103)	(0.121)
Political environment (ln)	0.271*	0.290***	0.258	0.114	0.027
	(0.148)	(0.107)	(0.351)	(0.236)	(0.268)
Regulatory environment (ln)	-0.014	-0.021	0.000	-0.229	0.158
	(0.111)	(0.079)	(0.245)	(0.229)	(0.235)
Business environment (ln)	0.126	0.393	0.368	1.298	-1.864**
	(0.219)	(0.265)	(0.625)	(0.874)	(0.796)
Inflation (ln)	0.020	0.048**	0.083	-0.015	-0.048
	(0.028)	(0.019)	(0.146)	(0.069)	(0.069)
Constant	-0.515	0.024	-2.182	-3.474	9.366**
	(0.919)	(1.021)	(2.697)	(3.838)	(3.863)
Observations	373	373	373	373	373
Number of id	83	83	83	83	83
Ar(1)	0.000	0.473	0.000	0.002	0.005
Ar(2)	0.523	0.074	0.282	0.781	0.792
Hansen	0.370	0.173	0.419	0.330	0.402
Number of instruments	54	26	40	26	29

Appendix X: Household Items

Household Items			
301	Furniture (3/4-piece sofa set)	319	Cars and other vehicles
302	Furniture (chairs)	320	Generator
303	Furniture (table)	321	Fan
304	Mattress	322	Radio
305	Bed	323	Cassette recorder
306	Mat	324	Hi-Fi (Sound System)
307	Sewing machine	325	Microwave
308	Gas cooker	326	Iron
309	Stove (electric)	327	TV Set
310	Stove gas (table)	328	Computer
311	Stove (kerosene)	329	DVD Player
312	Fridge	330	Satellite Dish
313	Freezer	331	Musical Instrument
314	Air conditioner	333	Inverter
315	Washing Machine	3021	Plastic chairs
316	Electric Clothes Dryer	3321	Smart Phone
317	Bicycle	3322	Regular mobile phone
318	Motorbike	3341	Other (Specify)

Appendix XI: Correlation matrix of explanatory variables

Correlation matrix of explanatory variables

Variables	CapTA	ROA	Std. Dev.	Deposit growth	GDPpc growth	CrisisDum
CapTA	1					
ROA	-0.159	1				
Std. Dev.	0.278	0.328	1			
Deposit growth	-0.080	0.428	0.085	1		
GDPpc growth	0.567	0.002	0.106	-0.015	1	
CrisisDum	-0.370	-0.004	-0.062	0.019	-0.718	1

Note: All variables are log-transformed. CAPTA – capital to total assets ratio, ROA – return on assets, Std Dev – standard deviation, GDPpc – GDP per capita, CrisisDum – crisis dummy

None of the explanatory variables display perfect multicollinearity and thus will not constitute a constraint to estimating the coefficients. Tests were also conducted to ensure the absence of endogeneity. A Wald test was conducted to determine whether there was a significant correlation between the treatment years and the potential outcomes. The test result revealed that endogeneity was absent. Tests were also performed to check for serial correlation in the outcome variables – the Z-score. This was done by regressing the Z-score on the last Z-score and checking the correlation between the Z-score and the last Z-score. In both tests, a serial correlation was non-existent.

Appendix XII: Simple Poverty Scorecard® Poverty-Assessment Tool

Appendix XIII: Surprising Findings

This research yielded some surprising findings, including:

- The Basel II/III Capital Framework revealed an initial negative effect on Nigeria.
- Leverage and unsound corporate governance were limiting factors to banking system resilience.
- South Africa, which is reputed to have one of the best banking systems in the world, did not reveal a statistically positive impact of the BCF.
- Liquid reserves were negatively correlated with performance, contrary to the expectations of Basel.
- Contrary to expectations, the impact of COVID-19 on households, and the MFI industry was not as significant as anticipated.
- COVID-19 had a positive impact on financial inclusion through the use of digital means.