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**A TRAJECTORY OF FINANCIAL INCLUSION
TOWARDS ECONOMIC INCLUSION: EMPIRICAL
EVIDENCE FROM LICs-GHANA AS A CASE.**

A thesis

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of the requirements for the degree

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ABSTRACT

This study investigates the trajectory of financial inclusion towards economic inclusion in Ghana. The aim is to track the dynamisms and the conduits through which financial inclusion translates into an inclusive-economic system in a way that becomes pro-poor and growth engendering. Specifically, the study i) examines the role that regulatory and institutional factors play in the attainment of broader inclusion in lower-income countries (LICs), with Ghana as reference case; ii) examines the means by which technological deepening contributes to drive towards an inclusive financial system in Ghana; iii) identifies firm attributes that are most significantly predisposed to the risk of exclusion from the use of formal financial services; iv) ascertains the most efficient means through which financial inclusion can impact on economic growth in Ghana; and v) scientifically assesses the means through which financial inclusion translates into economic inclusion at the household level.

The *raison d'être* of financial intermediaries (FIs), is fundamental to our understanding of why financial exclusion exists and appears endemic in LICs. Past studies have failed to link the two. The complete understanding of why financial exclusion exists and appears dominant in LICs is embedded in the understanding of why financial intermediaries exist and operate. It becomes difficult to explain why exclusion exists if FIs are merely perceived as delegated monitors, risk managers and a coalition of information sharers. Profit-maximisation, which implies cost minimisation, suggests that intermediaries will refrain from serving those economic agents perceived to be associated with significant information asymmetry and transaction costs that characterise imperfect financial markets.

This thesis, therefore, contributes to illuminating an understanding of why financial exclusion appears prevalent in LICs and demonstrates a means through which economic inclusion can emerge out of an inclusive financial system. Failure to establish these linkages tends to lead to financial policies that either lack theoretic groundings or miss the intended outcomes.

Using multi-sourced datasets from reliable domains such as the World Bank (World Development Indicators, Gallup Poll Global Findex and Enterprise Surveys), World Governance Index, Transparency International, Heritage Foundation/Wall Street and the ICPSR (via Princeton University database) allows the underlying relationships to be investigated. The empirical investigations are based on the four key pillars/dimensions of financial inclusion (impact, quality, usage and access-IQUA). Econometric models are estimated using multiple regression analysis. Maximum

likelihood estimation (MLE) process, Instrumental Variable Estimation (IVE) and Linear but semi-parametric models are employed in empirical estimations that lead to robust outcomes.

The use of logistic regression, which is a family of binary models based on MLE process, underscores the concept of financial inclusion/exclusion itself being dichotomous in nature. That is, either an agent is included financially or otherwise. Again, the adoption of the generalised method of moment (GMM) model which is part of the IV estimation process recognises the problem of endogeneity and simultaneity that often characterise household-level data on financial accessibility and its impact.

The findings indicate that financial inclusion does not occur in a vacuum, and the impact of institutional and infrastructural factors on a broader inclusion is critical. The study identifies key institutional factors, such as national-level governance, corruption perceptions, economic freedom, and economic and technological deepening, as playing crucial roles. The findings further suggest that rule of law (which ensures contract enforceability), political stability, regulatory quality, voice and accountability, all significantly influence financial inclusion positively.

The study finds a positive impact of technology on financial inclusion. Specifically, the use of modern technological amenities, such as mobile phone and internet, can offer digitalised-based, branchless financial services which help reduce both information asymmetry and transaction costs for providing financial services. The findings further suggest that nonbank-based digitalised-financial services (DFS) provision appears non-discriminatory, compared with bank-based DFS. Again, the inclusion driven by bank-based DFS reduces over time, while nonbank-based DFS rises. This substitutability trend observed in this study defines the contemporaneous trade-off of bank-based DFS and nonbank-based DFS over time.

Identification of the firm-level characteristics that either contribute to, or reduce their predisposition to risk of being excluded from the use of financial services is one of the key objectives that motivated this study. Using a logistic regression model as a link function and with a rich dataset from the World Bank Enterprise Survey on Ghana, the results suggest that firm age, size, sector of operation and ownership of website are key determinants of financial inclusion. The likelihood of exclusion among firms reduces with website ownership that helps reduce information and transaction costs associated with lending to information-opaque sectors such as SMEs. Similarly, the findings suggest that the retailing, matured and high-sales firms have a better chance of accessing lines of credit from financial intermediaries. Consistent with prior studies,

risk of financial exclusion is found to be higher among SMEs than larger firms. Again, sole-proprietorship and partnership firms are found to have high-risk dispositions when it comes to credit constraints, compared with publicly listed companies.

The study further reveals that certain key structural changes at national level that occurred specifically within the follow-up data collection period, account for the observed differences in the results of the two datasets used. The political change from the private sector-led administration (baseline) to the social democratic regime (follow-up), the discovery of oil in commercial quantities and the eight-month post-election hearing by the country's Supreme Court were identified as having played a part in exerting latent impacts on financial exclusion/inclusion, especially among SMEs.

Using a quantile regression model, the study contributes significantly to our understanding on the role financial development, inclusion and structure play in economic growth of developing economies. The results suggest that the banks' growth-facilitating role is much stronger than that of the financial markets. Depth of financial inclusion (proxied by the amount of credit to the private sector), is found to be positively related to economic growth. This suggests that, for LICs, the growth-enhancing effect of finance thrives on the strength of financial institutions as it engenders wider inclusion.

The results further suggest that the impact of a financial inclusion programme at household level depends largely on the quality of the process leading to its implementation. It reveals that donor-funded programmes implemented via donor-agencies have more positive poverty-reducing impacts on the beneficiaries than those implemented by government agencies.

These findings have policy ramifications for LICs aiming for a broader and more inclusive financial system. That technological infrastructure and amenities significantly influence financial inclusion, suggests that developing countries aiming to achieve a financially inclusive society must pay attention to these institutional contexts with more emphasis on technological infrastructure.

At the firm level, policy attention of donors, sector players and regulators needs to focus on the firm's attributes that are predisposed to their exclusion from the formal financial sector, while strengthening policies for those that are inclusive-inducing. Policy and capacity building on enterprise growth and sustainability will be strategic in targeting the inclusion-inhibiting factors. Firm-level constraints that confront small, individually owned businesses when addressed will both ensure their inclusion in the formal financial system and, most importantly, their growth and sustainability.

Tracking potential externalities that originate from structural changes and how that affects other sectors at the micro-level, must not elude policy attention. This way, mitigation measures will be fashioned to address any negative confounders while any unintended gains are consolidated.

For donor agencies, a clear signal is given: channel pro-growth and poverty-reducing financial inclusion funds through financial intermediaries where wider inclusion can be guaranteed. The synergistic role of the implementation quality of a financial inclusion programme/policy is very important to ensure the desired impact at the household level. This is particularly important to the understanding of how access and utilisation, which define broader financial inclusion, would be incentivised.

Policymakers, donors and researchers pursuing the agenda of financial inclusion need to pay attention to the wider institutional and environmental context within which broader inclusion is expected, as they do interact *pari-pasu* in creating a harmonized developmental trajectory. Poverty-reducing impacts of financial inclusion will then be guaranteed as financial inclusion translates into broader economic inclusion. This way, the trajectory of financial inclusion leading to economic inclusion is trackable to serves as a basis for inclusion policy formulation in LICs.

THESIS RELATED RESEARCH OUTCOMES

Published Works:

Book Chapter contribution

Agyekum, F. K., Locke, S., & Wellalage, N. H. (2016). Does financial accessibility and inclusion promote economic growth in low income countries (LICS)? In E. Moreno (Ed.), *Financial Performance*. (pp. 99-136). New York, NY: Nova Science Publishers, Inc.

Forthcoming (Under Review):

Agyekum, F.K., Locke, S. & Wellalage, N. H. (2016). Firm's Risk of Exclusion from financial services in LICs: Evidence from Ghana. Targeted Journal: *Journal of Financial Intermediation (JFI)*

Agyekum, F. K., Locke, S., & Wellalage, N. H. (2016). Financial inclusion and digital financial services: Empirical evidence from Ghana. Targeted Journal: *International Journal of Electronic Commerce*

Conference Papers:

Agyekum, F.K., Locke, S. & Wellalage, N. H. (2016). ICT, Digital Financial Services and inclusion: A Panacea to Inclusive growth in LICs? Evidence from Ghana. Paper presented at IFABS 2016 Asia (Brunei) International Conference on: "Corporate Finance Decisions In A Changing Global Environment" (16-18 August, 2016).

Agyekum, F.K., Locke, S. & Wellalage, N. H. (2016). Financial Inclusion in Ghana; does Institutional Context Matter? Paper presented at the 20th New Zealand Finance Colloquium/PhD Symposium; University of Otago, Queenstown (10-12 February, 2016). Accessible at <http://www.nzfc.ac.nz/archives/2016/papers/updated/41.pdf>

Agyekum, F.K., Locke, S. & Wellalage, N. H. (2015). Financial development and inclusion; a panacea to household level corruption? An econometric Proposition. Paper presented at the 19th New Zealand Finance Colloquium, Waikato Management School, University of Waikato, Hamilton, New Zealand.

Work-in-Progress

- *Welfare implications of financial inclusion, does source of financing matter?*
- *A search for Theory of Financial Market Failure in Lower Income Countries (LICs) and implication for Financial Exclusion.*

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DEDICATION

To my wife and children

DECLARATION

I, Francis Kwame Agyekum, declare that this thesis is an original work done in the University of Waikato Management School towards the requirement of an award of Doctor of Philosophy degree. No part of this work has been used here or anywhere, either now or in the past for similar purpose. Any ideas, thoughts, figures, and tables expressed or used are originally mine; and where prior works are referred to, they are duly acknowledged and cited.

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LIST OF ABBREVIATIONS

ASSFIN	Association of Financial NGOs
AFI	Alliance for Financial Inclusion
AML	Anti-money laundering
ARB	Association of Rural Banks
BLUE	Best Linear Unbiased Estimator
BoG	Bank of Ghana
CFT	Combating the Financing of Terrorism
CPI	Corruption Perception Index
CU	Credit Union
CUA (GH)	Credit Unions Association of Ghana
CV	Coefficient of Variation
CGAP	Consultative Group to Assist the Poor
CLRM	Classical Linear Regression Model
DWH	Durbin-Wu-Hausman
DD	Donor programme implemented by Donor-agency
DID	Difference-in-Difference estimation
DG	Donor programme implemented by Government-agency
DFS	Digital Financial Services
DV	Dependent Variable
ERP	Economic Recovery Programme
FE	Financial Exclusion
FDI	Foreign Direct Investments
FI	Financial Inclusion
FIDWG	Financial Inclusion Data Working Group
FIs	Financial Intermediaries
Findex	Financial Inclusion Index
FINSAP	Financial sector adjustment programme
FNGOs	Financial Non-governmental Organisations
FOC	First-Order Condition
GCSCA	Ghana Co-operative Susu Collectors' Association
GDP	Gross Domestic Products

GLM	Generalised Linear Method
GSE	Ghana Stock Exchange
IMF	International Monetary Fund
ICPSR	Inter-University Consortium for Political and Social Research
ICT	Information and Communication Technology
IFC	International Finance Corporation
IGC	International Growth Centre
IGF	Internally Generated Fund
ITU	International Telecommunication Union
IQUA	Impact, Quality, Usage and Access
IV	Instrumental Variable
GPFI	Global Partnership for Financial Inclusion
GLM	Generalised Linear Model
GMM	Generalised method of moments
GG	Government inclusion programme implemented by Government
G20	Group of Twenty
LDV	Limited Dependent Variable
LFIs	Less-Formal Financial Institutions
LI	Lerner Index
LICs	Lower-Income Countries
LIMCs	Lower-Middle Income Countries
MBIE	Ministry of Business, Innovation and Employment
MC	Marginal Cost
MB	Marginal Benefit
MR	Marginal Revenue
MFIs	Microfinance Institutions
MFS	Mobile Financial Services
MLE	Maximum Likelihood Estimation
MM	MFIs Programme Implemented by MFIs
MIX	Microfinance Information Exchange
MDGs	Millennium Development Goals
MNOs	Mobile network organisations
MPAT	Microfinance Poverty Assessment Tool

MLCs	Money Lending Companies
NAIRU	Natural Rate of Unemployment
NBFIs	Nonbank Financial Intermediaries
NIC	National Insurance Commission
NPAs	Non-Performing Assets
NPART	Non-Performing Assets Recovery Trust
ODI	Overseas Development Institute
OLS	Ordinary Least Square
OECD	The Organisation for Economic Co-operation and Development
PI	Poverty Index
PCA	Principal Component Analysis
PSBR	Public Sector Borrowing Requirements
PNDCL	Provisional National Defence Council Law
QAT	Qualitative Asset Transformers
QR	Quantile Regression
ROC curve	Receiver Operating Characteristic curve
ROSCAs	Rotating Savings and Credit Associations
RCBs	Rural and Community Banks
S&L	Savings and Loan Company
SMEs	Small and Medium Size Enterprises
SAP	Structural Adjustment Programme
SUEST	Seemingly unrelated estimation test
UN	United Nations
UNSGSA	UN Secretary-General's Special Advisor
US	The United States
VIF	Variance Inflation factor
WBES	World Bank Enterprise Surveys
WB	World Bank
Windex	Welfare Index
WGI	Worldwide Governance Indicators
WDI	World Development Indicators

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CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This chapter provides an introductory background to the entire thesis. It opens a case for the essence of the study, setting the tone for the rest of the chapters. The problem and research questions that motivated the study, objectives, as well as the significance of the study, are clearly outlined in this chapter.

Globally, in recent times, there appears to be a surging interest in the concept of financial inclusion, especially among policymakers and financial sector actors. However, academic research studies are barely emerging, focusing mostly on cross-country studies. These often lack country-specific details that could drive policy toward maximum expected outcomes. Financial inclusion is not well understood, especially within the context of lower-income countries (LICs) where structural constraints, institutional bottlenecks and financial system failures serve as setbacks to financial inclusion efforts. This tends to lead to policy formulations that lack theoretical basis. Consequently, the understanding of why financial exclusion exists in the first place, and what underpins its widespread presence in developing countries will be elusive. Failure to fully understand the institutional and the wider environmental contexts within which financial inclusion must occur in LICs, will undermine policy efforts. This failure will, in part, explain why past researchers have failed to reach consensus on the growth-inducing and poverty-alleviating impacts of finance (Chibba, 2009). Understanding the constraints that thwart efforts at narrowing exclusion gaps among private sector agents, particularly small businesses and poor households in LICs, is very significant. This holds the key that unlocks the poverty-alleviating impact of finance as a natural outcome of inclusive growth guaranteed by an inclusive financial system (Demirgüç-Kunt & Klapper, 2012; Mohan, 2006).

The identification of this research gap drives this thesis, as it seeks to find answers to the big question that defines inclusion: thus; ‘Is finance *available, accessible, and most importantly affordable* to *all active and productive agents* of the economy?’ This defines the ‘*4As*’, (*i.e., ‘four aspects’*) of financial inclusion. Indeed, how this definition is reflected in Ghana’s context, which promises a reasonable basis for generalisation within LICs/lower-middle-income countries (LMICs), is of interest, given that Ghana recently emerged as a lower-middle income economy (Demirgüç-Kunt, Klapper, Singer, & Van Oudheusden, 2015). The thesis, therefore, investigates the trajectory of financial inclusion towards economic inclusion in a developing economy, Ghana.

The rest of the chapter is as follows. Section 1.2 offers background to the entire thesis, 1.3 establishes the problems that necessitated the study and 1.4 outlines the significance of the study. Sections 1.5 and 1.6 offer the organisation of the thesis and conclusion of this chapter respectively.

1.2 Background of the Study

Financial inclusion, which connotes participation and the use of formal financial services promises, welfare benefits to households (Allen, Demirguc-Kunt, Klapper, & Pería, 2016) through inclusive economic growth (Demirgüç-Kunt et al., 2015).

This thesis, therefore, investigates pertinent dimensions of financial inclusion within the context of LICs. This is done within a set of complex mechanisms involving plethora of players, actors and the wider environment within which inclusion is expected. The empirical application is on Ghana, an LMIC. As the research focuses on the key elements underpinning financial inclusion, the aim is to empirically examine the dynamisms and the conduits through which such an inclusive financial system translates into an economic system that is inclusive, pro-poor and growth-engendering.

As noted earlier, there seems to be evidence suggesting that inclusive growth will result from an inclusive financial system (Beck, Senbet, & Simbanegavi, 2015). The trajectory of financial inclusion towards economic inclusion has not been established in a scholarly manner, especially in LICs. This transitional process from financial to socio-economic inclusion is not expected to occur in a vacuum. Many complex indicators, processes, players and the interplay of certain regulatory

and environmental factors shape the underlying phenomenon (Hannig & Jansen, 2010; Sarma & Pais, 2008). The institutional factors relating to financial inclusion are discussed in chapter 6.

The regulatory framework that ensures sound and safe institutions in the financial sector is expected. These are necessary ingredients towards inclusive financial system where market imperfections are embedded. Regulatory and supervisory duties are key to avoid moral hazard problems (Basu, Yulek, & Blavy, 2004) which often undermines institutional soundness. Failure of most MFIs and other intermediaries in LICs is partly attributable to the absence of clear industry regulations that guide the operations and performance standards in the financial sector. This spill-over effect is the issue of unsecured depositors and savers resources. This ultimately undermines financial inclusion efforts, as depositors become reluctant to entrust their savings to the remaining MFIs leading to further contagion (Basu et al., 2004; Kirkpatrick & Maimbo, 2002).

Again, financial and institutional sustainability that guarantees continuity and certainty of investment is key to ensure broader inclusion. This is expected in a well-regulated environment where prudential regulation delivers the benefits of both protecting depositors (savers) and ensuring financial institution growth and stability (Hannig & Jansen, 2010).

In a monopolistic business environment, the tendency to exclude significant active economic agents arises. Consequently, competition that promotes freedom to choose from a variety of financial services and products is expected to deliver affordability to clients. As Marshall (2004) observes, increased access to financial service for the majority of people in the UK is directly attributable to financial sector regulation and competition. Greater competition that enhances both efficiency and systemic resilience in the financial sector (Mohan, 2006) is therefore, a key requirement towards an inclusive financial system.

The complexity of the underlying relationships involved is further exacerbated by the structural rigidities and financial market failure prevalent in most LICs. This is further compounded by financial inclusion itself being perceived to be part of the larger picture, and a key component of financial development (Beck et al., 2015). The relationship between financial inclusion and financial development could further add to the puzzle. Thus, the question of whether financial inclusion is a

natural by-product of a developed financial system or a significant precursor of a developing financial system is raised. There are no clear-cut answers to any of these questions. A careful probe using scientific investigations is likely to unravel the intricacies involved.

In the specific case of Sub-Saharan African countries, Ghana included, the complexity takes on a different shape. The general lack of scale economies in the provision of financial services (Berger & Udell, 2006), less stable political systems embedded within volatile economic regimes, weak institutional and regulatory frameworks, coupled with underdeveloped financial and non-financial infrastructure, all contribute to undermine efficient financial service delivery (Allen, Otchere, & Senbet, 2011; Kablan, 2010; Killick, 2010). These structural constraints, coupled with the presence of significant information asymmetry rising out of a dysfunctional financial market (Allen et al., 2011), have contributed to a high presence of informality and a dichotomised financial sector (Aryeetey, 2005; Aryeetey, Hettige, Nissanke, & Steel, 1997; Beck et al., 2015; Pagura & Kirsten, 2006; Yartey, 2007). These complexities have unintended outcomes and implications for sector players. Ghana, therefore, provides a useful example of a learning curve for emerging lower- and lower-middle-income economies that aim to achieve inclusive financial systems.

In an ideal world of unimpeded flow of information transmitted through the market mechanism, resources are allocated in an optimal manner (Freixas & Rochet, 2008). The financial market under such economic utopia allows the intermediation process to allocate financial resources to their most efficient use (Allen & Santomero, 1997; Scholtens & van Wensveen, 2003; Bhattacharya & Thakor, 1993). Surplus funds thus, find their way to the deficit spending units very smoothly under such conditions (Agyekum, 2011; Mishkin & Eakins, 2006). This suggests that optimal allocation of financial resources will be the natural outcome of an efficient and sound financial system operating with a significant degree of market perfection.

However, the presence of information asymmetry in the financial sector of most LICs undermines the smooth operation of market systems (Hannig & Jansen, 2010). The reality of such imperfections weakens the soundness and efficiencies expected when allocating financial resources (Aryeetey, 1997; Atieno, 2001). The failure of the market to optimally allocate these financial resources has given rise to the

existence of widespread financial exclusion as some economic agents are marginalised (Stiglitz, 1989). For Ghana (like other LICs) where the market environment is characterised by structural rigidities, infrastructural constraints and institutional bottlenecks, the expected ‘soundness’ and ‘efficiency’ remain a utopian dream (Aryeetey, 1997; Atieno, 2001).

These inherent complexities and structural constraints pose dilemmas to both the state and private sector actors in such economies. As an instance, the financial intermediaries face the dilemma over the means to provide financial services to the underserved without compromising their own sustainability. Part of the quandary is also the issue involving the appropriateness of the products to meet the peculiar needs of the underserved. Additionally, the issue of which segment of the dichotomised financial market must engage their activities cannot be ignored (Aryeetey, 2005; Beck et al., 2015; Pagura & Kirsten, 2006; AFI, 2009).

In addition, public sector agencies responsible for ensuring an inclusive financial system also confront a set of conundrums in respect of policy options that would have wider impact. Dilemma over means to support private financial sector actors, and most importantly, the regulatory framework that needs to be formulated to incentivise broader inclusion, cannot be ignored. The controversy over the state’s direct involvement (Beck, Demirgüç-Kunt, & Honohan, 2009; UN Departments of Economic & Capital Development Fund, 2006) in the financial service provisions, especially to the poor households and the marginalised small businesses, adds to the problems (AFI, 2009). The widespread inefficiencies due to political patronage and corruption prevalent in most LICs raise doubts about using market failure as the justification for state intervention (UN Departments of Economic & Capital Development Fund, 2006).

The wider society is therefore presented with even more complex dilemmas: a choice between a failed financial market and an inefficient state financial service delivery (Acemoglu & Verdier, 2000). In some cases, society has limited options: a scenario that would warrant direct or indirect donor involvement to ensure deeper inclusion outcomes.

Efforts and the role microfinance institutions play towards financial inclusion are evidenced globally, particularly among the emerging Asian countries. Care need to be taken however, in drawing inferences for Ghana, considering social differences.

Countries such as India, Philippines, Bangladesh and Indonesia are often cited. As an instance, (Hannig & Jansen, 2010) observe that the use of mobile phone banking in the Philippines expanded access to about four million previously underserved clients in the year 2002 alone. The increase in credit accessibility among the Indian poor from seven percent in 2004 to over twenty percent in year 2009, is attributed to the role MFIs plays toward financial inclusion. As the home to the Grameen banking concept that relies on microfinancing to alleviate poverty, Bangladesh is often in the MFI literature spotlight. Available evidence suggests that between four and six million new clients were served to by MFIs outreach via microcredit (Fernando, 2009; Hannig & Jansen, 2010).

1.3 Financial Inclusion in Ghana: Problem Statement and Motivation for the Research

The concept of financial inclusion (FI) appears to be gaining both policy and academic relevance in recent times. It is increasingly becoming a strategic factor in the development policy mix. The creation of ‘UN Secretary-General’s Special Advocate (UNSGSA) for Inclusive Finance for Development’¹ attests to its importance on the global geopolitical sphere. Financial inclusion that ensures access to financial resources helps overcome social exclusion, inequality and the attainment of inclusive growth that promises sustainable development. (UNSGSA's Annual Report, 2016). Regarded as a cross-cutting developmental issue, FI holds the key for greater economic and social empowerment. The transformative role of access to affordable and safe financial services means that FI will engender inclusive and participatory growth to stimulate sustainable development (UNSGSA's Annual Report, 2016).

The launch of ‘global partnership for financial inclusion’ by the G20 (GPFI, 2011) also underscores the concept’s global importance. The Group’s proposal for the innovative approach to financial services delivery that guarantees financial access among the small and medium size enterprises (SMEs) and poor households in LICs is key (Beck et al., 2015).

¹ Source reference for the UN Secretary General’s advocate for Financial Inclusion for Development is <https://www.unsgsa.org/>. Retrieved on 25th August, 2016.

The problem which motivates this research is best encapsulated in these two key statements by UN staff. The former UN Secretary General² remarks:

The stark reality is that most poor people in the world still lack access to sustainable financial services, whether it is savings, credit or insurance. The great challenge before us is to address the constraints that exclude people from full participation in the financial sector.... Together, we can and must build inclusive financial sectors that help people improve their lives. (Ocampo, Derviş, & Weingarten, 2006; UN Departments of Economic & Capital Development Fund, 2006) also in (Imboden, 2005).

A recent observation by the UNSGSA also brings the problem into perspective:

Today, 2 billion adults are excluded from the formal financial system. Financial exclusion is greatest among poor people and in emerging and developing countries, including the rural households that account for more than 70% of global poverty. This hampers people's ability to earn, protect themselves in times of crisis, and to build for the future. In addition, more than 200 million small- and medium-sized enterprises in emerging markets alone lack access to finance, limiting their ability to grow and thrive. (UNSGSA's Annual Report, 2016)

The quotes above show that the trend of financial exclusion/inclusion around the globe fits into the existing phenomenon of 'global North-South'. Emerging scholarly works suggest that exclusion is more widely pronounced in developing economies than in developed countries (Demirgüç-Kunt & Klapper, 2012a). This makes financial inclusion an important developmental enigma that requires global attention. Using the Global Findex data for 2014, Demirgüç-Kunt et al. (2015) find account penetration rate³ in OECD economies higher (94%) than developing countries (54%). In the same year, the study reveals that 71 percent of adults in OECD economies reportedly saved in the past 12 months, compared with 60 percent in Sub-Saharan Africa and 30 percent in other LICs. A similar trend is

² Kofi Annan (former UN Secretary General) made this stark observation in 2003 when the year 2005 was declared as the 'International year of Microcredit' (see Economic & Fund, 2006).

³ Defined as individuals who reportedly own accounts in the formal financial system.

observed among other dimensions of financial inclusion. As an instance, only 41 percent of wage recipients in developing countries reportedly receive their wage payments via their accounts, as compared to 86 percent in OECD and 45 percent in Sub-Saharan African countries (Demirgüç-Kunt et al., 2015). This trend has implications for small business credit accessibility in LICs.

As the UNSGSA's Annual Report (2016) reports indicate, financial resource accessibility remains a significant challenge to a significant number of enterprises in LICs and emerging economies. World Bank research also corroborates this. Indeed, financial exclusion among SMEs and individuals is high within Africa, with basic financial services still lacking (Demirgüç-Kunt & Klapper, 2012a). At the household level, World Bank/CGAP research indicates that about 70 percent of the adult population in LICs (including Ghana) still lack basic bank accounts (Demirgüç-Kunt & Klapper, 2012b; The Consultative Group to Assist the Poor & The World Bank Group, 2010).

In Ghana, a recent World Bank/CGAP estimate suggests that less than one-half of the adult population do not participate in any part of the financial system. It is estimated that the number of banks branches per 100,000 people is six and nearly 70 percent of Ghanaian adults lack basic access to formal financial services (Demirgüç-Kunt & Klapper, 2012a). The recent evidence suggests that only 29 percent of includable adults participate in the formal financial sector, while 20 percent use a mobile financial service platform to participate in the financial system (Demirgüç-Kunt & Klapper, 2012a). There is a considerable adult population that still resort to informal financial sources to meet their financial needs (Beck et al., 2015). A similar trend is observed among SMEs in Ghana as shown in the Table 1.1 below.

Table 1.1: How Ghana compares in terms of financial exclusion among SMEs

Indicators	Region				Ghana
	Global	High Income Countries	Lower-Middle Income Countries	Sub-Saharan Africa	
Bank accounts per 1,000 adults	499.1	1067.9	389.1	153.4	459.0
Bank branches per 100,000 adults	13.9	24.3	7.4	4.2	5.9
Firms identifying access to finance as a major constraint (%)	19.3	14.4	24.4	27.4	62.2
Firms not needing a loan (%)	49.4	60.5	52.4	42.0	22.5

Note: The table above shows how Ghana compares with the rest of the world in terms of the current indicators of financial inclusion/exclusion. All estimates are from the World Bank Enterprise Survey, 2013⁴. “Firms not needing loan” in most cases indicates adequacy of internal funds, for which a higher figure points to less financial constraints. The estimates indicate that approx. 62.2% of the (720) sampled firms across all sectors of Ghana identified finance as a major constraint. Only 21.2 % can finance their investments using bank source of funds, while 25% are reportedly able to finance their working capital using same.

Ghana’s financial sector comprises both banking and non-banking financial institutions (NBFIs). However, the financial landscape is dominated mostly by the private commercial banks, controlling approximately 93 percent of banking assets (GCAP, 2011). The influence of the NBFIs that mostly offer pro-poor financial services appears marginal, with the combined assets estimated at less than 10 percent of the financial system’s assets (CGAP, 2011; Steel & Andah, 2008). This undoubtedly has implications for financial inclusion at the grassroots/household level.

In addition, the emerging petroleum industry, following the discovery of oil in 2007, is potentially contributing to widening the exclusion gap for non-oil sectors. That is, financial resources could be skewed towards the emerging oil sector at the expense of others, leading to a kind of financial sector ‘Dutch disease’.

Again, the impact of financial sector reform on financial inclusion in Ghana has not been empirically ascertained by scholars. Ghana undertook financial sector reforms in the late 1980s. This became known as the financial sector adjustment programme (FINSAP). The reforms were within the broader framework of the economic recovery programme (ERP) supported by the IMF and the World Bank (Owusu-

⁴ Data obtainable from <http://data.worldbank.org/data-catalog/global-financial-development>, retrieved on 23, June, 2016.

Antwi, 2011). The reforms were geared towards measures that would ensure the private sector drove the financial sector (Brownbridge & Gockel, 1996). These reforms were implemented in three phases. The second and third phases focused on the creation of new institutions, mostly NBFIs, while phase 1 was aimed at making the banking sub-sector efficient (Brownbridge & Gockel, 1996). Privatisation of public sector banks was undertaken as a way of limiting fiscal influence in the financial sector (Brownbridge & Gockel, 1996; Leith & Söderling, 2000; Owusu-Antwi, 2011).

Prior to the financial sector reforms, the existing banks were in a distressed condition. Banks were coerced to lend to state-determined priority sectors such as agriculture. This had unintended implications for financial inclusion outcomes. For instance, non-priority sectors were financially excluded, especially foreign firms that needed to obtain permits from the central bank before they could access credit from domestic financial intermediaries (Brownbridge & Gockel, 1996).

There is less doubt, if any, about the impact of the reforms in deepening the financial sector (Brownbridge & Gockel, 1996; Ackah & Asiamah, 2014). However, whether the deepened financial sector translates into an inclusive financial system remains unresolved (Beck et al., 2015). The possibility of financial deepening occurring (following reforms) without guaranteeing inclusion to all is observed by Demirgüç-Kunt and Klapper (2012b). Culpeper (2012) observes that liberalisation reforms in LICs resulted in widening the exclusion gap. As the financial sector becomes profit-driven, following the divestiture of public sector banks, it is observed that pro-poor services are often withdrawn. This further widens the existing exclusion gap (Culpeper, 2012).

Again, the introduction of the universal banking licences in 2003 as part of the sector reforms led to the influx of foreign banks into Ghana (Ackah & Asiamah, 2014). This has helped reduce the high banking concentration ratio that prevailed prior to the reforms (Owusu-Antwi, 2011). However, Owusu-Antwi observes that these developments have failed to translate into innovation necessary for engendering inclusion. Motivated by profit, most of these expatriate banks seem less inclined to lend to SMEs and rural enterprises due to the perceived risks and informality (Steel & Andah, 2008).

Hence, doubt remains as to whether financial sector reforms in LICs (particularly in Ghana) have resulted in greater inclusion (see for example, Leith & Söderling, 2000, and Culpeper, 2012; Aryeetey, 1994b). Has the deepened financial sector with significant foreign participation translated to wider inclusion of the includible economic agents in Ghana? Beck et al. (2015) admit there is an unclosed gap between financial deepening that accompanies reforms and financial inclusion. This potentially existing gap, partly motivated this thesis.

1.3.1 Research Questions and Objectives

To satisfactorily answer the research questions posed in the previous section, five thematic areas of financial inclusion are focused. These are restated in distinct research questions and objectives, out of which sets of testable hypotheses are developed. These research questions are not only based on gaps in the literature, but most significantly, at the heart of the four (4) core dimensions of financial inclusion as identified in the literature (see Chapter 4). The questions and objectives are posed below:

- a) What are the regulatory and institutional factors that influence financial inclusion in Ghana? In particular, how does technological deepening translate into financial inclusion in LICs with focus on Ghana?

Objective (O_(a)): To investigate the role that regulatory and institutional factors play in broader inclusion attainment Ghana.

(O_(ai)): To empirically investigate means by which technological innovations contribute in the drive towards an inclusive financial system in Ghana. The goal is to ascertain the impact of digital financial services (DFS) on financial inclusion.

- b) What are the key determinants of SMEs' financial exclusion and constraints in Ghana?

Objective (O_(b)): To empirically identify firm attributes that are most significantly predisposed to the risk of exclusion from formal financial services.

- c) What are the conduits through which financial inclusion engenders growth at the macroeconomic level?

Objective (O_(c)): To carefully ascertain the most efficient means through which financial inclusion can impact on economic growth in Ghana.

d) How does financial inclusion translate into economic inclusion at the micro/household level?

Objective (O_(d)): To scientifically investigate the means through which financial inclusion translates into economic inclusion at the household level. The goal is to establish a link between financial and economic inclusions, and how that defines welfare-inducing impacts of inclusion programmes in LICs.

1.4 Significance of the Study

The study contributes significantly to both policy and the academic community in a way that enriches an understanding of the understudied relationships. The study's ingenuity stems from it being the first ever comprehensive study applying robust econometric methods to investigate financial inclusion in Ghana.

Within the context of LICs, it is important to address the issue of how financial inclusion can serve as a useful antidote to issues relating to social and economic exclusion. As a global developmental agenda, a deeper understanding of the concept of FI in relation to LICs confronted with structural, institutional and infrastructural constraints is important.

The study therefore contributes to the existing literature on financial inclusion, as it knits together the various dimensions of inclusion (Triki & Faye, 2013a; Hannig & Jansen, 2010). Through these linkages, the study brings out the means by which *access* and *utilisation* aspects of the concept are synergised by the *quality* dimension, in a way that translates into optimal financial inclusion '*impacts*' (see Chapter 4 for details on these linkages). In paying attention to these linkages, a comprehensive worldview of the concept of financial inclusion is offered to both researchers and policymakers. The study makes a unique contribution towards a complete understanding of how access and quality dimensions translate into expected inclusion impacts. Prior studies oftentimes tend to focus on some of the dimensions of financial inclusion. This creates a gap in the ability to track financial inclusion to economic inclusion that reduces poverty. Linking together all the key dimensions of inclusion in this study, using a rich dataset and a more robust method of investigations, carefully establishes the trajectory of financial to economic

inclusion. This allows the pathway of financial inclusion towards economic and social inclusions to be tracked, as highlighted in this study.

It is noteworthy that literature on financial inclusion in LICs is just emerging. This general lack of literature and scholarly works on inclusion as an emerging developmental concept, especially within the African region, underscores the relevance of the study. Consequently, this thesis sets a significant pace for others to follow in the coming years.

Prior studies emphasise the significance of considering country- and firm-level attributes that affect inclusion (Allen et al., 2016; Demirgüç-Kunt & Klapper, 2013; Demirgüç-Kunt, Laeven, & Levine, 2003). That financial inclusion does not occur in a vacuum underscores the importance of paying attention to the impact of the quality of a national governance system, institutions and the general economic environment. National governance quality and institutional factors such as the rule of law, corruption index, political stability and regulatory quality therefore becomes very important to consider in a study of the financial inclusion expected in LICs. No prior studies exist on financial inclusion in Ghana that have incorporated these national and institutional factors. This further sets the study apart and adds to its uniqueness in expounding an understanding of the inclusion-institutional context nexus.

The relevance of this study is further increased by the growing global attention FI has received following the launch of Year 2005 as the International year of Microcredit by the former UN Secretary General Kofi Annan (in 2003). This is also heightened by the Maya Declaration (in 2009) and launch of 'global partnership for financial inclusion' by the G20 (GPMI, 2011; Economic & Fund, 2006; Ocampo, Derviş, & Weingarten, 2006). Further, the appointment of UNSGSA for Inclusive Finance for Development is adding to the growing importance of financial inclusion in recent times. Financial inclusion is increasingly becoming a key policy priority item on both national and global fronts (Pearce, 2011; Sarma & Pais, 2011). It is becoming one strategic matrix on the scoreboard of the UN's sustainable development goals (UNSGSA's Annual Report, 2016). Monetary and regulatory bodies of financial sectors are globally pursuing various measures to drive broader inclusion (Hannig & Jansen, 2010; AFI,

2009). The AFI's Maya Declaration has solicited commitment from national financial players, regulators and policymakers to inclusive financial systems globally (AFI, 2009). The central bank of Ghana has committed to membership to this declaration which makes this study more relevant in drawing policy attention to critical matters. As financial inclusion progressively becomes a national priority, issues of responsible finance, innovation in the financial sector that embraces the rural/urban poor and the financially marginalised in society as addressed in this study become key.

Financial inclusion is gradually becoming an international and national security policy priority due to the potential it has for poverty reduction via inclusive growth (Ackah & Asiamah, 2014). As the tendency to commit crime reduces when economic and social inclusiveness emerges out of financial inclusion, threat and risk to national and international security is ameliorated. Prior studies have established the linkages between financial inclusion, anti-money laundering (AML) and the fight against financing of terrorism (CFT) (Demirgüç-Kunt & Klapper, 2012b; UN Departments of Economic & Capital Development Fund, 2006).

Many scholarly works on Ghana's economic progress and its financial sector have been undertaken in the past. Ghana's attainment of the millennium development goal (MDG) to halve the poverty rate has been recognised (Breisinger, Diao, & Thurlow, 2009). Also, as the first Sub-Saharan African country to gain political independence, Ghana continues to enjoy a positive image on the global scene due to the democratic values it has upheld since 1992 (Killick, 2010). Ghana is often regarded as a shining example in Africa (Radelet, 2010). This relative stability (Booth et al., 2004) has ensured institutional reforms. There is a strongly evolving private and financial sector with significant foreign investments which has attracted researchers, from within and abroad (Aryeetey & Kanbur, 2005; Bawumia, 2010). However, in the considered view of the author, research on financial inclusion in Ghana, on a scale and depth as covered in this thesis, is yet to be sighted. This is not to suggest a complete nonexistence of studies focusing on some aspects of the subject. What sets this study apart is a depth of coverage that strategically links FI to economic and social inclusion.

Focusing on Ghana as a single-country study provides an example of a learning curve for other LICs, particularly those within the Sub-Saharan African region sharing similar attributes. Despite the setback of lack of generalisability, Thrikawala, (2016) observes that single-country studies lead to deep and focused conclusions. This allows country-specific details that are overlooked in most cross-country studies to be emphasised. This is a clear departure from prior similar studies where cross-country data were used (see, for example; Allen, Demirgüç-Kunt, Klapper, and Martinez Peria, 2012). Focusing on country-specific and unique characteristics that have a bearing on financial inclusion ensures that key policy variables often submersed in cross-country studies are highlighted. Thrikawala (2016) noted further that such multi-country studies tend to be shallow in their findings though they have the advantage of being generalizable. The inclusion of structural rigidities, which pose daily constraint, and are often overlooked in prior studies, suggests significant policy outcomes. An in-depth country-level study with emphasis on Ghana has several benefits:

- i) Potential generalizability; as Ghana has recently transited from a LIC into LMIC status, it shares institutional and economic features of both LICs and LMICs that allow for potential generalization (Demirgüç-Kunt et al., 2015); and
- ii) Policy leading towards financial inclusion in Ghana will be tailored to country-specific needs.

The role of technological infrastructure in engendering greater financial inclusion has been acknowledged (Donovan, 2012b; Kpodar & Andrianaivo, 2011). By incentivising greater participation and reducing overhead costs of rendering financial services to the previously unbanked, (Agrawal, 2008; Subbarao, 2009), technology is becoming a strategic wheel for rolling towards financial inclusion (Donovan, 2012b; Gangopadhyay, 2009: 2011; Triki & Faye, 2013a). For instance, mobile phone penetration and internet rollout are two such means by which technology helps bridge the exclusion gap in most LICs (Gangopadhyay, 2009; 2011; Triki & Faye, 2013a). Using a GMM model, Kpodar and Andrianaivo (2011) as an instance, establish that mobile phone rollout significantly spurs economic growth in Africa as it fosters financial inclusion. The economic growth effect of financial inclusion is critically monitored through technological inclusion. Financial inclusion is seen as one of the building blocks for inclusive growth (Triki

& Faye, 2013). This way, ICT influences growth through innovation, such as the digital financial services (DFS) found in most parts of Africa including Ghana. Consequently, emphasising how technological deepening contributes to pro-poor growth via financial inclusion, in this study, adds to emerging literature in this area.

One significant key contribution of this study is the focus on SMEs and their financial constraints. The importance of SMEs to an economy and the reality of myriad constraints confronting them are well documented. It is estimated that more than 90 percent of enterprises in Ghana are SMEs, contributing about 70 percent of GDP (Abor & Quartey, 2010). The sector is a key contributor of employment in Ghana yet faces financial constraints (Abor & Biekpe, 2006; Abor & Quartey, 2010). As the study identifies the firm characteristics that are most significantly predisposed to the risk of being excluded from the financial services, policy on SMEs in Ghana would focus on matters of critical concern to them. The outcome of the study will be helpful for policy formulation targeting firm attributes that have significant association with their risk of exclusion. Policy and capacity building on enterprise growth and sustainability will be strategic for targeting inclusion-inhibiting factors. As these constraints are addressed, the firm's participation in the formal financial system will be increased. The multiplier effect of such a policy mechanism is expected to guarantee SME's growth and sustainability.

Consensus among researchers on the impact of finance on both growth and poverty has been rare in the past. In recent times, however, consensus seems to be building around financial inclusion as the link that was missing in past studies (Hannig & Jansen, 2010). Recent empirical evidence suggests that finance has a positive impact on growth and poverty alleviation almost with certainty, if financial inclusion is deliberately monitored. Emerging studies suggest that accessibility to quality financial services leads both to growth and reduced poverty (Culpeper, 2012). This way, financial inclusion becomes a strategic tool for small businesses and households to accumulate assets and hedge against risks. This guarantees their financial stability as more investments become likely (UNSGSA's Annual Report, 2016). This information adds to the importance of this study as it contributes to the literature on informality and welfare impacts of finance at the household/micro-level. Beck et al. (2009) suggest that household survey data provides better insight into the inclusion impact studies than the use of macro-data, which most researchers use. They, however, admit that such surveys that focus on household's financial

services are rare. This phenomenon has contributed to the general lack of understanding with respect to the poverty-alleviating impact of financial inclusion at the household level. This research therefore provides very useful insights.

Finally, it is important to utilise a more robust estimation method to investigate the underlying relationships. The novelty of blending different estimation techniques as a multi-model specification approach employed in the study is noteworthy. The rationale for this approach is that wide-ranging dimensions of financial inclusion are modelled simultaneously; relying on different datasets, relationships and model specifications that require different variables' usage.

Using methods such as the generalised method of moment (GMM) as an instrumental variable estimation process (Baum, Schaffer, & Stillman, 2007; Hall, 2005) and logistic regression estimation techniques (Hosmer Jr, Lemeshow, & Sturdivant, 2013; Park, 2003; Pregibon, 1981), establishes causality testing in a very robust way to the best extent possible given the datasets available (Vella & Verbeek, 1999). The use of GMM underscores the endogeneity issue that confronts most micro-econometric empirical studies on financial inclusion using household-level data (Khandker & Pitt, 2003; Khandker, 2005). Further robustness checks necessitate the use of quantile regression, (Cameron & Trivedi, 2005; Wellalage & Locke, 2014), difference-in-difference (DID) and ordinary least square (OLS) estimation techniques at some stage, benchmarking them against the baseline models indicated in the previous paragraph (Angrist & Pischke, 2008; Villa, 2012).

1.5 Organization of the Thesis

The thesis is organised into ten distinct but inter-connected chapters. The concept of financial inclusion, however, serves as the linking-cord. This ensures coherence and cogent flow of thoughts from concepts, theories through to empirical findings. The rest of the thesis is organised as follows.

Chapter 2 is devoted to a review of literature relating to Ghana's financial system that allows for deeper understanding of the regulatory context within which financial inclusion is expected. Chapter 3 focuses on the literature review, exploring the theory base of the thesis. The chapter further explores prior studies on key variables and relationships being investigated. The chapter achieves two key

objectives: first, it allows the study to be posited within its literature context and; second, as research gaps are identified, testable hypotheses are clearly carved out.

In building on the literature reviewed in the previous chapters, Chapter 4 outlines the conceptual and research framework of the thesis. Literature gaps identified are carefully conceptualised as an anchor that holds the empirical chapters together. The chapter lays a significant foundation upon which the empirical chapters are based. Following this is the fifth chapter that addresses the methods of investigation and matters relating to data. The various sources of data, measurement and definition of variables as well as method of analysis as employed in this study are carefully outlined.

Chapters 6-9 present the empirical outcomes of the study. They comprise presentation of analysed data and discussions of findings. Chapter 6 discusses findings relating to the institutional context of financial inclusion, emphasising the impact of technology on financial inclusion in LICs. Chapter 7 discusses the linkage between financial inclusion and economic growth at the macroeconomic level. Chapter 8 discusses factors that account for firms' exclusion from the use of financial resources. It must be noted that Chapters 7 and 9 examine the impact of financial inclusion at the macro- and micro-levels respectively. The ninth chapter establishes the financial inclusion-poverty reduction nexus at the household level. It critically examines the welfare-inducing impact of financial inclusion programme at the household level. These impact chapters track the trajectory of financial inclusion to economic inclusion. Chapter 10 concludes the study with policy recommendations. It provides a summary of the overarching findings and the scholarly contributions the thesis makes to the knowledge community.

1.6 Chapter Summary and Conclusion

The widespread financial exclusion in LICs generally and in Ghana in particular, calls for more academic research that can unravel the mystery. The puzzle lies in the situation that even after years of series of financial sector reforms, financial exclusion appears widespread (Beck et al., 2015). The underlying puzzle at the core of this thesis is the observation made by Beck et al. (2015) and Demirgüç-Kunt et al. (2015), that a deepened financial system may not automatically guarantee an inclusive financial system. The problems of informality, transaction costs, and

information asymmetry that give rise to issues of moral hazard and adverse selection appear to have all contributed to the exclusion of many potentially includable economic agents from the use of financial services. These problems have contributed to fuelling the risk perceived by the formal financial sector players of serving SMEs and poor households.

As financial inclusion becomes an important component of financial development and a global agenda, this research focusing on inclusion in a developing country seems fit. In doing this, the thesis contributes in a significant way to the emerging literature on financial inclusion, especially that relating to LICs/LMICs. Focusing on Ghana, a lower middle-income country, allows for potential generalisation in both the lower- and middle-income economies of similar economic and institutional structures.

CHAPTER 2

FINANCIAL INCLUSION IN GHANA: THE REGULATORY AND INSTITUTIONAL CONTEXT

2.1 Chapter Overview

This chapter examines several institutional and regulatory contexts that are indispensable to the drive towards an inclusive financial system. However, meaningful and sustained inclusion does not occur in a vacuum. Institutional and regulatory contexts determine to an extent whether inclusion occurs or not. Effective policies made within appropriate regulatory frameworks and institutional setting are a key towards inclusion. Financial inclusion policies would have wider impacts if certain identifiable stakeholders and actors are engaged. These include financial sector regulators, intermediaries, and quasi-intermediaries that can provide platforms for broader inclusion, such as mobile network organisations (MNOs) and other state agencies. Linkages among these players are necessary to achieve the desired inclusion outcome.

The rest of the chapter is organised as follows: the next section (2.2) provides an overview of the existing structure of the financial sector of Ghana. The section analyses the role some of these stakeholders and active participants play to ensure effective inclusion. Section 2.3 gives an overview of the regulatory frameworks and key institutions that regulate Ghana's financial sector.

2.2 Structure of the Financial Services Industry in Ghana

A complete understanding of the nature of inclusion expected in LICs requires an appreciation of the prevailing structure of the financial system. There are many ways of approaching this phenomenon; each approach involves classification of financial intermediaries (Agyekum, 2011). Classifications based on ownership structure (i.e., either foreign, local, or mixed), whether the institution involved is

banking or non-banking, deposit-taking or non-deposit taking, are common (Agyekum, 2011; Incoom, 1998). Intermediaries are also classified based on their roles either as regulators or regulated and, as formal or non-formal (Aryeetey, 1992; *see also* Aryeetey, 2008). Some of these bases for classifying FIs are global (e.g. banking vs. non-banking), while others are only peculiar to LICs (e.g. regulated or unregulated).

These criteria notwithstanding, the financial landscape of Ghana, like most economies, can simply be viewed as comprising of banking and non-banking intermediaries, both operating under the regulator which is the Central Bank of Ghana (BoG). The Figure 2.1 below offers a diagrammatic view of the structure.

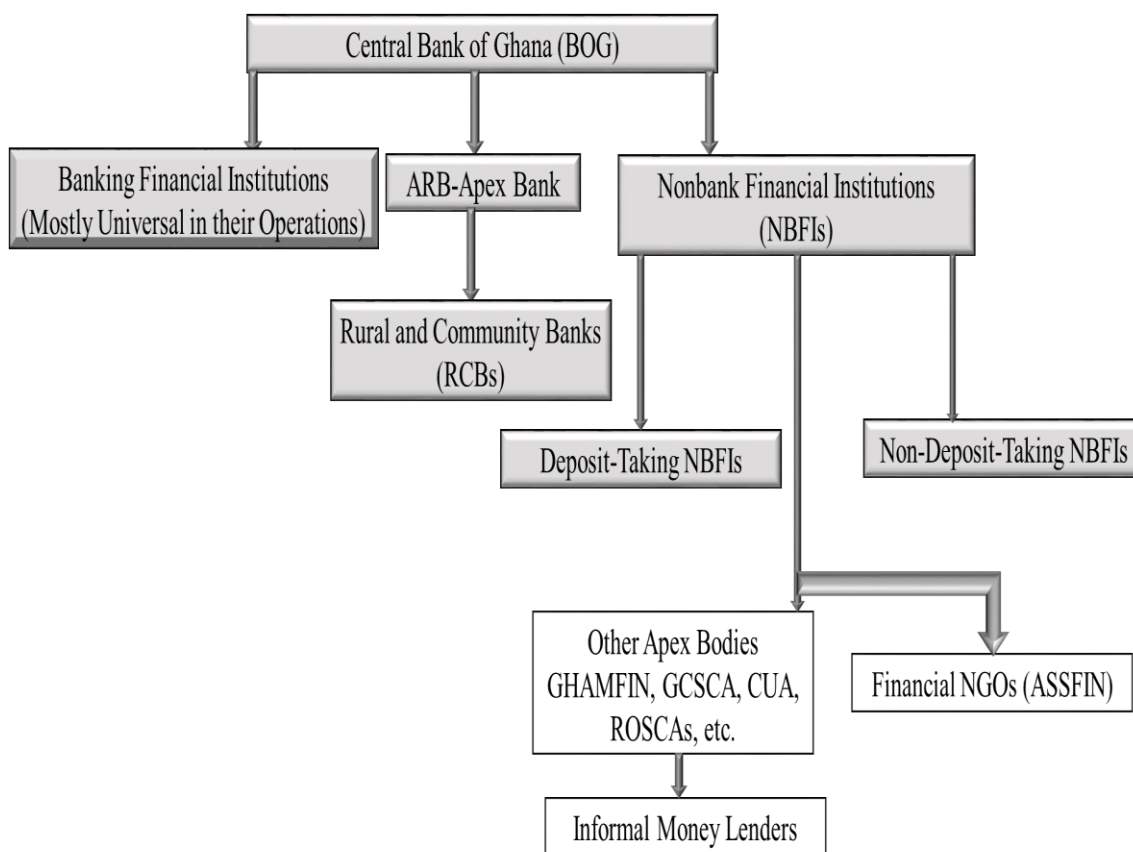


Figure 2.1: Structure of financial system as it exists in Ghana
Source: Author building on Incoom (1998); Agyekum (2011)

At the apex is the central bank (Bank of Ghana) under whose regulation and supervision come all other financial institutions. The rural and community banks (RCBs) are unique in their operations and therefore largely fall outside the formal banking sector as they are regulated by the central bank via an apex body (ARB

Apex Bank)⁵. These institutions are supervised by the banking supervision department of the central bank. An exception is the insurance companies who are non-bank non-deposit taking but are regulated by the Ghana Insurance Commission.

In Ghana, banks dominate the financial landscape with significant foreign participation (Ackah & Asiamah, 2014; Steel & Andah, 2008). The banks mostly operate as formal, and tend to serve less than 10 percent of households and are, therefore, potentially contributing to exclusion (Steel & Andah, 2008). Using the FinScope and FinAccess survey data, Beck, Maimbo, Faye, and Triki (2011), found that from the 34 percent of adult households that banked in Ghana, only 7 percent use formal sector banks.

The non-bank financial institutions (NBFIs) sector, comprising formal (FFIs), semi-formal (SFIs) and informal financial intermediaries (IFI), play a crucial role (Beck et al., 2015). Based on their scope of operations, entities such as the insurance firms and pension funds operate as formal non-deposit NBFIs. This suggests that though all less-formal financial institutions (LFIs) in Ghana are NBFIs, the reverse does not hold.

The role of NBFIs in inclusion remained informal and less important prior to financial sector reform. However, the significant contribution of these NBFIs in Ghana was highlighted when financial sector reform was implemented as part of the FINSAP. Though financial sector reform started around 1987, the initial phase concentrated on how to restructure the formal sector banks to operate more efficiently. However, as Steel and Andah (2008) observe, the recovery and growth that attended the Structural Adjustment Programme (SAP) necessitated the need for supporting the NBFIs sector, as the formal banks could not meet the growing demand. The significant presence of financial exclusion after the reform raised doubts about the financial repression hypothesis of MacKinnon-Shaw (Aryeetey, 1994a; Steel & Andah, 2008). The enactment of the Financial Institutions (Non-Banking) Law, 1993 (PNDCL 328), to regulate the operations of NBFIs brought their contributions into the spotlight.

⁵ ARB stands for Association of Rural Banks. It now functions as a quasi-central bank overseeing the operations of the Rural and Community banks (RCBs). RCBs are unit banks that operate in a specific geo-ethnic location.

Ghana’s financial sector has also been classified as formal, semi-formal and informal, but the complexity in defining ‘informality’ arises (Steel & Andah, 2008). For instance, Steel and Andah (2008) further caution about the use of the term ‘informal’. They argue ‘informality’ must not be taken as the firm operating ‘outside the law,’ as all business entities require some form of registration to operate. Consequently, it seems safe to use the term ‘informal’ referring to those intermediaries that are outside the direct regulation of the central bank. Also, these informal intermediaries are under *proxy* regulation as their activities are remotely monitored via their Apex bodies. These bodies are registered and regulated by the central bank (Steel & Andah, 2008).

The classifications of financial institutions into formal and informal are also influenced greatly by sectors they serve. In most informal finance literature in Ghana, RCBs are often classified among the informal financial institutions due to the informal rural real sectors they predominantly serve (Steel & Andah, 2008). In terms of regulation, the Bank of Ghana regards RCBs as formal regulated under the Banking Act and operating as quasi-commercial banks (BoG, 2016).

This understanding is important in defining the kind of financial inclusion expected. The less formal/informal financial intermediaries operate mostly as NBFIs (see Figure 2.1). Table 2.1 below gives the current number of all financial intermediaries operating in Ghana as at April 2016. The institutions such as microfinance, money lending companies and financial non-governmental organisations (FNGOs) comprise those officially licensed.

Table 2.1: Types and number of financial institutions operating in Ghana (excluding informal)

Institutions	Type/Status	Number	Total
Banking Financial Institution (Banks)			32
Non-Bank Financial Institutions (NBFIs)	Finance Houses	23	66
	Remittance Companies	3	
	Savings and Loans Companies	31	
	Leasing Companies	2	
	Finance and Leasing Companies	3	
	Mortgage Finance	1	

	Credit Reference Bureau	3	
Rural and Commercial Banks (RCBs)			140
Microfinance companies (MFIs)	Fully Licensed	467	492
	Partially Registered ⁶	25	
Money Lending companies (MLCs)	Fully Licensed	67	72
	Partially Registered	5	
Financial Non-governmental Organisations (FNGOs)	Fully Licensed	11	12
	Partially Registered	1	
Insurance Companies	General (Non-life)	29	
	Life (Assurance)	26	58
	Reinsurance companies	3	
Forex Bureaux (Traders in foreign currencies) ⁷	Active	392	413
	Inactive	22	

Source: Author's compilations from Bank of Ghana's homepage (as at April, 2016)

The informal financial institutions, including credit unions, rotating savings and credit associations (ROSCAs) and Susu, are not directly under the central bank's formal regulations (Aryeetey, 2008; Steel, Aryeetey, Hettige, & Nissanke, 1997). The central bank of Ghana, however, has oversight responsibility through their respective associations.

It is impossible to discuss financial inclusion among SMEs in Ghana, like most LICs, without recourse to these informal intermediaries. Although their operations are characterised by greater opacity and high degrees of risk, their ability to foster close ties and unique relationships with their clients keeps the sector running (Steel et al., 1997). Through what may be described as 'shadow inclusion'⁸, their ability to provide 'quasi-banking and financial services' (Gandhi, 2014; Pozsar, Adrian, Ashcraft, & Boesky, 2010) to their clients cannot be ignored. This promises a more grass-roots approach to financial inclusion, especially if they could be integrated into the formal financial system (Aryeetey, 1994a, 2008; Seibel, 2006). The next

⁶ Institutions with Approval-In-Principle

⁷ It has to be emphasized that almost every bank in Ghana trades in foreign exchange. The Forex Bureaux are separate entities from the Banks, providing foreign exchange transactions for profit (spread).

⁸ A concept that is used to reflect the inclusion expected of shadow-banking activities that quasi-banks and other MFIs engender. Gandhi (2014) recognises the role shadow banks play in facilitating financial resource mobilisation, credit delivery and financial inclusion largely, as they parallel the formal intermediaries in the delivery of credit to households and businesses (Pozsar, Adrian, Ashcraft, & Boesky, 2010).

section reviews some key less formal/informal financial intermediaries in Ghana and their roles in fostering inclusion at the grass-roots level.

2.2.1 Financial Inclusion and the Role of Less/Informal Financial Institutions

Microfinance and microcredit have become an important component of poverty alleviation at the grassroots level, since Grameen bank's ground-breaking efforts in Bangladesh (Gonzalez, 2013; Muhammad, 2009; Pollin, 2007; Rahman & Milgram, 2001; Schurmann & Johnston, 2009). Oftentimes, charitableness hangs in the balance with sustainability. The need to balance financial sustainability of operations on one hand, and outreach (to marginalised groups), on the other, is often challenged. This compels MFIs to charge relatively higher interest rates (Annim, Awusabo-Asare, Abane, Amonoo, & Acheampong, 2014). The sources with which they fund their operations partly influence their behaviour. Annim et al. (2014), for example, identified sources of funding for MFIs as own sources through deposit mobilisation, special loan/grants from either government or donor sources, and borrowing from the wholesale money market for onward lending.

(i) Rural and Community Banking (RCB) Concept in Ghana

Rural banking in Ghana began in 1976 when the existing commercial banks refrained from serving the rural folks perceived as poor and risky (Steel & Andah, 2008). The rural banking concept in Ghana followed the Pilipino model, and are considered unit banks (Steel & Andah, 2008). Unit banking requires rural banks to be owned and operated by the indigenous residents of a particular district or municipality. Their unit state requires that they do not operate branches, though they may operate an agency outside their district of origin (Agyekum, 2011).

Regulated under the Banking Act 1970 which existed at the time, RCBs could be opened if a minimum capital requirement of US\$43,000 were met by the residents of that community to ensure local ownership (Steel & Andah, 2008). Figure 2.2 shows the regional distribution of RCBs across all ten (10) regions of Ghana.

Following the establishment of the first rural bank in Agona-Nyarkrom in 1976, the number has significantly increased to 140 as at April, 2016 (Bawuah, Boachie, Manteaw, Otoo, & Brobbey, 2012; BoG, 2016; Dogbe, Arthur, Akwaboah Oppong,

Awuah Kyeremateng, & Boampong, 2013). These RCBs and other rural-based micro-financial institutions play a crucial role in financial inclusion in rural areas. The number of institutions present in each region partly determines financial resource accessibility and hence inclusion. As an example, Figure 2.2 depicts the Ashanti Region as having the highest number of RCBs in Ghana, followed by Eastern, Brong Ahafo and the Western regions. There is no doubt that the number of RCBs in the Ashanti Region, for instance, is a true reflection of the number of districts/municipal assemblies and partly due to the centrality of its location. This allows the region to attract most of the commercial activities from every part of the country.

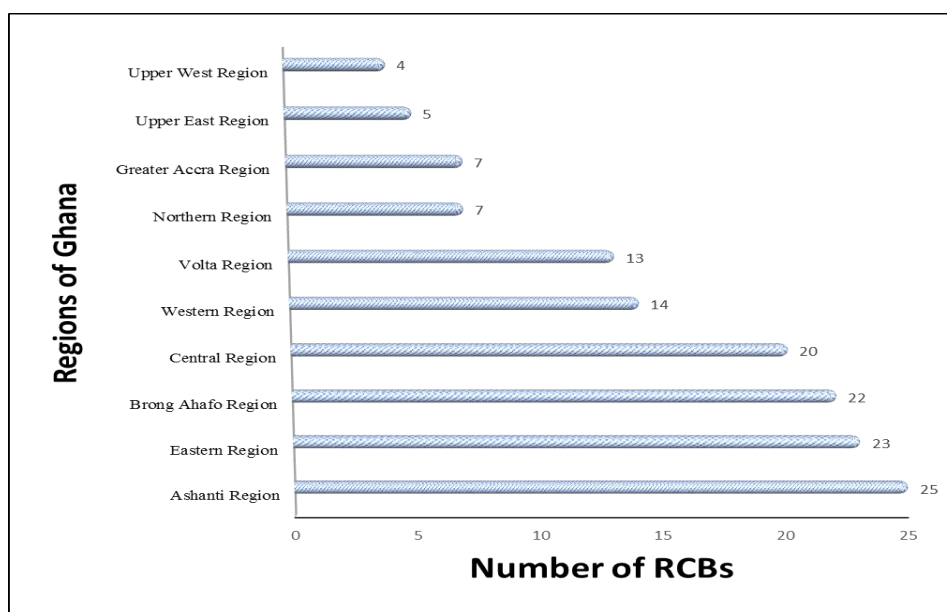


Figure 2.2: Regional distribution of RCBs

Source: Author using data from Bank of Ghana (as at April, 2016)

As less-formal intermediaries, a relationship-lending strategy is an important part of the RCB's operations. Annim et al. (2014) for example, identified a 'peer-nomination, group-based' lending strategy among RCBs. The peer-recommended model, coupled with pre-saving requirements, has the tendency to exclude the very poor (Annim et al., 2014). There is also what is known as the 'committee technique,' applicable especially when a donor funded project is involved. This tends to be pro-poor and inclusion fostering, as the key driver is the purpose of the credit scheme rather than the socio-economic background of the clients.

RCBs in Ghana operate under the direct supervision of the Association of Rural Bank's (ARB) Apex Bank established in 2001. The Bank of Ghana ultimately has the overall oversight responsibility for the operations of RCBs via the Apex body (Agyekum, 2011). The ARB, which was established as FNGO in 1981, eventually metamorphosed into an Apex Bank (Steel & Andah, 2008). Steel and Andah (2008) observed that promotion and capacity building of the RCBs done through advocacy, seminars and training are the core and original mandate of the Apex body. As the quasi-central bank for the RCBs, Apex Bank performs certain key functions. These functions include treasury management, cheque clearing, as well as domestic and international money transfers. It also ensures compliance through its monitoring, inspection and supervisory functions. To function well as a quasi-central bank, Apex Bank engages in services such as maintenance of primary cash reserves, funds management, lending, supply and receipt of excess cash, as well as guarantee of payment instruments (ARB Apex Bank Ltd., n.d.)⁹.

(ii) Credit Unions

Credit unions in Ghana are considered semi-formal and mutual intermediaries who specialise in consumer savings (Adusei & Appiah, 2011; Steel & Andah, 2008; Greenbaum, Thakor, & Boot, 2015). They are motivated by group welfare-maximisation rather than profit (Adusei & Appiah, 2011). Due to their mutual nature, membership usually reflects a common bond of interest such as employees of an organisation, or members of a particular religious denomination (Greenbaum, Thakor, & Boot, 2015).

The existence of credit unions (CUs) in Ghana dates back to 1955 when the Catholic Church established the first CU in Northern Ghana to advance the welfare of its members (Adusei & Appiah, 2011; Steel & Andah, 2008). This, according to Steel and Andah (2008) aimed at assisting members and therefore operated on a self-help model. The concept, which subsequently spread to other trade unionists groups in Ghana, is built on the principle of a group of people with homogenous interest to accumulate wealth through periodic savings (Adusei & Appiah, 2011). The regular contribution allows a group member to obtain credit after some time, usually six months (CUA, 2016). In most cases, the credit facility the borrower is entitled to

⁹ see ARB official website for more detailed functions of the bank: <http://www.arbapexbank.com>

exceed his/her accumulated savings and is very often with minimum interest charges.

Seen historically as social cooperative groups, CUs in Ghana are not officially regulated under the formal financial system. In the past, the Co-operative Societies Decree of 1968 under the supervision of the Co-operative Council regulated the operations of the union. The establishment of Ghana Cooperative Credit Unions Association (CUA) as a new regulatory body, among other things, renders services such as training, education, auditing, financial and technical capacity building (Steel & Andah, 2008).

As of 2016, CUA reported a membership of 435 across the country. Figure 2.3 gives the regional distribution of CUs in Ghana, per CUA’s online records. These exclude those that are voluntarily not yet official members of the association.

Three models of CUs are operational in Ghana: community-based, church/parish-based, and occupational-based. In most cases, the CUs operate accounts with formal (bank) intermediaries. Inclusion is indirectly fostered as they connect their membership to the formal financial system.

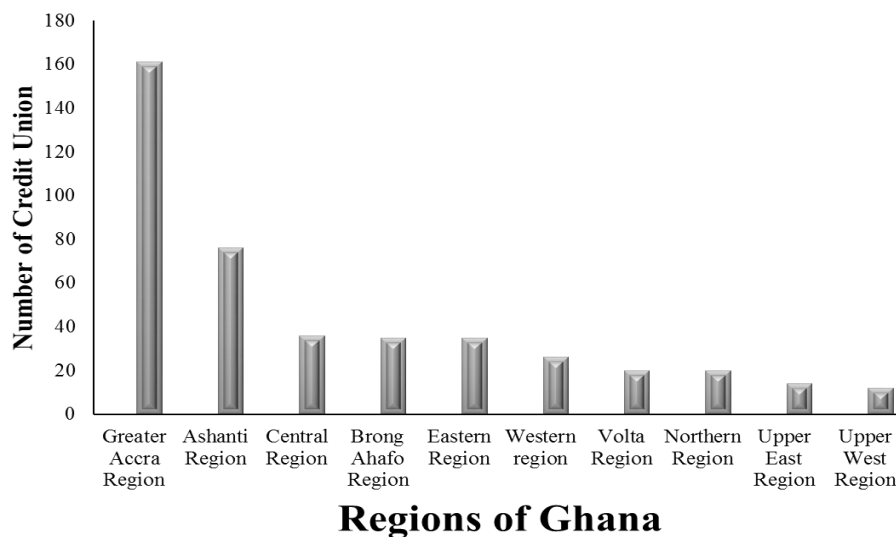


Figure 2.3: Regional distribution of Credit Unions in Ghana as members of CUA

(iii) Association of Financial NGOs (ASSFIN)

The FNGOs mostly serve specific clients in consonance with the purpose for which they are established (Annim et al., 2014). Annim et al. (2014) find FNGOs and RCBs are those whose inclusion programmes cut across all the income quintiles.

The targeted nature of FNGOs, however, suggests that RCBs are more likely to be inclusion-engendering than the former.

FNGOs operate under an apex body known as the Association of Financial NGOs (ASSFIN). Established in 2005, ASSFIN monitors the performance of members to meet international best practice. The tailored nature of a FNGO's operation relies on a peer-selection procedure for lending. Annim et al. (2014) also acknowledge that in some cases clients are required to pre-save as a matching fund before credit is granted. It seems a common practice to find FNGOs accepting in-kind deposits or loan repayments, and offering a guaranteed market for the outputs of particularly their rural clients (Annim et al., 2014). The poverty-reducing impact could be significant, though the very poor without economic enterprise may be excluded.

(iv) Ghana Co-operative Susu Collectors' Association (GCSCA)

The Susu operates as a savings scheme for motivated individuals who advance fixed contributions for a period of time. Their operation remains informal and unregulated in Ghana (Aryeetey, 1994a; Aryeetey & Gockel, 1991). They are, however, supervised via their umbrella body, known as Ghana Co-operative Susu Collectors' Association (GCSCA) and therefore considered semi-formal (Steel & Andah, 2008). In addition to the supervisory functions, the organisation builds the capacity of its members. Like the CUs, contribution is required to qualify as a member of Susu group (Annim et al., 2014). This undermines their inclusion efforts as such a requirement tends to exclude the very poor who cannot afford such mandatory contributions.

Regarded as a mobile banking service, the Susu collector goes around to collect members' contributions (Aryeetey & Gockel, 1991; Miracle, Miracle, & Cohen, 1980). In recent times, however, there are designated stalls or kiosks where contributions can be made. The identifiable models of Susu savings groups include i) the single-collector model, ii) rotating Susu system, and iii) the group-based model, in which members contribute towards mutually-owned clubs (Aryeetey & Gockel, 1991).

Like the S&Ls and the CUs, inclusion outreach programmes of Susu groups are often skewed towards the rich and are less pro-poor (Annim et al., 2014). However, because their activities allow individuals to accumulate wealth over time, they

significantly contribute to domestic financial resource mobilisation at the grassroots level. For instance, the association in 2007 reported mobilised deposits to the tune of GHC38.5 million (equivalent to approximately USD 25 million at the time). In that same year, the sector is reported to have disbursed about GHC1.02 million to its members. This makes crucial their role in creating an inclusive financial system in the informal sector.

2.3 Financial Sector Regulators

2.3.1 Central Bank of Ghana as Key Sector Regulator

(i) Role of the Banking Supervision Department

The Bank of Ghana, as the central bank, is directly responsible for matters relating to the overall regulation and supervision of financial institutions in Ghana. Except for insurance companies that operate under national insurance commission (NIC), all NBFIs are supervised by the central bank via the banking supervision department. Supervision and regulation of RCBs and some other less-formal intermediaries are carried out indirectly through their respective Apex-bodies. Ghana's central bank is a member of the Alliance for Financial Inclusion (AFI)¹⁰ whose main objective is to administer policies relating to financial inclusion with the aim of helping members to increase access to financial services to the poor and the marginalised.

2.3.2 Regulatory Framework of Financial Intermediaries in Ghana

Regulatory frameworks in the form of legislative instruments govern the supervisory activities of the central bank. These include the Bank of Ghana Act, 2002 (Act 612); the Banking Act, 2004 (Act 673); Non-Bank Financial Institutions Act, 2008 (Act 774); and the Company Code 1963 (Act 179), (BOG, 2016; Agyekum, 2011). These frameworks are to ensure that all participants in the financial system have safety for their financial resources; a key to incentivise an inclusive financial sector. The frequent state interventions in the financial market prior to the financial sector reform are attributed to the absence of such legal and regulatory frameworks. The consequences of such interferences were widespread

¹⁰ Alliance for Financial Inclusion (AFI) which is a global network of financial policymakers comprising mainly developing and emerging countries with membership mostly central banks and other financial regulatory institutions of their respective countries.

disintermediation and exclusion, as distrust among people and businesses in the financial system served as disincentive to deposit, save and even borrow (Brownbridge & Gockel, 1996).

The Banking Act 2004 (Act 673) which replaced the PNDCL 225, regulates the operations of formal banking institutions in Ghana. For the NBFIs, however, the Non-Bank Financial Institutions Act No. 774 serves as the regulatory framework guiding the operations of sector institutions, though a significant number of NBFIs still operate outside the law. The issuance of ‘operating rules and guidelines for MFIs in 2011’ is seen by many as means to rope in the formerly unregulated (Boateng & Boateng, 2014). The guidelines classified MFIs into four tiers (Ackah & Asiamah, 2014; Steel & Andah, 2008). The first tier, comprising RCBs, Finance Houses and S&L companies, are generally regarded as formal. Deposit-taking FNGOs and Susu groups are under the second tier and considered semi-formal. Tier three comprises money lenders and non-deposit-taking, non-profit FNGOs, is considered generally as less-formal or informal. The fourth category consists of the informal groups such as individual Susu collectors and moneylenders (Steel & Andah, 2008). The rules regarding branch expansion, capital requirements, reporting standards, and permissible activities are captured in the operating guidelines.

The insurance industry as it exists in Ghana operates under the regulatory and suspensory control of the National Insurance Commission. The main regulatory framework that guides the industry is the Insurance Act, 2006 (Act 724) which gives regulatory powers to the commission. To ensure the premium charged by the insurance companies does not financially exclude majority of the people, NIC approves the rates. The key players include insurance companies, reinsurers, brokers and significant numbers of insurance agents scattered across the country. The industry trades in a wide range of policies to meet the needs of the broader population which underpins inclusion.

2.4 Financial Sector Reforms in Ghana and Implications for Financial Inclusion

In the late 1980s, Ghana undertook financial sector reform as part of the broader Structural Adjustment Programme (SAP) supported by the Bretton Woods

Institutions. This became known as the financial sector adjustment programme (FINSAP), and was part of the much wider economic recovery programme (ERP) that began in 1983 (Antwi-Asare & Addison, 2000; Brownbridge & Gockel, 1996; Leith & Söderling, 2000; Owusu-Antwi, 2011).

The exact date for the commencement of the FINSAP has been inconsistently reported in most studies. Whereas classical scholarly works commissioned by the Overseas Development Institute (ODI) to evaluate the impact of the reforms on the financial sector firmly establishes this date 1987 (Antwi-Asare & Addison, 2000), other sources, financed by OECD development centre (Leith & Söderling, 2000), and more recent work by Owusu-Antwi (2011) places the reform's date at 1989. That the FINSAP was part of the wider ERP, which began with a fiscal stability phase (1983-1986), followed by the monetary and financial sector reform, makes 1987 appear reasonable. For instance, the rule regarding minimum and maximum deposits was officially abolished in September 1987. Within the same period, interest rates were subjected to the market dictates. These key financial sector policies began in 1987 which, therefore, makes it a more plausible commencement date for the FINSAP, though Antwi-Asare and Addison (2000) admit major programmes under the reforms were implemented between 1988 and 1990. Brownbridge and Gockel (1996), however, consider the period between 1987 and 1989 as preparatory phase.

The reforms were implemented in three phases: FINSAP-I (1989-1991), FINSAP-II (1992-1995), and FINSAP-III (1995-beyond) (Leith & Söderling, 2000). While FINSAP-I focused on measures to ensure efficiency in the existing banks, FINSAP-II & III focused on the creation of new institutions, mostly NBFIs (Brownbridge & Gockel, 1996). Privatisation of public sector banks was undertaken. This was to limit fiscal influence in the financial sector (Brownbridge & Gockel, 1996; Leith & Söderling, 2000; Owusu-Antwi, 2011).

Prior to the reforms, the existing banks were in a distressed condition. There was a pressing need for action and steps were taken to reform the sector. Issues relating to the direct control of interest rates, directed allocation of financial resources to priority sectors, and the dominance of public sector banks were addressed (Brownbridge & Gockel, 1996; Owusu-Antwi, 2011). The reforms brought a liberalisation of credit controls on banks. Measures taken include deregulation of

the interest rate ceiling, introduction of new regulations in regard to prudential supervision, and restructuring of insolvent banks.

In many respects, the controls prior to the reform created unintended outcomes. The credit control policy that compelled banks to lend to administratively determined priority sectors such as agriculture impeded financial inclusion efforts. Non-priority sectors were financially marginalised. As an instance, foreign firms needed to obtain Bank of Ghana's (BoG) permits before accessing credit from domestic financial market (Brownbridge & Gockel, 1996); a development that thwarted their inclusion.

Figure 2.4 below shows the effect of the pre-reform rigid policies, and the impact that the financial sector reforms brought on both the financial and the real productive sector indicators. In essence, it reveals the various phases of financial developments in Ghana both pre- and post-reform eras.

Included in the series are bank credit to private sector as ratio of GDP, bank credits to deposit ratio, banks assets as percentage of GDP, monetary growth rate, inflation rate, and bank deposits as percentage of GDP. Whereas inflation was on an upward spiral over the periods prior to the reforms, key monetary and financial indicators depict downward trends. The positive impact of the reforms is noticeable. The period following reform produced not only declining rates of inflation but, most significantly, upward movements in most of the key financial indicators. The establishment and operationalisation of the Ghana Stock Exchange in the early 1990s provided a further injection of new dynamism into the post-reform financial sector.

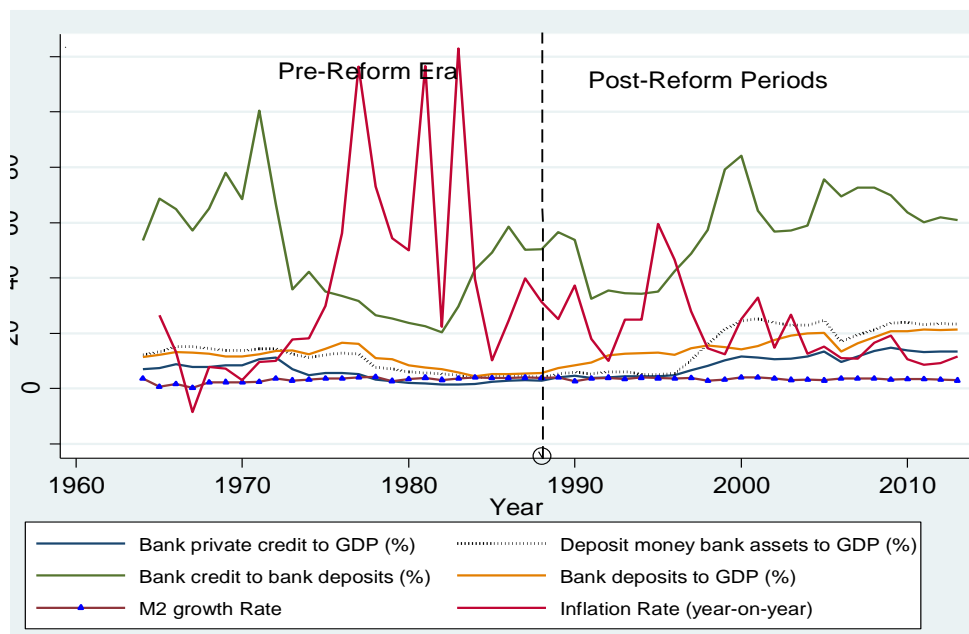


Figure 2.4: How financial indicators responded to the financial sector adjustments programme (World Bank Group, n.d.)

Empirical evidence suggests that the reforms which introduced measures that ensured the private sector drive the financial sector helped deepen the sector. There has been a significant influx of foreign banks in the wake of the reforms, particularly following the introduction of universal banking licensing in 2003 (Ackah & Asiamah, 2014). The high banking concentration ratio that prevailed during the pre-reform era has reduced as new banks enter the industry. However, it is argued that these developments in the formal financial sector have not translated into the innovation necessary to engender greater inclusion (Owusu-Antwi, 2011). The profit-driven approach of most of the entrant expatriate banks, with little incentive to lend to SMEs due to informality and perceived risk, might have widened the exclusion gap. The scholarly debate still lingers as to the extent to which such deepening processes engender financial inclusion.

Privatisation of pro-poor, state-owned banks was an integral part of the overall goals of the FINSAP (II) that began in 1994 (Owusu-Antwi, 2011). It is argued, for example, that the privatisation led to the withdrawal of pro-poor financial services offered to the marginalised (Leith & Söderling, 2000). Culpeper (2012) therefore argues that liberalisation reforms in most LICs inadvertently resulted in widening the financial exclusion gap.

2.4.1 Some Key Financial Developments after the Reform

The periods prior to the reforms have attracted research and academic attention as most of the financial and monetary factors were at their lowest. Inflation reached its record high of approximately 123 percent in 1983. Because this is a measure of consumer inflation, the food shortage that accompanied the severe drought and wildfire that occurred in the 1983 might have significantly contributed to the price hikes (Kraus, 1991; Ofori-Sarpong, 1986).

The second phase of the reforms (i.e., FINSAP II) commenced in 1994 and focused on two key goals: divestiture of state-owned banks and establishment of nonbank financial intermediaries (Owusu-Antwi, 2011). This indeed made NBFIs key players on the Ghanaian financial landscape especially in their role in financial inclusion (see Chapter 9).

Table 2.2 below shows trends and developments of some NBFIs reported on the microfinance information exchange (MIX) database for the period 1999-2013.

Table 2.2: The assets base of some NBFIs using MIX database

Fiscal Year	MFIs (count)	Cum MFIs	Number of depositors (median)	Deposits (median)	Number of active borrowers (median)	Gross Loan Portfolio (median)
1999	1	1	0	n.a.*	700	1,573
2000	3	4	170	n.a.	1,456	166,117
2001	2	6	666	n.a.	2,210	160,905
2002	3	9	0	n.a.	6,300	267,267
2003	15	24	13,593	2,124,974	2,832	438,510
2004	12	36	1,884	975,405	5,037	519,459
2005	33	69	16,370	1,353,887	4,735	652,584
2006	34	103	25,873	1,846,120	5,725	947,701
2007	40	143	25,087	3,348,416	5,588	1,726,345
2008	36	179	29,082	1,729,157	6,303	1,612,596
2009	45	224	24,042	1,312,090	5,711	1,147,971
2010	36	260	9,410	1,130,762	4,776	1,239,123
2011	25	285	21,133	3,664,584	5,602	3,476,178
2012	11	296	9,709	132,844	4,781	553,925
2013	4	300	49,818	13,094,854	8,159	14,307,632

Source: Mix Cross-market Analysis (*n.a. means data unavailability)

The median active number of borrowers and depositors are inclusion indicators. This has been graphically exhibited in Figure 2.5 below. That the active depositors outstrip the active borrowers, brings to the fore the issue of sustainability which is

an important component of financial inclusion. Indeed, MFIs' sustainability guarantees that they can contribute meaningfully to the pursuance of an inclusion agenda.

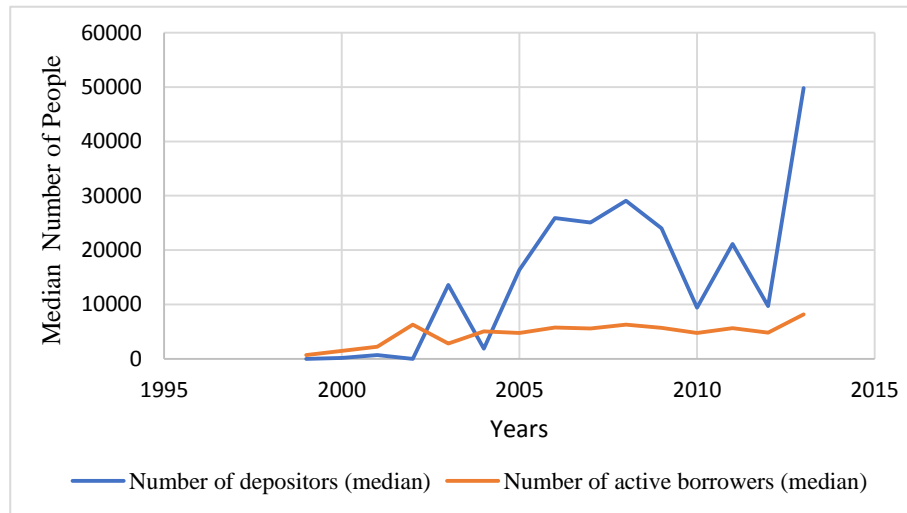


Figure 2.5: Trend of financial inclusion among semi-formal NBFIs using active number of borrowers and depositors as indicators (MIX Market, n.d.)

The count and the cumulative trends of the MFIs from 1999 to 2013 are shown graphically in Figure 2.6. It is noticeable that the Ogive increases at an increasing rate between 2002 and 2009 and increases at a decreasing rate thereafter.

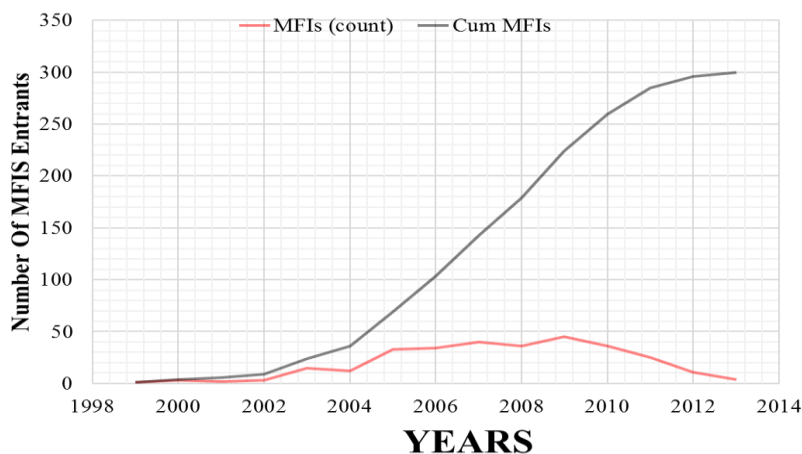


Figure 2.6: Frequency and cumulative trends of MFIs for the period 1999-2013 (MIX Market, n.d.).

The trend observed may not be coincidental. The period between 2001 and 2009 is what has been described as the 'golden age of business' in Ghana (Arthur, 2006).

Because the regime favoured a private sector-led approach to economic developments, many financial sector policies appeared favourable to the private sector. For instance, the passage of the Banking Act 2002 which allows the practice of universal banking ensured that many foreign banks entered the financial arena (Ackah & Asiamah, 2014). It is, therefore, not surprising that the marginal increment in the number of NBFIs shows an increasing trend. The gross loan portfolio also defines the access aspect of inclusion that these NBFIs engender. It is instructive to also observe from the figure above that diminishing marginal rate of MFIs growth (registration) in Ghana occurs in year 2009. This outcome is not coincidence, as the period marks the new political regime that was more austere and less private sector friendly (see Chapter 8 for the empirical implications).

2.5 Digital Financial Services Providers in Ghana

The widespread use of mobile technology appears to be defining new means of providing financial services to those previously excluded from the formal/traditional financial system. In Ghana, either mobile telecom network operators (MNOs) or financial institutions (usually banks) provide digital financial services (DFS). The digital financial products of banks include internet/online banking, mobile banking and other electronic amenities such as ATM, Debit and Credit cards (The CGAP & InterMedia, 2015).

The mobile network operators (MNOs) have a unique financial service generally known as mobile-money. This facility offers all subscribers the opportunity to load money into their mobile wallet, allowing them to make payments, transfer cash and receive remittances (Donovan, 2012). Currently, there are six MNOs operating in Ghana, of which four (4) offer DFS. According to the Consolidated Group to Assist the Poor (CGAP), the penetration rate of mobile money is still low in Ghana, though promises to be a viable means of engendering financial inclusion. The existing financial sector regulations are not applicable to the MNO's DFS.

2.6 Chapter Conclusion

The chapter reviews key institutions, the regulatory framework and actors that all interact to ensure an inclusive financial system in Ghana. This is in recognition that inclusion does not occur in a vacuum. The role of financial intermediaries (both

banks and nonbanks), the mobile network operators and the sector regulators all come in to play to shape any real drive towards broader inclusion. The significant role of regulatory and institutional frameworks cannot be over-emphasized if financial inclusion policies are to have much wider impact.

CHAPTER 3

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

3.1 Chapter Overview

This chapter surveys literature that offers the theoretical basis for the thesis. It also helps to identify gaps following a careful review of prior research on financial inclusion/exclusion. Hypotheses developed out of the literature gaps are presented in this chapter. The chapter provides strong foundation for the research framework and feeds into the empirical testing of the hypotheses postulated.

The rest of the chapter proceeds as follows. The theoretical foundation presented in Section 3.2 guides the reviews of the dual theories of financial intermediation and developments in this sub-section. Section 3.3 surveys definitional aspects of financial inclusion as an emerging concept. This subsection allows the author to fine-tune the definition of financial inclusion by offering a conceptualised definition that avoids either the over-simplification or exaggeration found with some existing definitions.

As research gaps are identified following a careful review of prior empirical and theoretical works in Section 3.4, hypotheses are developed. Section 3.5 follows with the conclusion of the chapter.

3.2 Theoretical Foundation of the Thesis

Two related theoretical frameworks form the foundation of this thesis. First are the theories of financial intermediation under which theories of information asymmetry, transaction costs and regulation are discussed. The second set provides the theories of financial developments. These theories are key to the understanding of the concepts of financial exclusion or inclusion, especially within the context of LICs.

Financial inclusion as a concept hangs on two pillars: the *process* dimension and *institutional* aspect. Processes that would ensure that a deepened financial system

translates into inclusive system with poverty-reducing impact cannot occur outside the core mandate of financial intermediation mechanisms; the reason intermediation theory holds a very significant place in this study. In effect, the intermediation asks the question: Who gets what, when, and why, with respect to financial resource allocation? The institutional dimension simply recognises that the inclusion process is attainable only within the wider context of regulatory, institutional and infrastructural contexts. This is where financial development and the theories that guide it enter. The role that institutional development plays has been established (Beck, Demirguc-Kunt, Levine, & Maksimovic, 2000; Beck & Levine, 2000; Demirgüç-Kunt & Maksimovic, 2002; Rajan & Zingales, 2000; Scholtens & van Wensveen, 2003); And the question of 'how one gets what', pops up when it comes to the role of institutional development in financial resource allocation.

Financial intermediation as a process ensures that the owners of surplus funds are brought together in an indirect manner with those who need them. The significance of this process has been widely underscored (Hannig & Jansen, 2010). Economic growth that potentially results in poverty reduction when the process of intermediation allows surplus spending units (savers) to channel their surplus funds to borrowers has been highlighted in prior studies. This allows borrowers the opportunity to invest and, in the case of households, consumption is smoothed. Three key theories that have been mostly used to explain the intermediation process, according to Kwakye (2012), are information asymmetry, transaction costs, and regulation.

In an ideal world of rational agents, and costless and complete information, a financial contract would be likely to occur without a bank's intermediary role (Scholes, Benston, & Smith, 1976). Since information would be available to all parties without cost, a person being aware of his consumption patterns could easily lend his/her surplus funds directly to the best would-be borrower who had the same maturity preferences as him/her. In this case, intermediaries would not be needed to ensure liquidity, screening and monitoring.

The theory of information asymmetry is often used to explain the financial constraints and exclusion small firms and poor borrowers encounter. Intermediation

will ensure efficient allocation of financial resources when financial intermediaries can overcome the problems of information asymmetry (Hannig & Jansen, 2010).

Asymmetric information is the difference in information available to different parties in a financial contract (Brealey, Leland, & Pyle, 1977; Hannig & Jansen, 2010; Sharpe, 1990). The theory suggests that information gaps exist between lenders and borrowers in a way that does not allow optimal allocation and utilisation of financial resources. This information imbalance occurs because borrowers often tend to have informational advantage over lenders. Borrowers know more about the investment projects they want to undertake, the risk involved and their own risk behaviour. This information may not be fully disclosed when entering contractual engagements and therefore gives rise to this imbalance (Brealey et al., 1977; Hannig & Jansen, 2010; Sharpe, 1990).

When lending to SMEs, the likelihood that the borrowed amount will be misapplied gives rise to the moral hazard issue. The probability that a moral hazard will occur is high where information opacity is endemic. For poor households, like small firms, who characteristically operate with a high degree of informational opacity, the tendency for moral hazard often serves as a disincentive for formal financial intermediaries to extend credit (Beck & Demirguc-Kunt, 2006; Berger & Udell, 2006; De la Torre, Pería, & Schmukler, 2010; Vos, Yeh, Carter, & Tagg, 2007). The cost of obtaining information to prevent the occurrence of such an insidious behaviour among small borrowers may serve as 'motivation' towards their exclusion (Brealey et al., 1977).

Transaction cost theory in lending, pioneered by Scholes, Benston, and Smith (1976) and later Campbell and Kracaw (1982), is based on the notion that market friction and imperfection warrant the existence of financial intermediaries (Kwakye, 2012; Scholtens & van Wensveen, 2003). The theory posits that by acting as coalitions of either borrowers or lenders, scale economies in transaction technologies could be exploited (Kwakye, 2012; Scholes et al., 1976; Scholtens & van Wensveen, 2003). The concept of transaction cost helps to partly explain why formal financial intermediaries are reluctant to provide financial services to poor households and small firms. The small nature of transactions involved makes it costly and unprofitable to serve small borrowers at the going interest rates (Beck & Demirgüç-Kunt, 2008; Beck et al., 2009; Johnston & Morduch, 2008).

Regulation becomes necessary where the socio-economic cost of market failure outweighs the private and marginal costs of regulation (Brunnermeier, Crockett, Goodhart, Persaud, & Shin, 2009). In the financial services industry, it is argued that regulation guarantees soundness and safety for all the market actors (Boot & Thakor, 1993; Scholtens & van Wensveen, 2003). The solvency and liquidity position of the FIs are altered through regulation. For instance, regulation that imposes huge minimum capital requirements limits entry into the industry as it also ensures the intermediaries' safety and their ability to refinance (Diamond & Rajan, 2000). According to Kwakye (2012), regulation is needed to check on the potentially insidious behaviour of banks, such as collusive tendencies, which may affect the price clients pay. This further ensures that banks deal with customers fairly in respect of interest offered on deposits and interest charged to borrowers. Thus, to ensure sustained public confidence, interest and patronage that prevents bank run or failure, regulation becomes inevitable for the FIs' existence (Greenbaum et al., 2015).

3.2.1 Theories of Financial Structure and Development

The thesis fits in well with a large amount of literature on the theory of financial development. However, the broad nature of the concept of financial development, which encompasses financial structure, inclusion and deepening, makes it imperative to confine the study within the purview of financial inclusion. Their inter-relatedness, however, compels the author to review the whole concept of financial development theoretically.

(i) Financial Deepening, Inclusion and Development Nexus

According to Hannig and Jansen (2010), the failure of a traditional measure of financial development using, for example, 'private credit to GDP' that captures only 'depth' to the neglect of 'breadth,' calls for a shift in the existing paradigm. Breadth that encapsulates access to financial resources/services defines an inclusive financial system. This is often neglected in the traditional measure that emphasises the policy end of accumulation of capital at the aggregate level.

There is a lack of consensus among policymakers and researchers on the linkages that must exist between financial deepening, inclusion and development. For instance, Beck et al. (2015) argue that financial development is a necessary, but not

sufficient, condition for inclusion. Deliberate policy actions are therefore required to ensure inclusion emerges from financial development. Also, as the linkage between financial deepening and access becomes weaker, financial development tends to be suboptimal. Klapper and Singer (2011) also find a positive, albeit imperfect, correlation between financial inclusion and financial development.

The concern over the failure of the financial sector reforms to engender financial inclusion in most parts of Africa is often raised (Beck et al., 2015; Demirgüç-Kunt & Klapper, 2012a, 2012b). Beck et al. (2015) hinted at the possibility of trade-offs between financial deepening and inclusion. In some instances, policy interventions aimed at inducing a deepened financial system could potentially be conflicting with the drive towards inclusion. Privatising public sector banks previously offering pro-poor services, as part of the financial sector reforms, is often a case of reference.

A deepened financial system that is inclusive will ensure both inclusive and pro-poor growth that is equitable. Financial inclusion, therefore, becomes a more pragmatic indicator of a developed financial system. The acid test of gauging financial development will be financial inclusion that results from a deepened financial sector. This way financial inclusion becomes the *missing link* that has often generated a lack of consensus in the past over the role finance plays in economic and social development (Hannig & Jansen, 2010). Many theories have been formulated on financial structure, though the author focuses on three that tie in well with this study.

Political Institution View: The political institution view holds that the financial structure of a nation is shaped by the level of information asymmetries and transaction costs, which are in turn influenced also by the nature and the quality of the political institutions and governance (Bhattacharyya, 2013). It is argued that non-democratic countries tend to be information opaque, which breeds rent-seeking grounds for the existing politically connected banks. As entry and competition are limited, the beneficiary banks in return share part of the rent with the ruling class. In light of this, Haber (2008), and Wallis (2008) both found that political competition drives away such abuse of the financial system, allowing for optimal allocation of financial resources.

In addition, this opacity allows the politically connected individuals to access credit without recourse to the viability of their investible projects. This is mostly at the

expense of the entrepreneur with no political connections (Bhattacharyya, 2013; Gockel & Akoena, 2002). This ultimately leads to misallocation of resources and exclusion.

This theory, therefore, predicts that better political systems and institutions create a market-based financial system which could ensure better financial deepening and promote inclusion. The current study identifies with this theory.

Economic Development Theory: This theory argues that an economic system that shows sign of growth and expansion would create additional demand for external finance for the firm which must be met by the financial institutions (Bhattacharyya, 2013; Boyd & Smith, 1998; Levine, 2002, 2005). From the supply side, financial institutions are able to save monitoring costs as the emergence of a market-based system is often associated with less need for it. Chakraborty and Ray (2007) in their model argued that as economic development creates a wealthy society, financial institutions have less need to incur high costs of monitoring. Based on this, the author includes GDP per capita as metrics for economic development and income distribution in the model to ascertain how that influences financial inclusion (see Chapter 6).

Social Capital Theory of Financial Development: The social capital theory of financial development is premised on the notion that existence of certain socio-cultural institutions serve as social capital, which tends to be associated with low moral hazard, and hence promotion of financial deepening as financial intermediaries save monitoring costs (Bhattacharyya, 2013; Guiso, Sapienza, & Zingales, 2000). Prior studies on the relationship-based lending approach (Scholtens & van Wensveen, 2003), which exists in the informal financial sector of most developing countries, seems to lend credence to this view.

3.3 Definition of Financial Inclusion

Financial inclusion is considered a key dimension of, and a strategic means towards, financial development (Beck. et al, 2015). This is because it serves as the means through which firms and households meet their financial needs at reasonable cost, as they fully participate in the formal financial system. Financial inclusion is, however, not limited to credit access. It is much broader, encompassing access,

usage, quality, and the impact of such inclusion efforts (Hannig & Jansen, 2010; Triki & Faye, 2013b).

The relevance of financial inclusion to financial development and pro-poor inclusive growth requires that the concept is defined appropriately. Failure to do so correctly could mean the real effect expected of an inclusive financial system is either underestimated or exaggerated. Against this therefore, various definitions offered in prior studies are carefully reviewed to identify the consensus. The author attempts to offer an original conceptualised or operationalised¹¹ definition of financial inclusion as a concept. This is part of the original contribution of this research to the existing literature. The conceptualised definition is motivated by a similar application in defining unemployment conceptually (Bruce, Flynn, & McConnell, 2013; McConnell, Brue, & Flynn, 2013).

The concept of financial inclusion, which is increasingly gaining academic and policy interest is premised on the realisation that a section of society (individuals and businesses) have difficulty accessing appropriate financial services from the mainstream financial services providers. The term financial inclusion and exclusion are therefore different sides of the same coin. The drive towards inclusion is, by implication, an admission of the existence of financial exclusion. The term *financial exclusion* was first coined in 1993 by geographers to explain the limited physical access to banking services, due to bank branch closures (Leyshon & Thrift, 1993). Following this, several attempts have been made both in policy and academic circles to determine how financial exclusion should be defined. These scholarly attempts made include, for example, Anderloni, (2003); Carbo et al, (2004); Devlin, (2005); Gloukoviezoff, (2004); and most recently Anderloni and Carluccio (2006).

These efforts notwithstanding, additional perspectives from researchers (Anderloni, 2003; Anderloni and Carluccio, 2006; Carbo et al, 2004; Devlin, 2005; Gloukoviezoff, 2004; Kempson et al, 2000; Sinclair, 2001) and policymakers, for example, the Treasury Committee of the UK (Treasury Committee, 2006a, 2006b; HM Treasury, 2004) have not coalesced to unanimity. Nevertheless, there is a consensus the concept encapsulates people who have difficulty accessing appropriate financial services and products from the mainstream financial services

¹¹ This is a response to a question of whether society/country could attain full-financial inclusion level posed to the author by a participant during one of the international conferences.

providers. Failure of the mainstream commercial providers to supply a range of products and services that are appropriate to the needs of all sections of society is the kernel. Two aspects of this definition are important: first, the reference to appropriateness of the financial products, and second, access to the mainstream financial services market. Thus, much of the exclusion appears to arise from a failure of the formal credit providers to meet the financial needs of all sections of society. That financial inclusion captures the availability and accessibility of credit at reasonable cost to the poor and the marginalised in society appears to be the common denominator. Triki and Faye (2013), for instance, perceive an inclusive financial system as one that provides appropriate, affordable, and widely accessible quality financial services to marginalised groups in society. From the demand point of view, Hannig and Jansen (2010) define financial inclusion to be that which guarantees every economic agent accessibility to the use of basic financial services, such as an opportunity to save, make payments, transfers, and have access to insurance services. Demirgüç-Kunt et al. (2015) also define financial inclusion as the ability of individuals and firms to access and use formal financial services. The UN Secretary-General's Special Advocate for Inclusive Finance for Development-UNSGSA (2015) defines financial inclusion as universal access to a wide range of financial services, at a reasonable cost. These financial services are provided by a variety of responsible and sustainable institutions, which encompasses issues relating to microcredit, remittances, payments, savings, insurance and SME finance.

The definitions surveyed above suggest that financial inclusion is a much broader concept than just financial accessibility. The multi-dimensional nature of the concept (Chibba, 2009) makes any single definition inadequate. On the supply side, it includes provision of appropriate, affordable and widely accessible quality financial services to the marginalized groups in society (Triki & Faye, 2013). It may be thought of as the ability of every economic agent to access financial services, viewed from a demand perspective (Hannig & Jansen, 2010). The financial system is said to be inclusive when it serves the needs of wider spectrum of society in an affordable and efficient manner, regardless of their socio-economic status (Sarma & Pais, 2011). Sarma and Pais (2011) further indicate that such a process will ensure that all active economic agents have access to and use of a widely available formal financial system with fewer obstacles and less cost. Efficient allocation of

financial resources will be promoted under such an inclusive system. This, in turn, is expected to advance economic growth and development processes. A more holistic understanding of these relationships, according to Hannig and Jansen (2010), requires research that takes into account a whole gamut of environmental factors that engender financial access and reduce exclusion. The juxtaposition of these varied definitions, bring about the consensus. Thus, the term can simply be defined as the ability of the previously ‘unbanked’ economic units to fully participate in the formal financial system via access and usage of appropriate financial and technological platforms at reasonable cost. These ‘unbanked’ include poor households and the financially marginalised (small) businesses. Following this definition, Chapters 8 and 9 address inclusion issues faced by SMEs and poor households respectively.

3.3.1 Operationalised Definition

The conceptualised definition offered here is based on demographic features of society. Like the concept of unemployment, it is inconceivable to assume that society can attain one hundred percent financial inclusion. This is naturally so because the population of a country comprises both the financially includable (i.e., *financially/economically active*) and non-includable (who could be regarded as *economically passive*).

By using certain demographic characteristics, such as age, it is possible to classify minors as those outside the includable set. The World Bank’s household financial inclusion survey (Findex) for instance, pegs this at those below 15 years (Allen et al., 2016; Demirgüç-Kunt et al., 2015), ostensibly, on the assumption that such an age group may either be schooling or dependants of their parents. They are therefore considered financially inactive. In practice this may differ from one country to another. The non-includable set could also capture other economic agents who are passive and may not be actively engaged in any economic activities. Firms that have ceased operation for non-financial reasons and the aged found in care homes could all be reasonable proxies.

The includable set is the economically active agents. It consists of households and firms who engage in economic activities of any kind; consumption and/or production. Private sector firms in general and adult households (by Findex criteria

those aged 15 and above) can be found in this category. Technically, the includible set could broadly be perceived as those financially included and those excluded. The financially included may be conceived of as comprising those who are fully or partially included. The fully included are operationally defined in this study as those engaging in formal financial sector activities. The partially included could be considered those participating in the semi/informal financial sector. These are neither fully included nor completely excluded.

The financially excluded therefore consist of the self/voluntarily (frictional) excluded and those excluded involuntarily (seasonal, structural and cyclical). The self-excluded are those who for some reason may not have the need to actively participate in the financial sector. The World Bank's Enterprise Survey, for instance, identifies firms in this group who may have internal funds enough for their operations. Their exclusion is implied, albeit voluntarily, because they have no need for lines of credit from financial intermediaries. There could, however, be latent factors that may account for this. The involuntary group are mostly the focus of both policy and research.

The involuntarily excluded are the agents who have the desire to participate in the formal financial system but are unable to do so. This category could be considered excluded by constraints. Many factors account for this and may range from demographics, economics, or geographical and psychological barriers. This thesis focuses on this group as it critically investigates the means by which inclusion of those involuntarily excluded financially, could translate into their economic inclusion.

As illustrated diagrammatically in Figure 3.1, the policy and research goal is enshrined in identifying routes through which the involuntarily excluded could be part of the formal financial system. The arrow points towards where inclusion efforts are focused. Thus, those involuntarily excluded from the formal financial system require policy that aims at working towards their inclusion.

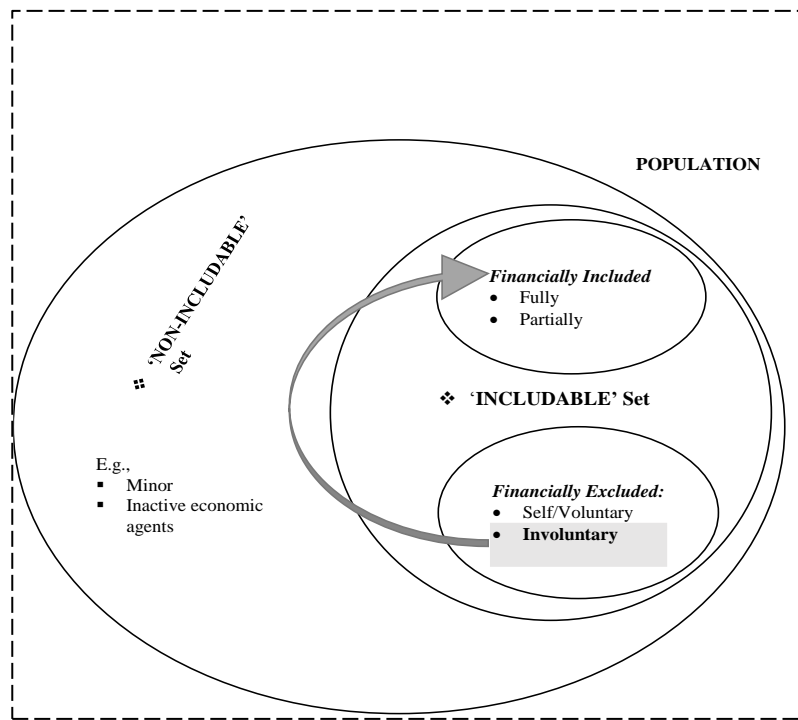


Figure 3.1: Graphical definition of financial inclusion

3.4 Prior Studies and Development of Hypotheses

3.4.1 Financial Inclusion and the Role of Institutional Context

The relationship between financial inclusion and institutional, economic and other country-level variables is explored in this thesis. Financial inclusion, which simply refers to the availability and accessibility of credit at reasonable cost to the poor and marginalised in society, does not occur in a vacuum. Prior research illuminates a range of issues contributing to greater financial inclusion. The linkage between expanded financial access and increased economic growth and social development continues to develop. A broad definition of financial inclusion as providing financial services to the poor at reasonable cost immediately raises the issues of breadth and depth. The former relates to coverage, percentage of the population covered, while depth encompasses how much service, which can variously be interpreted as size of credit or the number of instruments and services available. Accordingly, prior research emphasises a range of different variables and metrics for the variables and, not surprisingly, is dispersed and lacks unity.

Past studies have established the role of credit accessibility and its multiplier impact upon the economy (e.g. Beck & Levine, 2001, 2004; Ndako, 2010). What could equally be the case, however, is the possibility of reverse causality. Thus, how

country-level institutional and regulatory factors contribute to the extent of inclusion in LICs has not been given scholarly attention. An exception, however, is Kpodar and Andrianaivo (2011) who, in their study on Africa, for instance, find that financial inclusion is engendered by good institution and wider bank-branch coverage. Kendall, Mylenko, and Ponce (2010) find that physical infrastructure is positively correlated with inclusion indicators used.

To this end therefore, the study reviews how institutional developments such as ICT, national governance structure and macroeconomic developments affect financial inclusion.

(i) National Governance, Institutional Framework, and Financial Inclusion

The link between a country's governance and economic development is the subject of several empirical studies. In keeping with transaction cost theory, Bhattacharyya (2013) argues that political institutions and the quality of governance system can influence the nature of information asymmetries and change incentive structure in the credit market. To underscore this possibility, Kaufmann et al. (2000) establish a positive (non-linear) relationship between governance indicator (rule of law) and economic performance (per capita incomes) for 166 countries for the years 1997–98. They also observe the same relationship between governance indicator (voice and accountability) and infant mortality rates for 173 countries. This implies that dividends of good governance and transparent political processes do have far-reaching implications for many national variables. Prominent among these is the financial development and deepening of developing economies. Other authors have also established linkages between democracy and financial development (Huang, 2010; Roe & Siegel, 2011; Yang, 2011). The consensus points toward countries with weak governance systems experiencing slow economic development and conversely, those with strong governance systems having higher economic growth.

A deepened financial system is expected to emerge from a political system that adheres to respect for the rule of law, contract enforcement, and protection of property rights (Acemoglu, Johnson, & Robinson, 2012; Haber, North, & Weingast, 2008; King & Levine, 1993; La Porta et al., 1998; Levine & Zervos, 1998; Rajan & Zingales, 2003; Yang, 2011). A reasonable conjecture is that financial inclusivity is more realisable under a political system that upholds the ideals of good governance. The contrary suggests political repression that limits competition is

more likely to repress the financial system. As argued by Haber et al. (2008), the expectation that democracy limits the state's power to repress the financial sector, leads to an efficient allocation of resources. Rent-seeking and opportunistic behaviours are discouraged under such transparent systems. Bhattacharyya (2013) argues further that there is a high likelihood that a *market-based financial structure* will emerge out of what has been termed a *democratic capital*. The inclusion of governance variables in the model is informed by the emerging theoretical and empirical literature establishing linkage between financial and political developments.

(ii) Financial Inclusion and Corruption

An analysis of 107 developing countries by Altunbaş and Thornton (2012) reveals that financial deepening, measured by bank credit to the private sector, reduces corruption. This, they argue, occurs when financial intermediaries monitor borrowers in a way that compels the latter to reduce discretionary expenditures leading to efficient allocation of resources. Empirical studies, at both country-level and bank-level analysis, also suggest that bank lending reduces with corruption (Weill, 2011). Corruption is found to be negatively associated with private credit (Detragiache, Gupta, & Tressel, 2005).

(iii) Economic Freedom and Financial Inclusion

Acemoglu, Johnson, and Robinson (2005) suggest that the kind of economic institutions prevailing in a country affect the distribution of resources, finance included. In a study to examine various models for tackling financial exclusion in Europe, Carbo et al. (2007) highlight institutional structure, political styles, and the existing financial/economic system as playing a critical role in ensuring inclusiveness.

Economic institutions such as the structure of property rights and well-functioning markets (Acemoglu et al., 2005), promote economic freedom and are pivotal in shaping financial inclusion. Beck and Levine (2008), emphasising the law and finance theories, observe that private contractual arrangements, protection and enforcement of legal and property rights, especially among investors, serve as a means of getting economic agents (households) incentivised to finance firms. When debt and equity are viewed as a legal claim on the firm's cash flow

(Modigliani & Miller, 1958), the role economic freedom plays in supporting financial inclusion becomes obvious. Jensen and Meckling (1976), as an example, discuss the role statutory laws and the court’s ability to enforce such laws play, acting together in resolving agency problems that arise out of contracts. These freedom-promoting institutional arrangements act together to shape the financial sector towards deepening and inclusion. The thesis investigates this relationship. Table 3.1 below summarises prior studies on the roles national governance structure, economic freedom and corruption play in encouraging financial inclusion. The content shows the authors, the key findings reported and most importantly, the direction of association found between the indicator concerned and financial inclusion proxy.

Table 3.1: Survey of prior studies on national governance structure, economic freedom and financial inclusion

National Governance structure and financial deepening		
Sources	Key findings on variables	Direction of Association
Kaufmann, Kraay, & Zoido-Lobaton (2000)	Governance indicator (rule of law) is related to economic performance for 166 countries	+
Huang (2010); Roe & Siegel (2011); Yang (2011)	Democracy and financial development are studied	+
Haber et al. (2008))	Democratic competition has trickle down effect on other key sectors of the economy (e.g. financial)	+
Acemoglu, Johnson, & Robinson, (2012); Haber, North, & Weingast, (2008); King & Levine, (1993); La Porta et al., (1998); Levine & Zervos, (1998); Rajan & Zingales, (2003); Yang, (2011)	Political system that adheres to tenets of democracy, (<i>e.g. respect of rule of law, contract enforcement, and protection of property rights</i>) leads to a deepened financial system	+
Bhattacharyya (2013)	Financial system is influenced by the quality of governance and political institutions that shape the nature of transaction costs and information asymmetries	+

Roe & Siegel (2011)	Financial sector serves as a channel through which positive externality arising out of good governance affects economic growth	+
Corruption on Inclusion		
Altunbaş & Thornton (2012)	Financial deepening (thus, bank credit to the private sector) reduces corruption	- (*)
Weill, 2011	Bank-level estimation revealed that banks' lending reduces with corruption	- (*)
Detragiache, Gupta, & Tressel, 2005	Corruption was found to be negatively associated with private credit	-
Economic Freedom and Financial Inclusion		
Carbo et al. (2007)	Institutional structure, political styles and the existing financial eco-system promote financial inclusion	+
Beck & Levine (2008)	Private contractual arrangements, protection and enforcement of legal and property rights, especially among investors, act as catalysts to incentivise economic agents (individual savers and intermediaries) to finance firms; hence positively influence inclusion	+
Jensen & Meckling (1976)	Statutory laws and the extent to which courts can enforce laws play a role in resolving agency problems that arise out of contracts	+

Source: Author's review of literature

Note: (*) = reverse causality

(iv) Macroeconomic Indicators and Financial Inclusion

The linkage between financial deepening, economic growth and development is well established (Arestis & Demetriades, 1997; Arestis, Demetriades, & Luintel, 2001; Beck & Cull, 2014; Beck, Lu, & Yang, 2013; Jung, 1986; Levine, 1997, 2005). The The World Bank Group/CGAP (2009) report on financial inclusion suggests that growth and stability at the macroeconomic level have a critical impact on credit services. Kendall, Mylenko, and Ponce (2010), also found GDP per capita to be positively associated with financial inclusion (loan penetration).

Table 3.2: Survey of prior studies on economic growth and financial inclusion

Sources	Key Findings on Variables	Direction of Association
Kendall, Mylenko, & Ponce (2010),	GDP per capita is positively associated with financial inclusion	+

Arestis & Demetriades, 1997 ; Arestis et al., 2001 ; Beck & Cull, 2014 ; Beck et al., 2013 ; Jung, 1986 ; Levine, 1997, 2005	Financial deepening (inclusion) positively influences economic growth	+ ^(*)
World Bank/GCAP (2010)	Growth and stability at the <i>macroeconomic level</i> have critical impact on credit services	+
Bhattacharyya, (2013); Boyd & Smith, 1998; Levine, (2002) & (2005)	Economic growth and development create avenues for the financial sector to deepen	+

Source: Authors' review of literature

Note: (*) = reverse causality

Table 3.2 offers a survey of prior studies linking economic growth and financial inclusion. The direction of the linkage points to whether negative, positive or mixed is expected as found by the researchers.

Hypotheses: H_(a1-4)

Establishing the linkage between regulatory and institutional factors on one hand and financial inclusion on the other, motivates the development of the testable hypotheses, H_(a1-4). These are specified below.

H_{a(1)}: Good governance is positively associated with, and promotes, financial inclusion.

H_{a(2)}: Improvement in the fight against corruption is positively associated with financial inclusion.

H_{a(3)}: Favourable economic (freedom) environment is positively associated with financial inclusion.

H_{a(4)}: Economic growth is positively associated financial inclusion

3.4.2 Financial Deepening, Inclusion and Technology

Evidence suggesting that financial liberalisation reallocates talent from the innovative sector to the financial system, thus retarding technological deepening, is advanced by Ang (2011). Causality is an issue and it may equally be argued that technology retards financial deepening. Many researchers do not seem to subscribe to this view.

Information and communication technology (ICT) is increasingly seen as a gap-bridging infrastructure for financial service provision, allowing the previously unbanked to be served (Diniz, Birochi, & Pozzebon, 2012). ICT is perceived to be enhancing access to credit and deposit facilities. This ultimately allows for efficient credit allocation and transfer in a way that incentivises financial inclusion (Kpodar & Andrianaivo, 2011). Mobile technology, according to S. Rasmussen (2010), is bridging the gap in some African countries, such as Kenya (e.g. Safaricom’s M-PESA, see also (Donovan, 2012; Jack & Suri, 2011; Kpodar & Andrianaivo, 2011) and South Africa (e.g. MTN mobile money¹²)). On balance, research suggests that technological deepening further deepens the financial process and ultimately ensures inclusiveness, as summarised in Table 3.3. According to Beck (2015), existing empirical evidence suggests that Safaricom’s (M-PESA) mobile financial innovation could generate monetary and financial transactions valued at about 50 percent of Kenya’s GDP. In a country-level study on Kenya, Beck et al. (2010) find that the likelihood of becoming financially included increases with mobile phone ownership.

To some extent, the provision of cellular phone services for Bangladeshi women as introduced by Grameen Bank via its subsidiary Grameen Telecom (Yunus, 1999) comes into focus. Considered as an innovative means for empowering micro-borrowers and savers (Sullivan, 2007) “due to access to credit and mobile phones” (Selinger, 2008), the initiative therefore serves as a means of closing the financial exclusive gap through technology, especially among women.

Table 3.3: Survey of prior studies on financial inclusion and technological deepening

Sources	Key Findings on Variables	Direction of Association
Kpodar & Andrianaivo, 2011	<ul style="list-style-type: none"> ICT (Mobile phone penetration) <i>positively</i> contributes to growth in Africa via greater financial inclusion ICT enhances access to credit and deposit facilities, thereby boosting financial inclusion 	+

¹² Donovan (2012) intimated mobile money facility is considered an effective means of ensuring financial access to millions of people globally.

	<ul style="list-style-type: none"> • ICT narrows financial infrastructural gap for reaching the financially marginalised 	
Diniz, Birochi, & Pozzebon, 2012	<ul style="list-style-type: none"> • an ICT-based platform supports financial inclusion as it provides a crucial network infrastructure to engender financial inclusion in remote places 	+
Donovan, 2012; Jack & Suri, 2011; Rasmussen (2010)	<ul style="list-style-type: none"> • Mobile money engenders more inclusion in Kenya 	+
Ang, 2011	<ul style="list-style-type: none"> • Financial deepening retards technological deepening as the latter reallocates talents away from innovation 	-

Hypotheses: H_{a5(i-iv)}

The question of how technological deepening translates into financial inclusion in LICs motivates the development of testable hypothesis below. The objective of which is to empirically ascertain the role technological advancement plays towards inclusive financial system in LICs.

H_{a5(i)}: Mobile phone roll out has increasing impact on financial inclusion in Ghana.

H_{a5(ii)}: Internet usage has positive impact on financial inclusion both at the micro- and macro-economic levels.

H_{a5(iii)}: Mobile-based DFS is pro-poor and has more significant positive impact on FI than bank-based DFS.

H_{a5(iv)}: There is a contemporaneous trade-off between mobile-based DFS and bank-based DFS over time.

(i) Financial Innovation and Inclusion: The Concepts of Mobile Banking and Digital Financial Services

Digital financial services (DFS) as part of mobile banking is one key innovation that can foster wider inclusion (Beck et al., 2015), especially in Africa. It is becoming an emerging means of fostering inclusion among the poor and the small business borrowers.

Mobile-based financial services (also called mobile money services) are a form of branchless banking services (Kpodar & Andrianaivo, 2011; S. Rasmussen, 2010).

Kpodar and Andrianaivo (2011) recognise that for LICs, mobile banking serves as one route towards financial inclusion, though for developed economies that may constitute an additional banking product.

The two related concepts that have contributed to the drive towards financial inclusion in LICs are mobile banking, also referred to as mobile financial services (MFS), and digital financial services (DFS). Though related, the two concepts are not the same in theory or practice. Mobile banking, which simply refers to the offering of financial services to clients in a branchless manner, appears broader. It encompasses branchless financial service provision by formal and informal financial intermediaries as well as non-financial intermediaries, such as mobile network operators (MNOs). Aryeetey (2008), for instance, considers the ROSCAs and Susu groups that go around to offer savings and other financial services to their clients, as part of the mobile banking practice.

Two modes of delivering mobile financial services are identified: Bank-based and MNO/Nonbank-based (Beck et al, 2015). The nonbank-based DFS could either be offered exclusively by MNOs or jointly by MNOs and banks.

The bank-based approach allows banking financial services to be remotely offered to clients who have direct relationship with the financial intermediary. The retailers act as the bank's agent and, for the convenience of customers, are often located outside the branch network of the bank. The financial institution-based model does not rely on mobile technology, and may be based off the DFS platform (see Figure 3.3). Instead, the service could be regarded as an extension of traditional banking services. Although bank-based mobile banking services potentially foster inclusion, the focus of the thesis is on the mobile-based digital financial services.

Digital financial services, however, refer to the use of the ICT platform to offer financial services digitally to clients. The services offered by branch-based (traditional) banks, such as ATMs, internet banking and electronic-based payment cards (credit and debit) are part of the DFS. The confusion that often arises is due to the DFS being offered by MNOs that are non-banks. The mobile-based DFS offered by MNOs by nature are both part of mobile financial services and digital financial services.

The interlinkages between these concepts are diagrammatically shown below in Figure 3.2.

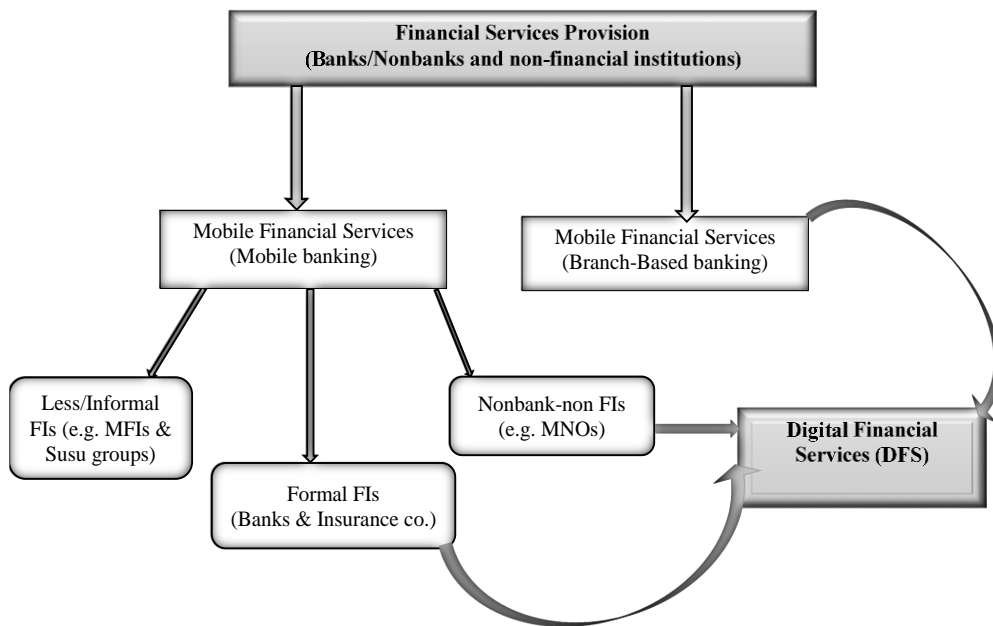


Figure 3.2: Interlinkages between mobile banking and digital financial services

There is a need to further clarify the bank and non-bank models of mobile financial services. The mobile or non-bank-based financial services rely predominantly on digital technology using mobile phones (Mas & Rotman, 2008; Morawczynski, 2007; S. F. Rasmussen, 2010). The MNOs act as the main retailers in this model. Although the bank-based model is subject to the central bank’s prudential regulation, the MNOs-driven by non-bank-based MFS are not. The latter is therefore not permitted to act as intermediaries with the facilitated deposits they collect which are only repayable (Kpodar & Andrianaivo, 2011). The MNOs, via agents, only facilitate customers’ cash in exchange for electronic equivalence in a virtual accounts known in Ghana as *mobile wallets* and *e-wallets* in Kenya and elsewhere (Kpodar & Andrianaivo, 2011). Transaction fee charges and in some cases reduced airtime distribution costs becomes the spread (or profit) for the MNO/non-bank-based DFS provider (Kpodar & Andrianaivo, 2011; Tarazi & Breloff, 2010). Some of the non-bank-based MFS in some parts of Africa include Orange Money in Ivory Coast(Kpodar & Andrianaivo, 2011), MTN mobile money, Tigo cash and Airtel money in Ghana and Kenya’s M-PESA by Safaricom (Tarazi & Breloff, 2010).

(ii) Utilities derived from the Mobile-based DFS

Digital innovation in financial service delivery appears to be the catalyst for wider inclusion especially in Africa (Beck et al., 2015). Mobile money services offered through a digital platform benefit users in many ways. Key among these are the convenience and costless means of serving the underserved. Indeed, the positive externalities arising out of financial inclusion promised by the DFS have not been fully quantified.

In Ghana for instance, mobile money services allow clients to load money into their mobile wallets. Customers are electronically able to receive and make payments from their mobile accounts. Similar practices are documented in other parts of Africa. Kpodar and Andrianaivo (2011) for instance, report that M-PESA (by Safaricom in Kenya), allows customers to effect transfers from their e-wallets for payments of bills, goods and services, taxi fares and more. Some business entities are found to use M-PESA as a platform for payment collection from clients (Kpodar & Andrianaivo, 2011; Mas & Radcliffe, 2010). Mas and Radcliffe, (2010) for instance, report that about 16,900 agents nationwide are engaged in M-PESA and about 40 percent of adults in Kenya representing approximately 23 percent of the entire population subscribe to it. Referring to Ndirangu and Nyamongo, Beck (2015) indicated that the amount transacted using M-PESA mobile financial innovation is about 50 percent of Kenya's GDP.

Additionally, the mobile platform allows employers to pay wages and salaries via mobile phone. Other potential uses, such as domestic and international remittance transfers, subsidies from and taxes to governments, are also documented (Kpodar & Andrianaivo, 2011). Figures 3.3 and 3.4 summarise the basic functional application of DFS offered via mobile phones to their users.

Though not investigated in this study, there is evidence indicating that financial innovation, such as mobile-based DFS, has implications for monetary policy (Beck et al., 2015). Ndirangu and Nyamongo report an improvement in monetary policy effectiveness in Kenya as currency in circulation outside the banking system reduces with the unbanked population.

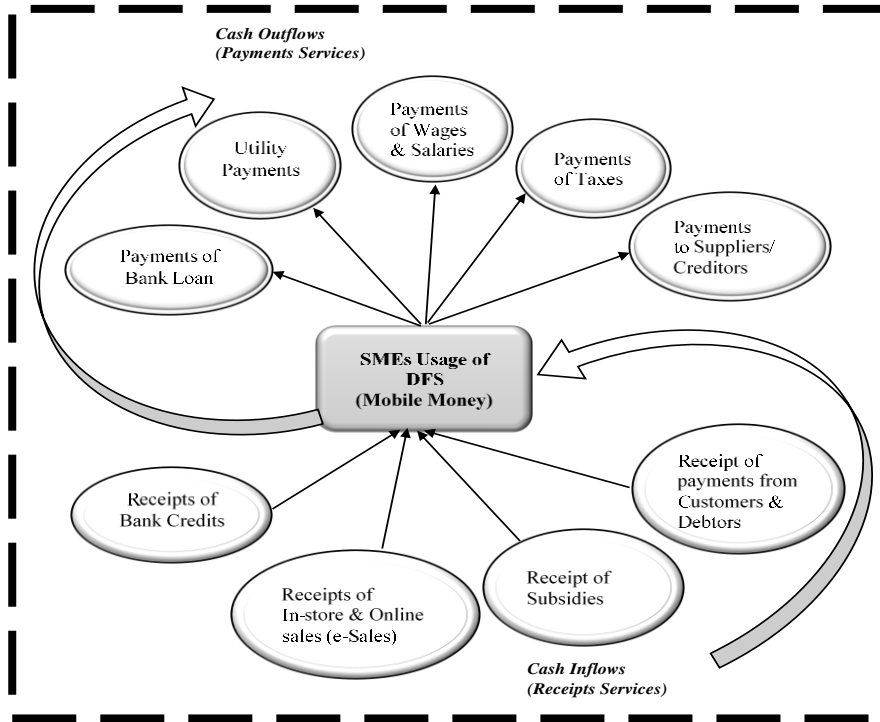


Figure 3.3: Ecosystem of SMEs' DFS facility usage

The benefits of DFS to households and SMEs are seen in the light of transaction facilitations. As an efficient, less costly mode of payments and receipts, DFS significantly reduces transaction costs to their users. Figure 3.3, and Figure 3.4 below depict the circular flow of cash/money as a basic transition-facilitating role of DFS to SMEs and households, respectively.

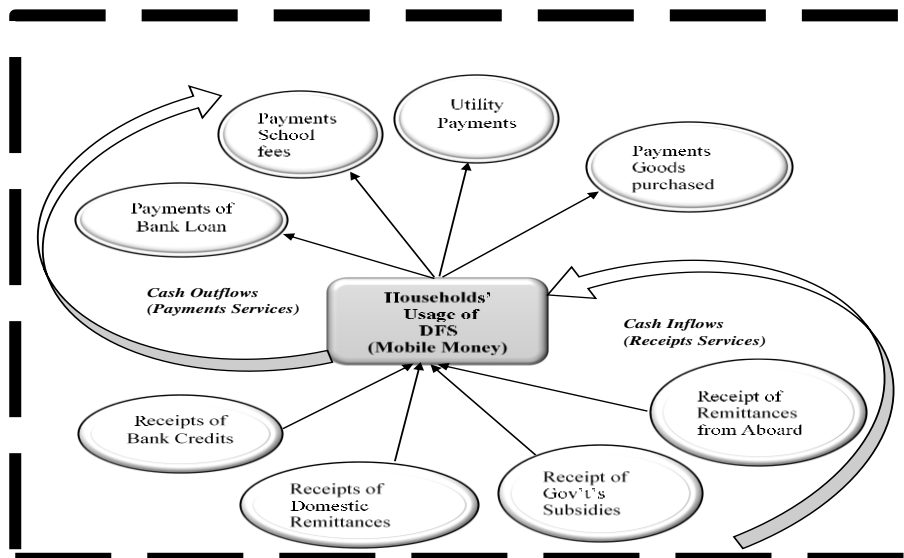


Figure 3.4: Financial ecosystem of DFS for household users

3.4.3 Firm's Risk of Exclusion from Financial Services in LICs

In a perfectly competitive environment where there is costless and complete information, rational individuals can enter a financial contract without a financial intermediary. Because costless information would be available to all parties, individuals could easily lend their surplus funds directly to the best would-be borrower with same maturity preferences as the lender. As observed earlier, there would be no need for a bank intermediary in such ideal world.

Theories of information asymmetry (Brealey et al., 1977; Hannig & Jansen, 2010; Sharpe, 1990) are key for understanding the financial constraints and exclusion that small firms encounter. Asymmetric information causes “lemons”, “adverse selection” and “moral hazard” (Stiglitz & Weiss, 1981, 1990) and helps explain why firms may face financial exclusion. Perceived as a mixed-bag of both bad and good borrowers, credit suppliers who cannot differentiate between prospective borrowers often resort to high rates and other non-price barriers to reveal the average quality of borrowers. The reality of moral hazard and adverse selection problems in the lending industry compels formal intermediaries to adopt screening strategies which mostly result in excluding SMEs from reaching such services. High interest charges and collateral as screening strategies by formal banks often work against the small business borrowers.

The positive impact of socio-economic network externality could be an indirect attribute of the firm. The exception, however, is the family business where such networks become social capital and a key attribute (Arregle, Hitt, Sirmon, & Very, 2007). Uzzi (1999), as an instance, finds a lower cost of credit to firms that have social attachment with their lenders, and the likelihood of their getting line of credit increased. The information sharing between firms and lenders in such network has the potential of dissipating information asymmetry that characterises SME lending. In most cases, relationship lending as a useful means for informal lenders reaching out to the SMEs, originates from the former (De la Torre et al., 2010). Within the context and scope of this thesis, the network effect is tested using matured firms, SMEs with experienced top managers and firms that are subsidiaries of other enterprises.

Against this background, the hypotheses $H_{b(1-7)}$ below are postulated.

Hypotheses: H_{b(1-7)}

The determination of firm attributes that either increase or reduce financial exclusion and constraints in Ghana is a key part of the study. The aim therefore is to empirically identify firm attributes that are most significantly predisposed to risk of being excluded from the use of formal financial services.

Firm Size

Small firms mostly operate with a high degree of informational opacity preventing them from accessing credit from the formal financial system (Beck & Demirguc-Kunt, 2006; Berger & Udell, 2006; De la Torre et al., 2010; Vos et al., 2007). Transaction costs in serving these small and opaque businesses could outweigh private benefits that credit suppliers stand to derive from them (Hannig & Jansen, 2010). Issues of market imperfection, information asymmetry, in theory and in practice, translate into higher risk, requiring higher premiums from credit suppliers. Practically, the reality of institutional bottlenecks is an obstacle to the smooth operation of SMEs, especially within LICs. This partly explains why formal external sources of finance appear to be a significantly minute part of SMEs' investment and working capital (Beck & Demirguc-Kunt, 2006).

Although the general business environment may not intentionally discriminate against small or large firms, the internal constraints faced by SMEs add to their problems. Issues relating to contract enforceability, lack of appropriate property rights and difficulty in accessing external credit pose greater constraints to small firms than larger businesses. Barriers that hinder a firm's access to finance could be removed if the informational gap that increases transaction costs of lending to SMEs is addressed (Beck, Demirguc-Kunt, Laeven, & Levine, 2008). Among a range of business environmental constraints, Maksimovic, Demirguc-Kunt, and Ayyagari (2006) find access to credit as the most critical constraint that reportedly confronts small firms.

Many empirical studies indicate that SMEs face more exclusion financially than their larger counterparts (Abor & Quartey, 2010; Aterido, Beck, & Iacovone, 2013; Beck & Demirguc-Kunt, 2006; Beck, Demirguc-Kunt, & Maksimovic, 2008). Access to finance and financial exclusion are perceived by firm owners and researchers as growth-inhibiting constraints small businesses face (Beck & Demirguc-Kunt, 2006). Considering the above, the hypothesis that the financial

exclusion gap among SMEs is higher than for larger firms, that can overcome such constraints, is postulated.

H_{b(1)}: Firm size is a significant determinant of a firm's risk of exclusion from the use of financial resources.

H_{b(1)}: SMEs have higher predisposition to risk of exclusion from the formal financial services than larger firms.

Website Ownership

Transaction cost reduces with emergence of both financial instruments and institutions. According to Levine (2005), this is evidenced when the long-run relationship between firms and financial intermediaries deepens. Information opacity that characterises the operations of most SMEs makes them appear less attractive and more susceptible to risk of financial exclusion compared with larger firms (Dong & Men, 2014; Stiglitz & Weiss, 1981). The severity of the information gap between borrowers and lenders appears considerably higher among SMEs than larger businesses trading publicly on the formal financial market. This increases the risk of being excluded financially, as credit gets rationed away from SMEs, generally perceived as risky borrowers (Stiglitz & Weiss, 1981; Aryeetey, 1994b). Scholtens and van Wensveen (2003) acknowledge that technology reduces information asymmetry in rendering financial services.

Following this, the hypothesis that website ownership significantly reduces a firm's exclusion risk disposition, as it allows credit suppliers a means of getting critical information on potential borrowers, is offered below.

H_{b(2)}: Information and communication technology significantly reduces information asymmetry, hence a firm's risk of exclusion.

H_{b(2)}: Website ownership that addresses information asymmetry issues in lending significantly reduces a firm's disposition to risk of exclusion.

Firm Age

Due to the general lack of an established relationship between the formal sector lenders and small business, credit supply and pricing decisions are often skewed to the disadvantage of SMEs (Dong & Men, 2014). Cull, Davis, Lamoreaux, and Rosenthal (2006) argued that establishment of tailor-made financial intermediaries

that could foster strong information networks with SMEs and younger firms could significantly reduce the information and transaction costs that confront them. Dong and Men (2014) identified financial constraints among younger firms as more severe than matured (or aged) ones. Similarly, Aterido et al. (2013) found that older firms are more likely to be financially included than starters. The author accordingly postulates that the risk of exclusion reduces with the age of firms, as long-run relationships are established between the lender and the borrowing firm over time. More formally, the hypothesis is postulated as:

H_{b(3)}: Younger firms have a higher predisposition to the risk of financial exclusion than mature (aged) firms.

Firm Location

A study by Leyshon and Thrift (1995) suggests that the wealth of a geographical location positively influences financial accessibility and inclusion levels. This, according to Popov and Udell (2012), induces banks to allocate more resources to a geographical location where more returns and opportunities are likely. In keeping with this, a hypothesis that the emerging oil sector in Ghana will attract more financial intermediaries leading to reduced exclusion in the location for that industry is postulated.

H_{b(4)}: Firm geographical location is a significant determinant of their likelihood of inclusion/exclusion

H_{b(4)}: Firms operating within the enclave of the oil-industry have lower predisposition to risk of financial exclusion relative to firms located in the other regions.

Firm Registration

A priori, the expectation that a firm's registration (formalisation) would reduce the likelihood of their financial exclusion seems rational. Some empirical cross-country studies seem to point in this direction (Farazi, 2014).

Many country-specific impact evaluation studies, for instance, in Sri Lanka (De Mel, McKenzie, & Woodruff, 2013) and in Bolivia (McKenzie & Sakho, 2010), have, however, come to the opposite conclusion. As the thesis identifies with other

country-specific impact prior studies, the author hypothesises that firm registration will not reduce the likelihood of financial exclusion.

H_{b(5)}: Formalisation significantly reduces a firm's predisposition to risk of exclusion.

Consequently, a significant negative relationship between firm registration and likelihood of financial exclusion is expected.

Firm Sector of Operation

The sector within which a firm operates affects financial accessibility and inclusion, but the outcomes are mixed. Whereas Dong and Men (2014) find high likelihood of financial exclusion among non-manufacturing sector firms, a study using five sub-Saharan African countries strongly suggests that the likelihood of credit constraints tends to be high among manufacturing sector firms (Wellalage & Locke, 2016). Following the latter empirical prior work, the author offers a hypothesis:

H_{b(6)}: Predisposition to risk of financial exclusion is higher among manufacturing sector firms than the other sectors.

The need to account for the significant differences between the regression outcomes of the treatment and control groups of both the baseline and follow-up dataset arises. Structural changes and shocks that occurred in Ghana after the baseline data point are predicted to significantly act as a treatment (externality) effect on a firm's risk of exclusion. The hypothesis below is offered.

H_{b(7)}: Structural changes and shocks that occur on the macro-/country level account for significant differences between the treated and the control groups across the same variables for different datasets over time.

3.4.4 Financial Development, Inclusion and Economic Growth Nexus

The relationship between financial inclusion and economic development has received scholarly attention in prior research (Beck et al., 2015; Demirgüç-Kunt & Klapper, 2012a, 2012b; Klapper & Singer, 2011). Hannig and Jansen (2010) argue

that an imperfect relationship should be expected. Even more complex is the role and mechanism through which finance impacts on growth.

Theoretically, the financial system's ability to generate information in an efficient manner to ensure optimal allocation of capital and monitor firm performance through corporate governance has been underscored (Levine, 2005; Hannig & Jansen, 2010). The system's role in mobilising and aggregating financial resources and finally, in risk amelioration, are emphasised (Levine, 2005). However, the complication arises when attempting to determine whether banks dominate the growth process (bank-based view) or whether the financial market (market-based view) drives growth in an economy. In addition to these two views, the financial function view is also offered.

The financial function view asserts that the financial sector comprises both institutions (e.g., banks) and markets (e.g., stock exchange), each complementing the other. It therefore may be irrelevant to identify what drives growth or that there is no need to emphasise on the exact composition of the financial system (Levine, 2005) as each segment plays its unique but complementary role. The theoretical basis for the financial function view is that both financial markets and institutions are created in response to information and transaction costs as well as contract enforcement constraints.

The study identifies with the view that financial institutions and the market complement each other in driving growth of a particular economy. This is so when judged as banks play a more critical role in allocating financial resources during the early stages of economic development, compared with the stock market (Levine, 2002). As the economy develops and the financial sector evolves with complex sets of financial arrangements for the now-sophisticated clients who may have high tolerance for risks, the role of financial markets then becomes inevitable. Characteristically, banks are more inclined to funding less risky, more mature enterprises, whereas financial markets have the capacity to nurture newer but riskier firms. This becomes possible because the market appears to be relatively endowed with a better set of risk management skills and expertise that allows for efficient adoption of risk ameliorating mechanisms (Levine, 2002, 2005).

Prior empirical works seem to support the view that a deepened financial sector that engenders more inclusion can significantly drive economic growth. Exploring the

linkage between financial inclusion and growth holds the key in understanding how the financial sector developments translate into economic growth and development, although Hannig and Jansen (2010) caution that such linkage may not be direct.

Following the Levine-King (LK) model on finance-growth nexus, the following hypotheses $H_{c(1-2)}$ are postulated. The motivation is the attempt to resolve the puzzle; How does financial inclusion (from either the institution or the markets) engender growth at the macroeconomic level in LICs? The aim is to ascertain the most efficient and pragmatic means through which financial inclusion can impact economic growth in Ghana.

Hypotheses $H_{c(1-2)}$

$H_{c(1)}$: Financial inclusion, as a key component of financial development (Klapper & Singer, 2011), drives growth in Ghana.

$H_{c(1-i)}$: Financial inclusion positively influences growth through efficiency of financial institutions.

$H_{c(1-ii)}$: Financial inclusion positively influences growth through depth of financial institutions.

$H_{c(1-iii)}$: Stock market development has a positive and significant impact on growth in Ghana.

$H_{c(2)}$: The financial structure significantly affects growth via financial institutions' efficiency. The growth-inducing effect of financial inclusion is attainable via financial institutions' (e.g., bank) efficiency.

$H_{c(2-i)}$: Financial structure (using efficiency) significantly influences growth through financial institutions.

$H_{c(2-ii)}$: Financial structure (using size and activity) influences growth via the complementary role of both institutions and markets.

3.4.5 Household's Welfare and Financial Inclusion

The question of how financial inclusion translates into economic inclusion at the micro-household level often arises. Empirical studies on the welfare impact of financial access and inclusion have been inconclusive (Beck & Demirgüç-Kunt, 2008; Karlan & Zinman, 2009). Whereas some point to the positive impact (see Karlan & Zinman, 2009), others do not find any significant impact. Some have even

argued that the choice of an econometric model can influence outcomes (Beck & Demirgüç-Kunt, 2008; Pitt & Khandker, 1998).

This notwithstanding, there is growing consensus that financial inclusion that allows small businesses and individual borrowers to build assets and accumulate wealth over time could have poverty-alleviating impacts. Aghion and Bolton (1997) argue that lack of financial access has a long-term impact on income inequality and such access allows capital accumulation. For poor households, a positive consumption-smoothing impact of credit access has been acknowledged (Johnston & Morduch, 2008). In most cases, the indirect impact of financial inclusion is the growth-inducing effect that ultimately tends to be pro-poor. In light of the empirical evidence presented, a hypothesis is advanced in the study that financial inclusion will have positive poverty-reducing impacts on household beneficiaries when individual heterogeneity is controlled for. The motivation is to ascertain how source of funding and implementation of household-level inclusion programme influences inclusion outcomes. These funders and implementing agencies are donors, government and the private sector MFIs.

(i) Donor Vs. Government as Implementers of Inclusion Programmes

The predominance of market failure in most LICs requires a government-coordinated effort towards a broader inclusive financial system (Beck & De La Torre, 2007). In the face of widespread corruption and prevalence of nepotism, government intervention tends to be counterproductive (Beck et al., 2009) with negative impacts on the intended beneficiaries (UN Departments of Economic & Capital Development Fund, 2006). State-provided credit poses no or little credit risk but services often tend to be subject to political subversion which ultimately compromises the impact expected. Beck and Demirgüç-Kunt (2008) acknowledge the inefficient outcomes of past records of state banks in ensuring broader access and inclusion.

To achieve efficiency and effect impact on donor-funded inclusion programmes in five countries (Indonesia, Kenya, Mexico, Pakistan and South Africa), Bester et al. (2008) noted the monitoring and supervisory role that all the known international donors, including IMF, DFID and the World Bank, played in their implementation. The success of such donor involvement underscores the *implementation quality* and

standard they ensure to achieve optimal impact. Accordingly, in this thesis, the hypothesis is strongly advanced that direct donor involvement in the implementation of donor-funded inclusion programmes in LICs will have poverty-reducing impacts on the intended beneficiaries more than government agencies. Put differently, the hypothesis that government implemented inclusion programmes will have suboptimal poverty-alleviating impact on beneficiaries, compared to donor implementation is postulated. The government's regulatory role is seen to have a more positive impact on access and drive usage (Bester et al., 2008) than direct implementation.

(ii) Rural-Urban Dimension of Financial Inclusion

There is evidence suggesting that the exclusion gap has spatial and geographic dimensions. Beck et al. (2009) have reiterated that formal mainstream financial services providers prefer wealthy locations to poor neighbourhoods. They identified geographical location as a key obstacle to financial access among poor household in LICs. Against this, the hypothesis that the poverty-alleviating impact of financial inclusion will be positively skewed in favour of urban households over their rural counterparts is advanced. Ackah and Asiamah (2014) observe the existence of similar urban-rural disparity in credit access in Ghana. High illiteracy, discrimination and fee charges could partly account for such disparity (Beck & Demirgüç-Kunt, 2008).

Hypotheses $H_{a(1-3)}$

To scientifically investigate the means through which financial inclusion translates into economic inclusion at the household level, the following sets of hypotheses are advanced. The goal is to establish a link between financial and economic inclusions; and how that defines welfare-inducing impacts of inclusion programmes in LICs. The implementation strategies of government-, donor- and MFI-funded financial inclusion programmes (Annim et al., 2014) would determine the impact expected. The hypotheses below help in the investigations.

H_a : Poverty-alleviating *impacts* of financial inclusion programmes significantly depends on the *quality* of programme implementation.

$H_{a(1)}$: Financial inclusion has a positive and significant impact on household's welfare.

H_{d(1-i)}: Participants in MFIs' inclusion programmes have significantly more improved welfare than non-participants.

H_{d(2)}: Poverty-alleviating impacts of FI depend on the implementation/institutional quality

H_{d(2-i)}: Donor-funded inclusion programmes, implemented through a donor-agency have both positive inclusion and welfare impacts on beneficiaries.

H_{d(2-ii)}: Donor-funded FI programmes implemented by state-agency have a positive effect on financial inclusion but a negative welfare impact on beneficiaries.

H_{d(2-iii)}: Government-funded inclusion programmes implemented by state-agencies have both a negative effect on financial inclusion and a welfare impact on beneficiaries.

H_{d(2-iv)}: MFI-funded and implemented financial inclusion programmes have a positive effect on inclusion, but a negative poverty-alleviating impact on clients.

H_{d(3)}: The poverty-alleviating impacts of financial inclusion depend on the type and objective of the implementing MFI concerned.

3.5 Chapter Summary and Conclusion

The chapter has provided a summary of literature surveyed serving as a theoretic basis for the thesis. Central to the question of why financial exclusion exists and why it appears widespread in LICs is the issue of why financial intermediaries exist in the first place and the developmental stage of a country's financial system. The dual theories of financial intermediation and financial development are reviewed accordingly. Theoretically, issues of information asymmetry, transaction costs and regulation are the traditional basis offered to explain the *raison d'être* of financial intermediaries. There are other emerging theories that see intermediaries as delegated monitors in an agency context, and as risk and portfolio managers. It is noteworthy that none of the theories reviewed explicitly acknowledges the pursuance of a profit-maximisation objective by FIs as a key factor that first, explains why they operate and second, why they tend to financially exclude a section of society. This observed gap motivated the author to postulate a paradigm

that holds the key to open and deepen the understanding of first why intermediaries exist; and second, and most crucially, why financial exclusion exists and appears widespread in LICs. This is central to this thesis (see Section 4.3 of Chapter 4 for details).

A conceptualised definition that avoids either oversimplification or exaggeration found among existing definitions is advanced in this chapter. The rationale is that financial inclusion, like any other concept if incorrectly defined, could potentially undermine policy efforts towards the expected impact.

Finally, following a careful review of prior research studies on financial inclusion and/or exclusion, gaps identified are modelled into testable hypotheses. Four thematic hypotheses subscripted (*a-d*) are developed based on the literature gaps, and presented in this chapter. Hypothesis **H_(a)** focuses on institutional factors zeroing in on the role technological advancement is expected to play in inclusion. The **H_(b)** covers firm attributes that either incentivise or inhibit their drive towards inclusion, while **H_(c)** are a series of hypotheses focusing on the impact of financial inclusion at the macroeconomic level. The last set of hypotheses, **H_(d)**, are postulated to investigate how household-level inclusion can be influenced by the quality of programme implementation. The chapter provides a strong foundation for both the research framework (Chapter 4) and feeds into the empirical chapters presented in Chapters 6-9.

CHAPTER 4

RESEARCH FRAMEWORK: CONCEPTUAL AND PARADIGM PROPOSITION

4.1 Chapter Overview

The chapter presents both the conceptual and research frameworks of the thesis. The conceptual framework offers the perspective of the thesis based on the four pillars/dimensions of financial inclusion (Hannig & Jansen, 2010; Triki & Faye, 2013) and how they interlink to chart a pathway towards economic inclusion.

The research framework, however, presents a theoretic proposition that offers a unified explanation as to why financial exclusion exists and appears widespread in LICs. The framework is embedded in why intermediaries exist and the role information asymmetry plays. As a unique contribution of this thesis, the proposed paradigm has implications for both policy formulations and further academic pursuits.

The rest of the chapter is as follows. Section 4.2 presents the conceptual framework and underlying assumptions. The theoretical framework guiding the thesis is presented in Section 4.3, and Section 4.4 concludes the chapter.

4.2 Conceptual Framework and Key Assumptions

4.2.1 Dimensions of Financial Inclusion

The thesis is built on the four core dimensions of financial inclusion as identified by Alliance for Financial Inclusion (AFI). These dimensions are impact, quality, usage, and access (IQUA) (Hannig & Jansen, 2010; Triki & Faye, 2013). Based on these dimensions, the thesis develops a conceptual framework, disaggregating them into *pillars* (access and utilisation), *enabler* (quality) and *outcome* (impact). Taking the tone from gestalts' notion that 'the whole is greater than the parts of its sum' (Franke, 1997), the study underscores the need for a synergistic approach to the concept of financial inclusion. This allows a complete picture of the concept and

how interrelated each component is to the others in a way that results in a harmonised outcome.

Financial resource access and utilisation are the basic building blocks of financial inclusion. Access in its broader sense implies both proximity to financial services and access to credits. Account ownership with formal financial intermediary and the ability to use the financial products and services are key to the access dimension (Allen, Demirguc-Kunt, Klapper, & Pería, 2016; Triki & Faye, 2013a). Generally identified as a supply side of the concept of inclusion, the role of financial intermediaries and other quasi-intermediaries are crucial (Triki & Faye, 2013a). The willingness of FIs to advance credit to firms and their general proximity to the financial facilities are central to *access* (Allen, Demirguc-Kunt, Klapper, & Pería, 2016).

Utilisation that mostly thrives on the demand side largely defines participation among active (economic) agents. Usage connotes the extent, frequency and regularity with which agents can utilise the formal financial infrastructure.

The soft dimension of the concept of financial inclusion is the quality. It includes, but is not limited to, the financial product and services provided by the intermediaries. Key among them is transactional experience that defines the relationship and which marries the demand and supply sides. Service delivery and programme implementation approaches are a key part the quality dimension. The focus is on how service providers relate to the service users and recipients. This way, quality will drive both sustained usage and efficient service provision in a manner that will have a resultant *impact*. The quality of policy implementation, infrastructure and financial amenities play a prominent role towards optimal impact (see Figure 4.1).

Impact, which is the fourth dimension of financial inclusion, therefore derives its strength from the combined effects of access and usage synergised by quality. Financial inclusion drive, like any other policy agenda, aims towards an outcome that has measurable impact. The ability of economic inclusion to emerge from financial inclusion significantly defines this *impact*. Assessment of the outcome of financial inclusion programmes in respect of beneficiaries further defines impact. Impact, therefore, connotes the extent to which the direct beneficiaries have experienced improved welfare. Impact can be household or micro-level (see

Chapter 9) or macro-level in which an inclusive financial system is reflected in the inclusive growth of the national economy (see Chapter 7).

Figure 4.1 outlines a linkage-model of financial and economic inclusions. In it, the dimensions of financial inclusion identified above are synchronised in a way that clearly defines the trajectory of financial to economic inclusions. The strategic roles of each of the four dimensions are clearly linked as an agent moves from financial inclusion towards economic inclusion. In investigating the mechanisms through which financial inclusion translates into economic inclusion, the *welfare and poverty-reducing impacts* are highlighted. Figure 4.2 presents a conceptualised model of optimality and sustainability of financial inclusion. Each of these frameworks has a direct linkage with, and strategically feeds into, the empirical chapters.

Starting from point 'A' (Figure 4.1), financial inclusion occurs when SMEs and households previously excluded from the financial system become participants. Access to affordable, quality financial services increases a household or SME's economic engagements, and that defines '*economic inclusion*' (point/box 'B'). The transition from A to B suggests that an inclusion *impact* occurs only when financial inclusion translates into economic inclusion. As economic participation increases following financial inclusion, the aggregate impact will be an increased national output (at point/box D). The expectation is that economic inclusion will influence both real and financial sectors.

On one hand, the multiplier effect will lead to aggregate growth on the macro-economic frontier. GDP growth emerges as economic inclusion results from financial inclusion (*d-link*). On the other hand, the active participation in the productive economic ventures has implications for the net worth of SMEs and disposable income of the households. All things being equal, increased net/disposable income further fuels more inclusion when the agent saves to increase their chance of accessing more credit from the existing FIs. As existing literature indicates, the ability to access credit often requires that some form of savings/deposit account is maintained with the lending institution (Blavy, Basu, & Yülek, 2004). The channel labelled 'c' then proceeds to 'e' which becomes a route for further inclusion cyclically. The interaction between D and C is important to determine whether an inclusion policy is sustainable.

The model emphasises the important role economic and institutional environments play towards both financial and economic inclusions. This is to underscore that meaningful inclusion does not occur in a vacuum. The role of sound monetary/financial policies and the quality of the national governance institutions cannot be downplayed. Technological infrastructure and amenities such as mobile money, internet, and mobile banking platforms enhance the quality of financial service provision. These become *inclusion-enablers*.

As technological amenities speed up financial transactions, *transaction costs* for rendering financial services to the unbanked are reduced (Freixas & Rochet, 2008; Donovan, 2012b; Jack & Suri, 2011; Kpodar & Andrianaivo, 2011), and *quality delivery* is assured. Such technological platforms therefore effectively facilitate financial inclusion.

As well as speed of service, a technological platform, such as Kenya’s M-Pesa by Safaricom, ensures wider service coverage in most parts of Africa including Ghana (Kpodar & Andrianaivo, 2011 Donovan, 2012; Rasmussen, 2010).

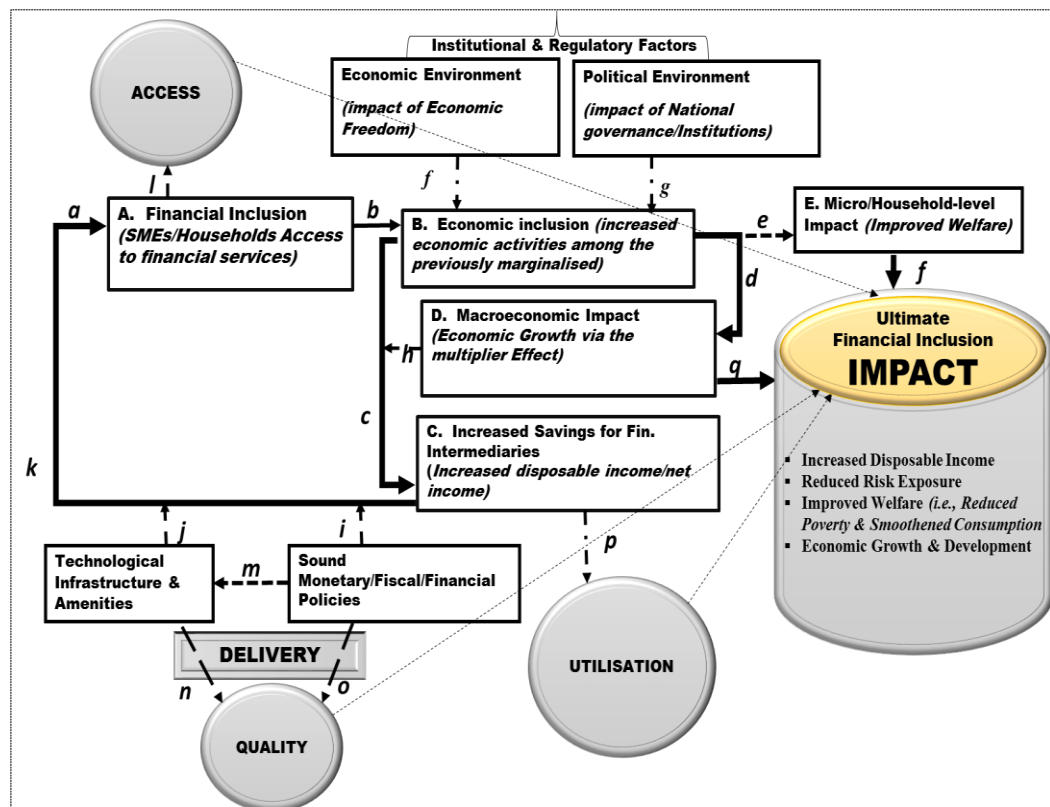


Figure 4.1: Model showing dimensions and trajectory of financial and economic inclusions

Source: Author (2016).

Optimality in every process is a desired end and very important. Financial inclusion as a process hangs on a scale that must be balanced. There is unbalanced inclusion when financial market failure caused, for instance, by informational opacity and transaction costs, leave a section of society excluded (Demirgüç-Kunt & Klapper, 2013). This is a symptomatic feature of most LICs where most agents (both SMEs and households) are excluded from the formal financial system due to financial market imperfection. The excluded lie low on the inclusion optimal scale. The other extreme case lies on the scenario where the system overly includes some economic agents. Researchers often cite sub-prime lending and the resultant market bubbles that occurred as an example of ‘over-inclusion’ (Ackah & Asiamah, 2014).

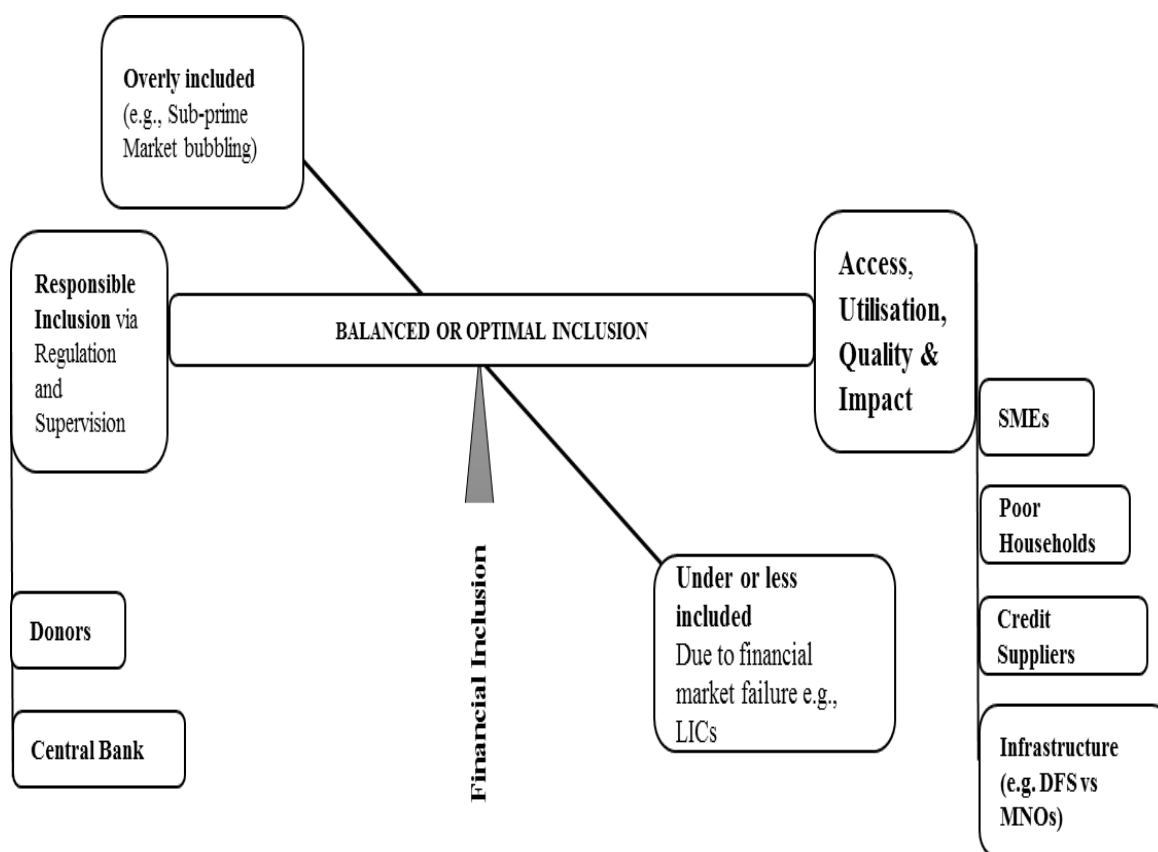


Figure 4.2: Conceptualised balanced-model of optimal financial inclusion outcome.

Source: Author (2016).

Attaining optimality in the inclusion agenda requires considered policy efforts. This ensures access and utilisation of quality financial services that impact on growth. Harmonised interactions between all stakeholders become necessary. The SMEs in need of credit, intermediaries serving as the conduit through which funds flow from

the surplus to the deficit units, and the wider infrastructural amenities that ensure quality and affordable service provision, all play important roles.

Again, optimality thrives on responsible inclusion, where donors and government agencies play regulatory and supervisory roles (Ledgerwood, 2013). Risks are mitigated and the scenarios of ‘under-’ and ‘over-’ inclusion are contained.

4.3 Theoretical Framework guiding the Research

This section builds a partial equilibrium framework of financial markets. The framework is in search of a theory of financial market failure (Demirgüç-Kunt & Klapper, 2013) and the implication it holds for financial exclusion in LICs. The emphasis is placed on the capital structure decision of intermediaries within the constraint of profit-maximization. The framework combines ideas from several existing theories that attempt to explain why credit constraints exist. In this, theory of information asymmetry, transaction cost, capital structure (pecking order) and neoclassical loanable fund theory of crowding-out effect serve as the building blocks. Keynesian savings/consumption model is also incorporated in developing a theoretical framework. The purpose is to find a plausibly unified explanation to an emerging stylised fact of the existence of considerable financial exclusion in LICs. This is a first attempt to build such a model relevant to the understanding of i) how financial exclusion occurs, and ii) why it appears endemic in LICs (Atieno, 2001; Demirgüç-Kunt & Klapper, 2012b) where the performance of the financial market is imperfect. The section is primarily motivated by the general absence of a unified model that explains the underlying phenomenon. The *theory of asymmetric information* is not only crucial to the explanation of why intermediaries exist, but is central to the understanding of why exclusion persists.

Proposition I: Financial exclusion cannot be explained outside the *raison d'être* of financial intermediaries.

In keeping with industrial organisation theory (Freixas & Rochet, 2008), the presence of market friction in the form of transactional technologies always necessitates the existence of an intermediary as a go-between (Allen, 1999; Williamson, 1989). Financial intermediaries (FIs) as specialised economic agents trading in financial claims (Freixas & Rochet, 2008) are no different. They do this

by simultaneously buying claims issued by borrowers (via credit demand) and selling claims to savers in the form of mobilised deposits (Krasa & Villamil, 1992; Moore, 1989).

However, FIs are not mere traders due to the nature of their financial contracts (loan and deposit). Thus, the non-saleability of the financial contract obliges them to hold it in their balance sheet portfolio until its expiration (Freixas & Rochet, 2008). If production is the transformation of input into outputs (given technology), then FIs as transformers of financial contracts and securities (Fama, 1980; Gurley, Gurley, & Shaw, 1960; Scholes et al., 1976) behave like any other producing firm. The rationale is to perceive FIs as profit-motivated firms that seek to maximise returns within the constraints of cost imposed by transaction and risk (information asymmetry). In this, the objective of a financial intermediary as a firm is no different from the traditional profit-maximization motive that drives any other firm (Freixas & Rochet, 2008).

The proposition confronts existing theories on intermediation that perceive intermediaries as producers of information, delegated monitors in an agency relationship (Diamond, 1984) or risk managers (Scholtens & van Wensveen, 2003). Such suppositions confine the behaviour and the *raison d'être* of financial intermediaries to the pursuance of interest of others (savers) instead of their own. Three reasons are offered to challenge the position above.

First, depositors (savers) are not owners of the intermediary business and as such, they receive interest as any other creditor. For the FIs to be regarded as delegated agents (Diamond, 1984) to monitor borrowers on behalf of savers suggests that the latter are part or proxy owners of the venture for which the amount has been borrowed. Secondly, unlike capital markets where buyers of stocks have the right to know and monitor the performance of the borrowing firm, the indirect financing involving intermediaries operates differently. Thus, the principles of commercial secrecy, anonymity and confidentiality in lending require that depositors are not aware of who uses their fund. Thirdly, there are no contractual agreements between depositors and borrowers as would be expected under direct financing via the stock market.

This framework emphasises the role of financial market friction that generates information asymmetry, risk and transaction costs associated with the business of

lending as important factors that explain the existence of financial exclusion. It also recognises the role fiscal deficit financing which crowds out the private sector, play toward firm's financial exclusion.

Risk-based theory (Scholtens & van Wensveen, 2003) argues that FIs assume risk for producing financial products and services. In using their owners' initial equity capital as required by monetary authorities, they assume risk in view of expected returns as they add value. Like any other entrepreneurial venture, meeting identified needs is a key to being in business. In view of this, Scholtens and van Wensveen (2003) see FIs as entities that meet the needs of both savers and investors. That some FIs do not accept public deposits, underscores the point being advanced. That is, *deposit acceptance is a leveraging decision that FIs take as a necessary but not sufficient condition for their existence*. In this case, the author posits that the FIs have only one business; *production and supply of financial services and products*. The optimal capital structure decision becomes a matter of choice, just as any other firm does.

Proposition II: The primary business of FIs is to produce (supply) financial services and products towards profit-maximisation.

4.3.1 Production Theory of the Firm

Neoclassical theory of production under the assumption of a perfect market has been applied to the intermediation process. The issue of applicability of the neoclassical concept of perfect competition has been raised to explain why financial intermediaries exist and how they develop (Scholtens & van Wensveen, 2003). Seen as any other firm, intermediaries produce financial products and sell them with profit maximization as the driving motive (Bhattacharya & Thakor, 1993). Under this assumption, inputs such as capital and labour are employed. Managers of this firm (e.g., banks) maximise profit when they are able to perform the function of qualitative assets transformation (QAT) (Bhattacharya & Thakor, 1993).

Financial intermediaries specialise in QAT when they are able to transform maturity duration, divisibility in terms of unit-size, liquidity and credit risk (Bhattacharya & Thakor, 1993; Greenbaum et al., 2015). By transforming short-dated, fluid liabilities using the principle of large numbers, the intermediary's liabilities behave as though they are long-term loans capable of financing long-term

assets and lumpy projects (Bhattacharya & Thakor, 1993). The law of large numbers (Diamond, 1984; Freixas & Rochet, 2008; Krasa & Villamil, 1992) states that for equal withdrawals that occur at any given time, the intermediaries are able to match them with more deposits than withdrawals (Agyekum, 2011). This allows the intermediaries to borrow short and lend long. For deposit-taking intermediaries, the aggregated deposits mobilised from small savers therefore become *debt-financing* in their capital structure. For the non-deposit-taking intermediaries, however, the capital structure will only comprise equity without a debt component, unless conventional debt instruments are raised. In view of this, intermediaries thrive on the huge information gap that exists between the suppliers and demanders of credit. By exploiting such information asymmetry between these two market actors, FIs are able to transform both maturity terms and liquidity preferences on either side of the market.

All these add up to balance-sheet portfolio management (Fama, 1983) as the prime focus of intermediaries as production units (Agyekum, 2011). However, no prior theory has approached FIs' operations from the capital structure point of view. Failure to apply the capital structure theory pushes the role of savers into obscurity. Notably, financial intermediaries viewed as producers may only have to be concerned about buyers (borrowers) of their outputs that guarantee them profit. Under such assumptions, the role of savers/depositors in their operation appears less relevant. In the light of this, the capital structure paradigm is proposed as an extension. Following Myers (1977) argument of 'debt overhang' for example, Allen and Santomero (1997) suggest that FIs have a strong preference for internally generated funds (IGF) when friction in the capital market makes external financing costly. However, to avoid under-investment, they seek external financing. Factors such as potential bankruptcy, transaction cost and information asymmetry, contribute to the high cost of external financing. The assumptions that guide the development of this paradigm are outlined below.

- i.) FIs are firms established by profit-motivated entrepreneurs to produce financial services and products.
- ii.) Capital is required as an input to complement the labour necessary to supply the outputs (financial services). However, capital in its broader sense, and in line with King and Levine (1993), is assumed to comprise physical, intangible, and human capital. The implication is that the

output (loan/lending services) of the intermediary firm will not vary with labour but rather the quantity of funds it mobilises as public deposits.

- iii.) The entrepreneurs (owners) provide their initial equity capital as the mandatory minimum capital, which can be supplemented by floating shares via public offers (IPOs).
- iv.) The firm has the option to supply its service solely based on its equity capital (as non-deposit-taking FIs), (Agyekum, 2011) or supplement it with debt-financing.
- v.) In a pecking order fashion, the various debt-financing options are ranked based on the ease, convenience and the cost of such capital/debts. These sources may include borrowing from i) the public using a deposit claim as an instrument; ii) interbank money market; iii) international financial market; and iv) finally from the Central Bank. Each of these sources attracts interest payments. To keep things simple, the firm's capital structure consists of the *mandatory equity capital requirement* and the *debt component* in the form of public deposits mobilised. The short-term nature of such liabilities (aside from fixed/term deposits), as acknowledged by Bhattacharya and Thakor (1993), requires special skills to transform such short maturity durations. The optimal portfolio choice of the firm's capital structure is based on cost considerations underpinned by the risk-returns trade-off.
- vi.) The FIs perform the function of qualitative assets transformation (QAT) (as explained earlier) and incur transaction costs for such functions (Bhattacharya & Thakor, 1993).
- vii.) The cost of debt is the interest paid on deposits, analogous of what the leveraged firm pays for the use of debt in its capital composition.
- viii.) The spread/profit for the FIs is the difference between the fees and other interest charges (for selling their products to the deficit units), and cost of debts (i.e., interest on deposits claims) (Kwakye, 2012).

Following viii) above, there are core assumptions which are key to understanding the simple model postulated.

- i. There are two different markets for credit, separated by an information gap. This gap allows FIs to enter into two separate financial contracts that are mutually exclusive (Krasa & Villamil, 1992; Moore, 1989).
- ii. The existing information gap between the two sub-markets (referred to as *inter-market information asymmetry* (IMIA)), allows FIs to exploit *arbitrage value* (av). The av is the interest rate spread mentioned under (viii), when FIs are simultaneously able to transact in both market segments more efficiently than an individual could. The spread then becomes a function of the information gap; i.e., $Spread(av) = f(\text{Information gap}/IMIA)$.
- iii. An intermediary will borrow at rate r_D from sub-market 'A' (for convenience, called *Deposits Market*) through a deposit claim issued. It packages the borrowed amounts and resells onward in the other sub-market 'B' (*Lending Market*) at price r_L , such that $r_L > r_D$. The FI closes the deal in market 'A', takes advantage of IMIA as there is *no cross-sharing of information* between the two sub-financial markets. The difference between r_L and r_D constitutes the *spread* (also, the *arbitrage value* as noted earlier).
- iv. The value of the arbitrage advantage is equivalent to the *risk premium* the intermediary firm adds to the cost of debt (r_D) it pays to depositors (in market A). This indeed depends on depth of *inter-market information asymmetry*, which gives rise to the transaction cost and risks that it assumes as a go-between performing the *QAT* function. The QAT function requires that the short-dated deposits from market **A** are repackaged and resold in market **B** in the form of long-term claims they hold from the *real sector* borrowers.
- v. Assumptions i-iv, presuppose that depositors who supply funds in the deposit market *A* are completely or partially oblivious of what goes on in market *B*'.

Indeed, the standard theory of information asymmetry based on adverse selection, moral hazard, costly state of verification and contract enforcements has been applied traditionally to the relationship between FIs and borrowers. Although asymmetry between FIs and savers is acknowledged (Freixas & Rochet, 2008), the existing literature fails to recognise a similar relationship between depositors and

borrowers. The author, therefore, contends that the information gap between depositors and borrowers is necessary to avoid a bank run that causes their failure.

Proposition III: That FIs make profits and continue to operate so long as they maintain the information gap between their buyers (borrowers) and suppliers (depositors).

In such a case, FIs act as arbitrage taking advantage of information gaps within the market to exploit economic rent (Greenbaum et al., 2015). The proposition above, however, confronts the loanable fund theory, which assumes the possibility of an equilibrium interest rate under a perfect market. It would be plausible to assume that depositors operate in a separate market with a different price structure from borrowers. This notion of market segmentation is underpinned by information asymmetry and guarantees profitability of FIs. The spread between lending and deposit rates (as the *arbitrage value*) depends on the depth of the information gap between savers and borrowers that prevents them from meeting directly.

The notion of a deposit-taking intermediary operating in dual-markets with different sets of contracts and engagements is not new. For instance, Krasa and Villamil (1992) observe that intermediaries have "two-sided" contracts acting as borrower and lender simultaneously, to operationalise the two contracts. Moore (1989) also sees banks operating in two different retail markets: i) for bank loans, and ii) for bank deposits.

4.3.2 Profit Maximization as Rationale for Exclusion

The profitability of the firm stems from their selling price (lending rate) oftentimes exceeding the marginal cost of producing these financial services and products. These marginal costs are made up of two parts: the actual *marginal operational cost* of running the firms, and the *marginal opportunity cost* of using depositors' funds (interest on deposits). The potential risk of default posed by the problems of adverse selection and moral hazard compels banks to charge higher lending rates as a risk premium. In LICs, non-idiosyncratic risks that come from the macroeconomic level (such as *inflation risk, exchange rate, political risks, etc.*) and corruption add to the premium FIs charge beyond their actual marginal cost. This is carefully modelled using a microeconomic theoretical framework of production analysis.

If actual marginal cost from an operation is denoted MC_a and the marginal opportunity cost of using depositor's funds is MC_r (i.e., deposit rate), then mathematically, intermediaries' aggregate marginal cost of production can be expressed as:

$$MC_{FI} = MC_a + MC_r \dots\dots\dots(1)$$

If we define marginal benefits (MB_{Lr}) as the lending rate charged on loans, then the intermediaries' spread at the margin (Kwakye, 2012), is equal to the difference between the marginal benefit and marginal cost stated as; $s = MB_{Lr} - MC_{FI}$; $\Rightarrow s = MB_{Lr} - MC_a - MC_r$. In a frictionless world of no information and transaction costs, the intermediaries' spread is expected to be zero (thus, MR=MC); *a condition that may suggest irrelevance of intermediation*. In the section following, the author postulates that the existence of *positive spread* is an indication of market imperfections as a necessary condition for the existence of financial intermediaries. The *widespread financial exclusion in most LICs* generally (Hannig & Jansen, 2010; Demirgüç-Kunt et al., 2015) and among small opaque borrowers is also attributed to the significantly higher *spread that market imperfections generate*. This is what the model seeks to establish.

Proposition IV: The *raison d'être* of financial intermediation is attributable to market imperfections that guarantee **positive spread** as an incentive towards profit-maximisation.

The specialist and routine nature of the FIs' work (Agyekum, 2011; Fama, 1983), coupled with economies of scale that characterise their operations (Greenbaum et al., 2015) ensure that the MC_a is minimised. This, according to Fama (1983), becomes inevitable, especially when competition exists. In an extreme case of perfect and complete market information as assumed under the Arrow-Debreu economy, MC_a is expected to be zero. With such an assumption, the spread will depend on the quantum of both the marginal benefit of lending (*lending interest*) and marginal opportunity cost of using savers' funds (*deposit rate*). This may connote strong-form efficiency in the financial market (Greenbaum et al., 2015), as both lending and deposit rates will equilibrate. This classical world will ensure zero spread, which will signal the irrelevance of financial intermediation (Freixas & Rochet, 2008).

Typically, $MB_{Lr} > MC_{FI}$, such that $MB_{Lr} - MC_{FI} > 0$.

$$MB_{LR} - MC_r = s \dots\dots\dots(2)$$

The assumption of a frictionless market implies that $MC_a = 0$ in Eq. (1). If both the MC_r and the *spread* (s) remain unchanged, then MB_{Lr} must fall to maintain equilibrium. This means that a perfect market condition that reduces actual cost of offering financial services ensures lower lending rate, and hence cost of capital to borrowers. In the extreme case of classical loanable fund model, lending rate will fall to the level of deposit rate at equilibrium. Thus, as lending and deposit rate will equate, the positive spread disappears.

a) Profit-maximisation under a Frictionless Market

Intermediaries (e.g., banks) are defined as entities whose main concern is to issue deposits and use the proceeds to acquire securities (Fama, 1980, 1983). This view reinforces the balance sheet management function of FIs (Agyekum, 2011). Fama (1980) identifies two core functions of FIs; first, maintenance of a system of accounts in which transfers of wealth between surplus units and deficit spenders occur; and second, the art of portfolio management. Deposits are regarded as a portfolio that has returns like other assets with similar risks, especially in unregulated perfect market settings. The fees charged for managing such portfolios, according to Fama (1980), suggest that there is no opportunity cost. However, financial intermediaries in modern practices offer interest to depositors and do incur other transaction costs of replenishing deposits (e.g., publicity cost).

For profit-maximising FI (Bhattacharya & Thakor, 1993), total profit is determined by the difference between total revenue and total cost. Total revenue is assumed to be derived from lending transactions (T_L), defined as the volume (quantity) of securities purchased (or monies lent out). Total cost depends on Deposit Transaction (T_D), that is, volume (quantity) of deposit mobilised.

Existing literature admits the presence of transaction costs for rendering financial services. For example, Fama (1983) admits there are both transaction costs, (i) to ensure that ‘a depositor’ who effects payment via an accounting system (e.g., cheque) has adequate funds to cover such transactions; and (ii) when FIs execute exchange of claims in which assets are sold or purchased. In an asymmetric information world, limited market participation in the financial sector is expected

(Allen & Santomero, 1997). Participation costs of monitoring the market trends compel investors to delegate such functions to FIs.

If the FIs' lending and deposit rates are given as r_L , and r_D respectively, then a simple expression for total revenue, total cost and total profit for the profit-maximising intermediary, can be obtained as:

$$TC = FC + VC_{(qT)} \dots \dots \dots (3)$$

$$C_{(qT)} = FC + VC_{(qT)} \dots \dots \dots (3a)$$

$$TR_{(qT)} = r_L Q^T \dots \dots \dots (4);$$

where r_L is the lending rate (price charged for lending financial services), and Q^T is quantity of lending (financial) transactions. The total cost function i.e., Eq. (3a) can be rewritten as;

$$C_{(qT)} = K + r_D Q^T \dots \dots \dots (3b);$$

where r_D is the deposit rate and K is fixed cost.

In keeping with the Arrow-Debreu world of a complete market, the following assumptions further guide the development of the model: i) No transaction cost for mobilising a deposit (e.g., administrative cost, publicity, etc.); ii) a perfect and costless flow of information to all financial market actors, with no market frictions; and iii) the Proxy Law of large numbers applies. Thus, at any given point, the amount of average deposit mobilised exceeds the combined amount of monies withdrawn by savers, and or the amount lent out to borrowers such that $Q_D \geq (Q_L + Q_W)$; where Q_D , Q_L , and Q_W , denote amounts deposited, lent, and withdrawn respectively.

Total Profit function is then specified as:

$$\pi_{(qT)} = TR_{(qT)} - TC_{(qT)} \dots \dots \dots (5);$$

where π is total profit, TR is total revenue and TC^{13} is total cost. The profit function that is maximised *subject to cost constraints* is given as:

$$\pi_{(qT)} = r_L Q^T - (K + r_D Q^T) \dots \dots \dots (5a)$$

¹³ Going forward C will be used in place of TC, for convenience.

Applying first order (FOC) for profit maximisation is given as:

$$\frac{d\pi_{(q^T)}}{dQ^T} = \frac{d[r_L Q^T - (K + r_D Q^T)]}{dQ^T} = \frac{d(r_L Q^T)}{dQ^T} - \frac{d(K + r_D Q^T)}{dQ^T} = 0$$

$$r_L - r_D = 0 \Rightarrow r_L = r_D \dots \dots \dots (6)^{14}$$

The Eq. (6) simply says that in an ideal world of perfect, frictionless financial market¹⁵, *bank's lending rate (marginal benefit) will be exactly equal to its deposit rate (marginal opportunity cost)*. The bank faces no risk and therefore only normal (zero economic) profit is permissible in the long-run, as per the perfect market structure paradigm.

b) Profit-maximisation under Market Frictions

The utopian world of *Walrasian* equilibrium (Gul & Stacchetti, 1999; Hahn, 1978, 1980; Smale, 1976) that promises utmost efficiency seems theoretically ideal though practically impossible. Indeed, in the Arrow-Debreu economy of efficient financial resource allocation (Allen & Santomero, 1997; Bhattacharya & Thakor, 1993; Scholtens & van Wensveen, 2003), the role of intermediation is needless as savers and borrowers can interact on a market at virtually no cost. Even in a stock market where information is assumed to flow freely across the market spectrum, the existence of brokerage fees and other charges confront the zero transaction cost assumption in the real world of financial services provision.

Below, the assumptions of perfect information and costless transaction are being relaxed. This allows for information entropies that generate transaction costs of rendering financial services. For instance, Allen and Santomero (1997) admit depositors incur both an initial fixed component of participation cost and a marginal cost for monitoring the performance of their assets. However, FIs assume such costs in performing the monitoring function for individual investors. Moreover, Myers (1977) also admits that a firm's debt policy may mirror the imperfection. In line

¹⁴ Notice that $\frac{d(r_L Q^T)}{dQ^T}$ is the marginal revenue (MR_{FS}), and $\frac{d(K + r_D Q^T)}{dQ^T}$ is the MC_{FS}, and that the *K* (Eq.4.4a) which is the fixed cost component disappears, applying the constant rule for differentiation.

¹⁵ with neither information entropy nor transaction cost of rendering financial services

with the above, transaction cost component is now introduced into the previous model. The resultant variable cost function now becomes:

$$VC_{(qT)} = Q^T (\tau + r_D) \dots\dots\dots(7);$$

where τ captures the transaction cost per output. Substituting Eq. (7) into (3a) yields:

$$\pi_{(qT)} = r_L Q^T - [K + Q^T (\tau + r_D)] \dots\dots\dots(8);$$

Satisfying the FOC for maximisation, produces;

$$\pi'_{(Q^T)} = r_L - (\tau + r_D) = 0 \rightarrow r_L^* = \tau + r_D \dots\dots\dots(8a)$$

From Eq. (8a) the marginal cost increases additively by the τ . The actual composition of the τ is worth highlighting. Eq. (8a) suggests that the presence of information and transaction cost contributes significantly to the lending rate that intermediaries charge. ‘*Ceteris paribus*’, increase in information asymmetry generates transaction cost per financial service of τ , which directly reflects in an *increased lending rate*. Because τ represents an incremental cost of rendering financial services beyond deposit rates (r_D) (under the frictionless model), it could be regarded as the *premium* required by intermediaries. Greenbaum et al. (2015) suggest that a *liquidity premium* for transforming maturity duration of assets must be present for FIs to continue to exist. They argue further that when such a premium reduces to a marginal transaction cost for performing QAT (i.e., r_D), the incentive for FIs to exist disappears.

The present paradigm, however, considers *risk premium* in its entirety rather than the liquidity risk premium suggested. The composition may include actual administrative and overhead costs, search costs (e.g., publicity) as well as a premium to cater for risk such as *default, political, inflation, volatility*, and other *macroeconomic uncertainties*. In the words of Kwakye (2012), “*the lending rate (i.e. cost of credit) to an individual borrower usually includes considerations regarding specific risks associated with the borrower as well as profitability of the intermediary*” (p. 8). Technological deepening may reduce search and administrative cost components of the transaction cost (Scholtens & van Wensveen, 2003), especially for advanced economies where such innovations exist.

The following policy implications can be deduced:

- i. A rise in τ due to information opacity and high transaction cost of serving SMEs/households, requires that the lending rate (r_L) also rises, to keep the optimality (i.e., to satisfy the maximisation) condition hold;
- ii. Given r_L^* , the intermediaries will demand collateral (as a non-price barrier) whose value at margin must be equivalent to τ ;
- iii. In advanced economies (e.g. OECDs), inflation, political and default risks tend to be very minimal, coupled with technological advancements potentially reducing transaction cost (relating to administrative and overhead cost) of rendering financial services (Scholtens & van Wensveen, 2003). The implication for the ‘ τ ’ in Eq. 8a, is to predict its closeness to zero in such *technologically and economically advanced economies*. Consequently, cost of capital (r_L^*), especially to the SMEs and poor households, is expected to be minimal;
- iv. The converse is expected in LICs where information asymmetry and financial market frictions translate into high political, inflation and default risks, coupled with the general lack of technological advancements. High information and transaction cost per service offering (τ) is expected to reflect in and feed into a higher cost of capital (i.e., r_L^*).

All the predictions postulated in this framework have implication for small borrowers in developing economies. Thus, they suggest small businesses and households that mostly operate with much opacity and obscurity (Berger & Udell, 2006; De la Torre et al., 2010; Vos et al., 2007), will be *financially excluded*, either through price-based (high cost of borrowing) credit-rationing (Stiglitz & Weiss, 1981), or non-price barriers such as collateral requirements (Aryeetey, 1994b).

c) Reconciling the Present Paradigm with the Conventional Theory of Finance

It is conceivable to reconcile the proposition above (Eq. 8a) with the standard capital asset pricing theory in traditional finance. To start with, let it be assumed that the banks will offer their savers interest that is equivalent (or close) to the *risk-free rate*, in line with the view that bank deposits are portfolio assets with *minimal*

risk (Black, 1970; Fama, 1980; Johnson, 1968). Deposits as a debt-like security tend to have low marginal participatory cost as there may be no need to monitor such assets (Allen & Santomero, 1997). This appears consistent with Fama’s assertion that the fees the banks charge in a competitive environment constitute their marginal cost of rendering transaction and portfolio management services (Fama, 1983). Given that FIs now trade, some authors, for example, Allen and Santomero (1997), advocate for integration between intermediation theories and asset pricing theories. As an instance, Allen and Santomero (1997) admit that the practice of monitoring financial markets to determine the kind of adjustments required on a given portfolio on a day-to-day basis, gives rise to the existence of significant marginal costs.

Assuming that the probability of FIs defaulting is low due to the possibility of bailout in an event of bankruptcy, then it is plausible to conject that the r_D in Eq. (8a) will be closer to the *risk-free rate* (r_f) offered on government securities (see Eq. 9). Under such plausible assumptions therefore, the cost of capital (lending rate) is simply the;

$r_L^* = r_f + \tau$ (9): (where; $r_f \cong r_D$ in Eq.8(a) is, the *risk-free rate* expected on treasury securities, and τ as the *risk premium*, as noted earlier). The Eq. (9) thus becomes the unweighted average cost of capital. Unweighted because, beta that measures how a change in the market conditions (transaction/information and other components of the risk premium) affects the cost of capital is assumed unity (1).

Introducing accounting beta (β) into the equation (9), leads to the traditional cost of capital theory given below in (Eq. 10):

$$r_L^* = r_f + \beta\tau \dots\dots\dots(10);$$

Thus a restriction is imposed on the value of the beta $0 \leq \beta \leq 1$, but would generally be assumed that it falls between zero (0) and one (1). Can beta reasonably be expected to be close to zero for advanced economies and close to one for LICs?

4.3.3 Crowding-Out Effects (COE) and Financial Exclusion: The Missing Component of the Loanable Fund Theory

One important theoretical prediction of the neoclassical theory of the loanable fund is the issue relating to *crowding-out effects*. The theory argues that the financial market will clear and establish an equilibrium interest rate that will be acceptable to both savers and borrowers. Government intervention therefore leads to distortion in the loanable fund market. Unlike the private sector firms that borrow to invest, the government borrows when it has deficit budget to finance; what is also known as *public sector borrowing requirements (PSBR)*. The reality of PSBR means that the government outcompetes and crowds-out the private sector firms on the loanable funds market (Kwakye, 2010).

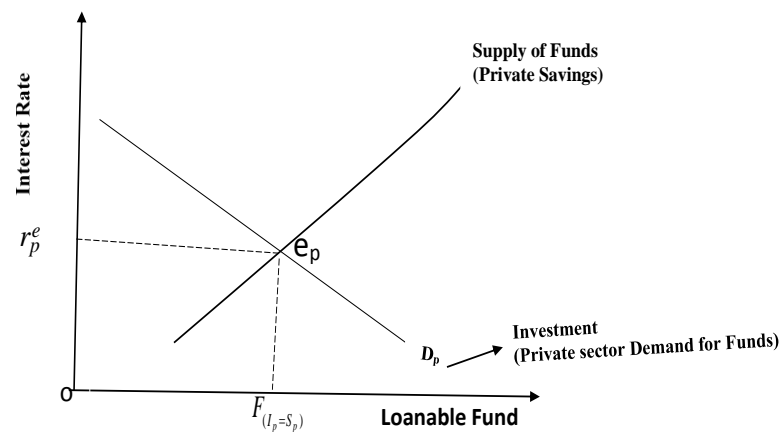


Figure 4.3: Equilibrium on the neoclassical loanable fund market

Two problems are identified with the loanable fund paradigm. First, the assumption that the lending rate will equate with the deposit rate at equilibrium makes no room for the possibility of interest rate spread (as indicated in Figure 4.3). Second, the theory fails to acknowledge the residual effect of rise in the interest rate on private consumption.

In contrast with the above, the current model proposition contends that as a government offers higher interest on its securities, households are motivated to inter-temporally allocate their wealth between current and future consumption (savings). For a given disposable income, the rise in savings in response to the higher interest offering on treasury securities is possible only when current consumption is sacrificed. The total crowding-out effect of PSBR is the combined

reduction of domestic private investment and domestic households' consumption. Within the Keynesian paradigm, both effects lead to reduction in the equilibrium level of gross domestic productivity (GDP), and hence national income.

Note that $\bar{Y}^d = S + C ; \Rightarrow \bar{Y}^d = S \uparrow + C \downarrow$; where Y^d is the disposable income, S is savings and C is Consumption.

From Figure 4.4, the gap \overline{ab} (PSBR) represents *total crowding-out effects* which is decomposed into the effect on reduced private investment and rising domestic private savings, which ultimately causes consumption to shrink *pari-passu*, due to the mirror relationship.

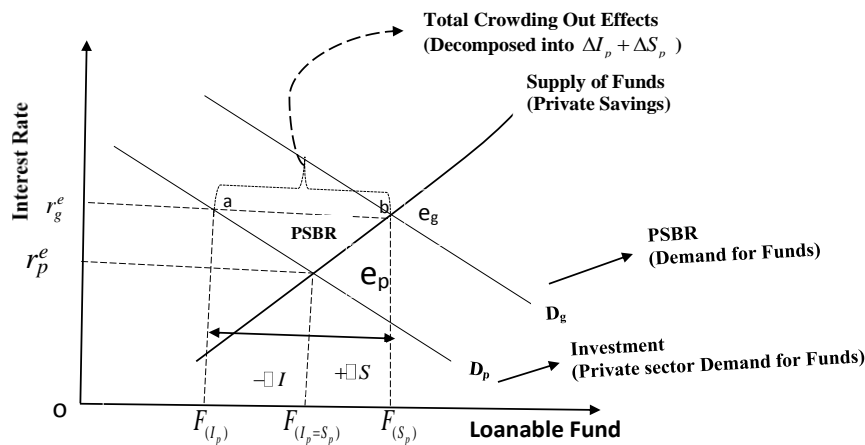


Figure 4.4: Showing the complete crowding-out effect of PSBR

The same gap which represents the total crowding-out effects, is the difference between quantity of savings supplied ($F_{(Sp)}$) and the domestic private investment,

($F_{(Ip)}$); such that the $\Rightarrow COE = \overline{F_{(Ip)} F_{(Sp)}}$. Thus, this can simply be expressed as:

$$PSBR = F_{(Sp)} + F_{(Ip)} \dots\dots\dots(11).$$

For simplicity, 'F' is dropped so that investment and savings stand out in the above Eq. (11) distinctly as: $PSBR = S_p + I_p \dots\dots\dots(11a)$. The Eq. (11) or (11a) defines the *total crowding-out effects*, which is being considered as financial exclusion.

4.3.4 Formal Treatment of the Complete Crowding-out Effects Model and Implication for Financial Inclusion

The mirror relationship between consumption and savings functions allows the latter to be derived from the former. Savings is unconsumed disposable income. Consumption function from the Keynesian paradigm is given as:

$$C = \alpha_0 + bY^d \dots\dots\dots (12);$$

which is not sensitive to interest rates or PSBR. However, the autonomous consumption a_0 which mirror-transforms into dis-savings (debt or negative savings) ($-a_0$) could suggest that Keynes had in mind the possibility of individuals borrowing to consume at zero disposable income. Because people can borrow to augment their current income to smooth consumption, suggests that the consumption function is sensitive to the interest rate. As indicated earlier, PSBR has effect on household's current savings via consumption. Modifying Eq. (12) to reflect the impact of both interest rate and PSBR, yields the consumption function given as Eq. (13).

$$C = bY^d - ar_p - \gamma PSBR \dots\dots\dots(13);$$

Deriving the savings function from Eq. (13) using the disposable income-consumption identity below:

$$Y^d = S + C \quad \Rightarrow S = Y^d - C \dots\dots\dots(14)$$

$$S = Y^d - (bY^d - ar_p - \gamma PSBR)$$

$$\rightarrow S = (1 - b)Y^d + ar_p + \gamma PSBR \dots\dots\dots(15).$$

And the domestic private investment demand is expressed as an inverse function of interest rate, (i.e., cost of credit) such that $I_p = f(r)$. The actual private investment demand function is given as equation 16, below:

$$I_p = I_0 + \varphi r \dots\dots\dots(16);$$

where φ is interest elasticity of investment demand and I_0 is autonomous component of the demand function.

From Eq. (11), i.e., the *crowding-out effect equation*, the interest rate can be derived, which *reflects the reality of financial exclusion that is likely to be caused by PSBR*. We thus, substitute Eq.(13) and Eq.(14) into Eq. (11a);

$$PSBR = S_p + I_p \dots\dots\dots(11a). \text{ Eq. (11a) recalled.}$$

$$PSBR = [(1-b)Y^d + \alpha r_p + \gamma PSBR] - (I_0 - \varphi r)$$

$$PSBR = (1-b)Y^d + \alpha r_p + \gamma PSBR - I_0 + \varphi r_p$$

$$(1-\gamma)PSBR + I_0 - (1-b)Y^d = (\alpha + \varphi)r_p$$

$$r_p^* = \frac{(1-\gamma)PSBR + I_0 - (1-b)Y^d}{(\alpha + \varphi)} \dots\dots\dots (17)$$

Notice that interest elasticity of savings/consumptions (α), interest elasticity of investment (φ), marginal propensity to consume (b) and consumptions/savings sensitivity to fiscal borrowing (γ), are all ratios, so accordingly the restriction; $0 < \gamma, \alpha, \varphi, b < 1$, (i.e., each falling between zero and one) can be imposed.

Against this, therefore, the following policy outcome can be deduced:

1. $\frac{\delta r_p^*}{\delta PSBR} = \frac{(1-\gamma)}{(\alpha + \varphi)} > 0$; i.e., the *complete crowding-out effect* of fiscal

domestic borrowing. This depends on savings/consumption sensitivity to fiscal borrowing (γ), interest sensitivity both to savings (α) and investment demand (φ). Crowding-out effect (COE) due to PSBR widens the *financial exclusion gap*, as it causes a rise in the lending interest rate to private sector borrowers.

2. $\frac{\delta r_p^*}{\delta I_0} = \frac{1}{(\alpha + \varphi)} > 0$; An exogenous increase in private sector investment

demand will cause a rise in the interest rate, if savings remain the same. Though the interest rate rises, this does not lead to financial exclusion as the rise is caused and accompanied by investment rise rather than either PSBR or financial market frictions.

3. $\frac{\delta r_L^*}{\delta Y} = -\frac{(1-b)}{(\alpha + \varphi)} < 0; \Rightarrow -\frac{MPS}{(\alpha + \varphi)} < 0$. The model predicts that

increase in national output (GDP) will cause an exogenous fall in lending

rates as savings rise. For a given marginal propensity to save, rise in income translates into a rise in people's disposable income and hence savings. Given the same investment demand curve, the cost of credit is expected to fall in a way that allows more firms to borrow cheaply. This will reduce the *exclusion gap* as inclusion is induced. Thus, policy to encourage growth in domestic productivity will be *inclusion engendering*. This again predicts that cost of credit in advanced economies with high income will be lower than LICs where income and productivity are low (see, for example, Cull, Demirgüç-Kunt, and Morduch (2014); Beck, Demirgüç-Kunt, and Peria (2007)).

In its structural equation forms illustrated on the Figure 4.4, income behaves exogenously and will cause a shift in the savings supply curve. However, reconciling the reduced forms with the I-S model (which shows an equilibrium in the real sector for a given interest rate and income), GDP then becomes an endogenous variable (see Eq. 23 and Eq.23a).

Note that the r_p^* in Eq. (17) is the cost of credit that real-sector private agents pay for borrowing from the financial system. This is the same as the lending rate r_L^* defined in Eq. (9). If it is simply assumed that savings/consumption is not responsive to PSBR, such that ($\gamma = 0$), then Eq. (17) becomes,

$$r_p^* = \frac{PSBR + I_0 - (1-b)Y^d}{(\alpha + \varphi)} \dots\dots\dots(17a);$$

In which case the crowding-out effect will be similar to point (2) above (i.e., $\delta r_p^* / \delta PSBR > 0 = 1/(\alpha + \varphi) > 0$).

(a) Model with Information Asymmetry and Transaction Cost

It has been established earlier that financial market frictions that give rise to information asymmetry and transaction cost do not allow equality between lending rate and deposit rates. The presence of *spread* constituting the *arbitrage value* (τ) serves as an incentive for the continual operation of FIs. Recall from Eq. (10),

$$r_L^* = \tau + r_D \rightarrow r_D = \tau - r_L^* \dots\dots\dots(10a);$$

Substituting Eq. (10a) into Eq. (15), gives;

$$S = (1-b)Y^d + ar_D + \gamma PSBR \dots\dots\dots (15) \text{ (recalled).}$$

$$S = (1-b)Y^d + a(r_L^* - \tau) + \gamma PSBR$$

$$S = (1-b)Y^d + ar_L^* - a\tau + \gamma PSBR \dots\dots\dots (18)$$

Substituting equations (18) and (16) into Eq. (11a), and solving for r_L^* , produces Eq. (19) below:

$$PSBR = [(1-b)Y^d + \alpha r_L - \alpha\tau + \gamma PSBR] - (I_0 - \phi r_L)$$

$$PSBR = (1-b)Y^d + \alpha r_L - \alpha\tau + \gamma PSBR - I_0 + \phi r_L$$

$$(1-\gamma)PSBR + I_0 - (1-b)Y^d + \alpha\tau = (\alpha + \phi)r_L$$

$$r_L^* = \frac{(1-\gamma)PSBR + I_0 - (1-b)Y^d + \alpha\tau}{(\alpha + \phi)} \dots\dots\dots (19).$$

From Eq. (19), the impact of market friction and imperfection (τ) on cost of credit to the firm can be ascertained.

4. $\frac{\delta r_L^*}{\delta \tau} = \frac{\alpha}{(\alpha + \phi)} > 0$; Thus, risk premium and transaction costs that exist due

to information asymmetry will cause cost of credit (r_L^*) to the private sector to rise. Consequently, the market will *financially exclude* many firms as it rations credit from those who cannot afford the risk-adjusted interest rate. This seems consistent with *credit rationing* paradigm of Stiglitz and Weiss (1981).

When the neoclassical assumptions of perfect and complete information are applied, no market friction and no fiscal intervention in the credit market can be incorporated in the current model. This leads to optimal allocation of financial resources. Entire household savings will be *channelled* towards the domestic private sector for investment at a rate acceptable both to borrowers and savers. That mimics a strong-form of market efficiency (Greenbaum et al., 2015). Under such circumstances, the QAT role of financial intermediation will be needless (Greenbaum et al., 2015) as equilibrium interest rate drives away arbitrage value (interest rate spread). This prediction is obtainable when, with the absence of fiscal deficit ($PSBR = 0$) and financial market friction ($\tau = 0$), Eq. (19) simply becomes:

$$r_L^* = \frac{I_0 - (1-b)Y^d}{(\alpha + \varphi)} \dots\dots\dots(20);$$

which can be rearranged back into *savings equal investment model* as done below;

$$\underbrace{r_L^* \alpha + (1-b)Y^d}_{s_p} = \underbrace{I_0 - r_L^* \varphi}_{i_p} \dots\dots\dots(21)$$

Note that unlike the Keynesian model, the classicalist did not explicitly recognise disposable income as a key determinant of savings. Eq. (21) therefore will be the neoclassical ideal of perfect market functioning illustrated in Figure 4.4.

(b) Model with Tax and the Implication of Financial Inclusion Policy

Finally, we now examine the model when tax is directly incorporated. It could be seen from the previous equations that the role of tax was implicit through disposable income (Y^d). As tax is directly incorporated in the model, it allows the effect of fiscal policy on financial inclusion to be determined. The disposable income definitional identity, as noted earlier, is income less direct tax. Thus,

$$Y^d = Y - T \dots\dots\dots(22);$$

Substituting Eq. (22) into Eq. (19), we obtain;

$$r_L^* = \frac{(1-\gamma)PSBR + I_0 - (1-b)Y + (1-b)T_0 + \alpha\tau}{(\alpha + \varphi)} \dots\dots\dots(23)$$

$$5. \quad \frac{\delta r_L^*}{\delta T_0} = \frac{(1-b)}{(\alpha + \varphi)} > 0; \Rightarrow \frac{MPS}{(\alpha + \varphi)} > 0; \text{ Tax imposition causes lending rates to}$$

rise as household savings fall in response to a fall in their disposable income. Increase in taxes as an austerity measure therefore *widens the financial exclusion gap*, as some firms will not be able to access credit due to a rise in cost of credit.

Table 4.1: Summary of policy predictions of the model, and implication for financial inclusion

#	Model Outcome	Policy Tool	Impact on Financial Inclusion
1.	$\frac{\delta r_L^*}{\delta PSBR} = \frac{(1-\gamma)}{(\alpha+\varphi)} > 0$	Fiscal borrowing (PSBR) and crowding-out effects	<i>Hampers inclusion</i> (see Kwarkye, 2012)
2.	$\frac{\delta r_L^*}{\delta I_0} = \frac{1}{(\alpha+\varphi)} > 0$	Exogenous increase in private investment	<i>Neutral outcome</i>
3.	$\frac{\delta r_L^*}{\delta \tau} = \frac{\alpha}{(\alpha+\varphi)} > 0$	Financial market imperfection and information asymmetry	<i>Hindering inclusion</i> (see Chapters 6 & 7; Stiglitz & Weiss, 1981)
4.	$\frac{\delta r_L^*}{\delta T_0} = \frac{(1-b)}{(\alpha+\varphi)} > 0$	Excessive taxation	<i>Inclusion-hampering</i>
5.	$\frac{\delta r_L^*}{\delta Y} = -\frac{(1-b)}{(\alpha+\varphi)} < 0$	Growth in national income and productivity	<i>Inclusion stimulating</i> (see Chapter 6; & e.g., Allen, et al., 2016; Pería, 2016)

Note: If assuming that $(1-b)/(\alpha+\varphi) = \theta_3$, $(1-\gamma)/(\alpha+\varphi) = \theta_1$, $1/(\alpha+\varphi) = \theta_2$ and $\alpha/(\alpha+\varphi) = \theta_4$ then the reduced form of Eq. (19) can simply become:

$$r_L^* = \theta_0 + \theta_1 PSBR + \theta_2 I_0 + \theta_3 (Y - T_0) + \theta_4 \tau \dots\dots\dots (23a),$$

and can be estimated as a linear model.

In line with Freixas and Rochet (2008) and Scholtens and van Wensveen (2003), technology can only reduce transaction cost as it addresses the ex-ante form of informational asymmetry (adverse selection), hence reduction in τ . An indirect effect of technology on the interim (moral hazard) or the ex-post (costly state verification) information asymmetry can be assumed (Kwarkye, 2012; Scholtens & van Wensveen, 2003).

4.4 Chapter Summary and Conclusion

The chapter offers a conceptual framework that links financial inclusion to economic inclusion using the four basic dimensions of financial inclusion as identified by the Financial Inclusion Data Working Group (FIDWG) of the AFI (Triki & Faye, 2013b; Hannig & Jansen, 2010). The expectation is that the

trajectory of inclusive growth that emanates from an inclusive financial system can be tracked and monitored.

The chapter also offers the research framework that combines ideas from several existing theories in an interdisciplinary manner. This is an attempt to offer a unified explanation for why *financial exclusion exists* and appears widespread in LICs. By harmonising and drawing synergies from existing theories of both Keynesian and neoclassical origins, a unique new paradigm emerges. The current proposition both explains why financial exclusion seems a natural outcome of structurally malfunctioned financial systems, and in part, adds to the existing theories on the *raison d'être* of financial intermediation.

The model predicts that information technology, an efficient national governance system and a much freer economic environment that helps to minimise the existence of information asymmetry and transaction costs are key drivers towards broader financial inclusion. Chapters 6-9 empirically validate this prediction, to the extent that data allowed.

CHAPTER 5

DATA AND METHODS

5.1 Chapter Overview

This chapter outlines the methods employed in the investigation process. Datasets used and their sources are also presented and a series of empirical models to be estimated are developed and presented. The chapter connects the previous two chapters on the literature reviewed, research framework and the subsequent chapters on the empirical findings. The variables used in the empirical investigation are carefully defined to ensure replication.

The rest of the chapter proceeds as follows. The research methodology which outlines the research type and design is presented in Section 5.2. Section 5.3 addresses data sources and typology, followed by the operational definitions of key variables in Section 5.4. Section 5.5 presents the methods of empirical investigation and estimation approaches, which is followed by specification of empirical models in Section 5.6. Section 5.7 presents the diagnostic and robustness tests carried out on the various models. Section 5.8 concludes the chapter.

5.2 Research Methodology

5.2.1 Type of Research and Design

A quantitative research approach is used in the design of the research (Black, 1999; Creswell, 2013; Hopkins, 2000). Specifically, econometric methods of investigation are employed where economic theory guides the use of both mathematical and statistical modelling in investigating the underlying relationships (Gujarati, 2009; Pindyck, 1998). Multi-varied estimation technique proved useful given the diverse nature of the dataset. This is partly due to the multi-dimensional nature of financial inclusion as a concept (Hannig & Jansen, 2010; Triki & Faye, 2013b; Chibba, 2009). It is practically impossible to adopt a single regression model to test the various hypotheses which are based on the multi-dimensionality of the phenomenon being investigated (Chibba, 2009).

Table 5.1: Summary of research design and estimation techniques

Thematic Area	Model Employed	Regression
Financial Inclusion and Institutional Context (see Chapter 6 for results)	Linear Models	OLS and Quantile Regression
Financial Inclusion and the Role of ICT (Digital Financial Services) (see Chapter 6)	Both Linear Models and Nonlinear (MLE)	OLS and Logistic Regression Models
Financial Inclusion Impact: Macroeconomic-Level Growth (see Chapter 7)	Linear Models	Generalized Linear Model (GLM) and Quantile Regression Model (QR)
Financial Inclusion and Firm's Attributes (see Chapter 8)	Nonlinear Model and Maximum Likelihood Estimation (MLE) Process	Logistic Regression Models with Difference-In-Difference Approach
Financial Inclusion Impact: Micro/Households' Poverty Level (see Chapter 9 for results)	Endogenous Covariate Model	Generalized Method of Moment (GMM) Estimation

Note: This table summarises the research design into thematic areas that are based on the multi-dimensionality of the concept of financial inclusion.

5.3 Data

This section of the thesis documents the various sources and data types employed in the study.

5.3.1 Data Collection

(i) *Type of Data and Sources*

Secondary data is employed in this study. The data have been collected and collated from several domain sources. The majority of the dataset falls within the category of cross-sectional data typology, with some time-series datasets employed at some stages (Chaudhuri, Jalan, & Suryahadi, 2002; Moretti, 2004).

Cross-sectional data is based on observation obtained from groups of individuals or firms at a given (single) point in time. Data sources that fall within this category are the World Bank's Enterprise Survey data, World Bank/Global Findex (Gallup Poll) dataset and Inter-University Consortium for Political and Social Research (ICPSR) datasets.

a) World Bank/IFC Enterprise Surveys Dataset

The World Bank/IFC Enterprise Surveys (WBES) provide a rich microdata set on firms around the globe. A pooled cross-sectoral, cross-industry, economy-wide dataset on enterprises in Ghana from the surveys for 2007 (baseline) and 2013 (follow-up) is used for the empirical analysis. Even though a wide range of sectors is captured in the survey, they are, however, condensed into manufacturing, retailing and ‘other’ (services). Importantly, the surveys include responses on matters that firms perceive as affecting their growth and operations. Beyond refutation, the WBES database is a credible source of useful firm-level data. Comparable information on firms’ qualities across sectors, size, and participation in the formal financial system and other demographic attributes such as age, gender of owners and managers, among others, are used in the study. Most of the data is dichotomous in form, as in ‘yes’ or ‘no’ type responses to questions and this points toward the use of binary regression model.

(ii) Sampling Methodology

The WBES covers wider environmental indicators that affect business operations such as finance, infrastructure, corruption and competition, among others. Stratified random sampling with replacement is the main sampling methodology for the World Bank’s Enterprise Surveys data (The World Bank Group, 2014). The stratified method is slightly different to a simple random sample where all members of the population have an equal chance of being selected without weight assignment, Under this sampling method, the entire population units are stratified into homogeneous groups, after which a simple random samples technique is applied in the selection of participants within each stratum (Goodman & Kish, 1950; Jolly & Hampton, 1990; Madow & Madow, 1944).

The adoption of this method, according to the WBES team, allows for the estimates for each of the strata identified to be made with a degree of precision as specified. The method also allows population estimates to be carried out relying on accurately weighting individual observations. The assignment of sampling weights helps address problems relating to variableness in probabilities of selection across different strata¹⁶. The advantage of using stratified random sampling over a simple

¹⁶ Detailed notes on the Basic instrument, the Sampling and Weighting information are obtainable from the website: <http://www.enterprisesurveys.org/Methodology/> (Disclaimer: This is as at August,

random sampling is the assurance of lower standard errors that promises more precision in the estimates (The World Bank Group, 2009).

Table 5.2: Basic stratifications of WBES (business sector strata) on Ghana for years 2007 and 2013

YEAR	Levels of Business Sector Strata Number of Firms in Each Business Sector Level							TOTAL
	Apparel	Food products & beverages	Retail	Other Manufacturing	Other Services	Chemicals, Plastics & Rubber	Basic Metals/ Fabricated Metals/ Machinery	
2007	115	76	103	101	99	0	0	494
2013	0	57	115	189	228	51	80	720

Source: IFC/World bank Enterprise Survey¹⁷

Tables 5.2 and 5.3 show the strata for firm size, business sector, and geographic regions covered in the Ghana's survey. A definitional guide for firm-size levels are 5-19 (small), 20-99 (medium), and 100+ employees (large-sized firms). The sector strata include manufacturing, retail and 'other services'. The country's geographical strata represented by the regions of Ghana are based on North (Kumasi and Tamale,) Mid-west (Takoradi) and South (Accra and Tema). The selection of a city is informed by the level of economic activities (WBES Survey Manual, n.d.).

Table 5.3: Basic stratifications of WBES (location and size strata) on Ghana for years 2007 and 2013

Year	Levels of Location Strata					Total	Size Strata			Gender Issues
	Accra	Kumasi	Takoradi	Tamale	Tema		Micro/Small (<20 employees)	Medium (20-99 employees)	Large (100+ employees)	Firms with no female owners
2007	295	98	50	51	0	494	368	94	32	252
2013	358	147	57	0	158	720	456	203	61	501

Source: IFC/World Bank Enterprise Survey

2016. Author has no control as to whether the World Bank Group will maintain the same information content as it appears now)

¹⁷ <http://www.enterprisesurveys.org>

As an instance, Accra and Tema have most of the participating firms because they are the industrial cities of Ghana. The 2007 Survey made no distinction between firms located in Accra and Tema as both cities are within the same (Greater Accra) region. The Kumasi figure for 2013-surveyed firms includes Northern Ghana (Tamale).

b) Global Findex Data

The Global Findex database contains household-level indicators that capture how individuals use financial services globally (Demirgüç-Kunt, Klapper, & Singer, 2013). It contains information on how people save, borrow, make payments and manage risk (Demirgüç-Kunt & Klapper, 2012a).

It uses the Gallup World Poll which surveys at least 1000 adults aged 15 years and above (Demirgüç-Kunt & Klapper, 2013), in more than 140 countries, randomly selected from both civilian and non-civilian populations. For example, 41 African countries including Ghana, and over 40000 adults in these countries are covered in the 2011 edition. The 2014 edition captures more than 100 indicators including some basic demographic characteristics in more than 140 economies, using randomly selected adults aged 15 years or over (Demirgüç-Kunt et al., 2015).

According to Demirgüç-Kunt and Klapper (2013), the Gallup World Poll surveys have been used to study social capital and well-being in prior academic studies.

Additionally, the Findex dataset from World Bank/CGAP offers several advantages as it touches on the critical issues of financial inclusion at the individual level. These include inclusion factors such as account ownership and usage of financial services, which are key indicators in this study. It also offers an insight into key demographic characteristics of respondents including gender, age and income quantiles of the respondents.

c) Inter-University Consortium for Political and Social Research Household-Level Data (Awusabo-Asare, Annim, Abane, Amonoo, & Acheampong, 2014).

In addition to the above, a total of 2734 households' survey data comprising 1628 on clients benchmarked against 1106 non-clients of 17 MFIs across Ghana is employed in this study. This secondary sourced cross-sectional micro-dataset is a

World Bank sponsored national household survey conducted in 2004 but released by Inter-University Consortium for Political and Social Research (ICPSR) in 2014 (Annim et al., 2014). The richness of the dataset stems from its spatial coverage based on three zones covering all the ten administrative regions of Ghana; northern, middle and coastal. The MFIs covered in this survey comprise credit unions, rural and community banks (RCBs), FNGOs, Susu groups as well as savings and loans companies (Annim et al., 2014). The survey adopted a more robust multi-dimensional technique, Microfinance Poverty Assessment Tool (MPAT), developed by the Consultative Group to Assist the Poor (CGAP) (Annim et al., 2014; Henry, 2003) in constructing the poverty index for the households sampled. The poverty index reflects relative living standard and general welfare of the households concerned.

d) Others Time-variant Dataset

Time-series data for the study are mainly from the following major international/multinational databases:

- (i) Index of Economic Freedom database (The Heritage Foundation, 2015)
- (ii) Corruption Perception Index Database (Transparency International, n.d.)
- (iii) Economic and Financial Growth/Development dataset (World Bank Development Indicators-WDI) (World Bank Group, n.d.)
- (iv) The global governance index dataset obtained from the Worldwide Governance Indicators (WGI) database(The World Bank Group, 2015);
- (v) International Telecommunication Union (ITU) statistics homepage; and
- (vi) Homepage of Ghana Cooperative Credit Unions Association (CUA) Limited (CUA, 2016).

5.4 Study Metrics and Operational Definitions of Key Variables

5.4.1 Outcome Variables Used

The choice of model and its outcome variables used in the empirical investigation is guided by the dimensions of financial inclusion discussed in Chapter 4 (Section 4.2.1) (Hannig & Jansen, 2010; Triki & Faye, 2013). Based on this, there are two

broad sets of models that drive the thesis: the *determinant* and the *impact* of financial inclusion (see Table 5.4). Proxies used as financial inclusion/exclusion are informed by whether the model concerned is a determinant or impact and whether it is a micro- (firm/household) or macro-level model. At the firm/household levels, the widely-used proxies include account ownership and borrowed or saved amount. In addition to these, a new indicator that captures whether or not individuals who are participants in the financial sector (MFIs programme) are also employed (Annim et al., 2014).

Although Annim et al., (2014) did not explicitly use the term financial inclusion, the classification of respondents into clients and non-clients (control group) of MFIs allows the author to generate an excluded group (non-clients assigned ‘0’) and an included (treatment group as participating clients of MFIs’ outreach programme, assigned ‘1’). As noted by Triki and Faye (2013), the whole notion and concept of financial inclusion appears categorical; either an agent is included or otherwise. This partly explains why many studies on financial inclusion have used dichotomous dependent variables.

Table 5.4: Showing the genre of the empirical models estimated

Model Reference Equation	Dependent Variable	Type	Summary of Hypotheses	Empirical Estimation
Eq. 13	FI (Domestic credit to private sector)	Determinants	$H_{a(1-4)}$	Chapter 6
Eq. 14	FI (Household’s Account Ownership)	Determinants	$H_{a5(i-iv)}$	Chapter 6
Eq. 17	GDP per capita (natural log)	Impact	(H_{c1-2})	Chapter 7
Eq. 15	FE (Lack of Line of Credit among firms)	Determinants	$H_{b(1-4)}$	Chapter 8
Eq. 16	<i>Windex</i> (Household’s Poverty/Welfare Index)	Impact	$H_{d(1-3)}$	Chapter 9
Eq. 16.2	FI (Natural log of Household’s Borrowed amount)	Determinants		Chapter 9

The macro-level investigation relied on domestic private credit to GDP as an indicator because it is found to be significantly associated with, and a key part of, financial inclusion (Demirgüç-Kunt & Klapper, 2012a). Moreover, poverty/welfare index and per capita GDP growth rate are two indicators that are used to gauge the *impact* of inclusion programmes at the micro- and the macro-levels, respectively.

These allow the author to track the trajectory of financial inclusion towards economic inclusion that induces welfare both at the individual and national levels. The next section offers detailed descriptions of the key indicators used as the dependent variables.

(i) Account Ownership: Financial Inclusion Indicator

An investigation into the *usage dimension* of financial inclusion employed account ownership as the dependent variable (Triki & Faye, 2013). Account ownership as a proxy of financial inclusion has been used in many prior studies (Brown & Taylor, 2011; Demirgüç-Kunt et al., 2013; Friedline, 2012; Friedline, Johnson, & Hughes, 2014; Greeson, Usher, & Grinstein-Weiss, 2010; Kim, LaTaillade, & Kim, 2011; Mandell, 2005). This is partly because, as observed by Triki and Faye (2013b), the concept of financial inclusion in itself is binary in nature.

A common feature of most of the studies cited above is the application of logistic regression. The only exception is Brown and Taylor (2011) who adopted random-effect Tobit and quantile analysis. For instance, Friedline (2012) used a logit model in a longitudinal data study from 2002-2007 with savings account ownership as the dependent variable. Using cross-sectional survey data, Mandell (2005) applied logistic regression with savings account ownership as the outcome variable. Following these studies, and in particular Allen et al. (2016) and also Demirgüç-Kunt et al. (2013), *account ownership* is used as a proxy for financial inclusion for the household-level investigation using Global Findex data on Ghana (see Chapter 6).

In the Findex database, account ownership is defined as adults who reportedly have accounts with formal financial institutions or have mobile money accounts, or both (Allen et al., 2016). In this thesis, an investigation is carried out using account ownership with (i) financial intermediaries (*FI_A/C*); (ii) mobile network operators (MNOs) (*MOB_A/C*); and (iii) a composite of both (i & ii) (*FI_(comp)*) as the dependent variables. In disaggregating account ownership into its various components, the model allows the author to examine how technological deepening in the form of ICT-based amenities, such as ‘mobile-money facility’, fosters inclusion in LICs. Allen et al. (2016) failed to give attention to this, as they used aggregate account ownership.

(ii) *Natural Log of Borrowed Amounts*

In addition to account ownership as a proxy for financial inclusion, other studies have employed amount (saved or borrowed) as the outcome variable (Furnham, 1999; Mortimer, Dennehy, Lee, & Finch, 1994). Mortimer et al. (1994), as an instance, employed cross-sectional data on high school students' savings habits in Minnesota, using both logistic and OLS. Ardic, Mylenko, and Saltane (2011) used SME's loan to GDP ratio as the outcome variable in their cross-country financial studies on SMEs' credit access. In line with the above, an OLS model using natural of borrowed amount is used as a proxy for financial inclusion, with the household-level survey data of ICPSR (Annim et al., 2014) (see Chapter 9).

(iii) *Lack of Line of Credit: Financial Exclusion (FE) Indicator*

The WBES captures firms that are financially constrained. The survey asks business owners and managers who lack financial access and have applied for a loans or lines of credit for the year concerned. This is captured by K.16 on the WBES questionnaire.

The 'No' response could either imply self/voluntary exclusion (Demirgüç-Kunt et al., 2015) or involuntarily exclusion (see Section 3.3.2), depending on what informed their choice, which is captured by K.17. Except for those who voluntarily excluded themselves because they have adequate working capital (option 1 of *K.17*), the remainder of the reasons is interpreted as factors that contribute to *involuntary exclusion*, and hence, are captured as part of the dependent variable. The options, including the complex nature of the application procedures, unfavourable interest offering, collateral requirements, inadequate loan size and unfavourable loan terms to maturity, are all captured by K.17 to signal barriers that prevent firms from participating in the financial system (Beck, Demirgüç-Kunt, & Peria, 2008). These constraining factors could be psychological; for instance, when firm owners refuse to apply for credit on the basis of mere speculation that they may be unsuccessful. All the responses to options 2-7 on indicator K.17 of the WBES global questionnaire are interpreted and captured as facing 'involuntary exclusion'. Options 8 ('Other') and 9 ('don't know') were left out due to the ambiguous nature of such responses.

Likewise, for those who applied for a loan (i.e., a ‘Yes’ answer to K.16), the outcome of their application (K.20) would determine whether they are financially excluded or not. The firm whose loan application is rejected is considered *involuntary exclusion*, and captured as part of the dependent variable.

It is important to note that this section of the thesis investigates the probability that a firm will be financially excluded given the firm-level attributes. In keeping with this objective, both perceived financial constraint (K.30) and past exclusion or otherwise (K.8) were ignored as they do not capture the likelihood concept being modelled. For instance, a firm that did not have a line of credit from a financial institution in the past (K.8) might have reapplied and been given one (K.16 & 20), for which reason that firm does not face the likelihood of being excluded.

In addition, firms without any form of account (savings or checking) with a financial institution are more likely to be excluded financially, as account ownership has widely been used an indicator of FI (see for instance, Demirgüç-Kunt et al. (2013), also Allen et al. (2016)). The WBES captures this with the K.6 indicator of the global questionnaire, and it is included as an FE indicator.

(iv) *Private Credit to GDP*

Following Beck, Levine, and Loayza (2000), and Levine, Loayza, and Beck (2000) the author proxies financial development (also a measure of financial inclusion) by the domestic credit provided by the financial sector (as a percentage of GDP). This is based on the empirical observation that a positive correlation exists between financial inclusion and financial development (domestic credit to private sector as a proxy) (Demirgüç-Kunt & Klapper, 2012a). In view of this, the author uses domestic private credit (% GDP) as a plausible macro-level proxy for financial inclusion.

(v) *Welfare/Poverty Index: Windex*

Studies that relate to poverty, financial accessibility, and inclusion, most especially at the household-level using a micro-econometric analysis, appear rare. A few attempts have, however, been made to gauge the poverty-reducing impact of financial access. Using a fixed-effects module, Khandker (2005) estimates aggregate village credit on a household’s welfare in Bangladesh. Their study finds MFIs’ activities having marginal positive poverty-reducing impact, and further

confirmed this using a simulated impact of micro-credit borrowing on poverty. Using a probit model based on propensity scoring matching, Ghalib, Malki, and Imai (2011) examine the poverty-reducing impact of a household's access to micro-finance in Pakistan and find a positive impact. The poverty indicator was captured in their model using consumer expenditure on health, education and food, among other items. The indicators used are similar to those Annim et al. (2014) used in obtaining the poverty index, which is employed in this thesis. Other authors have, however, focused on susceptibility to poverty (Pritchett, Suryahadi, & Sumarto, 2000) rather than poverty itself (Chaudhuri et al., 2002).

In keeping with these studies, the poverty-reducing effect of financial inclusion is investigated in this thesis. The use of poverty/welfare index (Windex) contained in the ICPSR household-level data (Annim et al., 2014) as the outcome variable, places this study in an advantageous position compared with prior similar studies. The computation of the poverty index followed the rigorous scientific and statistically approved methodology of the Microfinance Poverty Assessment Tool (MPAT); a robust multi-dimensional technique developed by the Consultative Group to Assist the Poor (Annim et al., 2014; Henry, 2003).

The MPAT approach employs Principal Component Analysis (PCA) by assigning weights to obtain a poverty index for each specific household sampled, which reflects their relative living standard and welfare. The index was constructed to assess the poverty-reducing impact of financial inclusion programmes among the clients of MFIs, in either a government/donor-supported inclusion programme or MFIs' own programme. In constructing the welfare index, Annim et al. (2014) used household clients' living conditions based on their consumption patterns, similar to approaches employed by Khandker (2005) in Bangladesh and Ghalib et al. (2011) in Pakistan. The composition can be seen in Table 5.5 and includes education, occupation, food and vulnerability, access to basic needs, geo-location, assets of households, quality of house and their general consumption expenditure. With zero as the mean index, a higher positive value suggests an improved welfare, and higher negative value (in absolute) implies the opposite (Annim et al., 2014).

Table 5.5: Indicators used in constructing welfare/poverty index

Indicators		Components
1	Clothing and footwear expenditure per person.	Expenditures
2	Index for type of ownership, access to water, electricity, quality of roof, walls, toilets, etc.	Quality of the house
3	Ownership of motorcycle, bicycle, TV, stereo, radio, fridge, stove, sewing machine, fan, iron, etc.	Assets of the household
4	Time (in minutes) to the nearest secondary school and pharmacist.	Access to basic needs
5	Urban or rural location in rural savannah	Geographical location
6	Coping Strategy: frequency of reducing number of meals	Food security and vulnerability
7	Literacy and level of schooling of household head, percentage of adults who have completed primary schooling, ratio of literate adults	Education
8	Number of adults self-employed in food-crop agriculture and distance to the nearest food market.	Occupation

Source: (Annim et al., 2014)

(vi) *Per Capita GDP Growth*

To study the impact of financial inclusion on growth at the macroeconomic level, the study used natural logarithm of GDP per capita as the dependent variable to gauge economic growth. This is in line with prior studies that have used natural log of real per capita GDP as proxy for economic growth (e.g. Beck & Levine, 2001, 2004; Ndako, 2010). According to Demirgüç-Kunt and Klapper (2012b) “national income, proxied by GDP per capita, explains much of the variation in account penetration around the world” (p. 3). This critically motivated the author in using per capita GDP growth rate as the outcome variables for investigating financial inclusion impact at the macro-level.

5.4.2 Explanatory Variables

The explanatory variables for the models, though diverse, could generally be categorised into micro-level (firm and household level factors), macro-level (dealing with economy-wide aggregate indicators) and environmental, capturing some regulatory and institutional framework that has a direct or indirect bearing on financial inclusion. As noted in the previous section, the choice of an explanatory

variable is informed by whether it has impact on or has determinants of inclusion. Detailed descriptions of all the variables used in this study are given in the Table 5.6.

(i) ***Firm Level Study: Explanatory Variables***

At the firm level, key independent variables are firm size, age, location, website ownership and sector of operations.

Firm Size

Many empirical studies suggest that SMEs face more financial exclusion than larger firms (Abor & Quartey, 2010; Aterido et al., 2013; Beck & Demirguc-Kunt, 2006; Beck, Demirgüç-Kunt, & Maksimovic, 2008). Many factors contribute to this, key among them being the requirements for obtaining lines of credit/loans. This includes the collateral securities formal intermediaries demand due to shadows and information opacity that characterise SME operations (Dong & Men, 2014; Hannig & Jansen, 2010; Stiglitz & Weiss, 1981). The two widely used indicators for measuring firm size, number of employees and sales, are employed in this study. As defined in the WBES database for Ghana, small-sized firms employ between five (5) and nineteen (19) people, medium between twenty (20) and ninety-nine (99) and larger firms, one-hundred and above (≥ 100). Dummy variables are generated to capture each of these categories, with large firms as the reference category. The definition of *firm size* using the employment criteria differs from study to study depending on countries concerned.

For instance, Ayyagari, Demirgüç-Kunt, and Maksimovic (2008) in their study defined small firms as employing 5 to 50 employees, medium-sized firms with 51 to 500 employees, and the large firms above 500 employees.

The natural log of sales is also used as a further robustness check on the employment criteria.

A priori, a positive sign is expected between SMEs and the financial exclusion variable. Among the wide range of business environmental constraints small firms face, finance stands out most acutely (Maksimovic et al., 2006). Koeda and Dabla-Norris (2008) also find an inverse relationship between bank credit and small-sized firms and a positive relationship with large firms.

Website Ownership

The WBES captures technological aspects of the business environment. The survey captures a firm's internet presence with respect to website ownership. The dummies for ICT category considers whether the firm owns a website for its operations or not. The indicator C.22b identifies firms that own and use their own website for business related activities such as sales, marketing and promotion of their products. The indicator C.22a, which captures firms using 'email to communicate with clients or suppliers', is excluded. A mere usage of email would not significantly have any meaningful impact on whether that firm gets or applies for credit or not.

The motivation to use website ownership as a potential determinant of financial inclusion stems from the empirical studies that have established a positive significant correlation between technological advancement and financial inclusion (Donovan, 2012; Gangopadhyay, 2009; Kpodar & Andrianaivo, 2011; Triki & Faye, 2013). The role of technological advancement in reducing the transaction cost of providing financial services is also observed (Scholtens & van Wensveen, 2003).

Firm Location

The location of the firm is crucial to determine whether or not access to credit is possible. Location dummies for Accra/Tema, Takoradi and the North (comprising the Kumasi and Tamale areas) are used. A few empirical studies of firms' financial inclusion/exclusion have delved into the geolocation as a key determinant. Leyshon and Thrift (1995), for example, established that the wealth of a geographical location has a positive impact on financial accessibility. Similarly, Popov and Udell (2012) observed that banks allocate more resources to geographically promising locations. Against this background, firm location as a crucial factor towards prospects of credit accessibility is investigated. The motivation is to ascertain whether firms operating within the enclave of the oil-drilling industry (Takoradi) have a high likelihood of getting credit; first, compared to other locations and second, before and after the discovery of oil. Is the emergence of the oil industry expected to attract more financial intermediaries to the region? A question that will be investigated in this study.

Firm Sector

The WBES is stratified using firms' sectors of operation as well as location and firm size. Although the core strata are usually manufacturing and service, in Ghana's case, retailing is added. In line with this therefore, *sector dummies* consisting of retailing, manufacturing and 'other' (service) are used as covariates, with service as the reference dummy. The inclusion of sector dummies is to ascertain whether or not a firm's sector of operation can contribute to the likelihood of being excluded.

Ghana's retail sector accounts for significant size in the enterprise landscape, as most manufacturing firms in Ghana start as retailers (Sutton & Kpentey, 2012). Besides, there must be good reason for the poor performance of Ghana's manufacturing sector towards the country's GDP (Kwakye, 2012). Could financial inaccessibility that defines exclusion in this study be part of the reason, or could corruption and lack of aid to the sector as identified by Tettey, Pupilampu, and Berman (2003) and also in Schwimmer, Tettey, Pupilampu, and Berman (2006) play a role?

A priori, positive (negative) correlation between the financial exclusion indicator and manufacturing (retailing) dummy is expected. This expectation is partly informed by the study by Wellalage and Locke (2016) who use five (5) sub-Saharan African countries to suggest the likelihood of credit constraints appears high among manufacturing sector firms.

(ii) *Explanatory Variables of the Household-Level Inclusion Study*

a) *ICT indicator: Mobile phone, Internet and Credit/Debit Cards usage*

The use of mobile phone and internet to engage in financial transactions is used as proxy to capture technological deepening and its impacts on financial inclusion. The macro-level data, however, captures proxies using mobile roll-out/subscription rate and internet penetration rate over time. The literature reviewed points to many empirical studies that have established positive and significant association between financial and technological inclusion (Donovan, 2012; Jack & Suri, 2011; Kpodar & Andrianaivo, 2011). Kpodar and Andrianaivo (2011), for instance, find a positive correlation between financial inclusion and mobile penetration. In line with these, the author expects mobile phone (*ICT_Mobusage*) and internet (*ICT_Intusage*)

usage to have positive significant association with financial inclusion. Additionally, the use of bank-based technology, such as credit/debit cards, is expected to have positive but little or no significant influence on financial inclusion.

It should be noted that the macro-model uses continuous variables for internet and mobile subscription rate, while the household-level model relies on binary cross-sectional data. One (1) is assigned if the individual uses either mobile phone (mobile money), internet (online banking) or credit/debit card for financial transactions, and zero (0) otherwise.

(iii) Household's Financial Inclusion Impact

a) Access and Quality Dimensions of Financial Inclusion

MFIs in Ghana implement different outreach programmes with various sources of finance: government, donors, and their own funds. The mode of delivery that defines 'delivery strategies of MFIs programmes and institutions' (Annim et al., 2014) is used in this section of the thesis to gauge the efficiency and quality dimension of financial inclusion (Triki & Faye, 2013) (see also the thesis concept, Chapter 4). The impact of both outreach (*FI_access*) programme and its quality (*FI_Quality*) on the client's welfare is also investigated.

Financial access (FI_access_{ij}) is measured by natural log of loan amount borrowed by clients i of microfinance institution j ; while the quality vector (FI_Qual_j) comprises a series of dummies capturing both implementation and institutional efficiency of the financial inclusion programme. Here donor-funded financial inclusion programmes could be implemented either by the government agency (*DG*) or a donor agency (e.g., via FNGOs) labelled (*DD*) (Annim et al., 2014). Government initiated inclusion programmes are mostly implemented by a governmental agency (*GG*) or via a designated MFI. Finally, the MFIs mostly implement their own programmes with their own funds (*MM*).

The *quality* (FI_Qual_j) seeks to establish which among these existing MFIs and their activities have a poverty-alleviating impact on their clients. In addition, it seeks to establish which of the implementation routes (governmental agency, donor agency, or MFI) are poverty-reducing and pro-poor for the clients. This is expected

to shape policies for sustainable and effective financial inclusion impact programmes. Data for this section of the investigation is from the World Bank-sponsored ICPSR's cross-sectional household-level survey on MFIs, their clients and non-clients in Ghana, collected by Annim et al. (2014).

b) Financial Inclusion Variable (FI_InLoan)

The natural log of the total amount borrowed by the household is used as an indicator of financial inclusion. This follows Ardic et al. (2011) who, for instance, used SME loan to GDP ratio as proxy for financial inclusion in a cross-country financial study involving SMEs.

c) Dummies for MFIs Type (TYPMFI)

The clientele base of the MFIs is categorised based on the type of MFI concerned. The rationale is to examine which of the sampled clients among the selected MFIs are well-off in their living conditions (welfare). The MFIs are represented by dummies and include Rural and Community Banks (RCBs), Credit Unions (CU), Savings & Loan Companies (S&L), Financial Non-governmental Organisations (FNGOs) and Susu group (Susu).

Types of MFIs are partly influenced by the objectives for which they are established (Annim et al., 2014). As observed by Annim et al. (2014), FNGOs and RCBs, by their nature of operations and purpose of establishment, are more likely to be inclusion engendering. Except for the profit-motivated S&L companies who operate like formal banks, all the MFIs sampled are expected to be welfare engendering.

(iv) Growth and Inclusion at the Macroeconomic Level

The impact of financial inclusion on the macro-front is expected to work through the depth and efficiency of the financial system. In view of this, two composite vector indicators are used as independent variables; financial depth and financial efficiency. As financial inclusion becomes the conduit through which finance affects growth, the rationale is to identify whether a bank-based or market-based financial system will drive growth in developing economies (Berthélemy & Varoudakis, 1996; Demirgüç-Kunt & Klapper, 2012b; Demirgüç-Kunt & Maksimovic, 2002; Levine, 2005; Mohan, 2006). The empirical analysis is on Ghana as a case. This is done within the context of what has become known as 'K-

L model' in the study of financial development (FD) and growth nexus (King & Levine, 1993). This also follows Mohan (2006) who argues that financial inclusion must link financial development to inclusively accelerated growth.

Financial Depth: Financial depth comprises both institutional depth (measured by the banks' credit to private sector to GDP ratio) and financial market depth (captured by Stock Market Capitalization to GDP ratio) as proxies for financial inclusion. Domestic banks' credit to the private sector as percentage of GDP (*BC2PS*) measures the financial resources intermediaries provide to the private sector. This captures depth within the financial intermediation process and hence inclusion originating from the institutions' side. Beck et al. (2011), for example, established positive correlation between per capita GDP and domestic private credit.

There are two reasons for using *BC2PS* as a proxy for financial development and in the present specific-context, financial inclusion. First, the linkage between domestic credit to GDP and economic growth is much stronger than other proxies such as broad money ($M2+$) to GDP ratio (Adu, Marbuah, & Mensah, 2013). Secondly, the strong positive relationship between financial inclusion (formal accounts ownership) and financial depth (domestic credit to private sector) has been empirically established (Demirgüç-Kunt & Klapper, 2012a). That the correlation is not perfect suggests the existence of other key determinants of financial development in addition to the domestic bank private credit to GDP ratio. In addition, *stock market capitalization to GDP (%) (MCAP)* is used as an indicator to gauge depth and inclusion that emanates from the capital market. It is defined as total value of all listed shares on the stock market as a percentage of GDP. The shallow nature of Ghana's capital market is such that *MCAP/GDP* is expected to have a positive but less significant impact on income growth and welfare.

Financial Efficiency: This captures both market and institutional efficiencies. Stock Market¹⁸ Turnover Ratio (%) (*GSE_{TOR}*) is used as a proxy for market efficiency while financial institution's efficiency proxied by bank overhead costs to total assets (%). The indicator *GSE turnover ratio (%)* is the ratio of total value of shares traded to the average market capitalization for a given period.

¹⁸ Ghana Stock Exchange (GSE)

The *Bank overhead costs to total assets (%)* (*BOC*) is a measure of an institution's operating expenses as a proportion of the value of its held assets held (Demirgüç-Kunt & Huizinga, 1999). WDI data source indicates that the composition of total assets includes all earning assets, both cash and due from the institutions (i.e., banks), foreclosed real estate, fixed and other nontangible assets such as goodwill, among others. The a priori expectation is that a reduction in the bank overhead ratio, which makes banks more efficient in their credit delivery to the private sector (inclusion), will lead to a rise in the welfare of the people as captured by GDP per capita.

(v) ***Institutional and Environmental Factors***

The part of the thesis focusing on how institutional context contributes to shape financial inclusion employs macroeconomic and other institutional indicators as independent variables.

These include a vector of macroeconomic indicators (*MEI*) comprising real per capita GDP growth rate, monetary growth rate, gross savings rate and private remittance flow. Other institutional factors, such as the Index Economic Freedom (*IEF*), Corruption Perception Index (CPI) and Worldwide Governance Index (WGI), serve as explanatory variables.

Governance Indices

Discussing environmental factors that affect financial inclusion in African economies without national governance matters may appear incomplete. This is within the context of myriad governance issues that confront the continent (Beck et al., 2011; Kaufmann, Kraay, & Mastruzzi, 2009), which inadvertently shapes financial services delivery in those countries. The author gauges the impact of the national geopolitical landscape on credit to the private sector, using four (4) proxies for the governance index (WGI) (Kaufmann et al., 2009): *Political Stability*, *Regulatory Quality*, *Rule of Law*, and *Voice & Accountability*.

Relating good governance and financial inclusion is plausible. For instance, the legal right of borrowers, creditors and the wider participation in the financial market hangs in the balance with the established governance and contract enforcement mechanism (Beck et al., 2011). Beck et al. (2011) find a negative correlation between poor governance (rule of law) and interest margins for banks. The banks'

ability to manage risks (both systemic and idiosyncratic) in lending is significantly influenced by the prevailing governance environment (Beck et al., 2011). Using a probit model, Koeda and Dabla-Norris (2008) also find a positive and significant relationship between rule of law and the likelihood of firms getting bank credit.

The inclusion of the national governance index is informed by their being approximately twenty-two (22) of the 50 years of political independence (1957-2007) of Ghana was under military rule (Wikipedia, n.d.). The unintended impact on the financial sector has been empirically established (Brownbridge & Gockel, 1996). Political corruption in the military during the 1970s contributed to the distress that banks in Ghana faced. Additionally, the freezing of bank accounts in excess of C50,000 by the military following the coup in the early 1980s contributed to exclusion that comes from non-participation among the perceived affluent, mostly businessmen who were targeted (Brownbridge & Gockel, 1996).

Corruption and Business Environment

The inclusion of a corruption index helps to ascertain the impact corruption and the general business environment captured by economic freedom could potentially have towards credit delivery to the domestic private sector.

Corruption in most African economies appears widespread and permeates modes of service delivery in most sectors, including credit services. It has been empirically established that huge non-performing loans that banks had on their balance sheets prior to the financial sector reform in Ghana could partly be traced to political corruption and nepotism that characterised the credit allocation process (Brownbridge & Gockel, 1996). In their cross-country level study, Altunbaş and Thornton (2012) used 107 developing countries and found that financial deepening (bank credit to the private sector) reduces corruption, as financial intermediaries are able to monitor borrowers in a way that reduces *ex post* information asymmetry. The converse is being investigated as the author ascertains whether corruption can influence the financial inclusion and development of Ghana.

Emerging empirical studies both at country and bank levels indicate that banks' lending reduces with corruption (Weill, 2011). In addition, corruption is found to be negatively associated with private credit (Detragiache, Gupta, & Tressel, 2005). A priori, a negative relationship is expected between the corruption variable and financial inclusion indicator.

An index of economic freedom (IEF) variables used in the study are *government spending freedom*, *investment freedom*, *business freedom*, *monetary freedom*, *financial freedom*, and *trade freedom*. The inclusion of IEF indicators is motivated by prior studies that have empirically established how economic institutions and their freedom affect financial inclusion (Acemoglu, Johnson, & Robinson, 2005) and/or exclusion (Carbo, Gardener, & Molyneux, 2007; Carbó, Gardener, & Molyneux, 2005). An economic institutional framework with property rights and contract enforcement mechanisms in a perfectly functioning market guarantees economic freedom (Acemoglu et al., 2005), which in turn produces economic outcomes such as financial inclusion. Many empirical studies have established the role the legal and institutional environment plays towards credit access and financial inclusion (Demirgüç-Kunt & Levine, 2005; Djankov, McLiesh, & Shleifer, 2007; Koeda & Dabla-Norris, 2008; Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997). Demirgüç-Kunt et al. (2003), for instance, find a negative and significant relationship between an index of economic freedom and banks' interest rate margins, suggesting that much freer economic and general business environments foster financial inclusion as a cost of credit reduces.

5.4.3 Controlled Variables

A range of demographic and other national-level factors are used as control variables. The control variable used depends on the model being estimated. Many firm-level characteristics are used as control variables, including a firm's top manager's experience, whether the firm is a subsidiary of a larger firm, formally registered or not, and the legal form of business ownership. The variables are all binary taking on 0 or 1. For instance, in respect of the legal form of firm ownership, sole proprietorship (partnership) is assigned one if the firm is a sole proprietorship (partnership) and zero otherwise (Kirschenmann, 2016). Contrary to Kirschenmann (2016) who perceived sole proprietorships as less risky than other business forms, the risk of exclusion from using formal financial sources is expected to be more pronounced among one-man businesses. A positive correlation between the likelihood of exclusion (*FE*) and being a sole-proprietor (*Sole_Prop*) is expected.

In modelling how technology incentivises financial inclusion at the household level, variables such as income, education and gender dummies serve as controls. Five quintile groups represented by dummies as captured in the database are used

in line with Allen et al. (2016) who observe that income positively influences financial inclusion at the household level. A priori, the expectation is that account ownership with a formal financial intermediary that defines financial inclusion, is positively associated with educational attainment (Allen et al., 2016). To control for this possibility, three levels of educational attainment dummies captured in the Gallup Poll/Findex data (primary/elementary, high/secondary and post-high school) are generated and used. The inclusion of a gender dummy is based on prior studies which suggest that most women, especially in LICs, are financially excluded (Allen et al., 2016). Accordingly, a negative relationship between financial inclusion and female variable is expected.

In studying the welfare impact of financial inclusion at the household level, certain demographic attributes that can potentially affect a household's ability to access credit and hence, their welfare, are controlled for. These include the family size of the borrower/clients (*FAMSIZE*), dependency ratio (*DEPRATFS*) and the ratio of literate adults (*RATLITAD*).

Factors that can potentially influence economic growth are included in the macro-level model as controls. These include annual percentage growth in money and quasi-money (*Monigrwth*), Lerner Index (*LI*) for banks, a proxy for competition in the banking financial sector and inflation rate (*Infla*). The rate of unemployment (*U-rate*), private remittance inflows (% of GDP), natural log of foreign direct investment flow (*LnFDI*), Banks Non-Performing Assets (*NPA*s), and gross savings as percentage of GDP are also included as control variables. The use of FDI as a control variable of growth and inclusion nexus is in line with other similar prior studies (see e.g., Adu et al., 2013). Also, the inclusion of inflation as a control is in line with the theoretic (following Fisher effect) (Barsky, 1987; Crowder & Hoffman, 1996; Driffill, Mizon, & Ulph, 1990) and empirical position that inflation affects the cost of credit, private investment and hence, growth (Kwakye, 2010). Also, inflation is one of the key macro-variables that affect both financial and nonfinancial sector actors in Ghana (Kwakye, 2010; Sowa & Kwakye, 1993). Much of the empirical prior research has revealed a negative relationship between inflation rate and credit supplied to the private sector by financial intermediaries (Djankov et al., 2007; Koeda & Dabla-Norris, 2008). (See Table 5.6 for detailed descriptions of the key variables employed in the study).

Table 5.6: List of variables used in the empirical investigation

Variable Name	Symbol	Variable Description/ Definition	Source
Account Ownership (Household-level)	<i>FI</i>	Individual adult respondents aged 15 years and above, who reportedly have an account personally or jointly with someone else, with either financial (banks, NBFIs, MFIs, etc.) or non-financial (post office, mobile network operators, MNOs) institutions <i>a proxy for financial inclusion</i> .	Global FINDEX/(Gallup Poll)/ World Bank Database, World Bank
	<i>Act_FI</i>	Respondents who own accounts with the sampled MFIs. Dummy variable; 1 if respondents (both clients and control group) own accounts in MFIs and 0, otherwise.	Inter-University Consortium for Political and Social Research (ICPSR) datasets / Princeton University Database (Annim et al., 2014)
Firm-Level Financial Exclusion	<i>FE</i>	Firms who involuntarily have no line of credit or loan from a formal financial institution. These include firms who do not own an account in any of the formal intermediaries, those whose recent loan application was rejected, and those who failed to apply for reasons other than adequacy of funds.	IFC/ World Bank's Enterprise Surveys (WBES)
Total Loan Amount	<i>FI_(Ln Loan)</i>	Natural log of total loan amount borrowed by clients of MFIs; <i>a proxy for financial inclusion</i> .	ICPSR
Debit/Credit Card Usage	<i>Bankcard Usage</i>	The respondents who own and have used debit/credit cards for the past 12 months.	Global FINDEX
National Income (GDP per capita)	<i>GDP_pc</i>	GDP per capita growth (annual %)	World Development Indicators (WDI)/ Financial Structure database (World Bank)
	<i>LnGDPpc</i>	Natural Logarithm of GDP per capita (in constant 2000 U.S. dollars).	WDI (World Bank)
<i>Private Credit to GDP</i>	<i>BC2PS</i>	Domestic money bank credit to private sector (% of GDP).	WDI (World Bank)

Internet Usage	<i>INTusage</i>	The use of internet for financial transactions including online wire transfers or payments in the past year.	Global FINDEX
Mobile Phone Usage	<i>MobMUsage</i>	The use of mobile money for financial transactions. The respondents who report using a mobile phone to either pay or receive money in the past year.	Global FINDEX
Unemployment rate	<i>U-rate</i>	Total number of unemployed as a percentage of total labour force.	WDI/ ILO (World Bank)
Educational level dummies	<i>Educ</i>	Respondent's education level showing dummies for primary, secondary and tertiary.	Global FINDEX
Age	<i>Age</i>	Respondent's age in years.	Global FINDEX
	<i>Lnage</i>	Natural logarithm of respondent's age in years.	Global FINDEX
Within-economy income quintile	<i>Income dummies</i>	Dummy variables taking on the value 1 if the respondent falls within a specific quintile (poorest 20%, second 20%, middle 20%, fourth 20% and the richest 20%), and 0, otherwise. These are based on the incomes of the respondents in Ghana.	Global FINDEX
Gender dummy	<i>Fem</i>	Dummy that takes the value 1 if the respondent is female and 0 otherwise.	Global FINDEX
Stock Market capitalization/GDP (%)	<i>MCAP</i>	Market capitalization of listed companies as percentage of GDP based on the value of listed shares.	WDI/ World Bank
Bank Overhead Costs	<i>BOC</i>	Bank overhead costs to total assets (%) capturing efficiency in the institutional (banks) side of the financial sector.	WDI/ Financial Structure Database
Rate of Inflation (annual %)	<i>Infl</i>	Computed as the percentage change in the Consumer Price Index (CPI).	WDI/ International Financial Statistics (IMF)
Stock Market (GSE ¹⁹) Turnover Ratio (%)	<i>(GSEToR)</i>	The value of total shares traded divided by average real-market capitalization in percentage.	WDI/ World Bank
²⁰ Lerner Index	<i>LI</i>	A measure of market power in the banking industry. Computed as the difference between output prices and marginal costs divided by output prices $(P-MC)/P$. LI used as proxy for competition in the banking financial sector.	WDI/ IFS (Bankscope, Bureau van Dijk (BvD))

¹⁹ Ghana Stock Exchange

²⁰ Lerner Index estimations follow the methodology described in Demirgüç-Kunt and Martínez Pería (2010), according to the WDI database.

Firm's Age (in years)	<i>Age</i>	Firm's number of years in operation; computed as the difference between the year of the survey <i>less</i> the firm's year of commencing its business activities.	Enterprise Surveys, World Bank (WBES)
	<i>LnAge</i>	Natural logarithm of firm's age.	
Firm's Size	<i>Size (LnSales)</i>	Natural Log of Annual Sales Revenue.	
	<i>FS_Small</i>	Dummy for small-sized firm (employs 1 to 19 workers)	
	<i>FS_Med</i>	Dummy for medium-sized firms (employs 20 to 99)	
	<i>FS_Larg</i>	Dummy for large firms (employs >100 workforce)	
Website Ownership (ICT)	<i>website_own</i>	The dummy for ICT category considers whether the firm owns a website for its operations; 1, if the firm owns website; 0, otherwise.	
Firm's Location	<i>Loc_North</i>	Location dummy for North; 1 if the firm is located in either Kumasi or Tamale areas; 0, otherwise.	
	<i>Loc_Tardi</i>	Location dummy for Takoradi; 1, if the firm is located in Takoradi; 0, otherwise.	
	<i>Loc_Tema</i>	Location dummy for Accra/Tema; 1, if the firm is located in Greater Accra region; 0, otherwise.	
Sector of Operations	<i>Sec_Manu</i>	Sector dummy; 1, if the firm is a manufacturing firm; 0, otherwise.	
	<i>Sec_Retail</i>	Sector dummy; 1, if the firm operates retailing business; 0, otherwise.	
Firm's Formalisation	<i>Firm_Regis</i>	Dummy variable; 1, if the firm is formally registered; 0, otherwise.	
Legal form of ownership	<i>Sole_Prop</i>	Dummy variable; 1, if the firm is a sole-proprietor; 0, otherwise.	
	<i>Partner</i>	Dummy variable; 1, if the firm is a partnership entity; 0, otherwise.	
	<i>Comp</i>	Dummy variable; 1, if the firm is a company; 0, otherwise.	
Gender	<i>Fem_own</i>	Gender dummy; 1, if the firm is female-owned; 0, otherwise.	
Firm's subsidiary link	<i>Sub_firm</i>	Dummy variable; 1, if the firm is a subsidiary of a mother firm; 0, otherwise.	
Manager's Experience	<i>Mger_Exp</i>	The number of years the top manager has been in a managerial position.	

Type of Micro-finance Institution (MFIs)	<i>RCB</i>	Dummy variable 1, if the MFI is rural bank and 0, otherwise.	ICPSR datasets (Annim et al., 2014)
	<i>CU</i>	Dummy variable; 1, if the MFI is credit union and 0, otherwise.	
	<i>NGO</i>	Dummy variable 1, if the MFI is a financial non-governmental organisation (FNGO) and 0, otherwise.	
	<i>S&L</i>	Dummy variable 1, if the MFI is a savings and loan company and 0, otherwise.	
	<i>Susu</i>	Dummy variable 1, if the MFI is Susu ²¹ and 0, otherwise.	
Dummy for Implementation Quality and Strategies	<i>DG; DD; GG & MM</i>	Dummy Variables for Donor funds-state agency implemented (DG); Donor funds-donor agency implemented (DD) and government of Ghana fund-state agency implemented (GG), and MFI fund-MFI implemented (MM).	
Loan Programme Dummies	<i>Gov't; Donor; MFIs</i>	Dummies for loan programmes or sources: MFI's own programme, government programme and donor agency programme.	
Gender dummy for female	<i>Dum-Fem</i>	Dummy for gender of clients of MFIs, 1, if client is female and 0, otherwise.	
Rural/urban dummy	<i>Rural</i>	Dummy for location of clients of MFIs and the control group, 1, if rural clients and 0, otherwise.	
Family Size	<i>FAMSIZE</i>	Number of members in the family.	
Literacy	<i>RATLITAD</i>	Ratio of literate adults.	
Dependency ratio	<i>DEPRATFS</i>	Dependency ratio (ch/famsize). Measured as number of children to family size.	
Dependency ratio	<i>DEPENRAT</i>	Dependency ratio (child/ adults); captured as the number of children to adults in the household.	
MFI Clients and Non-clients	<i>FI_{comp}</i>	Dummy variable; 1, if the respondent is a household client of MFIs (assumed to be financially included); 0, if non-client (control group, assumed to be financially excluded).	
Poverty/Welfare Index (Composite)	<i>Windex (Aggregate)</i>	Composite household poverty/welfare index for both clients and non-clients (control group).	

²¹ Susu is type of rotating savings scheme/club in the form of a mobile banking service delivery. Typically found among West African countries.

Tercile Poverty/Welfare index (dummies)	<i>Welfare Tercile (WefT)</i>	Dummies for poverty/welfare tercile with lower (<i>WefT1-poor</i>), Mid-tercile (<i>WefT2-Mid</i>) and Higher Tercile (<i>WefT2-Rich</i>).	
Quintile Poverty/Welfare index (dummies)	<i>Welfare (Quintiles) (Wefq)</i>	Dummies for poverty quintiles; (<i>Wefq1</i>), quintile (<i>Wefq2</i>)-below average welfare, (<i>Wefq3</i>) average welfare, (<i>Wefq4</i>)-above average welfare and highest/richest welfare (<i>Wefq5</i>).	
Age	<i>B1AGE</i>	Age of head of household.	
	<i>InAge</i>	Natural log of age of head of household.	
	<i>AgeSQ</i>	Square of age of head of household.	
Education Dummies	<i>B1E</i>	Dummy variables for maximum level of schooling of head of household (ranging from non-completion of primary to post-secondary levels).	
Occupation Dummies	<i>B1F</i>	Dummy variables for occupation of the household head.	
Domestic Credit by FIs	<i>C2PS</i>	Domestic credit provided by financial sector (% of GDP).	WDI/ Financial Structure database (World Bank)
Corruption Index	<i>TI_CPI</i>	Corruption Perception Index (CPI) measuring perception of corruption among public officials.	Transparency International (CPI) Homepage
Governance Index (<i>Gindex</i>): Political Stability and Absence of Violence/Terrorism	<i>Gindex: Pol_Stab</i>	Indicator captures perceptions of the likelihood that a government will be destabilised or overthrown by unconstitutional means.	Worldwide Governance Index (WGI by Kaufmann et al. (2011))/ World Bank
<i>Gindex</i> : Regulatory Quality	<i>Gindex: RegQual</i>	Captures perceptions of the ability of the governing authorities to formulate and implement policies (and regulations) aimed at promoting private sector development.	
<i>Gindex</i> : Voice and Accountability	<i>Gindex: V&A</i>	Captures the perceptions of the extent to which the people in the country can exercise the freedom of expression and association, as well as their participation in selecting their government.	
<i>Gindex</i> : Rule of Law	<i>Gindex: ROL</i>	Indicator measures perceptions of the extent to which private agents have confidence in the quality of contract enforcement, property rights, the police, and the judicial system.	
Monetary Growth Rate	<i>Monigrowth</i>	Annual percentage growth in money and quasi money (M2+).	WDI (World Bank)

Mobile Subscription per capita	<i>MOBsub_Rate</i>	ICT: Mobile cellular subscriptions (per 100 people) –square root transformation.	International Telecommunication Union (ITU)/ (also WDI, World Bank)
Internet Subscription per capita	<i>INTSub_Rate</i>	ICT: Internet users (per 100 people) square transformation.	ITU/ (also WDI, World Bank)
Index of Economic Freedom	<i>LOGEFI</i> <i>EFloverall</i>	Logarithm of composite index of economic freedom. Composite index of economic freedom.	The Heritage Foundation/ Wall Street ²²
Index of Economic Freedom (<i>IEF</i>): investment freedom	<i>IEF_IF</i>	Measures how investment capital in an economically freer country can flow unimpeded, as resources are allowed to move freely across sectors, activities and national borders with no hindrances.	
IEF: Trade freedom	<i>IEF_TF</i>	The indicator captures the absence of trade restrictions such as tariffs and non-tariff barriers (NTBs).	
IEF: Business Freedom	<i>IEF_BF</i>	Business freedom captures ease with which private entities are able to conduct their business activities with limited or no governmental interference and over-burdening regulations.	
IEF: Monetary Freedom	<i>IEF_MF</i>	The monetary freedom variable captures the extent to which the combined effect of price control and instability within a given economy pose a constraint for the firm.	
IEF: Government Spending Freedom	<i>IEF_GF</i>	The ‘government spending freedom’ indicator, captures the latent freedom that the government guarantees the private sector when the former controls its spending and the resultant deficit level and the attendant crowding-out effects.	
Foreign Direct Investment (FDI) flow	<i>LnFDI</i>	Natural logarithm of foreign direct investment flow into Ghana.	WDI (World Bank)
Gross Savings	<i>Gross_NaSave</i>	Gross domestic savings (% of GDP).	WDI (World Bank)

²² <http://www.heritage.org/index/explore?>

Bank Non-performing Loans	<i>NPA</i>	The ratio of defaulting loans to total gross loans. The NPA includes payment of principal, which is the gross plus interest due three (3) or more months.	WDI/IFS (Financial Soundness Indicators)/ World Bank
Personal remittances, (% of GDP)	<i>REMIT_Pc</i>	This indicator captures emigrant workers' remittances sent to Ghana from abroad. The remittances amount is averaged using the population to arrive at the per capita remittance.	WDI/ IFS/ World Bank
	<i>REMIT2GDP</i>	This comprises personal transfers (both in cash or in kind) received by resident households.	WDI/ IFS/ World Bank
Structure-Activity	<i>StrucAct.</i>	Ln (total value traded ratio / bank credit ratio).	WDI/ IFS/ World Bank
Structure-Size	<i>StrucSIZE</i>	Ln (market capitalization ratio / bank credit ratio).	(Author's generation based on Levine (2002))
Structure-Efficiency	<i>StrucEffic</i>	Ln (total value traded ratio * overhead costs).	
Finance-Activity	<i>FinAct.</i>	Ln (total value traded ratio * private credit ratio).	
Finance-Size	<i>FinSize</i>	Ln (market capitalization ratio + private credit ratio).	
Finance-Efficiency	<i>FinEffic</i>	Ln (total value traded ratio / overhead costs).	

5.5 Methods of Empirical Investigation and Estimations

Techniques

5.5.1 Application of Linear Models

(i) *Ordinary Least Square (OLS) and Generalized Linear Model (GLM)*

The Ordinary Least Square (OLS) estimation methods are used for testing some of the hypotheses in the study. The application of OLS is subject to the assumptions underlying the classical linear regression models (CLRM). OLS deals with relationship between y_i and x_i such that the conditional mean function is specified as:

$$E(y_i/x_i) = x_i' \beta \dots\dots\dots(1);$$

and the resultant estimator ($\hat{\beta}$), which must satisfy the basic assumption underlying the classical regression model is given below:

$$\hat{\beta} = \min_{\beta \in R} \sum_{i=1}^n (E(y_i/x_i) - x_i' \beta)^2 \dots\dots\dots(2);$$

Where $\hat{\beta}$ is the estimator under OLS that minimises the conditional mean function (thus, Eq.2).

The estimator, which is the sum of the error squared (Cameron & Trivedi, 2005), is assumed to be BLUE in the Gauss–Markov sense (Drygas, 1983; Harville, 1976; Zyskind & Martin, 1969). Under such an assumption it is important to ensure that the model is not only linear in parameters but also with an error term that is both serially uncorrelated and homoscedastic. These, among other requirements, guarantee an estimation that is best and efficient in terms of its minimum variance. In practice, the first order condition of minimising the variance of the error term strictly applies to guarantee the unbiased estimator that is also ‘best’. In situations where the CLRM assumptions appear to be in violation following diagnostic tests, other models are used.

(ii) *Quantile Regression Model*

A quantile regression (QR) model is employed in this study, benchmarking it with the OLS outcomes for robustness checks. Developed originally by Koenker and Bassett (1978), QR improves upon OLS estimates by observing the impact of an incremental change in the regressors on the outcome variable at its specific quantile,

unlike the conditional mean as in the case of OLS. The QR model as an extremum estimator like the OLS (Cameron & Trivedi, 2005), measures the relationship between y_i and x_i at different points on the conditional distribution of y_i , and gives a complete picture regarding the distribution of the dependent variable (y_i); thus specified as:

$$Q_{\tau p}(y_i/x_i) = x_i' \beta_{\tau} \dots\dots\dots(3);$$

with $\hat{\beta}_{\tau}$ being the estimator given as:

$$\hat{\beta}_{\tau} = \min_{\beta \in R} \sum_{i=1}^n (\rho_{\tau}(Y_i) - X' \beta) \dots\dots\dots(4)$$

This contrasts with the OLS that deals with the relationship between y_i and x_i using the conditional mean function.

It should be noticed that τ falls within an interval of zero and one ($0 < \tau < 1$) and, according to Wellalage and Locke (2014), the term (ρ_{τ}) , which serves as check function transiting from OLS to the quantile techniques follows:

$$\rho_{\tau} = \begin{cases} \tau * x \dots\dots\dots \text{if } x \geq 0 \\ (\tau - 1) * x \dots\dots\dots \text{if } x < 0 \end{cases} .$$

The $\hat{\beta}_{\tau}$ is the least absolute-deviation estimator that minimizes the Eq. (4) above, analogous to the $\hat{\beta}$ under OLS (Cameron & Trivedi, 2005).

The usage of least-absolute-value models (LAV) with varied percentiles ensures more robust results. It allows for the behaviour of the financial inclusion indicator (i.e., outcome variable) to be observed across different spectra of the quantiles. The option for using QR as a further robustness check for the OLS results stems from the former also following a conditional distribution of a linear function of the regressors (Cameron & Trivedi, 2005).

Further, the QR model avoids making assumptions about the parametric distribution of the errors. It also is suitable in situations where heteroscedasticity appears inherent in the data and tends to be insensitive to outliers (Cameron & Trivedi, 2005; Wellalage & Locke, 2014). Besides, QR allows the study of the marginal impact of regressors (x_s) on both location and scale parameters of the model, which helps to derive much deeper understanding of the data.

(iii) Instrumental Variable (IV) Estimation Method: Generalized Method of Moments (GMM)

The study employed an instrumental variable (IV) estimation method in its household-level investigation where the threat posed by the presence of an endogeneity problem cannot be ignored (Khandker, 2005; Khandker & Pitt, 2003). The specific IV model is generalised method of moments (GMM). The IV approach is applied in situations where a researcher suspects non-orthogonality between the disturbance term and the regressors in a way that generates an endogeneity problem. Under such conditions, parameter estimates using OLS tend to be inconsistent (Baum et al., 2007).

Endogeneity occurs where a given independent variable has a dual association with the outcome variable and the error term. This is often caused by omitted variables, measurement error, or simultaneity issues (Chenhall & Moers, 2007; Klette & Griliches, 1996). Thus, when regressors are asymptotically uncorrelated with the disturbance term, OLS yields consistent estimates (Amemiya & MaCurdy, 1986; Inoue & Solon, 2010). In the face of an endogeneity problem, an IV estimation allows for dealing with the indirect unobservable effect of a given regressor by truncating the correlation between the suspected endogenous regressor and the error term using appropriate instruments that must both be valid and non-weak (Baum et al., 2007).

The CLRM assumption of a non-linear relationship between the error term and the regressors (i.e., $E(X'u) = 0$) requires the error term to be non-stochastic. However, in models where simultaneity and endogeneity issues exist, there is the risk of bias and inconsistent outcomes if OLS is applied. Assuming for instance a given model

$$y = X\beta + u \dots \dots \dots (5),$$

and the parameter estimate as $\hat{\beta} = (X'X)^{-1} X'y$, taking the expected value of the $\hat{\beta}$ (i.e., $E(\hat{\beta}) = E(\beta) + E((X'X)^{-1} X'u)$), yields $= \beta + (X'X)^{-1} E(X'u) \dots \dots (6)$.

It could be noted from Eq. (6) that as $E(X'u) = 0$ under the CLRM assumptions, the $E(\hat{\beta}) = \beta$, which is the true value of the estimator of β . The same cannot be said when there are endogeneity problems, in which case $E(X'u) \neq 0$. When this happens, the OLS estimator produces an inconsistent and biased outcome, hence the adoption of IV.

a) *An Instrumental Variable (IV) Estimator*

The instrumental variable method requires that an instrument (Z) be found to have an association with the independent variable (X) but not the error term (u). IV estimator is defined by $\hat{\beta}_{IV} = (Z'X)^{-1}Z'y$; where Z and X , and y are scalar of instruments, regressors and the dependent variable respectively; and with $N \times 1$ vectors (Maddala & Lahiri, 1992). An IV estimator with *just identified model* ($r=K$), follows the generalised consistent outcome given as $\hat{\beta}_{IV} = (Z'X)^{-1}Z'(\beta X + u) = ((Z'X)^{-1}Z'X\beta) + ((Z'X)^{-1}Z'u)$ ²³. The expected value then becomes $\beta + ((Z'X)/N)^{-1}(Z'u)/N$; where Z is an $N \times K$ matrix with i th number of rows and z_i' . The order conditions require that $\text{plim}(Z'X) \neq 0$, while $(Z'u) = 0$ in which case the mean IV estimator yields a consistent outcome given as $\hat{\beta}_{IV} = \beta$ with variance $\hat{V}(\hat{\beta}_{IV}) = (Z'X)^{-1}Z'\hat{\Omega}Z(Z'X)^{-1}$ where $\hat{\Omega}$ is a diagonal matrix [u^2].

The IV method fits a linear regression of a given dependent variable (y) on a set of independent variables, comprising both exogenous (X_i) and endogenous (Q_i) and (Z) being instruments for the Q_i . More formally, this is expressed as:

$$y_i = \beta_0 + \beta_1 X_i + \beta_2 Q_i + u_i \dots \dots \dots (7)$$

$$Q_i = a_0 + a_1 X_i + a_2 Z_i + v_i \dots \dots \dots (8)$$

In this instance, y_i is the dependent variable of an i th observation, with Q_i as the endogenous covariates. The X_i is the included exogenous regressors while the $Z_{i(s)}$ are the excluded exogenous regressors as potential instruments. The error terms u_i and v_i are assumed to have zero expected values, but non-zero covariance, such that $E(Q_i, u_i) \neq 0$ and $E(Z_i, v_i) = 0$ following the assumption about the instruments ($Z_{i(s)}$).

The Generalised Method of Moment (GMM) model thrives on the satisfaction of the *moment* or the *orthogonality* condition. Moment condition requires that there are known additional exogenous variables (Z) that are excluded from the main regression equation (Baum et al., 2007). The test of moment condition is to ensure that the instruments are independent on, and unrelated to, the disturbance (error) term. The test of moment condition logically implies a test of orthogonality

²³ Notice that a number multiplied by its inverse is unit (one)

condition central to the GMM process. A weighting matrix needs to be specified to obtain the optimal two-step estimates.

Assume that $V = (X_i Z_i)$, where V , is the full set of the exogenous variables comprising the included and the excluded. In general, given

$$y_i = \beta X_i + u_i \dots \dots \dots (9),$$

we expect the V instruments to define the moment condition such that;

$$f_i(\hat{\beta}) = Z_i' u_i = Z_i' (y_i - \hat{\beta} X_i) \dots \dots \dots (10);$$

where f_i is a matrix with $(V \times 1)$ order. The non-endogeneity of the instruments requires that there exists V orthogonality (moment) conditions that must be satisfied to establish the true value of β . A significant assumption underlying GMM model is that for each V instrument, there exists a sample moment:

$$\bar{f}_i(\hat{\beta}) = \frac{1}{n} \sum_{i=1}^n f_i(\hat{\beta}) = \frac{1}{n} \sum_{i=1}^n f_i Z_i' (y_i - \hat{\beta} X_i); = \frac{1}{n} Z_i' u_i \dots \dots \dots (11)$$

The rationale behind the GMM estimation process is that a choice of estimator for β must equate the sample moment to zero, i.e., $(\bar{f}_i(\hat{\beta}) = \mathbf{0})$. This, however, only works well under that *just-identified* model where instruments exactly equal the estimated unknown parameters. Over-identification moment conditions require a weighting process that makes the first-order condition for minimisation hold (Baum et al., 2007).

The choice of GMM over other IV estimation methods is the computational convenience it offers. Also, GMM estimators are generally consistent, asymptotically normal in terms of distribution and efficiency, as they use the information contained in the moment condition (Hall, 2005). Unlike the maximum likelihood estimation process, GMM is still applicable where the full shape of the distribution function of the data is unknown. In addition, GMM provides statistically acceptable means of estimating parameters of a given econometric model, which is based on the information relating to the population moment conditions because of restrictions the underlying theory imposes. In the presence of a heteroscedastic error term, GMM is more efficient than other IV estimation methods, while in the case of homoscedastic error terms, GMM is not in any way inferior (Baum, Schaffer, & Stillman, 2003; Baum et al., 2007).

In the household poverty-financial inclusion studies, the problem of endogeneity can hardly be avoided (Imai, Arun, & Annim, 2010; Khandker, 2005). On one hand, financial access influences household poverty levels; and on the other hand, the poverty level can potentially influence the likelihood of accessing financial resources. In using household-level cross-sectional data involving microcredit/finance, "activities placement and self-selected participation endogeneity" issues arise (Khandker & Pitt, 2003; Pitt & Khandker, 1998). The IV method was, for example, employed by Pitt and Khandker (1998) to deal with the problems of endogeneity in a similar study in Bangladesh.

In the specified empirical models, the author acknowledges that any random shock that affects the household size also affects the poverty index (level) and so family size is treated as endogenous following diagnosis. Additionally, there is an expectation of a random shock that affects the household's financial inclusion status and also affects the poverty level (outcome variable, *Windex*). This informed the treatment of the amount borrowed (FI) as endogenous in the Eq. 16.1 (see section 5.6.4). In each case, the chosen instruments are presumed to be uncorrelated with error term (u_i) and poverty/welfare index, but have a link with their respective endogenous regressors, following Baum et al. (2007).

(iv) Binary Models: Logistic Regression

Binary models where the outcome variable takes on zero-one (0,1) can be either linear probability models (LPM) theoretically (Angrist & Pischke, 2008; Gujarati & Porter, 1999) or limited dependent variables (LDV) which are nonlinear (Angrist & Pischke, 2008). Gujarati and Porter (1999) point out that OLS application on such binary models can lead to spurious outcomes, though they can be used as a benchmark to compare with other alternative models. Logistic regression model, in practice, forms part of limited dependent variable (LDV) models (Angrist & Pischke, 2008; Gujarati & Porter, 1999) with conditional expectation (CEF) naturally nonlinear (Angrist & Pischke, 2008). This suggests that logistic regression models like other LDV models, are only applicable in studies where the outcome variable is dichotomous.

Although, in practice, both probit and logit models do apply in LDV cases, the choice is often informed by a diagnostic outcome of the error distribution (Gujarati

& Porter, 1999). Indeed, most researchers opt for logit over probit models due partly to the former's "comparative mathematical simplicity" according to Gujarati and Porter (1999).

The author's analysis of the error term finds a binomial distribution, pointing to the use of a logistic regression as the most appropriate method for the part of the thesis where the outcome variables are dichotomous. Logit as a link function transforms the original $F(\pi; 1,0)$ such that the estimated $\hat{\pi}$ behaves continuously using a maximum likelihood estimation (MLE) process. The logit transformation therefore spreads the outcome variable over the entire range of numbers between $-\infty$ and ∞ to allow for linear estimation with logit as the link function (Gujarati & Porter, 1999).

Theoretically, this follows the functional expression; $F(\pi) = \text{Ln} [\pi / (1 - \pi)]$; where π is the probability of 'success' or 'that an event occurs'; and $[\pi / (1 - \pi)]$ is the odds of an event occurring. This is the ratio of probability of an event occurring (success) to the probability of the event not occurring (failure). The monotonic transformation from probability into odds suggests that the odds increase with the probability, and vice versa. The logistic model can generally be specified as: $\text{Pr}(\pi) \text{ ob}(y = 1|x) = \left(\frac{\exp(\beta X)}{1 + \exp(\beta X)} \right)$, when expressed as a probability, where π is that probability of an event occurring.

In this study, the model is applied to two datasets; on the firms' risk of exclusion (using WBES data on Ghana) and on the likelihood of individuals getting included financially (using Global Findex dataset). The definition of π therefore depends on the specific case. As an instance, π is the probability of an event that a given firm i , will be financially excluded, given the firm's attributes. In the household-level investigation using the Global Findex data, however, π is the probability of an individual getting included financially.

The likelihood of financial exclusion/inclusion is expressed as a dummy variable y taking on binary values defined as:

$$y = \begin{cases} 1; & \text{if a firm is involuntarily excluded from the use of financial services} \\ 0; & \text{if otherwise} \end{cases}$$

The model, as expressed below in Eq. (12), becomes the log of odds (logistic) link function, where the dependent variable (left-hand side (LHS)) becomes the log of odds of being financially excluded or included. The X s are the explanatory

variables and the β_s are the coefficient estimates. The β_s are the logarithmic-transformed odd ratios of a logit model.

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \dots + \beta_p X_{ip} \dots \dots \dots (12).$$

This logit model is a transformed natural log of the odds of an event occurring (financial inclusion/exclusion occurring in the context of this study), now spreading the dependent variable (left hand side-LHS) over a range of $-\infty$ and ∞ . The model, unlike the classical regression (OLS), does not assume linearity of the independent variables. The model makes no assumptions in respect of the homogeneity of the variance of the error term and normality of the distribution of the error term (Gujarati & Porter, 1999).

However, the maximum likelihood estimation process relies on the assumption of a correctly specified model, where there is no omission of key variables or inclusion of extraneous ones. A correctly specified model also implies that the true conditional probabilities are a logit (log-odds) function of the regressors. Because perfect or strong multicollinearity affects the outcome, coupled with an assumption that the cases are independent, rigorous diagnostic checks are required. Accordingly, diagnoses on multicollinearity and specification errors are carried out on the empirical estimation.

The odds ratio in this study measures the odds of being financially excluded (or included) divided by the odds of being financially included (excluded). The probabilities drive the odds ratios, suggesting that the latter depend on the magnitude of the probabilities (of both exclusion and inclusion). A higher odds ratio (above one) suggests that the variable concerned exhibits the dominant effect of probability of success.

5.6 Empirical Model Specifications

5.6.1 Econometric Model (I): Financial Inclusion and Institutional Context

The model below is posited to investigate the effect of prevailing regulatory and institutional factors on financial inclusion.

Model

$$FI=f(MEI, IEF, WGI, ICT, CI)\dots\dots\dots(13);$$

where, ‘FI’ represents financial inclusion as the outcome variable. A proxy for financial development used here is the share of domestic credit by the financial sector to the private sector (as a percentage of GDP), in line with Beck, Levine, and Loayza (2000). Given that financial inclusion is a key component of financial development (Demirgüç-Kunt & Klapper, 2012a), the latter is also used as proxy for aggregate financial inclusion at the macro-level study. The empirically established strong positive correlation between financial inclusion and financial development measured by credit to the private sector (Demirgüç-Kunt & Klapper, 2012a) allows the author to use the proxies indicated above.

The explanatory variables in Eq. 13 are; MEI, IEF, WGI, ICT, CI which stand for macroeconomic indicators, index of economic freedom, worldwide governance index, information and communications technology and corruption index, respectively (*see* Section 5.4.2 (v) for detailed description). Summaries of the full description of the regressors and their sources are provided in Table 5.6.

The specific econometric model estimated is given as:

$$FI_t = \beta_0 + \beta_1 CI_t + \beta_2 WGI_t + \beta_3 IEF_t + \beta_4 MEI_t + \beta_5 ICT_t + u_t \dots \dots \dots (13.1);$$

where CI_t , IEF_t , MEI_t and ICT_t are vectors of their respective variables (as given in Eq. 12), β_s are the coefficient estimates and u_t is the error term assumed to have zero expected value and constant variance. A priori, the β_s are expected to have positive signs such that $\beta_s > 0$. It is to be noted also that β_2 in Eq. 13 captures the coefficients estimates b_2 - b_5 ; β_3 , (b_{10} - b_{14}); β_4 , (b_6 - b_9), and β_5 , (b_{15} & b_{16}) in the empirically estimated model (13.1). This model allows for the testing of the hypotheses $H_{a(1-4)}$ outlined in Chapter 3. The result is presented in Chapter 6.

$$C2P_t = b_0 + b_1 CI_t + b_2 PolStab_t + b_3 RegQual_t + b_4 RoL_t + b_5 VnA_t + b_6 MoniGrowth_t + b_7 GDP_pcGrwth_t + b_8 Gross_Sav_t + b_9 Rmit_t + b_{10} IEF_Bf_t + b_{11} IEF_Gf_t + b_{12} IEF_Mf_t + b_{13} IEF_Tf_t + b_{14} IEF_If_t + b_{15} LogMobSub_t + b_{16} INT_Sub_t + u_t \dots \dots \dots (13.2)$$

5.6.2 Econometric Model (II): Financial Inclusion and Technological Deepening

The model below is specified to investigate the role ICT plays in financial inclusion in Ghana. This follows the hypothesis that technological deepening has a positive significant effect on financial inclusion.

General Model Specifications

$$FI=f(ICT, X).....(14)$$

In the models specified above, FI represents financial inclusion, which is the dependent variable (explained in Section 5.4.1).

Equations 14.1 and 14.2 are the specific models specified to investigate the usage dimension of financial inclusion (Triki & Faye, 2013). The two econometric models estimated reflect the nature of the data used (macro-level/time-series, Eq. 14.1 and micro-level cross-section household data of Gallup Poll, Eq. 14.2). The percentage of adults having an account with a formal financial institution signals the actual usage of financial services and products.

Specifically, the empirical regression model takes the form specified here:

Macro-model

$$FI_t = \beta_0 + \beta_1 TI_t + \beta_2 X_t + \varepsilon_t(14.1)$$

and the

Micro-model

$$FI_i = \alpha_0 + \alpha_1 TI_i + \alpha_2 X_i + e_i(14.2)$$

Following Allen et al. (2016), the outcome variable FI_i , (account ownership) of Eq. 14.2 is a dichotomous variable and is estimated using logistic regression.

The model Eq. 14.1 using the macro-dataset, is estimated using the OLS model, and in line with Kendall et al. (2010). This is informed by none of the CLRM assumptions appearing to be violated after a rigorous model diagnosis. The subscripts of both equations (14.1 and 14.2) reflect the time-series and cross-sectional data respectively, as used in the empirical estimation (see Chapter 6 for

the outcome). These models allow for the testing of hypotheses $H_{a5(1-4)}$ as outlined in Chapter 2.

As noted earlier, the key independent variables of interest in Eq. 14. (1&2) are information and communication technology (ICT) denoted TI_i . In the tested model (Eq. 14.1) using the macro-level time series data, the author controls for national level indices such as the macroeconomic variable per capita GDP and economic freedom index, captured by X_s . Recent empirical works have recognised ICT advancement, especially mobile telephone deployment, as a unique means to foster financial inclusion in Africa (see e.g., Kpodar and Andrianaivo, 2011).

In the micro-model (Eq. 14.2), the dependent variable measures the likelihood of individual i getting included financially. Account ownership can be with a financial institution, post office or mobile network operator (MNOs) as contained in the household (Findex) data for Ghana. The ICT indicator variable denoted by TI_i represents technological infrastructure. The X_i are the control variables, which include an individual's demographic characteristics such as income quantile, educational level, age and gender. The α_s are the estimated parameters and e_i is the non-stochastic error term.

The estimation of Eq. 14.1 is by a maximum-likelihood estimation and processes with the logit model as a link function (Albert & Chib, 1993), as the outcome variable is categorical (Hosmer, Hosmer, Le Cessie, & Lemeshow, 1997; Wacholder, 1986). Logit is considered the 'most popular link function for binary data' according to Albert and Chib (1993); partly informing its being chosen over other binary outcome models. Detailed descriptions for the regressors are given in Section 5.4.2 (ii) and summarised in Table 5.6.

5.6.3 Econometric Model (III): Financial Exclusion and Firm's Attributes

Many prior studies have investigated factors that serve as barriers to a firm's credit accessibility. These include studies involving financial constraints among SMEs (Abor & Biekpe, 2006; Abor & Quartey, 2010; Beck, 2007; Beck & Demirguc-Kunt, 2006; Beck, Demirgüç-Kunt, & Maksimovic, 2005), firms operating within developing economies with a high degree of informality (Beck, 2007; Beck & Demirguc-Kunt, 2006; Wellalage & Locke, 2016), and financial challenges firms face even after financial sector liberalisation policies (Aryeetey, 1994b; Tagoe,

Nyarko, & Anuwa-Amarh, 2005). However, a clear departure from these studies is the motivation to consider firms' attributes that either incentivise or inhibit their inclusion in the use of financial services. A model of geographical, economic, technological and demographic variables that are associated with the likelihood that a firm in Ghana will be excluded financially is accordingly postulated:

$$FE_i = f(\text{Firm Size}, \text{ICT}, \text{Sector}, \text{Location}) \dots \dots \dots (15)$$

The outcome variable, FE_i represents financial exclusion. It captures the likelihood that an 'i' firm in Ghana will 'involuntarily' be excluded from getting a loan or line of credit. The respondents include firms whose loan applications were either refused or who involuntarily refused to apply due to constraints both real and perceived (see WBES questionnaire K.17(2-7)).

All the explanatory variables except sales, manager's years of experience and age are categorical, taking on binary values (0 or 1). Stata statistical software allows for the generation of these dummy variables such that quantitative analyses are carried out on the qualitative factors (Gujarati & Porter, 1999). The use of the natural log of variables such as sales, age and manager's experience was to reduce the dispersion from their expected values, which helps minimize the potential effects of extreme values. Firm attributes, such as the years of operation (Age), the manager's years of experience, whether the firm is a subsidiary of another organisation, and the legal form of business ownership, are used as the control variables captured by X_i in Eq. 15.2. The model to be empirically tested expressed in odds ratio form is specified as:

$$FE_i = \exp^{(\alpha_0 + \alpha_1 \text{Size}_i + \alpha_2 \text{ICT}_i + \alpha_3 \text{Sector}_i + \alpha_4 \text{Location}_i + \alpha_5 X_i + \varepsilon_i)} \dots \dots (15.1)$$

However, the transformed model into logistic regression to be estimated is of the form:

$$FE_i = \alpha_0 + \alpha_1 \text{Size}_i + \alpha_2 \text{ICT}_i + \alpha_3 \text{Sector}_i + \alpha_4 \text{Location}_i + \alpha_5 X_i + e_i \dots \dots (15.2)$$

The logistic regression model specified above is now linear in parameter (Hosmer Jr & Lemeshow, 2004), given that, in reality, the Eq. 15.2 is an ordinary regression with the logit as the response variable (Bruin, 2006). The model allows for the testing of hypotheses $H_{(b1-4)}$, in an estimation guided by maximum likelihood

process (Gujarati & Porter, 1999; Hosmer & Lemeshow, 2005; Hosmer Jr et al., 2013). The empirically estimated model outcome is presented in Chapter 8.

5.6.4 Econometric Model (IV): Inclusion and Micro/Firm Level Impact

The econometric model to gauge the poverty-reducing effect of a financial inclusion programme is posited below. Most prior studies on how finance affects poverty are either at macro-level or micro-level studies and are often descriptive in nature (see e.g., Anim et al, 2014). An empirical econometric regression model using micro-household level data is very difficult to find within the body of existing literature (Beck et. al., 2015). To fill this gap, poverty-alleviating impact of financial inclusion using micro-level households' data is empirically investigated. The motivation is from both theoretical and empirical positions that living standards of poor households will improve with inclusive financial system (Imboden, 2005). The general model is specified as follows:

Model

$$Windex_i = f[FI_access_{ij}, FI_Quality_j, Demographics Factors_i] \dots\dots\dots(16)$$

As described in detail in Section 5.4.1 (v), the *Windex_i*, which denotes *welfare index*, is used as the dependent variable to model the *impact dimension* of financial inclusion. Section 5.4.2 (iii) offers a detailed description of the independent variables used, and Section 5.4.3 captures the control variables. A range of demographic factors such as gender, literacy level of adult household member, client's location (urban/rural), family size and dependency ratio are used as control variables.

The empirical estimated econometric model is specified below:

$$Windex_i = \lambda_0 + \lambda_1 FI_A_{ij} + \lambda_2 FI_Qual_j + \lambda_3 X_i + e_i \dots\dots\dots(16.1);$$

where *Windex_i* connotes welfare/poverty index for individual *i*, with *FI_{A_{ij}}*, and *FI_{Qual_j}* capturing the *access* and *impact* dimensions of financial inclusion respectively. The Eq. (16.1) above is estimated using an IV estimation process (see Chapter 9 for results).

The *X_i* captures the basic demographic attributes of MFI clients, key among which are urban-rural dimension, age of the household's head who is a client, and

household size. The error term (e_i) captures any variations in the outcome variable that could be due to stochastic factors that are not captured in the model.

To ascertain the impact of MFIs' type, the quality of the programme's implementation and other demographic attributes of the clients on financial inclusion, the model below is estimated using an OLS process.

$$FI_i = b_0 + b_1 MFI_typ_i + b_2 FI_Qual_j + b_3 X_i + e_i \dots\dots\dots(16.2)$$

It is to be noted that OLS is generally regarded as a part of GMM, according to Baum et al. (2013), though the former strictly follows the CLRM assumptions described in Section 5.5.1 subsection (i).

The motivation for using OLS to estimate Eq. (16.2) stems from the realisation that endogeneity is not endemic; also, none of the OLS assumptions is violated after diagnostic checks. Baum et al. (2003) and (2007) caution the risk of using IV method when the orthogonality condition test suggests that the disturbance term and the regressors are unrelated, hence the use of OLS.

The two models specified above are used empirically in testing the series of hypotheses $H_{a(1-3)}$ outlined in Chapter 3. The results of the empirical estimation are presented in Chapter 9.

5.6.5 Econometric Model (V): Financial Inclusion and Impact on Macroeconomic Growth

The question of how financial inclusion translates into economic inclusion has both micro- and macro-dimensions. The micro-aspect is addressed in the previous section. The economy-wide impact of financial inclusion programmes is modelled using macro-level indicators. The proxies used are to ensure inclusion at the national level is gauged accurately. This is motivated by the outcome that the financial system must lead to inclusive growth at the national level (Chibba, 2009; Hannig & Jansen, 2010). Using GDP per capita to measure economic growth, the model below is useful to investigate the growth-financial inclusion nexus.

Model

$$G = f(\text{Fin Depth}, \text{Fin_Effic}, \text{Fin/Mon Environ}, \text{SGD})\dots\dots\dots(17)$$

where; G denotes economic growth as the dependent variable; Financial Depth (*Fin_Depth*), Financial Efficiency (*Fin_Effic*), Financial/monetary environment (*Fin/Mon Environ*), as regressors, controlling for standard growth determinants (*SGD*). Following prior studies (see Beck & Levine, 2001, 2004; Ndako, 2010) the author uses the natural log of real GDP per capita (*lnYpc_t* in Eq. 17.1) as an indicator for economic growth. Descriptions of the independent and control variables are given in Section 5.4.2 and 5.4.3 respectively. The estimated model specified below will be useful for testing the hypotheses (**H_{c1-2}**) outlined in Chapter 2. The outcome is presented in Chapter 7.

Specific estimated model

$$\ln Ypc_t = \omega_0 + \omega_1 MCAP_t + \omega_2 C2PS_t + \omega_3 Remit_t + \omega_4 Infla_t + \omega_5 MoniGrwth_t + \omega_6 LI_t + \omega_7 GSEret_t + \omega_8 U_rate_t + \omega_9 FDI_t + \omega_{10} BOC_t + \omega_{11} NPA_t + \omega_{12} Gross_Sav_t + u_t \dots(17.1)$$

The puzzle of whether it is the financial institutions (e.g., banks) or market (stock market) that drive growth, especially in LICs, led to econometric modelling motivated by the Levine-King (K-L) model (King & Levine, 1993). This really begs the question as to how the existing financial structure and development in a given economy influences its economic growth. This is helpful to identify the trajectory of financial inclusion towards economic growth, and whether that trajectory is traceable through the institution (bank-based view), financial market (market-based view) or both (thus, countervailing view).

Following Levine (2002), the model below is specified;

Growth = f(Financial Structure, Financial Development, and other Standard Growth-Determinants).

To this end, the following relations are postulated:

$$G_t = \alpha_0 + \alpha_1 FS_t + \alpha_2 X_t + e_t \dots\dots\dots(17.2)$$

$$G_t = b_0 + b_1 FD_t + b_2 X_t + e_t \dots\dots\dots(17.3)$$

$$G_t = \theta_0 + \theta_1 FS_t + \theta_2 FD_t + \theta_3 X_t + e_t \dots\dots\dots(17.3)$$

The *FS* presents financial structure. Higher value suggests financial market-driven, and a lower value implies banks/financial institutions-based financial system. The *FD* captures the overall financial development, encompassing development of banks, non-banks and securities market per the WDI database definition (Demirgüç-Kunt & Maksimovic, 2002; Levine, 2005). Higher values imply deepened financial services. The X_t captures the *standard growth determinants* serving as conditioning factors, e_t is the error term, whereas α_s, b_s and θ_s are the coefficients. The key predictions of the model can be found in Table 7.5.

5.7 Diagnostic Checks and Specification Tests

5.7.1 General Diagnostic

5.7.1.1 Heteroscedasticity

A test to establish whether or not the variance of the error term is constant is one basic requirement of the classical linear regression models. Homoscedastic error term assures the author that the error term does not exhibit any systematic patterns. Homoscedasticity implies that the individual value of the dependent variable (y_i) is expected to spread around their mean (estimated) value with the same variance (Gujarati & Porter, 1999). In that case, therefore, the assumption that the independent variables (X_s) are non-stochastic becomes key. It will suggest that the only source of variations in the dependent variable will be the error term (e_i). Under the homoscedastic assumption, the conditional mean of both the dependent variable and the error term are constant and the same (σ^2).

Both Breusch-Pagan / Cook-Weisberg and White/Koenker nR^2 are applied in such diagnosis depending on an OLS and IV respectively. In the instances where a heteroscedasticity problem exists in the model, heteroscedasticity-robust standard errors are used to address any potential consequences (Stock, Watson, & Addison-Wesley, 2007).

5.7.1.2 Multicollinearity

The problem of multicollinearity arises when there is an exact linear relationship among the regressors (X_s). The CLRM assumption prevents a situation where there is a linear functional relationship between the covariates. When this occurs, the expected value of the dependent variable (y) will be biased. Such a problem also

makes it impossible to estimate the partial regression coefficients, hence an inability to ascertain the individual impact of the Xs that are linearly correlated (Gujarati & Porter, 1999).

To ensure such situation does not exist, the author performs a diagnostic test using the variance inflation factor (VIF). The variance inflation factor (VIF) captures the impact of linear correlation among the regressors. VIF is related to the multiple correlation coefficient (R) such that $VIF=1/(1-R^2)$. The reciprocal of the VIF is the tolerance level that can also be used. As a general guide, a VIF larger than 10 is an indication of the severity of multicollinearity (Neter, Wasserman, & Kutner, 1990). The application of the VIF is to rule out the threat posed by the presence of multicollinearity to the fitted models to ensure that the OLS estimators produce best linear unbiased estimators (BLUE) (Gujarati & Porter, 1999).

In practice, however, it is impossible to avoid multicollinearity, since any correlation among the covariates generates collinearity. A moderate multicollinearity appears common and therefore complete orthogonality between the independent variables is unlikely. The severity of its existence in a model leads to inflated standard errors in a way that can compromise the reliability of the estimated regression coefficients. The Stata software used by the author drops variables that are highly collinear.

5.7.1.3 Normality Tests

Ensuring the validity of all parametric (Thrikawala, 2016) statistical tests, such as in OLS models, required that the residuals behave normally. This helps address any issues that may arise out of skewness and high kurtosis in the data, which may affect the test statistics (p, t and F). The estimations using binary models and non-parametric models do not rely on the normality of the dependent variable to produce valid outcomes. For the linear parametric models, however, a normality check becomes crucial.

In line with this, the author carried out graphical checks on the dependent variable of the semi-parametric and parametric models. This is to help check the distributional robustness. The application of a ladder-of-power histogram and ladder-of-power quantile normal plots, following Tukey (1977), and also in StataCorp LP (2009), assures the normality of the distribution (Gould, 1992). This helps rule out the existence of significant divergence of the plots from the expected.

In addition, a kernel density plot, which produces a histogram for the residuals, is applied at some stage. Again, where dispersions appear significant in a given variable, natural logarithmic transformation was adopted to reduce the variability and skewness (Bernard & Bernard, 2012; Thrikawala, 2016).

5.7.1.4 Specification Tests

A correctly specified regression model is key to ensuring validity of the outcome. Ramsey's reset test using powers of the fitted values of the model is used in OLS diagnosis to determine whether inclusion or omission of some variables is needed.

In models involving either binary or continuous dependent variables, must ensure that the link function fits. For instance, decision to employ logit or probit as link functions must be informed by their respective distribution and how well each model serves as a link function. The link test is also employed in OLS models. The *linktest* command in Stata software after the logistic command allows the author to detect a specification error in the binary (logit) models. Intuitively, the test assures a properly specified model where the need to include additional predictors may not arise.

5.7.2 Model Specification Tests for the GMM

5.7.2.1 Test for Endogeneity

The use of GMM, which is part of an instrumental variable (IV) estimation method, is based on the suspicion of non-orthogonality between the disturbance term and the regressors in a way that generates the endogeneity problem (Baum et al., 2007). Reliance on OLS estimator under such endogeneity conditions produces both inconsistent and biased outcomes. This leads to the carrying out of diagnostic checks using the appropriate tests. Both Durbin-Wu-Hausman (D-W-H) and Hansen/Sargan C (difference-in-Sargan) tests are run to detect the presence or otherwise of endogeneity issues and in some cases, heteroscedastic error term.

The application of D-W-H and Hansen/Sargan C (difference-in-Sargan) tests ensure that the problem of endogeneity is clearly ruled out (Cameron & Trivedi, 2010). The tests are based on the null hypothesis that the suspected endogenous covariates are exogenous (Baum, Schaffer, & Stillman, 2007). The rejection of the hypothesis following the significance of the test implies that the specified endogenous

regressors were indeed so. The application of the test suggested the presence of endogeneity in the dataset, necessitating the use of an IV estimation method. Cross-sectional data on household welfare and credit access studies raises serious issues of endogeneity (Khandker, 2005; Khandker & Pitt, 2003). As an instance, Pitt and Khandker (1998) modelled the welfare-inducing impact of credit to households through consumption. The authors addressed endogeneity issues which they traced to the possible association between the residuals of the credit access and the consumption equations, using a two-stage IV estimation method (Khandker, 2005; Pitt & Khandker, 1998). However, where the test suggests absence of endogeneity issues, OLS are applied.

In the context of the empirical models specified in Section 5.5(ii), the author acknowledges that any random shock that affects the household family size also affects the poverty/welfare index, hence, the treatment of family size as endogenous. It is expected that a random shock that affects a household's financial inclusion status can also affect its standard of living as captured by the poverty/welfare index (*Windex*). Also, an individual's level of education and type of occupation potentially may have an effect on their family size, as well as their financial accessibility. This informed the treatment of amount borrowed (*FI_LnLoan*) and family size (*FAMSIZE*) as endogenous in the first model (Eq. 16.1). In each case, the chosen instruments (i.e., the excluded exogenous variables) are presumed to be uncorrelated with error term (\mathbf{u}_i) and dependent variables, but to have a link with their respective endogenous regressors, following Baum et al. (2007). The outcomes of the multiple regression models are presented in Tables 9.3 – 9.6 and discussed. This allows for meaningful inferences to be deduced, out of which policy implications are adduced.

The GMM is efficient whether or not the error term is homoscedastic (Baum et al., 2003, 2007). However, the choice of GMM over other IV-estimation process is also informed by whether the disturbance term is homoscedastic or not. Using a White/Koenker nR^2 test statistic, which follows Chi-square distribution, helps test the null hypothesis that the disturbance term is homoscedastic. The test suggests presence of heteroscedasticity (*p-value* 0.0000), and according to Baum et al. (2007) GMM is most preferred.

5.7.2.2 Identification

Identification problems in simultaneous equations give rise to a situation where unidentified models make it difficult for the reduced form estimates to produce structural coefficients. Identification therefore becomes crucial as the moment condition requires r set of information about K unknowns; (where r is the number of instruments and K is the number of endogenous regressors). If r is equal to K , then the model instrumentation is considered just-identified and if $r > K$, an over-identified condition has occurred.

In practice, an over-identified model is an ideal when it comes to simultaneity issues in empirical models. An over-identified restriction allows more than one set of structural coefficients to be deduced from the reduced form (Gujarati & Porter, 1999).

The order condition must be met for IV to yield consistent estimates. The condition specifies that the number of instruments must exceed or at least equal the number of endogenous regressors. This implies that the instruments excluded from an equation must at least be equal to the endogenous variables contained in that equation. In that case, $r \geq K$ should hold. It is expected that a given instrument must both be valid and relevant. Unidentified models exist where too few relevant instruments exist, such that the order condition is violated, i.e., $r < K$. The author uses Hansen's J statistic to test the orthogonality condition in which an over-identification restriction is established (Baum et al., 2003, 2007). This guarantees that the model is well specified with chosen instruments in which the use of a weighting matrix is required to meet the first-order condition (FOC) in the minimization process.

5.7.2.3 Instrument Weakness Test

Weak instruments give rise to weakly identified models. This occurs in situations where the correlation between the instruments excluded and the endogenous regressors instrumented is not strong enough (Baum et al., 2007). Baum et al. (2007) further caution that severe finite sample bias issues may occur when using IV/GMM methods of estimating β_s when the instruments are weak. A weak identification test can be carried out using the Wald test of either Kleibergen-Paap

rk or Cragg-Donald which follows F distribution (Baum et al., 2007; Stock & Yogo, 2005).

The application of the Wald test was to test the hypothesis that the instruments used are weak. The minimum eigenvalue statistic (F-stat value), found to exceed any of the critical values produced by the Wald test, did not provide enough grounds for acceptance of the null hypothesis. In such case, the null hypothesis that the instruments chosen are weak was not accepted.

5.8 Chapter Summary and Conclusion

The chapter has outlined the methods that are used in the investigation process. As a quantitative research design, econometric methods of investigation using both parametric and semi-parametric models applied in this thesis are presented in the chapter.

Because the concept of financial inclusion/exclusion is dichotomous by nature, a binary model using logit as the link function has been useful model. In addition, the use of generalised method of moments (GMM) as part of the instrumental variable models is in the recognition that endogeneity is often endemic in household-level financial inclusion studies.

Multi-domain sources of datasets as used in the empirical investigations are also presented in the chapter. Key among these are the World Bank Enterprise Survey (WBES), Gallup Poll Global Findex database, Inter-university Consortium of Political and Social Research - (household-level data sponsored by the World Bank) and world development indicators (WDI) of the World Bank.

Additionally, a series of empirical models to be estimated are developed and presented in this chapter. A careful definition of the variables used in the empirical investigation process outlined in this chapter is to allow for both traceability and replication. As the chapter connects the two preceding it and the subsequent chapters on empirical findings, it allows for replicability of the estimated models in future research.

CHAPTER 6

EMPIRICAL STUDY OUTCOME: INCLUSION AND INSTITUTIONAL CONTEXT

6.1 Chapter Overview

This chapter is an empirical response to the research questions of whether institutional factors play a significant role in creating an inclusive financial system. The estimation of equations 13.1 and 14 (1&2) allows for the formal testing of hypotheses $H_{a(1-4)}$ and $H_{a5(1-4)}$, respectively. The empirical evidence presented in this chapter contributes to the understanding of a broader set of factors influencing financial inclusion in LICs. Prior studies have emphasised the role national governance indicators (e.g. rule of law) plays in FI (Beck et al., 2011; Koeda & Dabla-Norris, 2008). Again, the role of technological amenities, such as mobile phones, in overcoming information asymmetry to enable deeper financial inclusion has also been established (Donovan, 2012; Jack & Suri, 2011; Kpodar & Andrianaivo, 2011). These relationships are examined in this chapter focusing on Ghana.

The chapter is organised as follows. The first part focuses on the broader environmental and institutional factors within which inclusion is expected. This will address the hypothesis $H_{a(1-4)}$ outlined in Chapter 3. Investigation into the unique role technological advancement plays in incentivising financial inclusion is addressed by hypothesis $H_{a5(1-4)}$. The rest of the chapter proceeds as follows. The next section (6.2) presents the outcome of the preliminary analysis using descriptive statistics. Sections 6.3 and 6.4 present findings based on the econometric estimates of multiple regression. The final section (6.5) offers a summary and policy conclusion of the chapter.

6.2 Preliminary Data Analysis

Analysis and discussion of descriptive statistics for the models on institutional factors and inclusion are carried out in Section 6.2.1. Descriptive summary statistics on the impact of technology on financial inclusion using micro-data from Global Findex database on Ghana are presented in Section 6.2.2. Descriptive statistics such as mean, standard deviation (SD), coefficient of variation (CV), minimum and maximum values of the variables are presented. The discussions, however, mostly focus on the mean and the CV.

6.2.1 Descriptive Statistics: Institutional and Regulatory Factors

Table 6.1 reports descriptive statistics for the data sample. The mean value of the dependent variable, (i.e., domestic credit provided to the private sector) is approximately 29 percent of GDP. This may suggest that a significant proportion of a bank's credit goes into meeting public-sector borrowing requirements (PSBR). This may signal an issue of a crowding-out effect on the domestic private sector (see Chapter 4, Section 4.3.3 for implications of financial inclusion). This outcome confirms the observation made by Kwakye (2010) that PSBR imposed by high fiscal deficit (in reference to 2009-2010 period) is a major contributory factor accounting for the high cost of capital in Ghana. This, he argues, thwarts the private sector incentive to invest (Kwakye, 2012).

The mean score on the corruption index (CPI) of 3.68 on the scale of 10, places Ghana above most African countries on the corruption perception scale. Recent data on CPI per Transparency International (2014) report, places Ghana first in West Africa and third in Africa, trailing marginally behind Botswana and Namibia. This nonetheless appears low compared with advanced economies (Transparency International, n.d.).

The mean score of 53.14 on the governance index regarding voice and accountability (*Gindex: VnA*) significantly reflects the current democratic dispensation with media proliferation playing a significant role in shaping the financial landscape of Ghana.

Table 6.1: Descriptive and summary statistics-macro dataset

Variable	Mean	Std. Dev.	Min	Max	CV
DV: Domestic Credit by FIs	28.99	5.36	18.36	39.30	18.5%
TI: CPI	3.68	0.41	3.30	4.60	11.2%
<i>Gindex: PolStab</i>	42.11	6.90	31.25	52.88	16.4%
<i>Gindex: RegQual.</i>	47.37	7.52	35.29	55.98	15.9%
<i>Gindex: VnA.</i>	53.14	8.75	37.98	62.56	16.5%
<i>Gindex: ROL</i>	50.13	6.02	35.89	56.87	12.0%
Monetary Growth Rate (<i>Monigrowth</i>)	33.16	11.43	17.49	56.53	34.5%
Internet Usage	3.83	4.71	0.01	14.11	123.1%
GDP per capita growth rate	3.66	2.72	1.27	12.42	74.3%
LOG of mobile Sub.	6.55	0.71	5.11	7.45	10.9%
Investment freedom	53.61	7.03	50.00	70.00	13.1%
Trade freedom	60.79	8.38	31.20	67.80	13.8%
Remittance per capita	3.70	1.68	1.48	6.11	45.4%
Gross savings	9.45	7.25	2.00	28.00	76.8%
Business freedom	58.59	6.19	50.00	70.00	10.6%
Monetary freedom	63.14	6.01	51.20	71.00	9.5%
Government's spending freedom	69.35	11.37	46.10	84.10	16.4%

Source: Authors' analysis

The variability in the data is measured by the coefficient of variation (CV). The high CV found among key variables such as *Gross Savings* (76.8%), remittance per capita (45.4%) and *GDP per capita growth rate* (74.3%), partly informed the use of a non-parametric model (quantile regression) in the multi-variate analysis. The CV is the ratio of the standard deviation (SD) to the mean. Unlike the SD, CV measures the variability in the data taking into account the means and the measuring scales of variables concerned. For instance, the data show that internet growth rate in Ghana from 1996 to 2013 was highly volatile, resulting in the SD of approximately 123 percent of its mean. This partly explains why the internet penetration rate using time-variant data reveals an insignificant relationship with financial inclusion.

6.2.2 Descriptive Statistics: ICT and Digital Financial Services

Table 6.2 below shows that about 40.2 percent of the respondents own some form of account. This confirms the findings of prior studies that more than 50 percent of adults in LICs do not own any form of account (see e.g. Demirgüç-Kunt & Klapper,

2013). The micro-dataset was cross-sectional data comprising 1,957 adults aged 15 years and above. The macro-data is longitudinal spanning 18 years (1995-2013).

Table 6.2: Descriptive and summary statistics-micro dataset

Variable	Mean	Std. Dev.	Min	Max
<i>Micro (Findex) Dataset</i>				
FI (Fin. Inst. and MNOs)	0.40	0.49	0.00	1.00
Account own (Fin. Inst.)	0.37	0.48	0.00	1.00
Account own (MNOs)	0.10	0.30	0.00	1.00
Mobile money usage	0.10	0.30	0.00	1.00
Age	33.98	14.72	15.00	98.00
Lnage	3.44	0.41	2.71	4.59
Bank card usage	0.16	0.37	0.00	1.00
<i>Income quantiles dummies</i>				
second 20%	0.20	0.40	0.00	1.00
middle 20%	0.18	0.38	0.00	1.00
fourth 20%	0.20	0.40	0.00	1.00
richest 20%	0.23	0.42	0.00	1.00
<i>Educational level dummies</i>				
Secondary	0.54	0.50	0.00	1.00
Tertiary	0.06	0.24	0.00	1.00
<i>Macro-time series Dataset</i>				
Credit2PS	13.08	2.96	6.01	16.99
Urate	6.48	2.69	3.60	10.40
Mobusage	35.93	41.86	0.07	114.82
INTusage	4.62	5.74	0.01	18.90
GDP_pcg	3.66	2.72	1.27	12.42
EFIOverall	58.13	1.51	55.60	61.30
INTSub_Rate	52.54	95.97	0.00	357.21
MOBsub_Rate	4.64	3.90	0.27	10.72
LOGEFI	4.06	0.03	4.02	4.12

Note: Descriptive summary statistics for the ICT -financial inclusion model.

Decomposition of account ownership into financial institutions-based and MNOs-based helps with the analysis. The study reveals that approximately 37 percent of the respondents reportedly own accounts with formal intermediaries compared with 10 percent who own mobile-based accounts (mobile money/wallet). It is instructive to note that in terms of rate of usage²⁴, mobile-based (99.0%) appears much higher than bank-based (45.0%). The contrast is clear, almost all the mobile-based account owners use it for financial transactions compared to those who own debit/credit cards in formal intermediaries. Non-bank-based digital financial services (DFS)

²⁴ Defined as the ratio of facility usage to account ownership

seem to drive the future of financial inclusion in Ghana and other LICs. This is also confirmed by the regression outcome.

The low internet penetration trend with the mean value of 3.82 implies that only approximately 4 out of 100 people in Ghana have access to internet facilities. In addition, mobile penetration rate in Ghana as at 2013 was estimated at approximately 115 percent²⁵ with an average growth rate of approximately 42 percent. This compared with internet penetration rates of approximately 19 percent, with average yearly growth rate of about 5.7 percent. This trend, observed in this study, seems consistent with the existing literature.

Emerging scholarly works suggest that there has been more rapid growth and adoption rate of ICT (e.g., mobile) in most parts of Africa in few past decades than before (Adam & Wood, 1999; Andrianaivo & Kpodar, 2012; Kpodar & Andrianaivo, 2011). World Bank (WDI) Report (2014, p.74) reveals that mobile tele-density (telephones per 100 persons) in Ghana was 1.3 percent in 2001, rose to 101 percent by 2012, with current ITU/ICT database estimates standing at 115 percent per 100 people. This is higher than the continental average of 71.2 percent. The internet penetration rate has been relatively slower, averaging 50 percent p.a. per the ITU estimates. This growing trend has implications for financial inclusion, as a new avenue for serving the previously unbanked (Kpodar & Andrianaivo, 2011; Triki & Faye, 2013).

Even though the analysis based on the macro-level (time-series) data on internet penetration shows no significant impact on financial inclusion, the micro-analysis suggests a promising trend. The significance impact of internet usage on inclusion could be attributed to the proliferation of ‘smart phones’ with internet connectivity as an embedded feature. This defines the *mutual inclusivity of mobile phone and internet penetration* as means towards inclusion.

The mean percentage score of the overall economic freedom index for Ghana is approximately 58 percent. Although Ghana’s business environment appears much freer compared with most countries within the West-African sub-region, the mean score also underscores that structural and institutional constraints remain (Aryeetey, 1997; Atieno, 2001).

²⁵ The fact that this rate exceeds 100% is expected as it is not uncommon to find people using more than one handset, with different network providers due to network coverage issues.

Demographic characteristics such as age, income quintiles and educational attainments of respondents serve as control variables. As an instance, the mean age of 34 suggests that the respondents are mostly youth who may find the use of smart phones with internet connectivity useful. The income variable reveals that approximately 18.7 percent fall within the poorest quintile, 20.1 percent in the second-lowest quintile, 18.0 percent in the median quintile, 20.1 percent in the mid-upper quintile, and 23.1 percent in the richest quintile. As shown on the pie chart below, participatory distribution in terms of income status of the respondents appears to be fair.

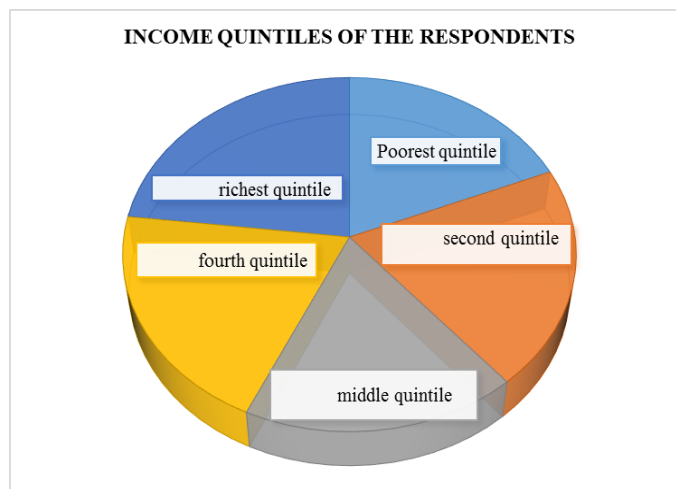


Figure 6.1: Distribution of the respondents' income status

The educational levels appear skewed towards second-cycle and primary-school leavers. Whereas primary-school leavers constitute 39.3 percent of the total respondents, 54.4 percent had up to secondary education level, with only 6.3 percent attaining tertiary level. Though this pyramid-like result may fairly reflect the adult population in Ghana, it nonetheless has implications for financial inclusion; especially if inclusion is limited only to those topmost on the educational ladder.

6.3 Outcome of the Multiple Regression Analysis: Inclusion and Institutional Context

Tables 6.3 and 6.4 depict multiple regression results using quantile regression with OLS as a benchmark. A careful diagnostic testing on the normality and distribution of the dependent variable indicates the use of a quantile regression (QR) approach (see Section 6.4.3). This has the advantage of providing more robust outcomes

relative to other methods, as no parametric assumption is made (Cameron & Trivedi, 2005; Wellalage & Locke, 2014). The approach also offers the flexibility of allowing the investigation of the entire distribution of the dependent variable (financial inclusion), instead of the conditional mean the OLS estimation imposes (Cameron & Trivedi, 2005). The quantile used ranges from 30-70, with intervals of 10 as seen in columns 2 to 6. The first column shows the OLS results. The results show that all the determinant variables tend to have a stronger impact at the lower quantiles of the dependent variable (credit to the private sector). This is reasonable as higher inclusion impacts are expected where financial inclusion levels are lower.

Table 6.3: Regression results for the main indicators of inclusion

VARIABLES	(2) OLS	(3) q30	(4) q40	(5) q50	(6) q60	(7) q70
<i>TI-CPI</i>	8.710* (2.102)	8.732*** (0.634)	8.732*** (0.569)	8.649*** (0.546)	7.213*** (0.569)	7.213*** (0.634)
²⁶ <i>Gindex – PoliStab</i>	0.689** (0.128)	0.672*** (0.0418)	0.672*** (0.0375)	0.592*** (0.0360)	0.575*** (0.0375)	0.575*** (0.0418)
<i>Gindex - RegQual</i>	0.153 (0.0852)	0.169* (0.0411)	0.169** (0.0368)	0.187** (0.0353)	0.206** (0.0368)	0.206** (0.0411)
<i>Gindex -V&A</i>	0.723 (0.279)	0.706*** (0.0706)	0.706*** (0.0633)	0.593** (0.0608)	0.462** (0.0633)	0.462** (0.0706)
<i>Monigrowth</i>	0.184 (0.0850)	0.183** (0.0224)	0.183** (0.0201)	0.158** (0.0193)	0.105** (0.0201)	0.105** (0.0224)
<i>INTsub</i>	-1.888 (0.655)	-2.292*** (0.186)	-2.292*** (0.167)	-1.970*** (0.160)	-1.374** (0.167)	-1.374** (0.186)
<i>GDP_pcg</i>	1.785** (0.387)	1.956*** (0.108)	1.956*** (0.0966)	1.826*** (0.0927)	1.476*** (0.0966)	1.476*** (0.108)
<i>MOBsub</i>	6.316 (2.903)	5.950** (0.772)	5.950** (0.692)	5.223** (0.664)	3.685** (0.692)	3.685** (0.772)
<i>IEF_IF</i>	0.195 (0.148)	0.341*** (0.0310)	0.341*** (0.0278)	0.257** (0.0267)	0.183** (0.0278)	0.183** (0.0310)
<i>IEF_TF</i>	0.582*** (0.0294)	0.593*** (0.0166)	0.593*** (0.0149)	0.578*** (0.0143)	0.561*** (0.0149)	0.561*** (0.0166)
<i>REMIT_Pc</i>	-10.80** (1.578)	-10.53*** (0.388)	-10.53*** (0.348)	-9.778*** (0.334)	-9.266*** (0.348)	-9.266*** (0.388)
<i>Gross_NaSave</i>	0.240 (0.188)	0.288** (0.0492)	0.288** (0.0441)	0.200** (0.0423)	0.0545 (0.0441)	0.0545 (0.0492)
<i>IEF_BF</i>	0.219 (0.0830)	0.220** (0.0274)	0.220** (0.0246)	0.228** (0.0236)	0.209** (0.0246)	0.209** (0.0274)
<i>IEF_MF</i>	0.718** (0.0924)	0.711*** (0.0351)	0.711*** (0.0315)	0.727*** (0.0302)	0.776*** (0.0315)	0.776*** (0.0351)
<i>IEF_GF</i>	0.206 (0.139)	0.191* (0.0470)	0.191** (0.0421)	0.169* (0.0404)	0.106 (0.0421)	0.106 (0.0470)

²⁶ 'Gindex' means governance index

Constant	yes	yes	yes	yes	yes	yes
<i>IEF_FF</i>	No	No	No	No	No	No
Observations in 18 years						
years:						
R-squared:	0.987					
Breusch-Pagan / Cook-Weisberg test for heteroscedasticity:	Chi2(1) 0.76 (p 0.3842)					
Link test for Model Specification:	$y\text{-hat}$ ($p\text{-value}$ 0.000); $y\text{-hatsq}$ ($p\text{-value}$ 0.346)					

Note: Dependent Variable (DV) is Credit supplied by Domestic Financial Institutions (proxy for Financial Inclusion). Standard errors appear below coefficients in parentheses. An asterisk (*), (**) and (***) denotes statistical significance at the 10%, 5% and 1% levels respectively. The reported standard errors are heteroscedastic-consistent following Cameron and Trivedi (2005); though the null hypothesis of homoscedastic error term is not rejected. Models (3-7) represent quantile regression (QR) results of various quantiles. Constant included but not reported. Index of economic freedom (financial freedom) not included.

6.3.1 Financial Inclusion and National Governance Quality

The coefficients of the four proxies for national governance quality (*Gindex*: *PoliStab*, *RegQual*, *V&A* and *RoL*; see Table 6.4) show a positive relationship with the financial inclusion proxy. Though the statistical significance varied using the OLS (column 1), the quantile regression outputs show robust significance results.

This shows that financial inclusion does not occur in a vacuum and is key to the understanding of the role that regulatory and institutional environments play. Indeed, relating good governance and financial inclusion is not an impossibility. As an instance, Beck et al. (2011) observe that the legal right of borrowers, creditors and the wider participants in the financial market depends immensely on the established governance and contract enforcement mechanism. The outcome supports prior studies that find a significantly positive relationship between financial inclusion and some key indicators of good governance. This is consistent across the spectrum of quantiles of the financial inclusion indicator (see Table 6.3).

The regulatory quality indicator (*Gindex-RegQual*) captures the perceptions that policies and regulations that promote private sector development can be formulated and implemented by the authorities (Kaufmann et al., 2009). The statistically significant coefficient suggests that the quality of regulatory framework prevailing in a country enhances the credit provision to the private sector. As an instance, the implementation of financial sector reforms (FINSAP I, II&III), witnessed an overhaul of the existing banking laws and subsequent enactment of Banking Act (2002) (Sowa & CEPA, 2003). The financial intermediaries responded positively by increasing domestic credit to private and public sectors (see Figure 6.1).

The *Voice and Accountability (V&A)* indicator captures the perceptions of the extent to which people are able to exercise freedom of expression and association (Kaufmann et al., 2009). The indicator also captures people's ability to participate in the selection process of their leaders. A positive and statistically significant coefficient suggests that, all things being the same, a point increase in the V&A indicator translates approximately into a 0.7 increase in domestic credit supplied to the private sector by the FIs. The indicator also captures the freedom of press and media in the country. The proliferation of FM stations owned by private individuals has undoubtedly created a platform where people can meaningfully contribute to the governance process. Credit allocation is positively impacted. Credit officers often take advantage of the media to educate and inform people of their existing financial products. Empirical prior studies have underscored the importance of information sharing and dissemination platforms as drivers towards financial inclusion as higher bank credits result (Djankov et al., 2007; Jappelli & Pagano, 2002).

The role contract enforcement plays in enhancing credit allocations is highlighted in this chapter. Contract enforcement can occur where the protection of property rights is guaranteed under an efficient legal system (Asli & Vojislav, 1998; Beck et al., 2005; Demirgüç-Kunt, Levine, & Detragiache, 2008). The *Rule of Law* indicator (Gindex-*RoL*; see Table 6.4) measures perceptions of the extent to which private agents have confidence in the quality of contract enforcement, property rights, the police, and the judicial system (Kaufmann et al., 2009). The study finds a positive robust relationship between the rule of law and the ability of the financial system to engender inclusion. The presence of information asymmetry which creates moral hazard and adverse selection issues in lending makes contract enforceability important. In an opaque lending environment, this has the tendency to create significant non-performing assets for the FIs. The rule of law ensures contract enforcement serves as an incentive for FIs to lend to the private sector. This, therefore, ensures an inclusive financial system.

These findings are consistent with many prior studies. The role contract enforcement plays in enhancing credit delivery is empirically established. As an instance, empirical evidence suggests that firms are able to raise external finance in economies where protection of property rights and contract enforcement exists (Asli & Vojislav, 1998; Beck et al., 2005; Demirgüç-Kunt, Levine, & Detragiache,

2008; Demirgüç-Kunt & Levine, 2005; Levine, 1999). Djankov et al. (2007) find credit to private sector firms directly proportional to the legal protection that creditors enjoy in a given country. Beck et al. (2011) find a negative correlation between poor governance (lack of rule of law) and interest margins for banks. Again, Koeda and Dabla-Norris (2008) find a positive and significant relationship between rule of law and the likelihood of firms getting bank credit, using a probit model. Private firms' ability to access credit is enhanced by conflict resolution guaranteed through the court system (Demirgüç-Kunt et al., 2008; Djankov et al., 2007; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997).

At the upper quantile ranges of the inclusion indicator, each year's percentile improvement in the political stability indicator (Gindex: *PoliStab*) has an increasing impact of approximately 0.56 points on the credit advanced to the private sector in Ghana. This further improves at the lower quantile where private credit is low (see Table 6.3). The *political stability and absence of violence/terrorism* indicator captures perceptions of the likelihood that a government will be destabilised via unconstitutional means (Kaufmann et al., 2009). The threat of political instability can fuel financial disintermediation as savers operate outside the financial system (Brownbridge & Gockel, 1996). Financial institutions are sceptical in widening their scope of operations, hence, limiting financial inclusion efforts. It is, therefore, reasonable to expect a politically stable environment to encourage the smooth operations of FIs, where the private sector enjoys more leverage. The finding supports the empirical literature that identifies civil and political turmoil as a destroyer of capital and other infrastructure needed to engender inclusion (Demirgüç-Kunt et al., 2008). A politically unstable environment motivates both crime and corruption. The lending risk this poses to the FIs compels them to limit the amount of credit to the private sector, engendering a high likelihood of exclusion. These, as Detragiache et al. (2005) indicate, are inhibitory factors to financial development with adverse consequences on inclusion in most LICs.

The figure below shows how national governance quality affects financial inclusion. Three phases are identified: periods before, during, and after the financial reform.

Prior to the restoration of the multi-party system of governance in 1993, the financial sector was highly repressed with a significant degree of opacity (Sowa & CEPA, 2003). According to Brownbridge and Gockel (1996), the distress in the

financial system was traceable partly to poor governance. This was reflected in widespread corruption and weak institutions, particularly in the 1970s. The reform was required to remove credit controls and misallocations that resulted from directed-lending (Brownbridge & Gockel, 1996; Gockel & Akoena, 2002). The figure reveals a significantly sharp decline in the credit supplied to the private sector between 1970s and the early 1980s.

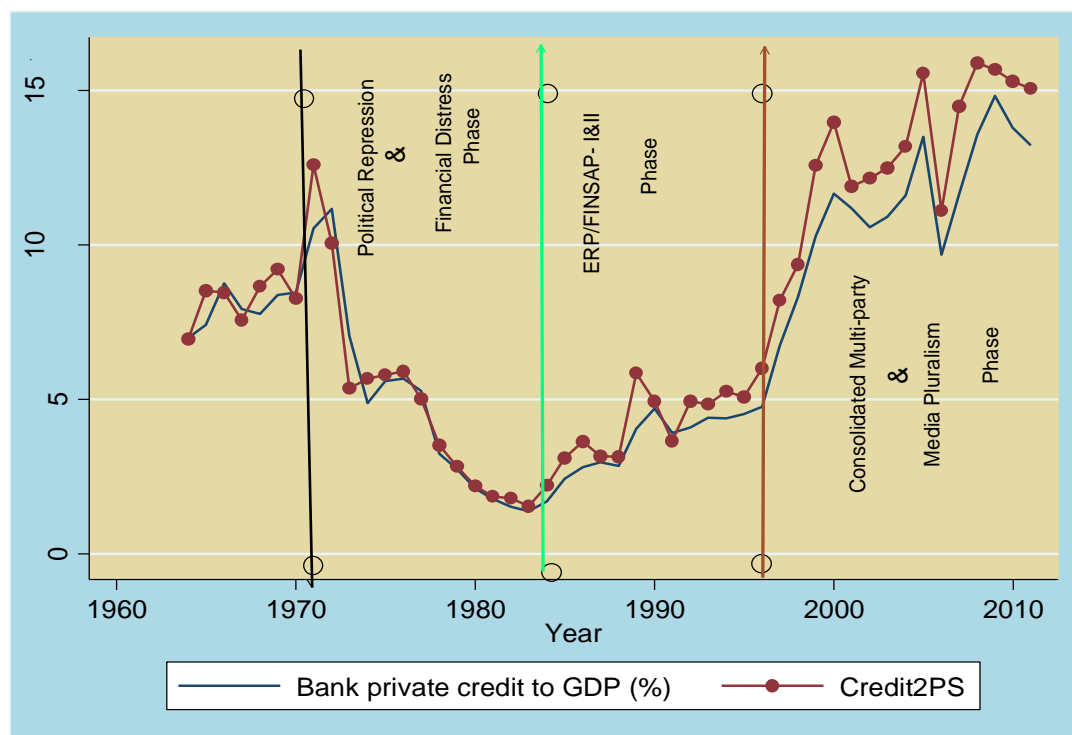


Figure 6.2: Trend of financial deepening and shallowing in Ghana (1960-2013)²⁷
 The figure depicts the trend of banks' credit to the private sector (as percentage of GDP) and the overall credit to private sector (% GDP). The vertical distance between the two curves represents the credit advanced to the private sector by the non-bank intermediaries. The dominance of the banking financial institutions and the limited role NBFIs played at the time, in the financial landscape of Ghana explains the narrowed gap.

Many factors contributed to the distortions in the functioning of the financial system, key among them was *political instability*. For instance, the inflation rate reached its highest in Ghana's history peaking at approximately 123 percent. Banks' non-performing assets portfolios soared (Brownbridge & Gockel, 1996), partly due to directed lending, *absence of contract enforcement* coupled with price controls that led to an interest rate ceiling (Gockel & Akoena, 2002). According to Sowa (2003), the financial sector reforms led to three major outcomes:

²⁷ by authors using World Bank data.

enhancement of the legal and regulatory framework for banks, interest rates liberalisation, and restructuring of the existing but distressed financial institutions.

The financial sector demonstrated signs of robustness following the liberalisation (Aryeetey, Baah-Nuakoh, Duggleby, Hettige, & Steel, 1996; Brownbridge & Gockel, 1996; Gockel & Akoena, 2002). The impact is seen in the significant upturn in most of the financial indicators, notable among these is the *growth rate of credit supplied to the private sector*. Banking competition deepened, significantly affecting innovations aided by the growing technological advancements (Gockel & Akoena, 2002). The observed trend partly motivated the empirical investigations into the extent to which technological infrastructure, regulatory environments and quality of national governance have an impact on financial inclusion in Ghana.

6.3.2 Financial Inclusion and Corruption

The regression results indicate that improvement in the CPI has a positive significant impact on financial inclusion. The finding is consistent under both the OLS and the various quantiles applied. The OLS results in Table 6.3 suggest that a unit improvement in the CPI for Ghana translates into approximately an 8.7 percentage point increase in the domestic credit advance to the private sector. This leads to the non-rejection of the hypothesis $H_{a(2)}$.

Corruption perceptions index (CPI)²⁸ measures the perceived corruption mainly in the public sector (Lambsdorff, 2001). It is based on the informed views of analysts, entrepreneurs and experts in countries concerned. A higher index for a country is desirable, signalling a reduced likelihood of corruption. In a repressive business and political environment, corruption and rent seeking tend to be pervasive, leading to resource misallocation. The financial exclusion gap widens as a result. This finding has far-reaching implications. A fight against corruption implies a fight against financial exclusion and marginalisation. The higher coefficient in the lower quantiles suggests that the FI's willingness to advance credit to the private sector increases as the corruption index improves.

The result supports a study by Detragiache et al. (2005) who found a negative relationship between corruption and private credit. Indeed, corruption misallocates scarce financial resources away from their productive use, when it leads to

²⁸ CPI is index derived by Transparency International

borrowers adversely selected. This often leads to lending institutions being distressed. The combined effects of adverse selection and moral hazard result in significant non-performing assets (NPAs) (Brownbridge & Gockel, 1996) that limit the banks' ability to grant more credit to deserving clients. Corruption, therefore, limits financial inclusion efforts. Consequently, an improvement in the CPI, which signals a reduction in corruption perception, narrows the financial exclusion in gap Ghana, as the outcome suggests. A corrupt environment has cost implications for SMEs. Demirgüç-Kunt et al. (2008), for instance, indicate that corruption can impose huge costs on doing business. Contract enforceability and protection of property rights are often compromised. Hallward-Driemeier and Aterido (2007) report that SMEs in Africa suffer the consequences of corruption both in terms of high cost and less financial accessibility.

6.3.3 Economic Freedom and Financial Inclusion

A repressive economic and political environment affects the way firms operate. More importantly, it tends to determine firms' ability to assess credit from financial institutions (FIs). A characteristic of such an environment with less economic freedom is the issue of risk due to information asymmetry. In response, FIs are less motivated to advance credit to private agents operating under such opaque economic ambience. Logically, improvement in the indicators constituting the index of economic freedom is expected to induce more inclusion in the financial sector. The author tests the null hypothesis ($H_{a(3)}$) that a 'favourable economic (freedom) environment is positively associated with financial inclusion'.

The index of economic freedom (*IEF*) essentially measures the general economic environment using ten quantitative and qualitative factors (Miles, Feulner, O'Grady, & Eiras, 2004). These are summarised into four main broad areas: *rule of law* (property rights, freedom from corruption); *regulatory efficiency* (business freedom, labour freedom, monetary freedom); *open market* (trade freedom, investment freedom, financial freedom); and *limited government* (comprising government spending and fiscal freedom variables). To reduce the problem of multiple collinearity in the data, the 'rule of law' category has been excluded as it is captured in the WGI. Generally, variables that posed collinearity constraint in the model, such as labour and fiscal freedoms, were dropped completely.

(i) Limited Government and Financial Inclusion

Excessive fiscal expenditure gives rise to an unsustainable budget deficit, where financing often *crowds out the private sector agent* from the domestic credit market (Allen, Demirgüç-Kunt, Klapper, & Martinez Peria, 2012). Fiscal discipline that translates into efficiency in public expenditure is expected to improve the economic freedom the private sector enjoys. The *government spending freedom* indicator implies a *latent freedom* that the government guarantees the private sector as it controls public spending and the resultant deficits.

The study finds a positive and significant relationship between government spending freedom and financial inclusion. Apart from the OLS results, all the quantiles applied produce statistically significant outcomes. For instance, at the thirtieth percentile of the dependent variable, a unit improvement in the government spending freedom results in approximately 0.19 percentage point increments in credit advanced to the private sector. A negative coefficient constitutes the *crowding-out effect* of meeting PSBR with domestic loanable credit. This occurs when the government out-competes the private sector for limited domestic credit (see section 4.3.3). Kwakye (2012) observes that excessive PSBR in Ghana over the years has pushed up the cost of credit and crowds the domestic private sector out of the credit market. The positive coefficient therefore connotes *crowding-in effect* in which government spending freedom allows financial resources to freely flow to the private sector. This, according to Allen et al. (2012), frees the financial system to allocate resources in an efficient manner, particularly to the private sector.

(ii) Regulatory Efficiency and Financial Inclusion

Business freedom captures the ease with which private entities are able to conduct their business activities with less regulation (Beach & Miles, 2006; Miles et al., 2004).

The study finds a significant positive relationship between the extent of business freedom private enterprises enjoy and the level of credit they obtain from the domestic FIs. The results are robust using the quantile regression model. The positive coefficient at 5 percent significance level across the applied quantiles (Tables 6.3 & 6.4) implies that FIs are incentivised by business confidence that private sector firms enjoy. A positive signal is given that any credit advanced will be put to its best alternative use. It also assures the lenders of a high likelihood of

loan repayments. This induces optimism in lending to the private sector, hence more inclusion.

Furthermore, price stability and issues relating to inflation constitute a key factor affecting smooth operations of most firms in LICs. The monetary freedom variable captures the extent to which the combined effect of price control and instability within the economy pose a constraint for the firm (Beach & Miles, 2006; Miles et al., 2004). Both the OLS and quantile coefficient show a significant and robust positive impact of monetary freedom on financial inclusion. For instance, the estimated OLS coefficient suggests that a unit improvement in monetary freedom leads to approximately a 0.72 percentage point rise in the credit advanced to the private sector.

The finding supports earlier empirical works on Ghana's financial sector development (see e.g. Gockel & Akoena, 2002; Sowa, 2003). As shown by Figure 6.1, the limited economic freedom with significant repression led to poor monetary indicators with the highest rate of inflation of 123 percent. As noted earlier, the impact of the FINSAP is a monetary system where interest rates and other prices respond to the underlying market dynamism without state interventions (Aryeetey et al., 1996; Brownbridge & Gockel, 1996; Gockel & Akoena, 2002; Sowa, 2003).

(iii) Open Markets and Financial Inclusion

It is evident that the investment freedom indicator (*IEF_IF*) is related positively to the proxy for financial inclusion at 1 percent (lower quantiles) and 5 percent (upper quantiles). The exception is the OLS results (column 1), that show a positive but insignificant relationship. The reduction in the coefficients when moving to the upper quantiles suggests a weaker marginal effect at higher levels of the dependent variable (DV). Intuitively, the advancements of more credit to the private sector may require much tighter monitoring and regulation from the FIs.

The indicator captures how freely investible capital can move across sectors, activities and national borders (Beach & Miles, 2006). The significance of this finding is that removal of investment restrictions motivates investors to access the domestic credit market. This may include access to foreign exchange, payments and transfer system, and removal of capital transactions rigidities. As credit suppliers respond to this, a deeper financial system evolves, leading to more inclusivity.

As noted earlier, *trade freedom* indicator is one of the proxies for the open market variables. It gauges the absence of trade restrictions, both tariff and non-tariff barriers (NTBs). Trade freedom implies that goods and services could move across national borders without restrictions. Robust positive and significant coefficients (at 1% level) across all the quantiles are observed. This implies that improvement in the trade environment has positive effects on financial inclusion as the private sector gets more credit. The establishment of a Ghana Free-zone enclave and Ghana Investment Promotion Council (GIPC) to promote trade and investment in Ghana seems to yield positive externality. FIs are motivated to offer more credit to private sector firms in an environment where trade is freely facilitated.

The findings appear consistent with those of prior research (Modigliani & Miller, 1958; Jensen & Meckling, 1976; Acemoglu, Johnson, & Robinson, 2005; Beck & Levine, 2008) in suggesting that economic institutions do play key roles in both influencing economic incentive structure and ensuring efficient resource allocation, which undoubtedly includes credit.

6.3.4 Financial Inclusion and Macroeconomic Indicators

The inclusion of some key macroeconomic variables in the model serves as a control. Apart from the private remittances variable, all the macroeconomic indicators showed positive association with the financial inclusion indicator. Many studies have, for instance, focused on how an inclusive and deepened financial sector affects growth in the national output (Levine, 1997, 1999, 2002, 2005; Levine et al., 2000; Levine & Zervos, 1998). The author investigates the opposite by exploring the role economic growth plays in fostering financial inclusion. This extends the frontier of understanding in the underlying relationship.

GDP per capita growth rate (*GDP_pcg*) is found to have a significant impact on domestic credit to the private sector at 5 percent level using the OLS results (see column 2, Table 6.3). A percentage increase in the growth rate of real GDP per capita would increase credit advanced to the private sector by approximately 1.8 percent. The outcome is robust and statistically significant. This finding is consistent with past studies (Beck, Demirgüç-Kunt, & Levine, 2003; Beck, Levine, et al., 2000; Levine et al., 2000) that find a strong correlation between economic growth and credits advanced to the private sector. For instance, the WB/GCAP (2010) report indicates that GDP per capita is positively associated with financial

inclusion (loan penetration). Other prior work, for example by Kendall et al. (2010), draws the same conclusion.

The implication is clear, growth in the national income has a significant impact in engendering financial inclusion (see thesis conceptualised paradigm, Section 4.3.4). As wealth is created and channelled through the intermediaries for onward lending to productive ends as the prediction of standard circular flow of income shows (Polak, 1957), private agents' participation in the financial system is boosted. More importantly, the result further implies that an improvement in national productivity will guarantee more liquidity that allows the intermediaries to offer credit to the private sector, thereby fostering financial inclusion.

Again, the econometric estimate on the annual *growth rate in money and quasi money (Moni_grwth)* variable seems to be in agreement with the graphical analysis (Figure 6.1). The coefficient shows a positive relationship between monetary aggregate (M2) and financial inclusion. The liquidity easing impact of expansionary monetary policy allows FIs to offer more credit to the real productive sectors more so than under a tight monetary regime. As predicted by Keynesian orthodoxy, increased money growth tends to reduce the cost of borrowing. The domestic private investments respond positively to the reduced interest rate which ultimately leads to increased growth (Cecchetti, 1995; Fry, 1978; Mishkin, 1995) through the monetary policy transmission mechanism (Agyekum, 2011).

Table 6.4: Regression model with modified indicators: (rule of law and financial freedom indicators replacing savings).

VARIABLES	(2) OLS	(3) q30	(4) q40	(5) q50	(6) q60	(7) q70
TI-CPI	7.869** (0.188)	7.821*** (0.0518)	7.821*** (0.0464)	7.883*** (0.0445)	7.883*** (0.0464)	7.883*** (0.0518)
Gindex PoliStab	- 0.903** (0.0222)	0.900*** (0.00469)	0.900*** (0.00420)	0.890*** (0.00403)	0.890*** (0.00420)	0.890*** (0.00469)
Gindex RegQual	- 0.468** (0.0223)	0.466*** (0.00502)	0.466*** (0.00450)	0.450*** (0.00432)	0.450*** (0.00450)	0.450*** (0.00502)
Gindex -V&A	0.0143 (0.0458)	-0.00194 (0.0109)	-0.00194 (0.00977)	0.0452 (0.00937)	0.0452 (0.00977)	0.0452 (0.0109)
Gindex -ROL	0.163 (0.0288)	0.180** (0.00686)	0.180** (0.00615)	0.153** (0.00590)	0.153** (0.00615)	0.153** (0.00686)
Monigrowth	0.106** (0.00516)	0.106*** (0.00146)	0.106*** (0.00131)	0.108*** (0.00126)	0.108*** (0.00131)	0.108*** (0.00146)

<i>INTSub_Rate</i>	-1.832**	-1.772***	-1.772***	-1.781***	-1.781***	-1.781***
	(0.0883)	(0.0159)	(0.0143)	(0.0137)	(0.0143)	(0.0159)
<i>GDP_pcg</i>	1.657**	1.637***	1.637***	1.645***	1.645***	1.645***
	(0.0358)	(0.00926)	(0.00830)	(0.00797)	(0.00830)	(0.00926)
<i>MOBsub_Rate</i>	3.499**	3.519***	3.519***	3.604***	3.604***	3.604***
	(0.182)	(0.0442)	(0.0396)	(0.0380)	(0.0396)	(0.0442)
<i>IEF_FF</i>	0.227**	0.220***	0.220***	0.217***	0.217***	0.217***
	(0.0130)	(0.00304)	(0.00273)	(0.00262)	(0.00273)	(0.00304)
Constant	-	-191.4***	-191.4***	-194.1***	-194.1***	-194.1***
	193.6***					
	(2.920)	(0.745)	(0.668)	(0.641)	(0.668)	(0.745)
<i>IEF_TF</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>REMIT_Pc</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>IEF_BF</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>IEF_MF</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>IEF_GF</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Gross_NaSave</i>	No	No	No	No	No	No

Observations in 18 years

years:

R-squared: 0.988

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity: Chi2(1) 0.76 (p 0.3841)

Link test for Model Specification: hat (*p-value* 0.000) hatsq (*p-value* 0.345)

Note: Dependent Variable (DV) is Credit supplied by Domestic Financial Institutions (proxy for Financial Inclusion). Standard errors appear below coefficients in parentheses. An asterisk (*), (**) and (***) denotes statistical significance at the 10%, 5% and 1% levels respectively. The reported standard errors are heteroscedastic-consistent following Cameron and Trivedi (2005); though the null hypothesis of homoscedastic error term is not rejected. Models (3-7) represent quantile regression (QR) results.

6.4 Financial Inclusion, Technology and Digital Financial Services

The impact information and communication technologies (ICT) has on the efficient operations of the financial sector is less debatable. The hypothesis that *ICT reduces information asymmetry and transaction cost necessary for broader financial inclusion* is tested ($H_{a5(i-iv)}$). Technological infrastructure (and amenities) such as mobile phone penetration (per capita) is found to be positively related to financial inclusion per the estimated coefficient (see Table 6.5). This supports prior studies (WB/CGAP, 2010; Kendall et al. (2010)). ICT influences services' provision through the supply of credit information. The resultant impact is a reduction of problems relating to information asymmetry and the transaction cost of rendering financial services (Scholtens & van Wensveen, 2003). This results in more inclusion in the financial system. As this helps overcome issues relating to information asymmetry and the transaction cost of rendering financial services, the results will be more inclusion in the financial system.

6.4.1 OLS Results: Digital-technology and Inclusion

Internet and mobile phone usage for financial services

Mobile cellular subscriptions (per 100 people) and internet users (per 100 people) constitute the two most widely applied technologies in the banking sector and are investigated in this section. The purpose is to empirically ascertain the effect of ICT in fostering financial inclusion at macro- and micro-levels.

The outcome of the macro-level analysis (see Table 6.5), reveals that a yearly increase in mobile subscription rate of 1 percent leads approximately to a 1.19 percentage point increase in credit to the private sector. This is after controlling for variables such as GDP per capita growth rate (*GDP_pcg*) and unemployment (*u-rate*). The ‘Mobile Subscription’ indicator (*Mobsqrt*) is found to have robust and positive significant impact on financial inclusion. This implies that the widespread adoption and usage of mobile network services have had tremendous impact on the financial sub-sector.

Table 6.5: OLS regression results ICT and inclusion; observed macro-trends

<i>Dependant Variable[†]</i>	(1)	(2)	(3)
<i>FI_C2Ps</i>			
<i>Model</i>	OLS	OLS	Glm
<i>Explanatory Variables</i>	β /se	β /se	β /se
<i>MOBsub_Rate</i>	1.186**(0.415)	1.051**(0.428)	1.186***(0.363)
<i>INTSub_Rate</i>	-0.0266*(0.0133)	-0.0220**(0.0094)	-0.0266**(0.0116)
U-rate	0.470(0.524)	0.311(0.496)	0.470(0.458)
GDP_pcg	0.128(0.178)	No	0.128(0.156)
LOGEFI	No	Yes	No
Constant	5.412(5.374)	-36.09(90.40)	5.412(4.699)
Obs. (years)	19		
R-square	0.648	0.647	n.a.
Adj. R-square	0.539	0.539	n.a.

Note: Table 6.5 presents the multiple regression results using macro-level data in gauging how ICT influences financial inclusion. Robust standard errors in parentheses; Asterisks, (*), (**) and (***) indicate levels of significance at 10%, 5% and 1% respectively.

[†]The dependent variable is domestic credit to private sector (% of GDP) used as a proxy for financial inclusion. (n.a. means not applicable to GLM estimation.)

Ghana’s mobile phone penetration rate (114.4%) per ITU’s estimates in 2014, appears one of the highest globally. This, as the Cignifi / WSBI (n.d.) report suggests, presents a rare opportunity for mobile banking as a potential mechanism to foster financial inclusion.

Results from the household-level data equally establish the significant contribution

ICT makes towards financial inclusion in Ghana. As presented in Tables 6.5 and 6.6, the results suggest that the use of mobile phones in financial transactions increases the likelihood of being included financially. Mobile technology allows the previously unbanked to perform financial transactions via mobile phones. With such a unique platform as *mobile money facility*, payments for utility bills, fees, fund transfers (domestic and cross-border) and other financial services can be carried out (Donovan, 2012; Jack & Suri, 2011; Kpodar & Andrianaivo, 2011). Important references are often made to *M-PESA* in Kenya (Kpodar & Andrianaivo, 2011; Donovan, 2012; Rasmussen, 2010) and *Mobile wallet/cash* in Ghana (by the three leading MNOs²⁹).

The finding supports a study by Kpodar and Andrianaivo (2011) who also find a positive correlation between financial inclusion and mobile penetration. They observe that mobile phone penetration enhances the credit allocation process, leading to broader inclusion in the financial system. ICT and mobile network services ensure a better flow of information. This helps reduce both information asymmetry and the transaction costs of providing financial services to the poor (Donovan, 2012; Kpodar & Andrianaivo, 2011). This reduction in information asymmetry between lenders and creditors is made possible as ICT ensures timely availability of information (Demirgüç-Kunt et al., 2008).

The information flow, according to Jensen (2007), helps reduce price volatility. This adds to the positive economic effects of mobile telephony. Financial inclusion is attainable because ICT amenities bridge the infrastructural gap in delivering financial services to the marginalised (Diniz et al., 2012). As the information accessibility dissipates any shadows in the credit delivery process, creditworthiness of potential borrowers is easily ascertained.

Again, prior studies have established empirically that countries with a wider platform for information sharing tend to experience significant levels of financial inclusion as more bank credits result (Djankov et al., 2007; Jappelli & Pagano, 2002). LICs provide a better case for policy consideration. Better information accessibility and transparent contract enforcement are found to deepen the financial

²⁹ In Ghana, the three MNOs offering digital financial services are MTN (mobile money), Tigo (cash) and Airtel (money).

system (Demirgüç-Kunt et al., 2008; Detragiache et al., 2005; Djankov et al., 2007), thereby increasing participation in the credit industry.

The internet usage (*INTSub_Rate*) captures the number of people with access to the worldwide web. The macro-level analysis (see Table 6.5) suggests an inverse relationship between financial inclusion proxy and internet penetration rate. The household-level analysis (Table 6.6), however, shows a robust positive marginal impact (ME = 0.172) at 5 percent significance level. The mixed outcome is expected, given the nature of the dataset involved. A number of reasons could explain this mixed outcome.

It is to be noted that the macro-level analysis uses internet penetration rate over time (trend), with no direct reference to usage in financial transactions. The household data, however, asks for specific information relating to the use of the internet in financial transactions for the past year.

In Ghana, like most LICs, home-based internet facilities are a preserve of the affluent few. Also, concern over internet security³⁰ thwarts the efforts of some FIs to introduce internet-banking facilities in Ghana. As can be seen in Figure 6.3, the widespread use of the mobile phone is not directly comparable to internet use in Ghana. The figure shows the trends and relationship between mobile phone penetration rates, internet usage and domestic credit to the private sector. It reveals that both internet and mobile telephony were at the low rate of usage prior to 2003. However, the exponential rise in mobile penetration rates relative to the internet over the same period supports the econometric coefficient estimates.

³⁰ (known in Ghana as computer 'Sakawa')

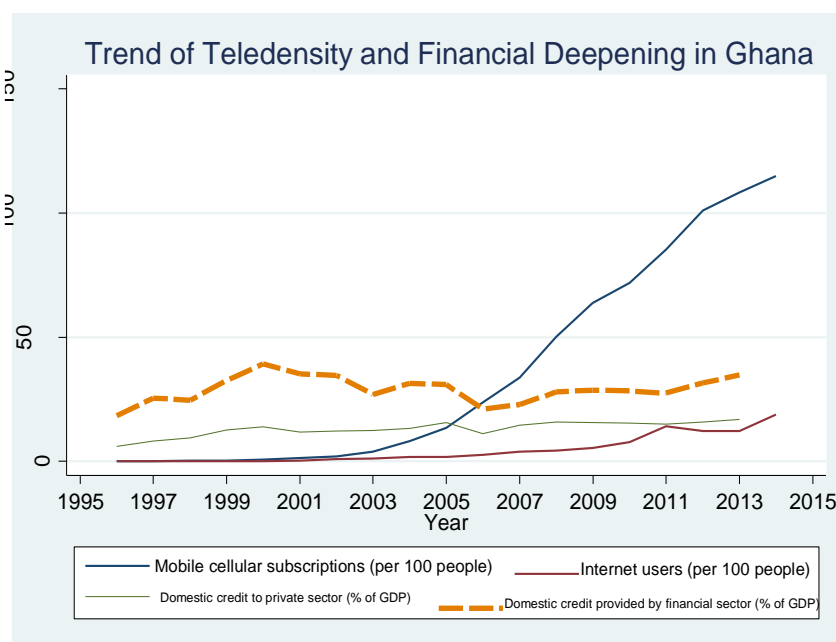


Figure 6.3: Trends of ICT deepening and financial inclusion indicators (1995-2014, WB/ITU data)

The proliferation of smart phones with internet facility as an added feature in recent times could play a role.

6.4.2 Logistic Regression Results: Bank-based and Non-bank-based DFS

The results of micro-level analysis using Global Findex data are presented in Table 6.6. The findings are robust after controlling for variables such as age, gender, and income of the respondents. Those highly educated, the aged, and higher income bracket groups have high likelihood of inclusion. Gender does not appear to be a significant determinant of financial inclusion, consistent with prior studies (see e.g. Annim et al., 2014).

It is important to note that coefficients with odds ratios (ORs) less than 1 suggest a negative relationship, and greater than 1, otherwise. A stronger positive relationship gives higher figure above 1. As an instance, the coefficient estimates for income for the baseline model (column 2) reveal that the ORs increase consistently (1.09, 2.42, 3.68 & 6.39; 2d.p.) from the lower (poor) to the higher (rich) quantiles.

The results (in odds ratios) indicate that likelihood of inclusion increases multiplicatively by over 8 points (baseline) and approximately 9.8 (follow-up model) for each mobile cellular usage for financial transaction. The marginal effect of mobile facility usage in financial transactions for the follow-up model (column 5) is higher than internet usage. This further confirms the previous observation that

mobile phone penetration in Ghana drives inclusion via DFS compared to internet usage. This is also consistent with outcomes of similar studies on some African countries (e.g., Kenya) (see e.g. Triki & Faye, 2013b).

Table 6.6: Logistic regression on technological and financial inclusion

VARIABLES	(2)	(3)	(4)	(5)
ES	Odds Ratio	Marginal Effect (dy/dx)	Odds Ratio	Marginal Effect (dy/dx)
FI ^{&}				
	Baseline (2011) Model outcome		Follow-up (2014) Model outcome	
<i>MobUsage</i>	8.157*** (5.916)	0.362*** (0.121)	9.682*** (1.912)	0.396*** (0.0248)
<i>INTusage</i>			2.681** (1.060)	0.172** (0.069)
<i>Gender Dummies:</i>				
Female	0.889 (0.138)	-0.0203 (0.0268)	1.075 (0.168)	0.0126 (0.0272)
Age	1.015*** (0.00522)	0.00254*** (0.000871)	1.016*** (0.00558)	0.00275*** (0.000962)
<i>Dummies: Educ. Levels:</i>				
Secondary	4.294*** (0.774)	0.274*** (0.0314)	2.725*** (0.449)	0.183*** (0.0293)
Tertiary	17.94*** (7.200)	0.560*** (0.0675)	24.27*** (12.05)	0.567*** (0.0572)
<i>Income Quintiles (Dum):</i>				
2 nd 20% Quintile	1.088 (0.275)	0.0133 (0.0397)	1.007 (0.282)	0.00111 (0.0470)
Mid-(20%) Quintile	2.423*** (0.618)	0.159*** (0.0451)	1.632* (0.435)	0.0867* (0.0469)
4 th 20% Quintile	3.677*** (0.908)	0.245*** (0.0447)	1.107 (0.293)	0.0173 (0.0450)
Richest 20% Quintile	6.390*** (1.643)	0.359*** (0.0473)	1.653** (0.419)	0.0890** (0.0445)
Constant	0.0584*** (0.0195)		0.0928*** (0.0289)	
Observations	999	999	996	996

Note: Robust standard errors in parentheses; asterisks, (*), (**), and (***) indicate levels of significance at 10%, 5% and 1% respectively; [&]Dependent Variable is Financial Inclusion (FI) proxied by Account ownership columns 2&3 and 4&5 present results based on the 2011 and 2014 Global Findex data, respectively.

In line with the hypotheses *H_{a5(iii-iv)}*, the author investigates the emerging route of offering digital financial services that promise greater inclusion in Ghana.

Consequently, bank-based and non-bank-based DFS across a two-time continuum (baseline year and follow-up year) is critically analysed. Account ownership with MNOs (non-bank-based) and with a financial intermediary (bank-based) are subsequently used as the dependent variables.

In comparison to the traditional (bank-based) mode of delivering DFS, non-bank-based DFS offered by MNOs appears pro-poor and non-discriminatory. As reflected in the outcome using the income quintiles, an individual's income-group has no significant impact on financial inclusion driven via MNO's DFS. The insignificant outcome suggests that an individual's age or income status does not determine whether s/he can use mobile-based DFS (see the highlighted cells on Table 6.7, columns 4 & 5). This guarantees pro-poor inclusion, with the potential of leading to inclusive-growth emerging from the innovative means of rendering financial services to the unbanked.

In contrast, financial inclusion promised by financial institutions (account ownership) is found to significantly discriminate against the lower income quintiles (see columns 2 & 3 on Table 6.7). The baseline model estimates of Eq. (6.1) (i.e., the bank-based DFS as proxy for FI), reveal that those in the richer income quintiles have a high likelihood of being financially included. Until recently, participation in the formal financial sector in Ghana required a source of income. Though these requirements are being relaxed following growing competition in the sector, the notion that the formal banks would generally refrain from serving the poor still remains (Carbo et al., 2007; Dev, 2006). Similar results are noticed using the age of the respondents. Participation in the formal financial sector in most LICs often tends to be age-based. The implication is that young people between ages 15 and 34 years would be reluctant to operate formal bank accounts, partly because of the stringent requirements. In contrast, the only requirement to own a mobile-money account in Ghana is a registered SIM card.

The strength of mobile-based DFS as an emerging trend in deepening financial inclusion compared with the bank-based DFS (debit/credit cards usage) is established. This operationally defines the *contemporaneous trade-offs between mobile-based DFS and bank-based DFS*. The contemporaneous trade-offs is observed as the likelihood of inclusion increases with mobile money usage (non-bank-based DFS) from the baseline year (2011) to the follow-up year (2014). Simultaneously, the likelihood of inclusion reduces with bank-based DFS across

the time spectrum. This appears consistent across the three equations (6.1, 6.2 & 6.3) reported in Table 6.7. For clarity, the effect observed is summarised in Table 6.8. The trade-offs observed are expected to inform policy on which routes offering DFS in Ghana positively influence the unbanked.

Table 6.7: Comparing baseline and follow-up marginal effects for the three proxy-dependent variables for financial inclusion used

VARIABLES	(2)	(3)	(4)	(5)	(6)	(7)
	<u>Bank-Based DFS</u> (F.Inst A/C)		<u>Nonbank-Based DFS</u> (MOB A/C)		<u>FI</u> (composite)	
Year	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up
	Marginal Effects					
<i>Mob.MUsage</i>	0.104 (0.105)	0.173*** (0.0301)	0.0386* (0.0218)	0.245*** (0.0144)	0.0538 (0.166)	0.384*** (0.0324)
Lnage	0.144*** (0.0276)	0.155*** (0.0298)	0.0265 (0.0176)	-0.0401 (0.0265)	0.173*** (0.0324)	0.120*** (0.0308)
BankCard	0.521*** (0.0544)	0.470*** (0.0404)	0.0886*** (0.0198)	0.0591** (0.0245)	—	0.434*** (0.0439)
2 nd Inc. Quintile (Mid-lower)	0.0308 (0.0329)	-0.0194 (0.0408)	-0.0413 (0.0276)	-0.0144 (0.0340)	0.0248 (0.0368)	-0.0168 (0.0419)
3 rd Inc. Quintile (Mid-quintile)	0.125*** (0.0377)	0.0866* (0.0443)	-0.0412 (0.0272)	0.0255 (0.0336)	0.137*** (0.0439)	0.0629 (0.0440)
4 th Inc. Quintile (mid-upper)	0.166*** (0.0418)	0.0136 (0.0402)	-0.0163 (0.0293)	-0.0363 (0.0296)	0.200*** (0.0480)	-0.0132 (0.0398)
5 th Inc. Quintile (Rich)	0.263*** (0.0441)	0.0218 (0.0375)	-0.0166 (0.0291)	0.0408 (0.0317)	0.303*** (0.0519)	0.0221 (0.0388)
Educ. (Second.)	0.156*** (0.0275)	0.207*** (0.0266)	0.0267* (0.0138)	0.0715** (0.0194)	0.187*** (0.0310)	0.215*** (0.0269)
Educ. (Tertiary)	0.383*** (0.0753)	0.664*** (0.0723)	0.124*** (0.0437)	0.0795 (0.0503)	0.438*** (0.0929)	0.614*** (0.0704)
Constant	n.a					
Observations	1,953	1,953	1,953	1,953	1,777	1,777

Note: Robust standard errors are reported in parentheses: asterisks, (*), (**), and (***) indicate levels of significance at 10%, 5% and 1% respectively. Table 6.7 shows contemporaneous trade-offs between mobile-based and bank-based DFS. Columns 2-7 compare the Baseline and Follow-up using estimated Marginal Effects. Columns 2 & 3 report the outcome based on the logit model using *account ownerships* with only FIs as the dependent variable (i.e. equation 6.1). Columns 4 & 5 present the same using *account ownerships* with mobile network operators as the proxy FI (dependent variable, i.e. equation 6.2). Columns 6 & 7 present the outcome using the aggregated financial inclusion (both mobile-based and the bank-based account ownership) as the dependent variable (i.e. equation 6.3).

$$FI_{(B/AO_i)} = b_0 + b_1TI_i + bX_i + e_i \dots\dots\dots(6.1);$$

$$FI_{(MNOs/AO_i)} = b_0 + b_1TI_i + bX_i + e_i \dots\dots\dots(6.2); \&$$

$$FI_{(comp_AO_i)} = b_0 + b_1TI_i + bX_i + e_i \dots\dots\dots(6.3).$$

Table 6.8: Trade-off matrix between nonbank-based (mobile money/wallet) and bank-based (debit/credit) cards usage over time.

VARIABLES	(1) Odds Ratio/ [ME(dy/dx)]	(2) Odds Ratio/ [ME(dy/dx)]	Remarks
Year	Baseline Model	Follow-up Model	
<i>Estimates Eq. (6.1)</i>			
<i>MobM Usage</i>	2.161[0.104]	3.519 [0.173]***	<i>Both Odds of Inclusion and Marginal Effect rise</i>
<i>Bankcard Usage</i>	46.82[0.521]***	30.15 [0.470]***	<i>Both Odds of Inclusion and Marginal Effect reduce</i>
<i>Estimates of Eq. (6.2)</i>			
<i>MobM Usage</i>	2.412[0.0386]*	18.12[0.245]***	<i>Both Odds of Inclusion and Marginal Effect rise</i>
<i>Bankcard Usage</i>	7.559[0.0886]***	2.013[0.0591]**	<i>Both Odds of Inclusion and Marginal Effect fall</i>

Note: Asterisks, (*), (**), and (***) indicate levels of significance at 10%, 5% and 1% respectively. The strength of non-bank-based DFS (mobile money usage) as an emerging trend in deepening financial inclusion is seen in comparison with the bank-based DFS (Credit/Debit cards usage). This defines the contemporaneous trade-offs between Mobile-based DFS and Bank-based DFS is seen in the likelihood of inclusion increases with the mobile money usage moving from the baseline year to the follow-up year, while the bank-based DFS use of Credit/Debit cards reduces simultaneously. The odds ratios and the marginal effects (in parenthesis) track the rise and fall. Marginal Effects (ME) are reported in parenthesis.

Robustness checks using a difference-in-difference (DID) estimation method is performed. This is to ascertain whether the observed trade-offs between bank-based DFS and non-bank-based is consistent across the two data spectra (2011-2014). The positive significant coefficient of variable ($_diff = 0.210$) in Table 6.9 (Column 3) confirms a rising trend in mobile money usage over the period 2011 (baseline) and 2014 (follow-up). However, the usage of bank-based DFS facilities shows a negative trend (-0.214) moving from the baseline to the follow-up period. This outcome suggests that *mobile money usage rises (positive coefficient)*, while *Credit/debit card usage reduces ($_diff = -0.00503$)* over the years among the non-bank-based account owners.

In addition, the *credit/debit card usage* reduces over the same period, even among the bank-based account owners (column 4, Table 6.9). For the bank account holders, having mobile money usage falls over the same period ($diff = -0.172$, see column 2, Table 6.9) is to be expected.

Table 6.9: Financial inclusion and ICT: difference-in-difference estimation

VARIABLE	(2)	(3)	(4)	(5)
S				
Dep. Var	Fin.Inst. Acc	Mob-Acc	Fin. Inst. Acc	Mob-Acc
treatment	Mobile Money Usage		Debit/Credit Card Usage	
Time	-0.0799*** (0.0248)	0.0111 (0.0123)	-0.0199 (0.0245)	0.0940*** (0.0135)
MobMUsage	0.497*** (0.0675)	0.284*** (0.0958)		
_diff	-0.172** (0.0831)	0.210* (0.108)	-0.0214 (0.0306)	-0.00503 (0.0518)
<i>Bankcard Usage</i>			0.704*** (0.0161)	0.212*** (0.0359)
Constant	0.369*** (0.0169)	0.0495*** (0.00681)	0.262*** (0.0130)	0.0207*** (0.00475)
Observations	1,956	1,956	1,955	1,955
R-squared	0.049	0.222	0.287	0.088

Note: Standard errors in parentheses; the asterisks (***) and (**) indicate 1%, 5% and 10% levels of significance respectively. Columns 2 & 3 record the changes that occur between the baseline data point (2011) and the follow-up data (2014) in the Global Findex, in terms of mobile-money usage and how it affects financial inclusion using account ownership as proxy defined earlier. Columns 4 & 5 record the same trend on the usage of bank credit/debit cards.

6.4.3 Model Diagnostic Checks

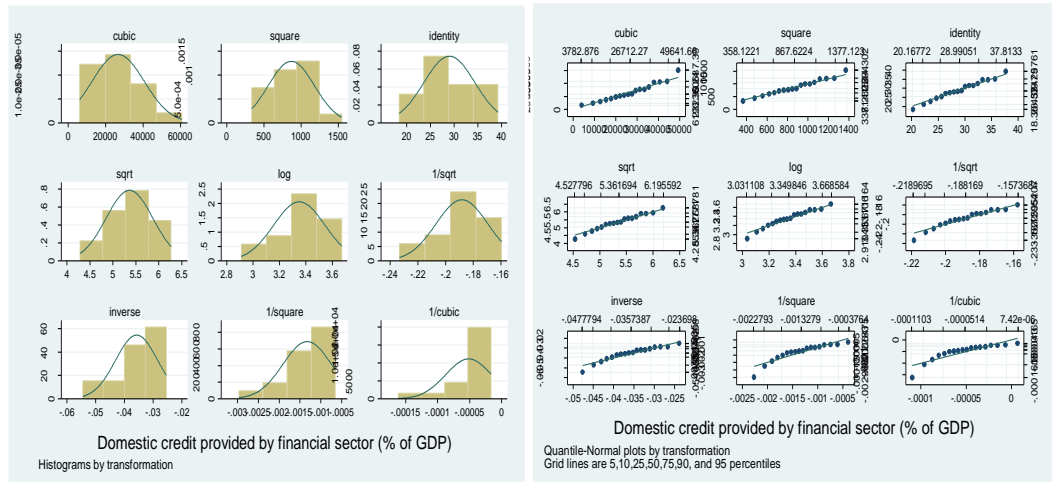
Rigorous diagnostic tests are carried out on the three models estimated in the chapter. This is to ensure that the model fits the data. Because different models require different specification and diagnostic tests, this section briefly discusses the diagnosis carried out on the Quantile, OLS and the Logistic regression models.

Quantile Model: The Breusch-Pagan / Cook-Weisberg test is used to test whether the variance of the error term remains constant (homoscedastic). The outcome did not suggest the presence of heteroscedasticity in the specified model (see Table 6.3). As noted earlier, QR tends to be suitable and produces robust outcomes even in the presence of heteroscedastic conditions. The model is also insensitive to outliers (Cameron & Trivedi, 2005; Wellalage & Locke, 2014) adding to its usefulness.

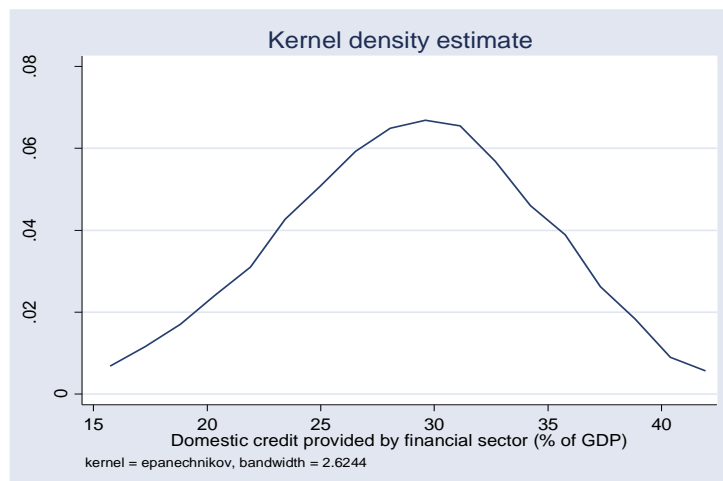
In addition, using a variance-inflation-factor (VIF) diagnostic test shows significant presence of multicollinearity in the macro-data. This necessitated the exclusion of certain indicators especially those in the World Governance Index (WGI) and Index of Economic Freedom (IEF).

A further test on the dependent variable was carried out to check the distributional robustness using *ladder-of-power histogram* and *ladder-of-power quantile normal*

plots, following Tukey (1977)³¹. These, with the Kernel density plots, assure the author of the normality of the distribution (Gould, 1992), as no significant divergence of the plots from the expected (solid line) is noticeable (see Figures 6.4 a, b & c).



(a) Histogram by transformation on the DV; (b) Quantile-norm by transformation on the DV



(c) Kernel Density plot on the outcome variables

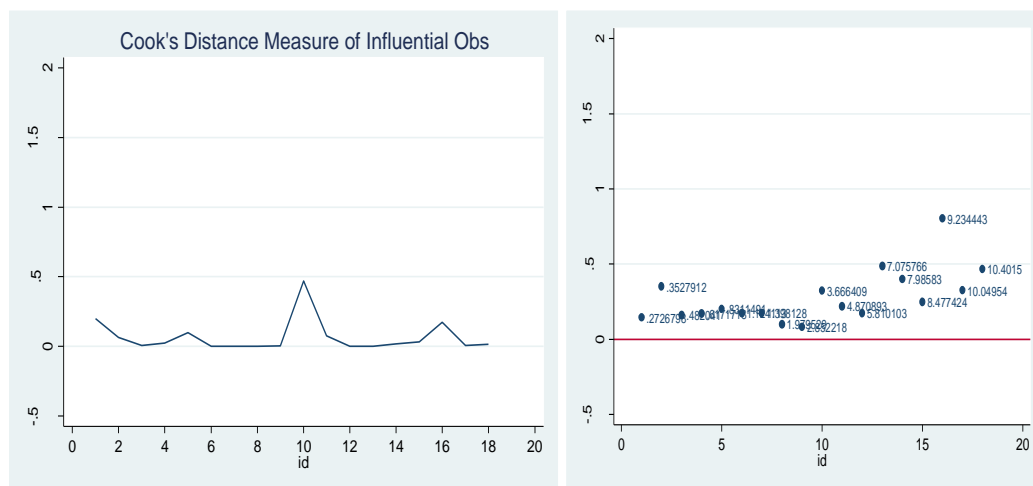
Figure 6.4: Normality checks on distribution of the dependent variable (DV)

OLS Model: At 10 percent significance level, the macro-model on ICT-Inclusion nexus reveals a homoscedastic error term. This, among other specification tests performed, guarantees the practicability of using an OLS model, results of which are presented in Table 6.5. Estimating with heteroscedasticity-robust standard errors helps deal with the apparent heteroscedasticity at significance levels below

³¹ and also in StataCorp LP. (2009). *Stata multivariate statistics reference manual*. Texas, TX: A Stata Press Publication.

10 percent (Stock et al., 2007). In addition, the Ramsey Reset test for the model points to the non-existence of problems relating to omitted-variables bias that would require additional variables (with p -value of 0.295). Given that no specification error is detected at 5 percent significance level, the author is 95 percent confident that the right model is specified. Additionally, a check on extreme values suggests that the observations were within range, giving some assurance of the absence of any potential outlier problem. However, ensuring that no single observation within the data has a significant leverage on the estimates is key. Both leverage of the residuals, and Cook's Distance (D) tests are used. The outcome points to the absence of any key influential observations (see Figure 6.5).

Using a Shapiro-Wilk (W) test for normality in the data, assures the author at 99 percent confidence level that the residuals are normally distributed (p-value of 0.308). Graphical checks of non-normality at both the middle and tail (qnorm) of the data confirmed this. The mean variance inflation factor (VIF) of 7.48 is an indication that there is no serious problem of multicollinearity within the fitted model. However, complete orthogonality among the predictor variables is not assumed. At 5 percent level of significance, the author observes that both mobile cellular and internet subscriptions rates jointly have a significant impact on financial inclusion, using the F-statistic ($F=1.841$; p -value = 001).



(a) Cook's Distance Plots

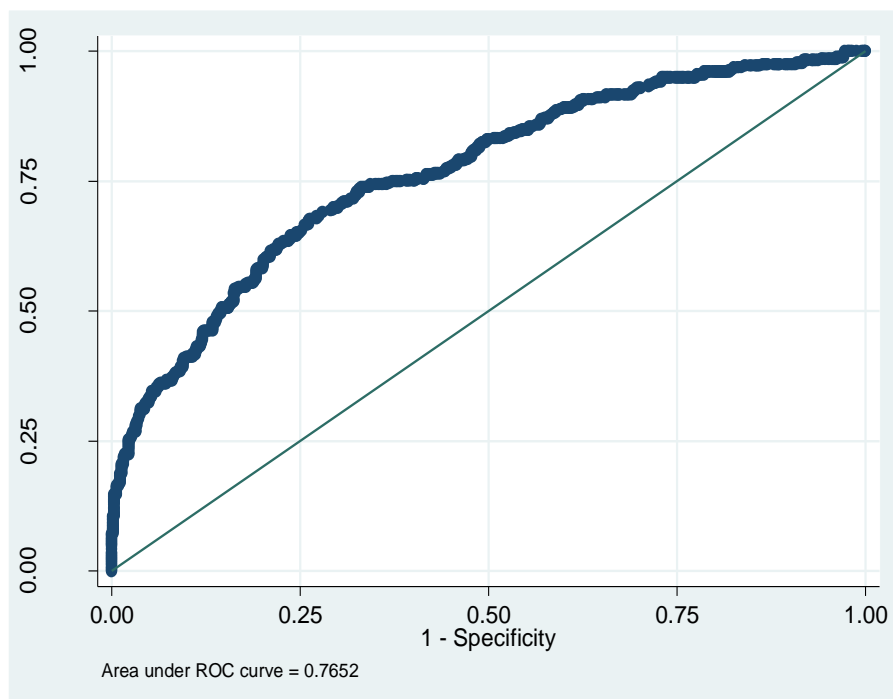
(b) Leverage Scatter Plots

Figure 6.5: Diagnosis of influential observations (Author's analysis using WDI data)

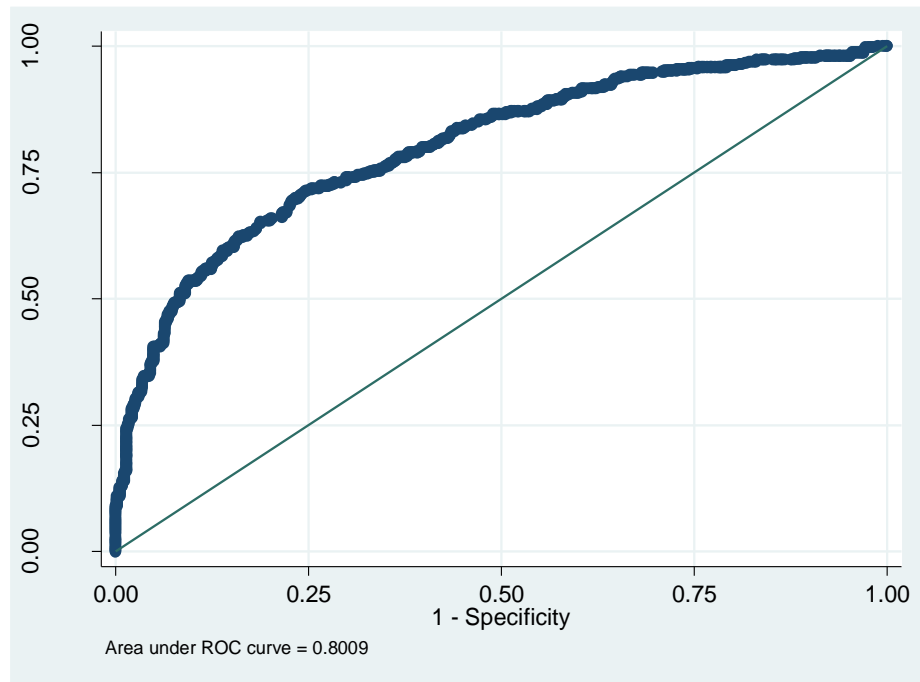
Logit model: A test on model's specification is performed to ensure that the choice of logit as the link function fits the dichotomous model well. The outcome suggests that there are no relevant variable(s) omitted, with a correctly specified link

function. This is informed by the predictive power of fitted mode (“ \hat{y} ”; p -value = 0.000) and the square of it (“ \hat{y}^2 ”) having no predictive power (p -value = 0.786). Again, goodness-of-fit using both Pearson’s, and Hosmer and Lemeshow’s are also carried out. The p -values of approximately 0.91 and 0.36 for the Hosmer and Lemeshow, and the Pearson χ^2 tests respectively, are indicative that the estimated model fits the data well (Hosmer Jr et al., 2013). The models’ mean VIF (1.11) and the tolerance measure suggest that there is no problem of multicollinearity.

The model’s predictive accuracy is assessed using sensitivity and specificity. The receiver operating characteristic (ROC) curve helps examine the predictive ability of the fitted model. This ensures that those financially included or excluded are correctly classified. The area depicted under ROC curve that rose from 0.76 to 0.8 after dealing with few influential observations (IOs), assures the author of the model’s predictive power (Hosmer Jr, Lemeshow, & Sturdivant, 2013) (see Figures 6.6 (a & b)).



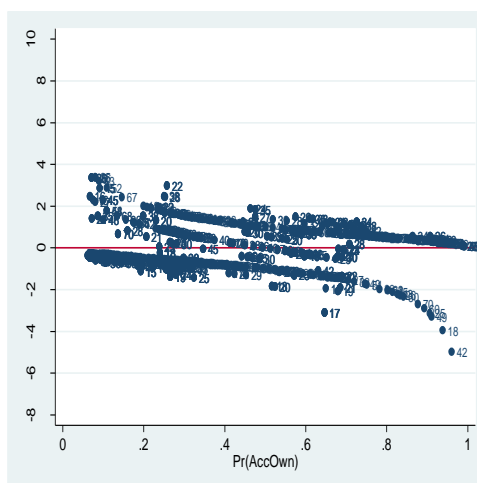
(a) Prior to dealing with influential observations



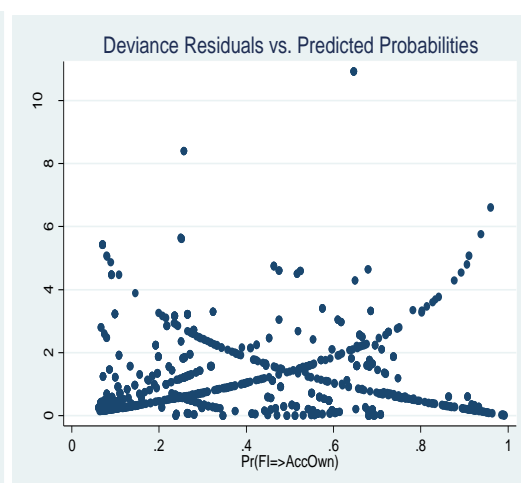
(b) *After dealing with influential observations*

Figure 6.6: ROC curves for the fitted regression model [before (b) and after (b) correction on potential influential observations].

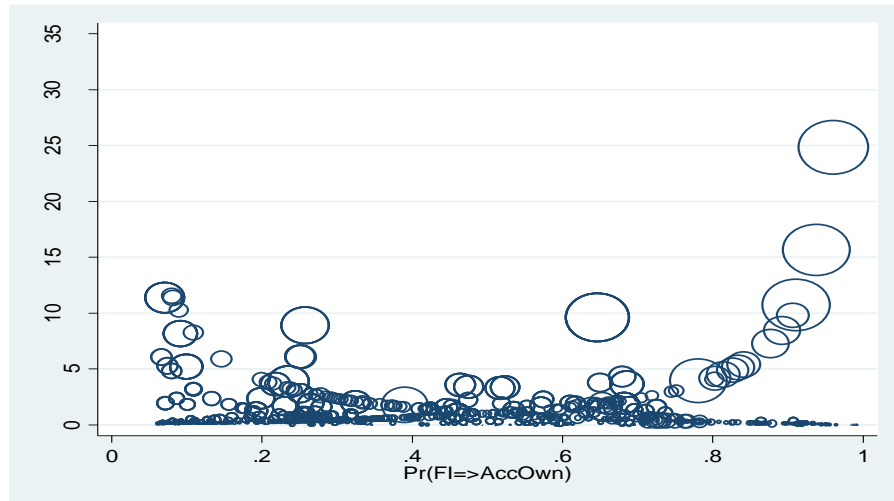
Detection of influential observations that potentially could have high leverage on the model outcome is critical in logistic regression models (Hosmer Jr et al., 2013; Pregibon, 1981). The use of three basic building blocks for logistic regression diagnostic; Pearson residual, Deviance residual, and Pregibon leverage allows the author to detect potentially influential observations, which were subsequently examined rigorously.



(a) *Standardised Pearson's*



(b) *Deviance*



(c) Pregibon Leverage

Figure 6.7: Diagnostic checks on detection of potential influential observations

To ensure that the logit-transformed model produces a linear association between the predicted variable and the covariates, a Lowess graph is produced. Figure 6.8 reasonably suggests that the relationship is linear after the binary dependent variable has been transformed (predicted probabilities) using logit as a link function. It is important to note the merging of the fitted line to the 45-degree line, underscoring how well the model fits.

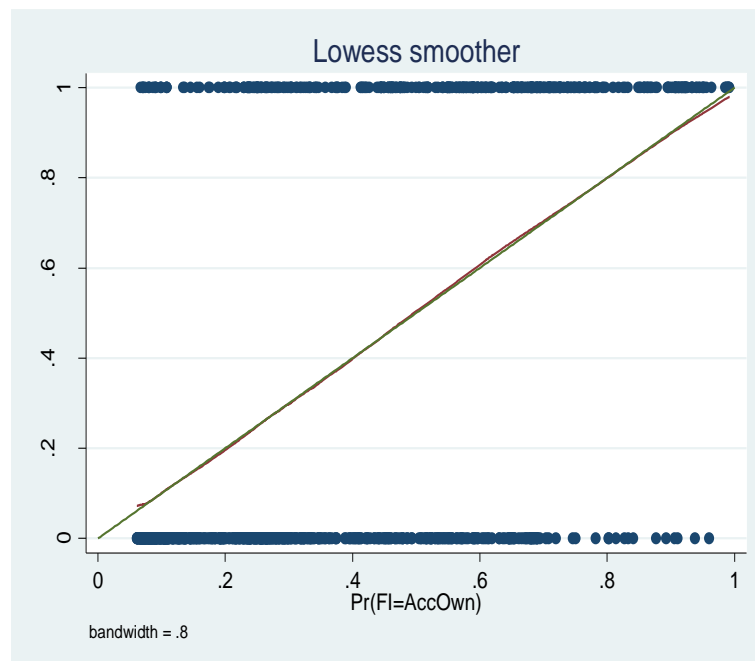


Figure 6.8: Fitted logistic regression model

6.5 Chapter Summary and Conclusion

Starting from the theoretic position that information asymmetry and high transaction cost in LICs account for significant presence of financial exclusion, the chapter outlines the means to overcome them. The problem of information asymmetry, coupled with nebulous governance and overburdened economic systems would mean that intermediaries will exclude a significant proportion of society. In this, technology and the quality of the national governance system within a freer economic environment is expected to address the information challenges faced by FIs. Broader and deeper financial inclusion is likely within such economic settings, underscoring that inclusion does not occur in a vacuum.

The rule of law, political stability, and a regulatory quality that guarantee contract enforcements, are crucial factors to incentivise FIs to lend to the private sector. Ex-post information asymmetry (moral hazard) and costly state verification issues are addressed under better governance systems. The positive externalities accruing from such institutional structures promote the wellbeing of society if they guarantee an inclusive financial system that benefits all.

In addition, the use of mobile phones and internet facilities in financial transactions helps reduce transaction costs of serving the previously unbanked. Digital financial service delivery is now accessible and affordable to many who were hitherto excluded. Technology, therefore, succeeds in overcoming information asymmetry that emanates from structural rigidities and imperfect financial systems. Inclusive and pro-poor growth is realisable as technology promotes broader participation in the financial sector. These positive externalities underscore how wider institutional and financial indicators interact *pari-passu* in creating a harmonised developmental trajectory.

CHAPTER 7

FINANCIAL INCLUSION IMPACT: ECONOMIC GROWTH AND FINANCIAL INCLUSION NEXUS³²

7.1 Chapter Overview

This chapter presents the empirical estimations of equations 17 (1-4). Hypotheses $H_{c(1-2)}$ are addressed in this chapter which seeks to provide answers to the research question posed on *whether financial inclusion serves as the conduit through which financial development can engender growth at the macroeconomic level in developing economies*. Prior studies (e.g. Chibba, 2009; Hannig & Jansen, 2010) have observed that financial inclusion is the best means to assess the role of finance in encouraging economic growth. Motivated by this, financial structure and development in Ghana's context is carefully modelled to empirically ascertain their impact on growth.

A quantitative analysis uses data covering the period 1998-2013 from World Bank/IFS and Bankscope sources. The use of a quantile regressions model in the analysis provides an extra level of robustness from earlier works and illuminates some interesting issues regarding the macro-level impact of financial inclusion.

The rest of the chapter proceeds as follows. Section 7.2 provides a descriptive and correlation analysis of the variables studied. Sections 7.3 and 7.4 proceed into the empirical estimation using regression approach, while Section 7.5 concludes the chapter with policy recommendations.

³² A version of this chapter has been published as a scholarly work in the form of a chapter contribution in a Book Titled "Financial Performance; Analysis, measures and impact on Economic Growth"; edited by Elaine Moreno; pp.99-135, with the title 'Does Financial Accessibility and Inclusion promote Economic Growth in Lower Income Economies (LICs)?' Most of the content of this chapter is reproduced from the paper with permission from Nova Science Publishers Inc., New York (ISBN: 978-1-63484-501- 4 (534-2 eBook) |Year: 2016).

7.2 Descriptive and Univariate Analysis

Table 7.1 offers the descriptive summary statistical analysis of the data. It contains mean, standard deviation (SD), and minimum and maximum range of the variables. The size of the standard deviation of variables such as inflation rate (*Infla*) (SD = 28.2) and market capitalization (*MCAP*) (SD = 8.4), points to the distributional concerns over a few variables used. Though the Kernel distribution plot (see Figure 7.1) indicates near-symmetrical distribution for the dependent variable, the skewness in some of the independent variables partly motivated the use of GLM and quantile regression (QR) models instead of OLS.

Table 7.1: Descriptive summary statistics

Variable	Mean	Std. Dev.	Min	Max
<i>LnGDPpc</i>	6.1063	0.1880	5.7707	6.6331
MCAP	13.5123	8.4431	1.1510	34.3348
BC2PS	8.0411	4.5130	1.5423	15.8275
LI	0.3163	0.1219	0.0158	0.4791
GSE _{TOR}	3.5091	1.7203	1.2216	8.7019
BOC	7.4863	1.4301	3.8000	9.6400
Infla	28.9508	28.1844	-8.4225	122.8745
Monigrwth	3.2994	0.8161	0.2101	4.2273
REMIT2GDP	0.3248	0.2803	0.0105	0.9275
NPA	14.5328	4.4738	6.4000	22.7000
Log FDI	19.3792	1.7098	16.5101	21.9155
U-rate	7.4652	2.8833	3.8000	11.0000
Sav2GDP	2.4832	0.5055	1.4485	3.3660

Note: Table 7.1 gives summary descriptive statistics of the variables used in the empirical analysis. The data covering the period 1998-2013 was used for the empirical estimates. Although the majority of the variables covered a significantly longer period, a few others had limited span, hence the sixteen-year data restriction.

The average rate of inflation is 29 percent over the 49 year period. The maximum value of approximately 123 percent in 1983 is critically noticeable. Rudimentary monetary theory suggests that lending rates will be significantly higher with such a high inflation rate, (e.g., Fisher Effect) (Barsky, 1987; Crowder & Hoffman, 1996; Driffill et al., 1990). This discourages small borrowers from accessing credit (Kwakye, 2010). As predicted by the theoretical framework, such macroeconomic constraints often widen the financial exclusion gap. As well as the high inflation, the mean non-performing loan (NPA) of 14.5 percent also implies that for every loan the banks lend, approximately 15 percent were irrecoverable. This further

underscores the high default risk and the structural constraints that inhibit banks from financially including many economic agents (see Section 4.3.2).

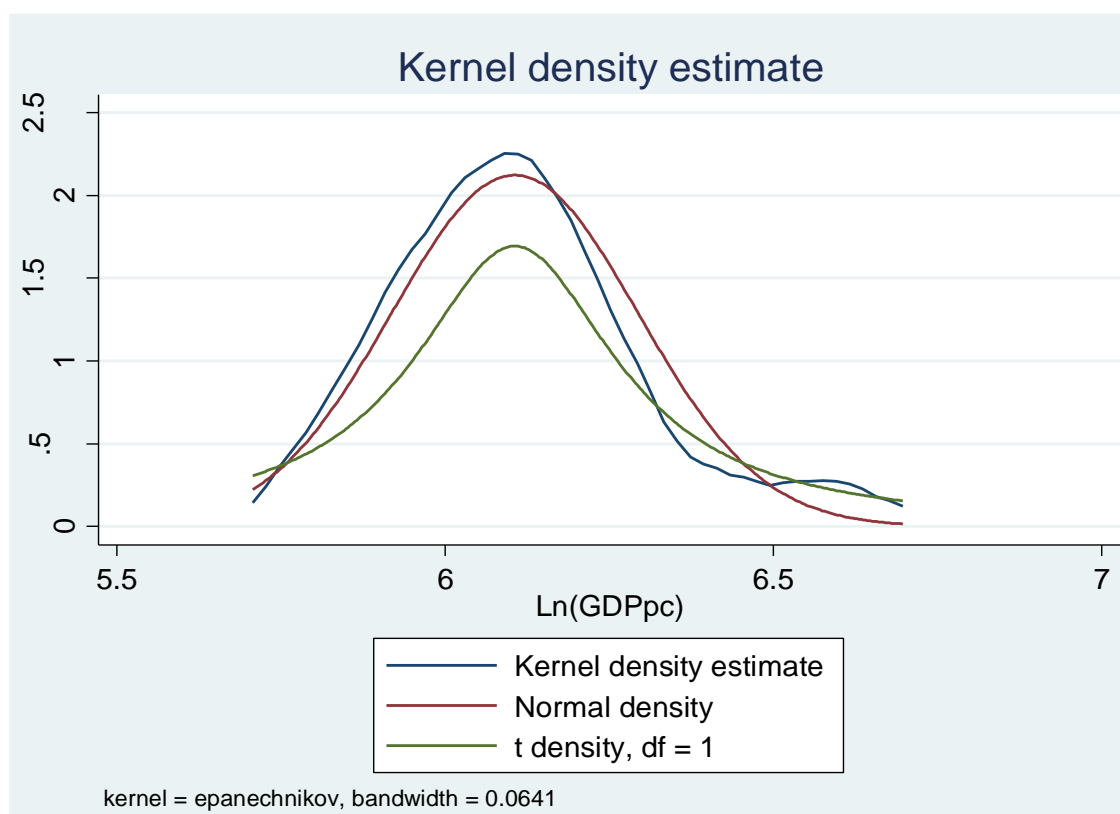


Figure 7.1: Kernel density estimates for the dependent variable

The mean market capitalisation (*MCAP*) of 13.5 percent and stock market turnover ratio (*GSE_{TOR}*) of 3.5 percent appear low. These underscore the early stage of the capital market development in Ghana. As noted earlier, Ghana’s stock exchange started official trading in 1990 as a private limited company. In 1994, it became a public company limited by guarantee under the 1963 (Act 179) Company Code of Ghana (Adam & Tweneboah, 2009). Adam and Tweneboah (2009) observe that the exchange had 13 listed companies in 1991, rising to 19 in 1995, 32 in 2007 and currently has 42 listed companies (GSE, 2016). As shown by Figure 7.2, the relationship between the proxy for economic growth (*GDP per capita*) and market capitalisation ratio (*MCAP*) appears non-monotonic and less defined.

7.2.1 Correlation Analysis

The application of Spearman’s rank correlation matrix highlights the key relations studied. It offers a non-parametric outcome of the variables studied. It reveals a strong positive and significant correlation ($\rho = 0.86$) between the indicators of financial inclusion (*BC2PS*) and economic growth (*LnGDPpc*) at 10 percent level.

This supports prior studies (see e.g., Demirgüç-Kunt & Klapper, 2012). Table 7.2 shows a high correlation coefficient among some variables; an indication of a potential multicollinearity problem. The average VIF of approximately 8.8 partly necessitated the use of GLM and QR as suitable models.

Although the correlation coefficient between market capitalisation ratio (*MCAP*) and GDP per capita (*LnGDPpc*) is found to be negative ($\rho = -0.15$) and statistically insignificant, the regression results show otherwise. The implication is that the effect of *MCAP* on growth is within the context of other controlling factors. Similarly, without controlling for other factors, inflation (*Infla*) and monetary growth rate (*Monigrwth*) appear significant but negatively correlated with economic growth. The natural log of FDI (*LnFDI*), remittances (*REMIT2GDP*) and savings/GDP ratio (*Sav2GDP*) are positive and significantly correlated with economic growth. This underscores the weaknesses of relying solely on non-parametric techniques in investigating key complex relationships. It should be noted that correlation isolates each indicator to assess its relationship with the others, without establishing causation. Such drawbacks highlight the superiority of using multiple regression when investigating important relationships.

Table 7.2: Spearman's rank correlation of the variables used in the empirical estimation of the finance-growth nexus

Variables	Ln GDP Pc	MCAP	BC2PS	LI	GSE _{TOR}	BOC	Infla	Monigrwth	REMIT2GDP	NPA	Log FDI	U-rate	Sav2GDP
Ln GDP Pc	1.00												
MCAP	-0.15	1.00											
BC2PS	0.86*	-0.11	1.00										
LI	0.13	0.31	-0.08	1.00									
GSE _{TOR}	0.04	-0.14	0.05	0.01	1.00								
BOC	0.39	0.11	0.26	0.32	0.07	1.00							
Infla	-0.56*	0.44*	-0.57*	-0.39	-0.19	-0.23	1.00						
Monigrwth	-0.46*	0.06	-0.33*	-0.51*	-0.26	-0.02	0.49*	1.00					
REMIT2GDP	0.74*	0.40	0.81*	0.31	-0.34	0.17	-0.41*	-0.16	1.00				
NPA	-0.19	0.22	-0.38	0.15	-0.07	-0.21	0.27	-0.16	0.18	1.00			
LnFDI	0.84*	-0.13	0.79*	-0.05	0.31	0.09	-0.59*	-0.28	0.17	-0.46	1.00		
U-rate	-0.64*	0.19	-0.51*	-0.23	-0.17	-0.71*	0.61*	0.37	-0.08	0.42	-0.55*	1.00	
Sav2GDP	0.68*	0.21	0.74*	0.46	0.01	-0.14	-0.44*	-0.32*	0.72*	0.44	0.31	-0.11	1.00

Note: The Asterisks denote significance level at 5%

7.3 Regression Results

The method of analysis in this chapter relies on micro-econometric techniques using both quantile regression (QR) and a generalised linear model (GLM). These models are selected for their robustness given the datasets used.

The suitability of using QR for the empirical estimates is motivated by it not making parametric distribution assumptions of the errors. Also, the QR model is insensitive to outliers (Wellalage & Locke, 2014) and suitable for data with heteroscedasticity issues (Cameron & Trivedi, 2005). This allows the author to study the marginal impact of the regressors on both location and scale parameters of the model and as such, much deeper understanding of the data (compared to the methods) is assured.

The model contributes in a significant way to the understanding of the underlying relationships. It produces robust outcomes (Cameron & Trivedi, 2005; Wellalage & Locke, 2014), as the author is able to investigate the entire distribution of the dependent variable (real per capita GDP). Comparing this outcome with a generalised linear model (GLM) adds more insights to its robustness. Concern over possible violation of key assumptions that strictly guide OLS models informed the choice of QR and GLM.

A review of James Ang's work that surveyed a recent study relating to the finance-growth relationship (Ang, 2008) reveals a methodological gap this present chapter fills. Of about forty-nine articles surveyed, spanning 1969 to 2008, only one used a semiparametric partial linear model and it was not QR. The use of QR in this chapter, therefore, becomes a methodological novelty that has been missing from finance-growth literature. Recognising that economic growth occurs through time dimensions (short, medium and long runs) makes the use of QR important.

7.3.1 Empirical Outcome: Financial Inclusion, Development and Growth

The concept of financial inclusion is key to ensuring that a deepened financial system translates into economic growth. In a specific case of credits that financial intermediaries grant to the private sector agents, inclusion ensures that viable investments that promote economic growth do not suffer. In keeping with this shift in paradigm, and following prior studies (Beck & Levine, 2001, 2004; Ndako, 2010), the author uses the natural log of real GDP per capita, a proxy indicator of

economic growth, as the outcome variable in this chapter. Table 7.3 presents regression outcomes of the baseline model (GLM-column 2) and the QR model (columns 3-5) as robustness checks.

Table 7.3: Economic growth and financial development

Regressors	Dependent Variable: <i>LN GDP per capita</i>			
	(2) GLM	(3) QR ₍₀₅₎	(4) QR ^x _(med)	(5) QR ₍₇₅₎
MCAP(%GDP)	0.0036 (0.54)	0.0032** (3.78)	- 0.0040 (- 0.21)	0.0079** (3.33)
BC2PS	0.0522** (2.07)	0.0222*** (6.96)	0.0177 (0.22)	0.0391** (4.36)
LI	0.983*** (2.84)	0.514*** (11.63)	0.712 (0.63)	0.254 (1.88)
GSE _{TOR}	0.0211 (1.63)	0.0007 (0.66)	- 0.0019 (- 0.07)	- 0.0371** (- 3.24)
BOC	- 0.0432*** (- 2.65)	0.0079** (3.56)	- 0.0265 (- 1.20)	- 0.002 (- 0.34)
Infla	0.0063 (1.03)	0.0026** (3.34)	- 0.0011 (-0.06)	0.0076** (3.73)
U-rate	- 0.0420** (- 2.49)	- 0.0091*** (- 6.36)	0.0056 (0.11)	- 0.0236** (- 2.96)
Monigrwth	0.0072** (2.27)	0.0038*** (11.41)	0.0021 (0.23)	0.0016 (1.08)
REMIT2GDP	- 0.475 (- 1.21)	- 0.0752 (- 1.46)	0.153 (0.12)	- 0.346** (- 2.90)
NPA	0.0160*** (3.99)	0.0092*** (33.99)	0.0033 (0.23)	0.0191*** (7.96)
LnFDI	0.0083 (0.16)	0.0742*** (12.65)	0.108 (0.70)	0.0917*** (4.83)
_cons	5.270*** (6.66)	3.981*** (46.99)	3.663 (1.83)	3.797*** (12.92)

Diagnostic matters

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity $\chi^2(1) = 8.66$; p-value 0.0033 (N = 16 years)

Durbin-Watson d-statistic for serial correlation: (13, 16) = 3.199416

Note: The levels of significance are denoted by asterisks (*) and interpreted as; 1% (***), 5% (**) and 10% (*). The outcome variable is Log of GDP per capita and t-statistics in parentheses. N-denotes number of observation in years (1998-2013). Columns 3, 4 and 5 show the outcome of the QR using the 5th, median (50th) and 75th quantiles of the outcome variable (*LN GDP per capita*).

(i) **Financial Depth and Growth**

A deeper financial system is likely to contribute to financial inclusion through credit accessibility. Consistent with prior studies, the author examines the impact of two indicators of financial depth on growth. The hypothesis that both financial market depth and institution depth influence economic growth positively is empirically tested. Financial institution depth, defined as domestic banks' credit to the private sector as a percentage of GDP (*BC2PS*), serves as a proxy for financial

inclusion. Stock market capitalisation as a percentage of GDP (*MCAP*) captures financial market depth. The regression results are presented in Table 7.3. These results indicate that a percentage point increase in private sector credit granted by the financial intermediaries leads to a 0.0522-point increase in economic growth. The result shows a robust positive significant relationship between economic growth and financial inclusion. The banks' private sector credit to GDP ratio is favoured as a superior proxy of financial development and inclusion. In their study, Adu et al. (2013) underscore the sensitivity of the growth-finance relationship to the indicator used as a proxy for financial development/inclusion. As an instance, broad money (M2+) to GDP ratio has been used in the past. However, its growth-predictive power in recent times seems to be weakened (Adu et al., 2013).

The use of financial institutions' credit advanced to the private sector offers a superior indicator compared with other proxies for inclusion, such as savings, account ownerships and frequency of instrument usage, as used by Allen et al. (2012). The superiority of banks' private credit as an indicator of inclusion is informed by its direct relationship with growth. The use of account ownership, savings and frequency of financial instrument usage may be a misfit when attempting to understand the link between financial inclusion and economic growth. Bank credit to the private sector undoubtedly translates directly into investments, production and growth; hence its adoption.

The finding that growth results from financial development in LICs rather than from stock market development seems to accord reasonably well with prior studies. The significant contribution this chapter makes is the *identification of financial inclusion as a critical conduit that ensures financial development translates into economic growth*. While prior studies only show a general linkage between growth and financial development (Beck & Levine, 2004; Levine, 2002, 2005; Levine & Zervos, 1998), the chapter attributes such a positive relationship to the ability of the financial system to include all active economic agents as it develops. Growth in Ghana has been fostered by financial sector development (with bank private credit as proxy indicator) due to its ability to engender inclusion in the financial system, compared with stock market development. The marginal impact of the financial market's depth on growth is positive but its statistical significance is only enhanced by the inclusion of other indicators (e.g., savings).

The Ghana Stock Exchange (GSE) capitalisation ratio offers liquidity for private sector agents and it is understandable why growth will be linked with stock market development. The liquidity it creates is expected to make investment less risky, resulting in economic growth as a natural consequence (Arestis et al., 2001). For developing economies, it is anticipated that stock market development will have a positive, albeit weak, influence on growth. A nonparametric analysis of the indicators using Spearman's rank (partial) correlation reveals much deeper insight (see Table 7.2). As noted earlier, the financial institution depth indicator (*BC2PS*) has a positive and significant correlation with growth at 5 percent significance level. This corroborates the regression results in Table 7.3. The market depth proxy (*MCAP*), however, shows a negative but insignificant correlation coefficient with growth. The very weak negative results point to the potential for the use of the QR method as a robustness test, as relying on average-based models such as the GLM alone could miss a significant relationship.

The computation of Spearman's rank correlation coefficient and subsequent significance testing often assumes that two variables may be monotonically related (Laerd Statistics, 2013). However, this condition does not seem to fit perfectly, as seen in the scatterplot (Figure 7.2) below.

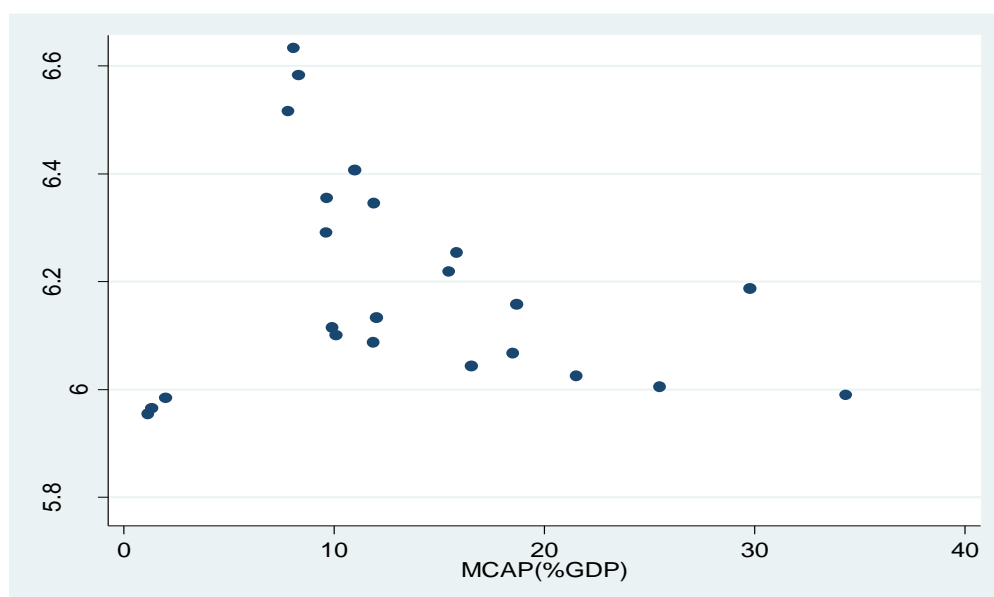


Figure 7.2: Relationship between market capitalisation ratio to GDP and economic growth in Ghana

The two variables (*MCAP* & *LnGDPpc*) exhibit positive, zero and a predominantly negative relationship at various points, validating the use of the QR model that relies

on conditional quantile of the growth indicator. Since the computation is based on ranking from 1 (being lowest value) upwards, the *MCAP* variable and growth variable (*LnGDPpc*) depict weak negative average monotonicity, and hence weak negative coefficient ($\rho = -0.15(2dp)$). The significance test³³ result fails to reject the null hypothesis that both indicators are independent.

Again, it is important to emphasise that stock market development in Ghana (as measured by market capitalization to GDP), does not significantly influence growth the way financial (institution) development does. To Levine (2002), such an outcome appears consistent both with theory and other empirical works (see also Levine and Zervos (1998)). Levine and Zervos (1998) argue that ability to trade the country's productive technologies more easily tends to better influence resource allocation and growth than merely listing on the national stock market, which does not in and of itself ensure resource allocation. Consistent with prior studies (see e.g. Arestis, Demetriades, & Luintel, 2001), it is evident through this chapter that while stock market and financial institution development complement each other in explaining growth in Ghana, the dominant effect of banking sector development is significantly greater than stock market development. The outcome may also point to the observation that market capitalisation indicators may have weak association with growth compared with the liquidity-based indicators such as the ratio of the value of traded shares to GDP (Arestis et al., 2001).

The outcome, nonetheless, is not an indication of the irrelevance of the stock market in the development of the economy. Indeed, the financial market's role in guaranteeing liquidity and mechanisms that allow economic agents to hedge and trade idiosyncratic risks could, in the long run lead to economic growth. The issue instead, has to do with the stage of economic development. The reality is that Ghana's stock market (like most LICs) is relatively weak and young, compared with financial institutions (particularly banks), whose operations date back to the pre-independence era. This further resonates with earlier research that in higher income countries, stock markets tend to have more impact than the banks (see e.g., Levine, 2002).

³³ Number of obs = 23, Spearman's rho = -0.1492; Test of Ho: ln(GDPpc) and MCAP(%GDP) are independent, and Prob > |t| = 0.4968

Market power within the financial sector is captured using the Lerner Index (LI)³⁴. The indicator is often used to estimate the extent of market power (Feinberg, 1980) and hence the level of competition that exists within the financial system (Jiménez, Lopez, & Saurina, 2013). Market power is found to be positively related to economic growth and economically significant. A higher index (LI) suggests less competition and potentially lower inclusion within the banking sector, which may imply a negative relationship with economic growth, a priori.

The outcome on LI appears contradictory with classical microeconomic theory of efficiency resulting from zero market power, as there exists an efficiency cost of market power (Berger & Hannan, 1998). However, the economic environment in LICs, saddled with widespread market imperfection, structural constraints, and institutional bottlenecks, often tends to inhibit a competitive structure in the lending industry (Atieno, 2001; Demirgüç-Kunt & Klapper, 2012). These frictions could support a positive relationship between market power (LI) and growth. Onerous entry capital and other requirements for the banking sector create market power as a necessary condition for the banks to remain innovative (Acs & Audretsch, 1987) and profitable. Such onerous entry conditions create huge barriers to entry into the banking sector. This is important for the understanding of why banks should wield market power to remain both competitive and efficient. The market structure existing within the banking sector often exhibits resemblance of oligopolistic (when each bank is taken as a unit) to monopolistic-competition (if branch-networks are considered) (Coccorese, 2004). If an oligopolistic market structure, which appears consistent with prior works, is assumed (Berg & Kim, 1994; Bikker & Haaf, 2002), competition over both price and products ensures that innovative services become a common feature (Acs & Audretsch, 1987). This may ultimately enhance financial inclusion (credit delivery) and growth. The existence of market power becomes necessary under such asymmetric market conditions to stimulate competition for sector efficiency, inclusion and growth. The positive significant relationship is, therefore, both likely and reasonable.

(ii) *Financial System Efficiency and Economic Growth*

The efficient operation of the financial sector that impacts growth has been examined in this chapter. This is specifically linked to the testing of hypotheses

³⁴ Lerner index captures the vertical distance between price and marginal cost. It is therefore computed as the measure of the mark-up of price over marginal cost [i.e. $(P-MC)/P$].

H_{c(1-i)} and H_{c(1-ii)}. The financial system's efficiency observed, has two sources: market efficiency and institutional efficiency.

Captured by the stock market (GSE) turnover ratio (GSE_{TOR}), financial market efficiency is found significant and positively related to economic growth (Table 7.3). The mean impact as captured by the GLM coefficient ($\beta=0.0211$) suggests that an improvement in the Ghana Stock Exchange (GSE) turnover ratio positively increases economic growth by approximately 0.02 percentage point by a multiplicative factor of the growth rate in the per capita GDP [i.e., $\partial(\ln GDP_{pc})/\partial(GSE_{TOR})=0.02*GDP_{pc}$]. The outcome is, however, insignificant at 10 percent, underscoring the weak source of growth expected from the emerging capital market. The quantile regression, however, produces varied results, capturing the impact of the financial market indicator (GSE_{TOR}) at a specific range of growth. At the quantile ranges above the medium quantile (e.g., 75th percentile) of growth (columns 4 & 5), the impact market turnover ratio on growth is negative, albeit insignificant. This suggests that the market efficiency reflects the underlying trend of the economic development process. This also implies that meaningful inclusive growth in Ghana (like most LICs) cannot be guaranteed by the financial market's efficiency. This outcome supports the similar outcome on Ghana in a study by Levine (2002).

Banks' overhead cost as a percentage of total assets (BOC) is used as a proxy of financial institutions' efficiency. Higher value represents less efficiency (Levine, 2002). Banks' overhead cost is found to be negatively related to economic growth (see columns 2, 4 & 5 in Table 7.3). The estimated coefficient ($\beta = - 0.0432$) is significant at 1 percent level. This implies that a unit percentage reduction in the financial institution's overhead cost ratio is expected to increase growth by approximately 0.04 at the multiplicative of the average growth rate. The inverse relationship as captured by both the GLM and QR models therefore predicts that banks' efficiency matters to economic growth. Thus such efficiency has implications for the financial institution's ability to offer credit to the private sector at reasonable cost. Reducing banks' overhead cost per assets then becomes a financial inclusion strategy that incentivises inclusive growth at the macroeconomic level.

7.4 Financial Structure and Development on Economic Growth

Following Levine (2002), the author examines how financial structure and development in Ghana influence growth at the macro-level. To this end, the following relationships summarised in Table 7.4 are investigated to directly address the hypotheses $H_{c(2-i)}$ & $H_{c(2-ii)}$.

Table 7.4: Model prediction of the bank-based, market-based and financial services views on the impact of finance-growth nexus.

Paradigms on Route of Growth-inducing impact of Finance	Basic Equations	Model Predictions	Implications
<i>Bank-based view</i>	$g_t = \alpha_0 + \alpha_1 FS_t + \alpha_2 X + e_t \dots (7.1)$	the $\alpha_1 < 0$, $b_1 > 0$, $\theta_1 < 0$ and $\theta_2 > 0$.	Growth is driven by financial institutions (e.g. banks)
<i>Market-based view</i>	$g_t = b_0 + b_1 FD_t + b_2 X + e_t \dots (7.2)$	$\alpha_1 > 0$, $b_1 > 0$, $\theta_1 > 0$ and $\theta_2 > 0$.	Growth is driven by financial market (e.g. stock market)
<i>Financial services view</i>	$g_t = \theta_0 + \theta_1 FS_t + \theta_2 FD_t + \theta_3 X + e_t \dots (7.3)$	$\theta_1 > 0$ and $\theta_2 > 0$.	Growth is driven by both financial institutions and market (complementarity)

Note: *FS*-financial structure (whether or not financial institutions dominate the market); higher value implies financial market-driven, and a lower value suggests banks/financial institutions-based. *FD*-captures the overall financial development, encompassing development of banks, non-banks and securities market. Higher values imply deepened financial services. *X*: Captures standard growth determinants serving as conditioning factors. And e_t is the error term; whereas α s, b s and θ s are the coefficients. See Table 7.7 for the summarised results.

The structure of the financial system is important in determining whether a deepened financial sector translates into inclusion that fosters growth. This is premised on the theoretic position that financial institutions (*banks-based*) become the driving force of a country's growth at the early stage of economic development (Boyd & Smith, 1998). As the country develops and income rises, the role of the market-driven system becomes significant. In view of this, the composition of the financial structure of Ghana is examined to determine what drives growth.

Tables 7.5 shows the regression results. The main explanatory variables used are *financial structure* (activity, size and efficiency) and *financial development* (activity, size and efficiency). Other standard growth determinants are included as conditioning factors. The results do not completely support either the bank-based

or the market-based views. It is important to note, however, that because most of the α_{1s} estimates are negative, while most of the b_{1s} are positive, the results seem to suggest that financial institutions drive inclusion and growth in Ghana. The financial institutions (banks) compared to the market in Ghana, appear moderately efficient at promoting growth (see column 2, b_{13} of Table 7.5). The estimated coefficients of the financial structure (*StrucSIZE* and *StrucEffic*) confirm that the banking financial institutions are dominant in terms of *size and efficiency* compared with the financial market's contribution to growth. Financial structure *activity*, however, indicates that the financial market dominates institutions in respect of their relative impact on growth. The findings are consistent with the findings by Levine (2002), though he argues that such an outcome must not be taken to mean that Ghana's capital market is stronger. In his view, it is the financial institutions in Ghana that are rather weak.

The financial development (FD) model results (i.e., b_{1s} , on Eq. 7.2 in Table 7.5) also suggest that financial institutions are still a dominant force relative to the financial market. Again, two-thirds of the parameter estimates of the *FD* equation (Eq. 7.2) (market-based view) confirm financial institutions' (e.g., banks) dominance as a driver of growth. Noticing that *Size* is insignificant statistically leaves the *Efficiency* indicator as the only possible route for institutions to impact growth. In particular, the estimates (θ_{1s}) in Table 7.5 (column 4) suggest that *activity and size* of the financial institutions (compared with the market) are dominant financial factors that influence economic growth in Ghana.

The inclusion of the standard growth determinants serves as control variables in the model. Among the myriad of standard growth determinants, remittances, FDI, monetary growth rates, rate of inflation, unemployment, gross savings, banks' competition measured by Lerner Index, and bank's non-performing assets (NPAs) ratio are all found to be linked with growth in Ghana. The inclusion of these determinants underscores the point that finance does not work alone and in a vacuum to affect growth. As noted in the previous chapter, financial inclusion influences growth within the wider context of other macroeconomic and institutional frameworks existing within a country. Failure to recognise this may lead to an overstretched claim of a direct causal relationship between financial sector activities and growth. This way, the role of finance could then be perceived as growth-enhancing, making room for other key determinants such as technology

(Malecki, 1997; Pohjola, 2000), energy (Mahadevan & Asafu-Adjaye, 2007; Stern & Cleveland, 2004), and natural resource endowments (Auty, 2001; Sachs & Warner, 1999; Stijns, 2005).

Table 7.5: Financial structure and development on economic growth

Independent Variables	<i>Dependent Variable: Ln GDP per capita</i>			
	(2) Bank-based	(3) Market-based	(4) Financial Services View	(5) Fin. Services View (without the SGD)
StrucAct.	- 0.0322(α_{11}) (- 0.33)		1.678***(θ_{11}) (2.36)	2.7816*** (0.6348)
StrucSIZE	0.542***(α_{12}) (3.23)		0.269*(θ_{12}) (1.86)	0.3165*** (0.0751)
StrucEffic	- 0.208***(α_{13}) (- 4.75)		- 1.853***(θ_{13}) (- 2.81)	- 2.7023*** (0.5806)
FinAct.		- 0.282***(b_{11}) (- 3.72)	1.745**(θ_{21}) (2.53)	2.9061*** (0.5623)
FinSize		0.192 (b_{12}) (1.60)	0.119**(θ_{22}) (1.98)	- 0.1637 (0.1375)
FinEffic		0.238*** (b_{13}) (2.86)	- 1.722**(θ_{23}) (- 2.47)	- 3.0083*** (0.5817)
LI	0.569*** (5.07)	0.615*** (4.61)	0.493*** (4.57)	
Urate	- 0.0333*** (- 5.88)	- 0.0397*** (- 5.43)	- 0.0291*** (- 5.48)	
Monigrwth	0.0759*** (6.68)	0.0532*** (6.07)	0.0501*** (3.97)	
LnFDI	0.0561*** (3.30)	0.0184 (0.69)	0.0289* (1.65)	
REMIT2GDP	- 1.346*** (- 5.02)	- 0.918*** (- 3.47)	- 0.957*** (- 3.76)	
NPA	- 0.0233*** (- 4.64)	- 0.0138*** (- 3.16)	- 0.0172*** (- 3.75)	
Infla	0.0207*** (4.39)	0.0129*** (3.41)	0.0155*** (3.63)	
cons	3.916*** (5.41)	5.485*** (13.53)	4.365*** (7.32)	yes
<i>Model's Summary Statistics</i>				
<i>chi2</i>	2284.9	1161.2	6898.3	
<i>Df</i>	5	5	2	
<i>Observation</i>	N*(16 years) (1998-2013)			

Note: Columns 2, 3 and 4 represent the estimated models of the bank-based, market-based and the Financial Services Views respectively, as summarised in Table 7.5. The standard growth determinants are completely omitted from the column 5, leaving only the FS and FD variables. Constant term included but not reported on the 5th Column. The levels of significance are denoted by asterisks (*) and interpreted as; 1% (***) , 5% (**) and 10% (*). The outcome variable is a *natural log of GDP per capita* and *t-statistics in parentheses*. The number of observations are in years (1998-2013) and data from World Bank domain sources. Estimation is by GLM method.

7.4.1 Driver of Financial Inclusion towards Growth: Institutions or Market?

In terms of activity and efficiency, the bank-based view seems valid in the specific case of Ghana. The dominance of the banking institutions in driving growth is supported by the findings, except for *size*. This is consistent with prior studies, for instance, Arestis et al. (2001) whose results support the view that financial (institutions/banks) development affects growth more strongly than the stock market. This is contrary to most cross-country studies on the finance-growth linkage, which often exaggerate the role of stock markets on economic growth.

The financial system's *efficiency* in delivering credit to the productive deficit-spending units serves as the channel through which finance impacts growth. For instance, two-thirds of the parameter estimates of the structure equation (Eq. 7.3; see results summary in Table 7.6) confirms financial institutions' (banks) dominance as a driver of growth. However, the statistical insignificance of the coefficient of *Structure-Activity* leaves *Structure-Efficiency* as the only viable means through which banks influence growth. The intermediaries' ability to deliver efficient financial services to the private agents in an information-opaque environment defines inclusion as that which ensures inclusive growth. This is reflected in the signs and significance of α_{13} , b_{13} and θ_{13} , though the unexpected sign θ_{23} casts a little shadow, and hence weakens the impact.

The findings in this chapter seem to accord well with prior studies. For instance, Levine (2002) identifies Ghana (with other countries such as Kenya and Egypt) as bank-based using the *efficiency* criteria. However, attributing this to the inefficiency of the stock market is what appears problematic. Over the years, banks in Ghana have developed more resilience against risk. This allows them to operate efficiently even within an information-opaque and asymmetric environment. The explanations given above reflect the situation in Ghana more closely than the conjecture offered by Levine. Since both financial structure and financial development efficiency indicators point to the superiority of the banking financial institutions over the stock market, the outcome does not suggest coincidence (see Table 7.6). The results confirm earlier findings of De Gregorio and Guidotti (1995) that the financial system's efficiency is the main vehicle for realising the growth-inducing effect of financial development.

In terms of *size* and *activity*, the results suggest a complementary role of institutions and markets as drivers of growth. This is consistent with the countervailing view that the impact of finance on growth must be viewed as complementary. This is evident in Table 7.5 and the summary in Table 7.6. This finding contrasts, to some degree, with Levine's (2002) findings, which classify Ghana (like Jamaica and Zimbabwe) as bank-based using the *size* indicator of financial structure (*structure-size*). The view that Ghana's banking sector is underdeveloped is not supported by the empirical reality. On the contrary, the findings in this chapter support the complementarity view as a plausible reflection of the structure of Ghana's financial system. This position confirms prior studies, which find that both financial markets and institutions collectively influence growth positively (Beck & Levine, 2001, 2004; Levine & Zervos, 1998).

Table 7.6: Summary metrics of the prediction of key indicators in column 5 of Table 7.5

Models	Activity	Size	Efficiency
Financial Structure [II]	- 0.0322(α_{11})	0.542***(α_{12})	- 0.208***(α_{13})
Financial Dev [III]	- 0.282***(b_{11})	0.192 (b_{12})	0.238***(b_{13})
Financial Structure and	1.678**(θ_{11})	0.269*(θ_{12})	- 1.853***(θ_{13})
Financial Dev. [IV]	1.745**(θ_{21})	0.119**(θ_{22})	- 1.722**(θ_{23})

Understanding the relationship, as the study has highlighted, suggests that policies on growth, financial sector reforms and financial inclusion need not be pursued in isolation.

7.5 Results on Diagnostic and Specification Tests

Basic diagnostic tests such as serial correlation, heteroscedasticity and multicollinearity are performed to ensure proper model choice for the dataset.

The Breusch-Pagan/ Cook-Weisberg test for heteroscedasticity (*p-value* 0.0033) failed to accept the null hypothesis that the error term is homoscedastic (i.e., has a constant variance). This coupled with the mean VIF 8.85, which signalled presence of potential multicollinearity, partly necessitated the use of QR and GLM. Indeed, Szroeter's rank test for homoscedasticity is further applied to investigate the source of variations in the variance in the error term (see Table 7.8). This tests the null hypothesis of constant variances against the alternative hypothesis that the variance is monotonic in variables. The outcome suggests that variables such as per capita

GDP, (*LnGDPpc*), market capitalisation to GDP ratio (*MCAP*), remittance to GDP (*REMI2GDP*), FDI and rate of inflation (*Infla*) are the source of heteroscedasticity.

Table 7.6: Szroeter's rank test for homoscedasticity

Variable	chi2	df	Prob > chi2 (p-values)	#
Ln GDP Per capita	7.17	1	0.0074	#
MCAP(%GDP)	6.86	1	0.0088	#
BC2PS	1.57	1	0.2104	#
Lerner Index (LI)	0.37	1	0.5406	#
GSE _{TOR}	0.34	1	0.5580	#
BOC	0.09	1	0.7614	#
Infla	5.02	1	0.0251	#
Monigrwth	0.21	1	0.6473	#
REMI2GDP	5.72	1	0.0168	#
NPA	0.21	1	0.6492	#
LnFDI	6.77	1	0.0093	#
U-rate	2.68	1	0.1015	#
Sav2GDP	2.22	1	0.1361	#

Unadjusted p-values

It is noteworthy that GLM serves as the baseline (benchmark) model, with the quantile regression as further robustness checks.

The Durbin-Watson test for serial correlation applied proved inconclusive, necessitating the need to run the residual graph to see the movement of the error term for the fitted model. As can be seen in Figure 7.3, the residuals of the fitted model do not seem to follow a well-defined (systematic) pattern, suggesting the absence of serious autocorrelation (Gujarati & Porter, 1999).

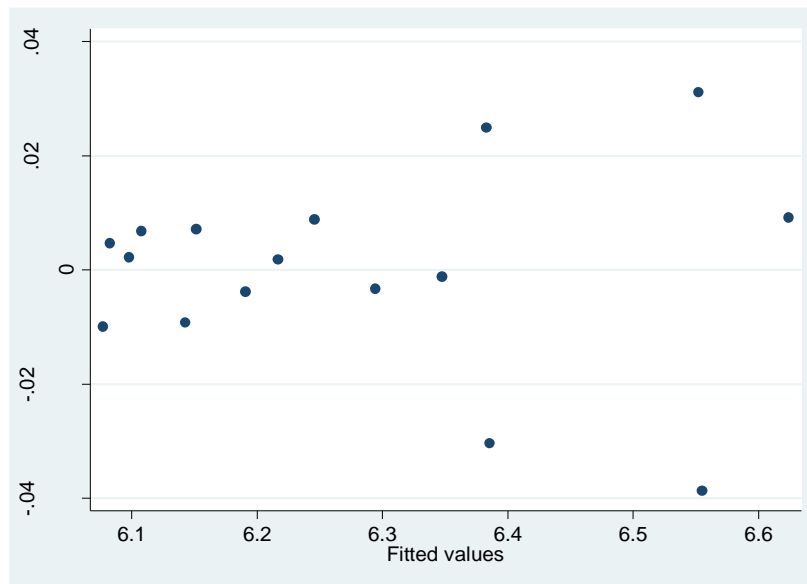


Figure 7.3: Residual pattern to check for autocorrelation

7.6 Chapter Summary and Conclusion

The chapter examines the means through which financial inclusion can impact national-level growth. This is premised on the recent realisation that inclusive growth results from finance if financial inclusion becomes a key implementation strategy. Benchmarking the quantile regression (QR) model with a GLM, the chapter makes a significant contribution towards the understanding of how financial development and structure lead to the inclusion necessary for growth in LICs. The econometric estimates lend support to hypotheses $H_{c(1-i)}$, $H_{c(1-iii)}$, $H_{c(2-i)}$ and $H_{c(2-ii)}$. However, the empirical outcome failed to support hypotheses $H_{c(1-ii)}$ and $H_{c(1-iv)}$.

Prior to the establishment of Ghana’s stock market, the financial landscape was dominated by banking financial intermediaries, some dating back to the pre-independence era. In view of this, it is logical to expect that the financial institutions (rather than the market) drive financial inclusion to facilitate growth. The study thus provides empirical support that the potential growth effect of financial institutions in LICs is much stronger compared to the market. This is due to the ability of the FIs to foster financial inclusion as it deepens. The combined effects of matured financial institutions against the young capital market in Ghana, may be a contributory factor.

As the banks pursue inclusion through credit to the private sector at reasonable cost, complemented by the liquidity and risk hedging mechanisms that the stock market

guarantees, sustained growth is very likely in LICs. In view of this, it is possible to think of the entire financial system facilitating the country's economic growth where both the institutions (banks) and the market complement each other to ensure broader inclusion. It is evident from the chapter that for LICs, the banks' growth-facilitating role is much stronger than that of the capital market. The financial sector facilitates growth when it ensures that viable investments are undertaken at a reasonable cost. Growth therefore emerges, as the financial development reduces both transaction and information costs.

The outcome proposes a policy pathway; there is greater tendency for the financial systems of LICs to become more market-based as they become richer. Prior to that, however, the financial institutions will drive growth as they engender financial inclusion. Policy efforts that strengthen the financial intermediaries in developing countries to enable them to promote broader inclusion become a promising conduit to achieving meaningful growth.

CHAPTER 8

FINANCIAL INCLUSION AND FIRM ATTRIBUTES

8.1 Chapter Overview

The empirical testing of hypotheses $H_{(b1-7)}$ is presented in this chapter. Estimating equation 15.2, the chapter discusses results of the investigation into the firm-level attributes that potentially contribute to their financial inclusion or otherwise. The study identifies firm characteristics that are most significantly predisposed to risk of being excluded from using financial services.

Firm-level pooled data for 2007 and 2013 from the WBES on Ghana is used. Sectors included are manufacturing, service and retailing. A logistic regression model serves as the baseline regression model. Difference-in-Difference (DID) technique is further applied to track any key structural changes and potential shocks that occurred after the baseline data point (Angrist & Pischke, 2008; Cameron & Trivedi, 2005).

The chapter is organised as follows. The next section (8.2) gives the descriptive summary statistics of the variables employed in the chapter. Section 8.3 presents the results of the multiple regression analysis. The model diagnostic test is presented under Section 8.4, while Section 8.5 concludes the chapter with policy implications of the empirical findings. Other relevant reference materials that may cloud the sequential flow of the main theme of this chapter are appended to the chapter at Section 8.6 A.

8.1 Descriptive Summary Statistics

It is to be recalled that the World Bank Enterprise Surveys (WBES) are the main source of data for the empirical investigation in this chapter. Table 8.1 presents the cross-sectoral/industry, economy-wide dataset on enterprises in Ghana drawn from the WBES for both 2007 (baseline) and 2013 (follow-up). This descriptive summary statistics on variables used is presented for the baseline, follow-up, and

the pooled dataset. Arithmetic mean, standard deviation, maximum and minimum are the basic statistics reported in the table.

In Ghana, SMEs are classified by the WBES as firms having 5 to 99 equivalent full-time employees. Small firms employ 5-19 and medium-sized firms between 20 and 99 employees. Approximately 70.1 percent of the firms sampled in the base year constituted small-sized firms, 24 percent medium-sized firms and only about 5.9 percent large-sized firms. The observation appears consistent with enterprise landscapes around the globe, which underscores the strategic role SMEs play in most economies. For instance, MBIE's Small Business Reports (2011-2016) suggest that the small business sector consistently constitutes 97 percent of all enterprises in New Zealand. The trend is not any different from other OECD countries (MBIE, n.d.).

Similarly, Abor and Quartey (2010) observed that SMEs constitute about 92 percent of the enterprise landscape of Ghana, contributing approximately 70 percent to GDP and create nearly 85 percent of employment in the manufacturing sector.

It is worth noting that firms classified as small in the follow-up period stand at approximately 65.7 percent, showing a reduction from the baseline period. The medium-sized firms show a rise from 24 percent in the baseline period to 26.3 percent in the follow-up (2013) period. The trend observed seems to suggest that some small firms might have metamorphosed into medium-sized firms over the six year period³⁵.

In 2007, approximately 62.2 percent of the sampled firms were classified as financially excluded using the definitional criteria (see section 3.3. 1) compared to 79.2 percent in the follow-up period (2013). Consistent with the empirical outcome using econometric modelling, enterprises in Ghana appeared to be more financially constrained in the follow-up period than the baseline period. This outcome appears consistent with World Bank research indicating a high prevalence of financial exclusion among firms and individuals within Africa (Beck et al., 2015; Demirgüç-Kunt & Klapper, 2012a) (see Figure 8.1).

In Ghana, the recent World Bank estimates suggest that the number of bank branches per 100,000 people is six and approximately 70 percent of adult Ghanaians do not have any access to formal financial services (Demirgüç-Kunt & Klapper,

³⁵ Between 2007 and 2013 when the baseline and follow-up dataset were collected, respectively

2012a). It is important to understand why financial exclusion among firms appears high in the follow-up period compared to the baseline year.

Figure 8.1 shows how firms in Ghana confront the issue of financial exclusion. As an instance, the number of firms in Ghana identifying access to finance as a major constraint appears to exceed the rest of the world.

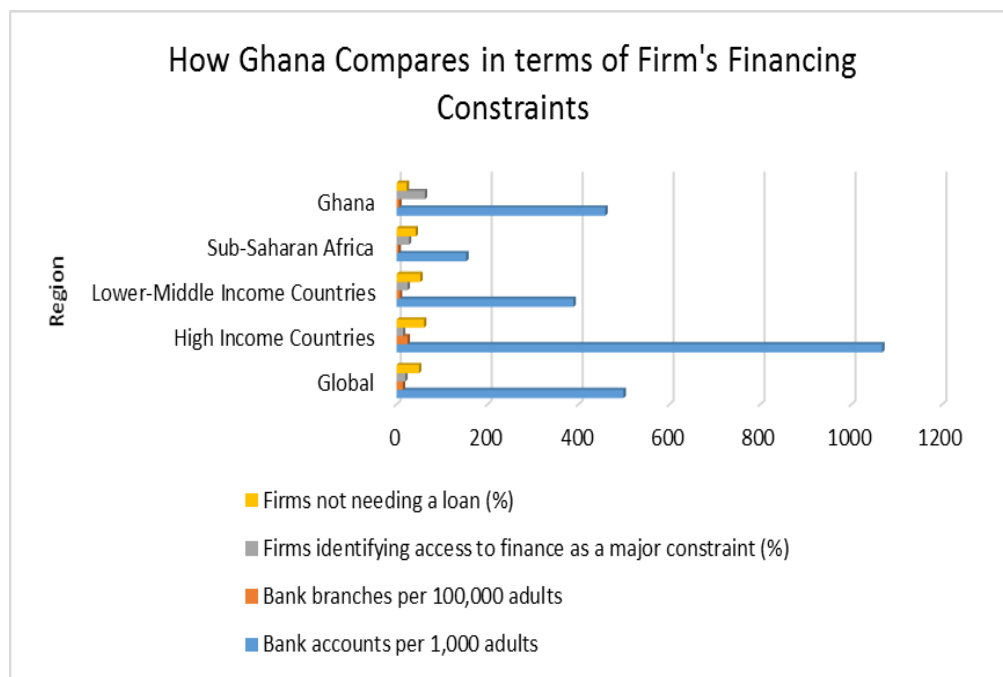


Figure 8.1: How Ghana compares in terms of financial exclusion (Author, using WBES dataset (2013)).

The baseline data collection period of the WBES falls within the period (2001-2009) described as the ‘golden age of business’ (Arthur, 2006), since private sector-led growth strategy of the regime alleviated firms’ financing constraints in Ghana. It is plausible to assume that the financing constraints faced by firms in the follow-up period might have wider implications. For instance, the percentage of sole-proprietorship firms reduced from the baseline period level of 70 percent to 61 percent. At the same time, partnership firms increased from 11.5 percent to 34 percent over the same period. The incentive to contribute capital towards the formation of partnerships in a financially constrained years seems a reasonable conjecture, which seems consistent with prior research. Dong and Glaister (2006), for instance, identified capital/finance as one of the top important criteria that motivated the selection of partners among 203 Chinese firms sampled.

Table 8.1: Descriptive summary statistics

Baseline (2007) Dataset (<i>N=616</i>)					Follow-up (2013) Dataset (<i>N=715</i>)				Pooled Dataset between the baseline and the follow-up (2007 & 2013) (<i>N=1,331</i>)			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
FE_ALL	0.6218	0.4853	0	1	0.7916	0.4064	0	1	0.7130	0.4525	0	1
Size (LnSales)	19.2371	2.0294	13.385	27.060	12.3552	2.3236	7.3132	19.810	15.991	4.0658	7.3132	27.06
FS_Small	0.7013	0.4581	0	1	0.6573	0.4749	0	1	0.6777	0.4675	0	1
FS_Medium	0.2403	0.4276	0	1	0.2629	0.4405	0	1	0.2524	0.4346	0	1
website_own	0.0714	0.2577	0	1	0.3343	0.4721	0	1	0.2126	0.4093	0	1
Loc_North	0.2971	0.4573	0	1	0.2042	0.4034	0	1	0.2472	0.4315	0	1
Loc_Tardi	0.0974	0.2967	0	1	0.0769	0.2667	0	1	0.0864	0.2811	0	1
Sec_Manu.	0.5081	0.5003	0	1	0.5231	0.4998	0	1	0.5162	0.4999	0	1
Sec_Retail	0.2825	0.4506	0	1	0.1608	0.3676	0	1	0.2171	0.4124	0	1
Firm_Regist	0.6374	0.4811	0	1	0.7427	0.4375	0	1	0.6940	0.4610	0	1
Sole_Prop	0.6981	0.4595	0	1	0.6098	0.4881	0	1	0.6506	0.4769	0	1
Partner	0.1153	0.3196	0	1	0.3385	0.4735	0	1	0.2352	0.4243	0	1
LNage	2.2229	0.8411	0	4.331	2.4390	0.7664	0	4.644	2.3383	0.8090	0	4.64
Fem_own	0.4903	0.5003	0	1	0.2923	0.4551	0	1	0.3839	0.4865	0	1
Sub_firm	0.0357	0.1857	0	1	0.1021	0.3030	0	1	0.0714	0.2575	0	1
Manager_Exp	13.3977	9.3042	1	50	16.194	9.2914	2	64	14.8861	9.3981	1	64

Source: Author's compilation using WBES, 2007&201

It is noticeable that the *website ownership* rate was approximately 7.1 percent in the baseline period, rising significantly to approximately 33.4 percent in the follow-up period. Arthur (2006) observes again that ICT infrastructure during the baseline period was at the early stage of modernisation. The trend observed suggests that technological deepening occurs over time.

Again, the percentage of firms operating in the manufacturing sector increased marginally from 50.8 percent to 52.31 percent between the baseline and follow-up periods. Simultaneously, percentage of firms operating as retailers reduced from approximately 28.3 percent to 16.6 percent. These observations are meaningful in the light of prior studies. As an instance, recent research on the enterprise growth map of Ghana by the International Growth Centre (IGC) suggests that the growth pathway for most Ghanaian manufacturers is traceable from retailing (Sutton & Kpentey, 2012). That implies that most of the local manufacturing firms in Ghana start out as retailers. As they gain experience over time, they begin manufacturing the same products they previously retailed. This may signal the possibility that some retail-operating firms might have upgraded to manufacturing status, as the descriptive statistics suggest.

The outcome shows a rise in the number of firms registered between the baseline (63.7%) and the follow-up periods (74.3%). This could be attributed to efforts by successive governments to reduce the number of firms operating in the shadows of the informal economy. The next section presents econometric results based on the logistic regression model.

8.2 Results of the Multiple Logistic Regression

The results of the regression models for both the baseline and follow-up datasets are presented (see Table 8.2), and discussed. The discussion is based predominantly on the model outcome for follow-up data. However, the application of DID technique helps to account for any difference observed between the two models (see Table 8.4).

Table 8.2: Logistic regression estimates comparing the baseline (2007) and follow-up (2013) outcomes

VARIABLES (Dep Var. FE [§])	(2)	(3)	(4)	(5)
	Odds Ratios		Marginal Effects (dydx)	
	Baseline	Follow-up	Baseline	Follow-up
	β [se]	β [se]	β [se]	β [se]
Size (LnSales)	0.799 [0.0483]***	0.797 [0.0594]***	-0.044 [0.0113]***	-0.029 [0.0092]***
FS_Small	1.212 [0.537]	2.558 [1.355]*	0.038 [0.0870]	0.118 [0.0661]*
FS_Med	0.662 [0.308]	4.151 [2.024]***	-0.081 [0.0914]	0.179 [0.0604]***
website_own	0.550 [0.208]	0.545 [0.148]**	-0.118 [0.0735]	-0.076 [0.0340]**
Loc_North	0.598 [0.122]**	0.425 [0.142]**	-0.101 [0.0396]**	-0.108 [0.0421]**
Loc_Tardi	2.425 [0.888]**	0.128 [0.0569]***	0.174 [0.0710]**	-0.259 [0.0535]***
Sec_Manu	0.846 [0.220]	0.996 [0.298]	-0.033 [0.0510]	-0.001 [0.0377]
Sec_Retail	0.732 [0.193]	0.461 [0.170]**	-0.061 [0.0517]	-0.098 [0.0462]**
Firm_Regis	1.066 [0.220]	1.763 [0.556]*	0.013 [0.0406]	0.072 [0.0392]*
Sole_Prop	1.948 [0.499]***	4.434 [2.207]***	0.131 [0.0497]***	0.188 [0.0612]***
Partner	1.319 [0.461]	2.802 [1.325]**	0.055 [0.0686]	0.130 [0.0584]**
LnAge	0.581 [0.108]***	0.705 [0.146]*	-0.107 [0.0355]***	-0.044 [0.0258]*
Fem_own	0.993 [0.184]	1.323 [0.413]	-0.001 [0.0366]	0.035 [0.0393]
Sub_firm	0.350 [0.209]*	2.609 [1.166]**	-0.206 [0.115]*	0.121 [0.0565]**
Mger_Exp	1.055 [0.0174]***	1.013 [0.0146]	0.0106[0.00311]***	0.002 [0.0018]
Constant	165.6 [231.7]***	18.83 [28.02]**	<i>n.a.</i>	<i>n.a.</i>
Observations	614	536	614	536

Note: The Table presents results on the baseline regression using 2007 and 3013 WBES datasets. The outcome variable is financial exclusion (FE), defined as Y=1 if a firm is likely to be excluded from getting a loan/line of credit, or 0 if otherwise. The levels of significance are denoted by asterisks (*) and interpreted as 1% (***), 5% (**) and 10% (*). Robust standard errors (e-form) are in parentheses. The estimation technique is logit. It is important to note that all the *positive marginal effects (ME) signal likelihood of exclusion, whereas the negative MEs, signal likelihood of inclusion* (as the *outcome variable is financial exclusion*).

Firm Size

The outcomes of both odds ratios (columns 2 & 3) and the marginal effects (columns 4 & 5) suggest that small and medium (SMEs) firms in Ghana are more likely to face financial exclusion than larger firms. These findings are significant at 10 percent (ME = 0.118) and 1 percent (ME = 0.179) levels for small and medium firms respectively. Measure of size using a natural log of sales also corroborates the employment criteria indicated above. Many empirical prior studies support the findings that SMEs face more financial exclusion than the larger firms (Abor & Quartey, 2010; Aterido et al., 2013; Beck & Demirguc-Kunt, 2006; Beck, Demirgüç-Kunt, & Maksimovic, 2008). Many factors contribute to this, key among which is the issue relating to the arduous requirements for obtaining line of credits/loans, especially from the formal intermediaries. Specific reasons, such as

smallness of loan size, short maturity, the complexity of loan application procedure, unfavourable interest payments, coupled with high collateral requirements, as detailed in the WBES responses, all shape up to deter SMEs from accessing credit from financial intermediaries. This appears to be consistent with the theoretic prediction that credit-rationing takes place in an environment where market imperfection thrives (Stiglitz & Weiss, 1981). SMEs' operations are often in the shadows and information opacity tends to financially exclude them more than larger firms that trade publicly (Dong & Men, 2014; Hannig & Jansen, 2010; Stiglitz & Weiss, 1981). This outcome, therefore, supports the hypothesis $H_{b(1)}$.

Figures 8.2 (a & b) below and on 8.6A in the chapter appendix, graphically exhibit the relationship between the probability of financial exclusion occurring and selected firm's attributes (fitted with 95% confidence interval). Upward sloping curves suggest that likelihood of exclusion rises with those attributes (as in the case of small-sized firms (b)): the converse holds for the downward-sloping curves (as is the case of firm size captured by log of sale (a)).

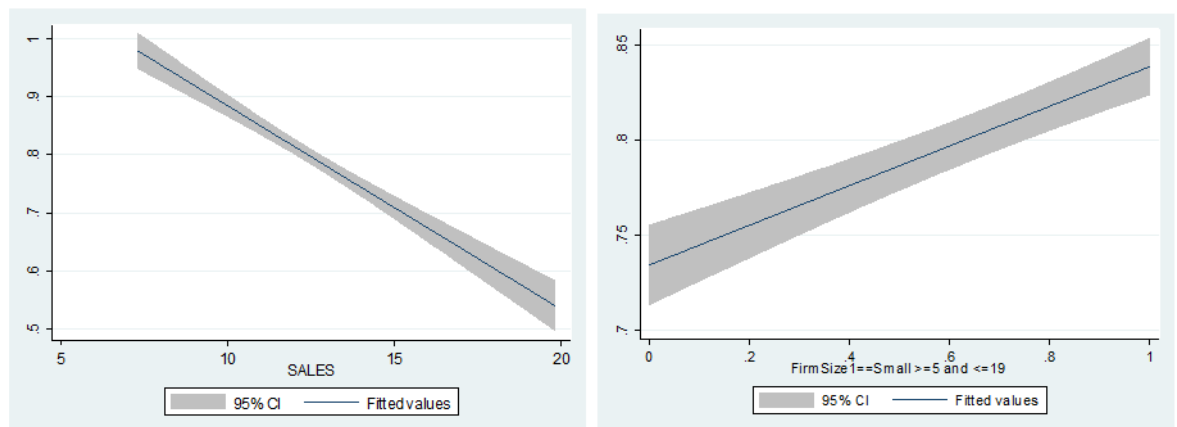


Figure 8.2 (a): Firm Size (Log Sales) and FE; Figure 8.2(b): Small Size firms and Financial Exclusion

Figure 8.2: Graphical presentation of selected firm's attributes and the likelihood of financial exclusion

Sector of Operation

The results indicate a high likelihood of exclusion among firms operating in the manufacturing sector compared with other sectors such as service and retailing. The performance of Ghana's manufacturing sector has been less impressive in recent times (Kwakye, 2012) and Schwimmer et al. (2006) identify corruption and lack of

aid to the sector as contributory factors. While the outcome is in contrast to that of Dong and Men (2014) who find high likelihood of financial exclusion among non-manufacturing sector firms, it does confirm the study of five sub-Saharan African countries which identifies high credit constraints among manufacturing sector firms (Wellalage & Locke, 2016).

Firm Age

The marginal effect of financial exclusion appears lower for older firms than for younger ones. This is statistically significant at 1 percent ($ME = -0.107$) for the baseline model and 10 percent ($ME = -0.044$) for the follow-up. The finding is consistent with similar studies carried out in other emerging economies by Dong and Men (2014), and by Aterido et al. (2013). The older firms might have established long relationships with the credit suppliers which, according to Levine (2005), helps reduce information and transaction costs.

Firm's Registration and formalisation

Consistent with similar country-specific, impact evaluation studies in Sri Lanka (De Mel et al., 2013) and in Bolivia (McKenzie & Sakho, 2010), the finding does not find support for firms' registration as an inclusion-enabler. The positive significant marginal effect ($ME = 0.072$) at 10 percent level (column 5), does not empirically support the hypothesis ($H_{b(5)}$). This outcome is, however, a contrast to cross-country studies that find a positive relationship between a firm's formalisation and its access to credit (Farazi, 2014). The processes leading to becoming formal require some form of registration with designated government agencies. The expectation is that credit suppliers may find it more risk-reducing to deal with the registered firms rather than unregistered. A priori, since formalisation could overcome information opacity, a negative marginal effect (reduced risk of exclusion) was expected. Further, as Farazi (2014) observes, a firm's primary motivation for becoming formal is the possibility of accessing credit from the formal financial sector. The possibility of facing regulatory costs and the burdens of being a registered firm often cloud the credit-access motive (Johnson, Kaufmann, McMillan, & Woodruff, 2000; Kasseeah, 2016).

It is worth emphasising that the decision to become registered or not is often based on a careful cost-benefit consideration. Firms may weigh both the pecuniary and non-pecuniary costs (e.g., paying tax burden) of becoming formal against the

benefits (e.g., credit accessibility) of doing so (Farazi, 2014). In practice, however, the decision to register is often imposed by the relevant government agency, often for tax and regulations purposes (Dabla-Norris & Inchauste, 2007; Wellalage & Locke, 2016b). Consequently, being registered becomes a disincentive to firms due to the tax and regulatory burdens registration imposes (Dabla-Norris & Inchauste, 2007; Johnson et al., 2000; Kasseeah, 2016). As such, an unintended outcome which includes high risk of exclusion from financial services may result, as revealed in this study. Emphasis placed on the benefits of getting registered, which may include tax exemptions and support for capacity-building from a relevant agency, as observed by Wellalage and Locke (2016), can induce voluntary registration among firms.

Legal form of firm ownership

Inclusion of business forms of ownership is in line with Coleman (2000). This allows the author to determine whether other corporate forms have an advantage over sole proprietorships when accessing lines of credit. The estimated results suggest that both partnership and sole proprietorship firms are more likely to experience financial exclusion than companies. This outcome supports the findings of Aterido et al. (2013) that sole-proprietorships have less likelihood of accessing external finance. The outcome is intuitive. One-man businesses are generally small and are confronted with the financial constraints faced by small businesses. The formal financial system is more inclined to finance publicly listed companies where scale production exists and full-disclosure of information diminishes opacity. Also, the unlimited liability which places personal obligation on the owners in the partnership and one-man businesses (Brigham & Houston, 2010; Coleman, 2000; Osteryoung, Newman, & Davies, 1997), may partly explain the outcome.

Application of a generalized regression model with logit as the link function (see Table 8.3.) allows the author to ascertain the risk ratios of the variables of interest. Risk-reducing firm attributes are those with risk ratios less than one. Those with risk ratios greater than 1 increase the risk of exclusion from the use of financial services. For instance, firms with functioning websites have approximately 17 percent reduction in risk of exclusion compared with those without. Small firms also have a 45.7 percent increase in risk of financial exclusion than larger firms; while medium-sized firms have a 35.5 percent rise in risk of financial exclusion.

Table 8.3: Measure of risk of financial exclusion using relative risk analysis

VARIABLES	Dependent Variable is Financial Exclusion		
	(1) Risk ratio	(2) Risk ratio	(3) Risk ratio
Sec_Manu	0.946		
Sec_Retail	0.882**		
WEB_Ownership	0.831***		
Loc_Takoradi	0.658***		
Loc_Tema	1.048		
Loc_North	0.935		
Aged	0.876***		
Size (Ln SALES)		0.971***	
Sole_Prop.		1.779**	
Partnership		1.696**	
FS_Small			1.457***
FS_Med			1.355**
Firms Regis.			1.044
Firms Subsid.			1.094*
Constant	0.945**	0.668	0.543***
Observations	705	550	715

Note: The Table above presents results on the Risk ratio analysis using generalized linear models that follow a log-binomial regression model using maximum likelihood optimisation, with log as the link function. The outcome variable is financial exclusion (FE), defined as Y=1 if a firm is likely to be excluded from getting a loan/line of credit or 0 if otherwise. The levels of significance are denoted by asterisks (*) and interpreted as; 1% (***), 5% (***) and 10% (*). Robust standard errors (e-form) are in parentheses.

Using a difference-in-difference (DID) estimation technique, the author could ascertain whether there exists an unobserved difference between the control (reference) group and the treated groups across the outcomes of the two models based on the two data points presented in Table 8.1. If such differences are constant across the two data points' periods (baseline and follow-up), then no significant difference between the reference and treated groups across the two periods would be expected. DID accommodates fixed-effects estimators with causal analysis as it controls for unobserved characteristics and/or complementary information that could potentially behave as confounders (Angrist & Pischke, 2008; Villa, 2012). The outcome of the DID estimation is presented in Table 8.4.

Certain events or policies in Ghana that followed the WBES baseline data in 2007 are expected to have treatment effects on the follow-up outcome, based on the 2013 survey. Potential treatment effects considered include political change from the pro-capitalist regime to the pro-socialist (2009); the eight-month post-election hearing at the Supreme Court of Ghana (2012), and the coming on-stream of the oil economy (2011). The national nature of those phenomena allows the author to hypothesise that, 'there are significant differences between the treated and the

control groups across the dataset for the two time periods’, with the unintended unobserved impact on the underlying relationships being studied. The delta (δ) from equation (7.1) captures the treatment effects. The treatment effect for small-and medium-sized firms, website ownership, subsidiary firms and Takoradi as a firm’s location are found to be empirically significant. Variables, including firm registration and firm location-North, are insignificant as treatment effects. These constitute the time-invariant effects contributing to the difference among the reference and the treated groups.

The application of a seemingly unrelated estimation test (SUEST) as a further robustness check on the DID is to test for the equality of the parameter estimates across the models. Website ownership, medium-sized firms, Takoradi and subsidiary firms do differ significantly, corroborating the DID outcomes. Comparing the baseline outcome with the follow-up results, differences are observed among some key variables. These include firm size, location, website ownership, inter-firm linkage, sector, and legal forms of ownership. To what extent could structural changes at the national level, such as the eight-month post-election hearing at the Supreme Court of Ghana (2012), oil discoveries and political-regime change, all of which occurred exclusively during the follow-up period, help explain in part the observed differences?

On Table 8.4, the outcome of the estimation using DID technique is presented. The general specification is as below:

$$y_{it} = a + \beta T_Var_i + \gamma Period_{it} + \delta INT(Period * T_Var)_{it} + \varepsilon_{it} \dots (7.1) ;$$

where y_{it} is the outcome variable; T_Vari represents individual variables of interest comprising both the control group (if T_Var dummy = 0) and treated group (if T_Var =1); Period is a dummy for time period indicating (t =0 for the baseline and t=1 for the follow-up) within which the treatment effect is ascertained. The interaction between the T_Var and time variable account for any potential differences.

Table 8.4: Financial exclusion and firms' attributes: Difference-in-difference (DID) on key variables

VARIABLES	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sales	FS_small	FS_Med	Web	Firm_Regis	Tardi	North	Subsid
Time	-0.732*** (0.193)	0.252*** (0.0428)	0.143*** (0.0281)	0.199*** (0.0272)	0.122*** (0.0443)	0.210*** (0.0253)	0.159*** (0.0284)	0.157*** (0.0252)
Size (LnSales)	-0.0710*** (0.0085)							
_diff (δ)	0.0345*** (0.0116)	-0.112** (0.0519)	0.115** (0.0562)	0.169** (0.0768)	0.0721 (0.0533)	-0.464*** (0.0860)	0.0306 (0.0569)	0.333*** (0.111)
FS_Small		0.205*** (0.0387)						
FS_Med			-0.142*** (0.0418)					
website_own				-0.327*** (0.0685)				
Firm_Regis					-0.0527 (0.0373)			
Loc_Tardi						0.197*** (0.0598)		
Loc_North							-0.0527 (0.0392)	
Sub_firm								-0.315*** (0.0962)
Constant	1.988*** (0.165)	0.478*** (0.0324)	0.656*** (0.0205)	0.645*** (0.0183)	0.655*** (0.0298)	0.603*** (0.0187)	0.637*** (0.0214)	0.633*** (0.0182)
Observations	1,166	1,331	1,331	1,331	1,330	1,331	1,331	1,331
R-squared	0.110	0.060	0.044	0.066	0.037	0.056	0.037	0.043

Note: Table 8.4 contains the estimation outcome using DID technique. The outcome variable is financial exclusion (FE), defined as Y=1 if a firm is likely to be financially excluded from getting a loan/line of credit, and 0, otherwise. The levels of significance are denoted by asterisks (*) and interpreted as 1% (***), 5% (**) and 10% (*).

The baseline outcome indicates no significant exclusion among the SMEs, though small firms have a predisposition. The follow-up model, however, reveals an outcome where financial exclusion is significant among SMEs. Most small businesses in Ghana start as sole proprietors (Sutton & Kpentey, 2012). Financial constraint experienced by one-man businesses both under baseline and follow-up periods is, perhaps, a cliché. Partnership firms experience no significant exclusion from using financial services during the baseline period. However, the likelihood of exclusion is observed in the follow-up period. Can liquidity constraint and fiscal austerity measures partly account for this?

The period that precedes the baseline data collection coincides with an era of economic growth. This could be described as economic prosperity with consistent GDP growth rates from 3.7 percent in 2000 to 8.3 percent in 2008. Regarded as 'the golden age of business' (Arthur, 2006), the period witnessed a situation where credit

suppliers pursued households and businesses to take up loan facilities. Other researchers have noted that enterprises were not credit constrained at the baseline period. Arthur (2006) for instance, noted that access to long-term credit among SMEs was made possible when the regime at that time signed an agreement with the US government³⁶ to supply credit of US\$2 million for five consecutive years (2004-2008) to assist SMEs. Firm size was not a basis for credit accessibility. The policies initiated by the regime, which included the creation of a special ministerial portfolio responsible for private sector development (Asem, Busse, Osei, & Silberberger, 2013), ensured that the barriers that often militate against SMEs were removed, leading to less rationing of credit as SMEs and large firms equally had opportunities to access credit. Asem et al. (2013) observed that private sector growth support was a major policy goal for the regime at the time. Consequently, a significant number of small businesses were assisted with credit, facilitated by the state-agency – National board for small industries (NBSSI) (Arthur, 2006). The rate of inflation was significantly controlled from 40.5 percent in 2000 down to 10.7 percent in 2007. All these policy interventions could possibly imply that firms were less credit constrained during the baseline period, as revealed in this study.

The follow-up regression results present a different story as they coincide with the regime change that places less emphasis on private-sector development. The introduction of tight austerity measures by the regime, coupled with high fiscal borrowing, raises the possibility of crowding-out effects. The loanable fund theory posits that credit is squeezed from private investment as the government outcompetes them with high Treasury-note rates far beyond what private borrowers can afford (Hoelscher, 1983). Household savings often get diverted towards purchase of Treasury bills, denying the private enterprises potential investible funds, ultimately compounding the crowding-out problem. According to Kwakye (2010), public-sector borrowing requirements (PSBR) imposed by high fiscal deficit (in reference to 2009-2010 period) is a major contributory factor for the high cost of capital in Ghana, a phenomenon that he argues kills the private sector's incentive to invest (Kwakye, 2010, 2012) (see also, Section 4.3.3).

Perceived risk of lending, especially to SMEs in a politically polarised country with a pending hearing in the Supreme Court, seems to fit well with the concept of 'intrinsic instability' and 'self-inflicted policy mistakes' as studied in relation to

³⁶ This was executed through African Development Fund

financial development (Loayza, Ranciere, Servén, & Ventura, 2007). Although empirical research on the potential economic impact of the eight-month post-election hearing in Ghana is lacking, prudential lending requirements dictate that lending institutions tread cautiously, given the general atmosphere of uncertainty that characterised the process. The follow-up data collection coincides with this period and the impact on credit to SMEs could logically be inferred using the regression outcome. SMEs' high likelihood of exclusion from accessing credit is therefore expected.

Credit suppliers could rely on a form of network relationship that helps reduce information asymmetry when offering credit to particular small borrowers (Calia, Guerrini, & Moura, 2007; Nguyen & Luu, 2013). A subsidiary firm's affiliation with a mother company is expected to improve credit access and reduce exclusion. Financial exclusion is not significantly observed among firms that are subsidiaries of bigger ones in the baseline model, though exclusion in the follow-up period is significantly noted. Linkage with a bigger entity does not become advantageous in getting credit in periods where credit is highly rationed among firms. The incentive to lend to the government becomes high as government instruments offer competitively higher rates (Hoelscher, 1983; Agyekum, 2011).

Firm Location

The study reveals firm location as a crucial factor when it comes to prospects for credit accessibility. The study finds firms operating within locations such as Takoradi and North having a high chance of being granted credit. Notice that the marginal effects for the two locations; Takoradi ($ME = -0.259$) and North ($ME = -0.108$) are economically significant at 5 percent and 1 percent levels respectively.

It is instructive to note that Takoradi is the oil city of Ghana, making reduced likelihood of financial exclusion reasonable. The location 'North' consists of firms in the Kumasi and Tamale. Located in the middle of Ghana, Kumasi attracts traders and businesses from all over the country. As the commercial city of Ghana, many retailing activities other than manufacturing take place. In addition, the region has the highest number of rural and community banks (18% of total RCBs)³⁷ in Ghana

³⁷ The same information can be obtained from Bank of Ghana website www.bog.gov.gh/privatecontent/Banking_Supervision/REGIONAL%20DISTRIBUTION%20OF%20RURAL%20BANKS.pdf

(Agyekum, 2011, see Figure 2.2). However, with Takoradi as the oil city, the stronger marginal effect compared with the North is expected, a priori.

The findings suggest that firms operating within the Takoradi enclave have a high likelihood of getting credit. The emergence of the oil industry may have attracted more financial intermediaries to the region. This underscores the study by Leyshon and Thrift (1995) that found the wealth of a geographical location has an impact on financial access. Popov and Udell (2012) assertion that banks allocate more resources to geographically promising locations seems consistent with the findings.

While the baseline results reveal that firms located in Takoradi have the likelihood of financial exclusion, the outcome based on the follow-up dataset suggests otherwise. The difference in these results is significant using both DID and SUEST estimates. It is noted that the baseline period falls within the pre-oil industry era, whilst the follow-up data point covers the post-oil economy. The outcome is as expected; credit suppliers have incentives to supply lines of credit to firms located within the oil-drilling enclave (Takoradi). Given the possibility that firms within the location are oil-industry linked, a concern is raised for a possible resource curse since the manufacturing sector and the manufacturing hub (Tema) experienced exclusion following the oil discovery. This is consistent with a study by Kwakye (2012) who used recent Bank of Ghana survey data to study banks' lending practices. While 65 percent of the intermediaries sampled would lend to the service sector, most of which are retailing (Sutton & Kpentey, 2012), only 31 percent would do so for the industries comprising construction, mining, manufacturing and oil and gas, with the agriculture sector receiving the least credit (4%) (Kwakye, 2012). This seems to confirm findings of prior studies that financial intermediaries tend to be pulled towards resource-endowed, wealthy geographical locations (Leyshon & Thrift, 1995).

Website ownership

The study finds website ownership as being a financial exclusion-reducing attribute. Firms' access to credit and other financial resources are greatly influenced by the credit information system that allows lenders to assess the risk of potential borrowers (World Bank Group, 2012). Website ownership dissipates opacity emanating from information asymmetry, which clouds credit administration in LICs. This is consistent with prior studies (see e.g., Brealey, Leland, & Pyle, 1977;

Hannig & Jansen, 2010). The role of ICT (*website*) becomes even more crucial as there is no credit rating bureau on small business in LICs (World Bank Group, 2012).

The improvement in the depth of credit information index (6 out of 8) contributed significantly to the overall distance to frontier (DTF) score (65 out of 100) of getting credit in Ghana since 2005 (World Bank Group, 2012). For instance, the World Bank Doing Business Report (2016, p. 204) indicates that the credit bureau per adult population is only 16.3 percent whereas credit registry coverage is utterly absent. The presence of the worldwide web improves the intermediation process by allowing credit suppliers access to information remotely on a client's credit worthiness. This reduces transaction and information costs and, ultimately, the lending risk to financial intermediaries. Ownership of a functioning worldwide web then becomes an invaluable tool that allows credit suppliers access to information on existing and potential clients. This, consequently, serves as a useful tool for reducing risk exposure in lending. Firms with worldwide website ownership are more likely to have access to credit than those without a website.

Technological deepening, however, occurs over time. ICT infrastructure was at the early stage of modernisation in the baseline period (Arthur, 2006). Baseline results suggest that website ownership is not a significant determinant of the likelihood of a firm's credit accessibility. Arthur (2006) observes that such infrastructural gaps hamper development of private firms in areas of information accessibility. Another plausible intuition is that the absence of liquidity constraints among credit suppliers in the baseline era could spur lending institutions to put a lower premium on information-sharing amenities such as website ownership. As credit constraints become reality following austerity measures and tight monetary regimes in the follow-up period, risks are highly avoided. Credit is rationed away from information-opaque borrowers to those whose information is readily available via a website. As websites become accessible to most firms, credit suppliers are offered another means to overcome information and transaction cost problems in lending.

As a further robustness test for the logistic model, a stepwise logistic regression is applied. This allows the author to ascertain which of a firm's attributes are extremely significant for determining the possibility of being excluded financially. The result is presented in Table 8.5. This allows policy to focus on relevant factors that matter most when it comes to financial exclusion.

Table 8.5: Stepwise logistic regression; (dependent variable is financial exclusion)

VARIABLES	(2)	(3)	(4)	(5)
	SWLR@5%	SWLR@5%	SWLR@1%	SWLR@1%
	Logit coeff	Odds ratio	Logit coeff	Odds Ratio
SALES	-0.223*** (0.0745)	0.800*** (0.0596)	-0.258*** (0.0600)	0.773*** (0.0464)
Loc_Tarkoradi	-1.980*** (0.427)	0.138*** (0.0590)	-1.908*** (0.414)	0.148*** (0.0613)
Partnership	1.004** (0.466)	2.728** (1.270)	1.215*** (0.460)	3.370*** (1.550)
Loc_North	-0.826** (0.328)	0.438** (0.143)	-0.948*** (0.295)	0.388*** (0.114)
Sole Prop.	1.334*** (0.482)	3.797*** (1.831)	1.462*** (0.468)	4.315*** (2.018)
FS_Small	1.192** (0.520)	3.294** (1.713)		
FS_Med	1.526*** (0.470)	4.598*** (2.163)		
WEB_Ownership	-0.587** (0.270)	0.556** (0.150)		
Subsid_firm	0.945** (0.443)	2.572** (1.139)		
DsecRetail	-0.752** (0.310)	0.471** (0.146)		
Regist_firms	0.655** (0.303)	1.926** (0.584)		
Constant	2.117* (1.287)	8.303* (10.68)	3.798*** (0.992)	44.63*** (44.29)
Observations	542	542	542	542

Table 8.5 presents the Stepwise logistic regression outcome, showing 5% (columns 2 & 3) and 1% (columns 4 & 5) tolerance significance thresholds applied. The trade-offs between the model's parsimony and explanatory powers are observed when advancing towards the highest significance level (1%). The dependent variable (DV) is financial exclusion (FE), defined as Y=1 if a firm is likely to be excluded financially from getting a loan/line of credit or 0, otherwise. The levels of significance are denoted by asterisks (*) and interpreted as 1% (***), 5% (**) and 10% (*).

The measure of firm size using employment criteria drops off at 1 percent, though size is maintained using sales. While firm location remains a significant inclusion-inducing attribute at 1 percent, being a sole-proprietor and partnership firms widen the exclusion gap for the firm, underscoring these critical matters deserving policy attention.

8.3 Outcome on the Model Diagnostic Tests

Rigorous diagnostic analysis is carried out on the estimated logit models using both the baseline (2007) and follow-up (2013) datasets.

8.3.1 Measuring Model Sensitivity and Specificity Using ROC

Sensitivity and specificity are indices commonly used to evaluate the predictive accuracy of logistic models and both indices affirm the predictive accuracy of the model used in this study. Following the approach of Hosmer et al. (2013), scores computed are 0.73 and 0.78 on 2007 and 2013 data respectively. The model's *sensitivity* captures the probability of a positive prediction, while its *specificity* captures the probability of the negative prediction, given the dependent variable. Thus, the indices respectively gauge the accuracy of the proportion of firms that truly are excluded financially and those correctly classified as not financially excluded.

The receiver operating characteristic (ROC) curve also helps examine the predictive ability of the fitted models. The ROC curves using both the baseline and follow-up datasets are shown in Figure 8.3. The area under the curve shows how accurately the test is able to classify firms as financially excluded or not. For a fitted model to be accepted as having predictive power, the area under the ROC curve must be significantly higher (above 0.5) (Hosmer et al., 2013). As probability (π) is in the interval 0 to 1, the ROC curve plots the sensitivity (truly excluded) and 1-specificity (falsely excluded). This implies that on average, the true positive is high and the false positive rate appears low. Both models have significant area under the curves; 73.43 percent for the baseline model and 78.24 percent for the follow-up model, with the overall classified at 81.72 percent.

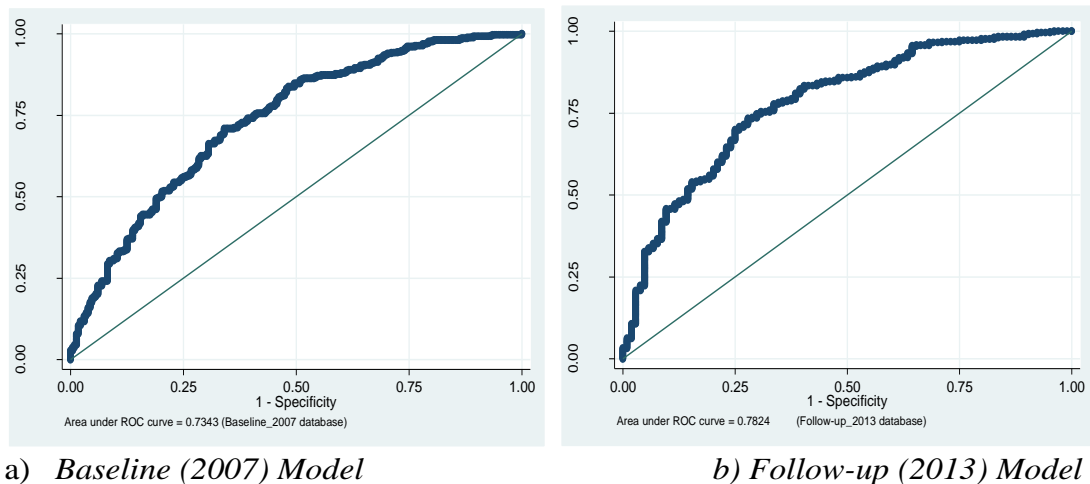


Figure 8.3: Shows the ROC curves for both the baseline and follow-up models

8.3.2 Model Specification Errors

A specification error test is performed on both baseline and follow-up fitted models to ensure that the choice of logit as the link function fits both datasets well. This is also to ensure that the relationship between the latent dependant (logit of outcome) variable and the explanatory variables is linear. The *linktest* is performed which uses both the linear predicted value (\hat{y}) and linear predicted value squared (\hat{y}^2) as the predictors in rebuilding the model (see Table 8.6 A).

The test suggests no indication that either relevant variable(s) have been omitted or the link function is incorrectly specified. Hosmer and Lemeshow's goodness-of-fit (with a p-value of 0.65 for the baseline model and 0.23 for the follow-up model) suggests the estimated model fits the respective dataset well (Hosmer Jr et al., 2013). A mean VIF (1.92) and the tolerance measure indicate that there is no problem of multicollinearity, though the author does not assume complete orthogonality among the predictor variables.

8.3.3 Detection of Influential Observations

Detection of influential observations that could possibly have high leverage on the model outcome is important. The possibility of data entry errors gives rise to such influential observations. Such objects could be of interest in the study, as they could skew the regression estimation in an unacceptable manner. Following the MLE method, the logistic regression minimises the *sum of the deviance residuals*, analogous to minimisation of the *sum of squared residuals* under the OLS regression. Pearson's residual, deviance residual and Pregibon's leverage are helpful statistics in this regard.

Defined as the square root of the contribution to the likelihood-ratio test statistic of a saturated model against the fitted model (Hosmer Jr et al., 2013), the deviance residual differs marginally from the Pearson's residual. Pearson residuals, defined as the standardised difference between the observed and the predicted frequencies, captures the relative deviations between the observed and fitted values. The deviance residual, however, measures the disparity between the maxima of the observed and the fitted log-likelihood functions, whereas the *hat diagonal* (or the *Pregibon's leverage*) measures the leverage of an observation.

These test statistics are appropriate to consider when identifying observations large enough to cause a change in either the chi-square or the deviance statistic.

Influential observations are identified following the general criteria that residuals must be greater than two or three in the case of a large sample. For Pregibon's $dbeta$, the rule of thumb is translated to observations that exceed a score of 0.2. A careful diagnosis, especially in the follow-up dataset, revealed some observations that could cause a change in either the chi-square or the deviance statistic. Figures 8.4 - 8.6 below show the diagnostic outcome before and after correction, (details of these diagnostics can be found in the Appendix to this chapter).

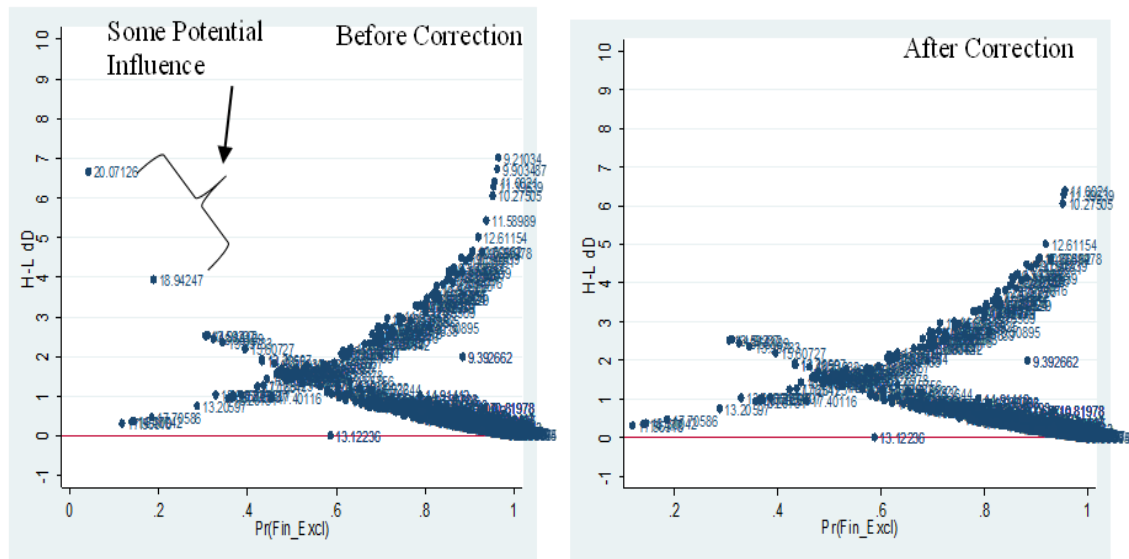


Figure 8.4: Difference-deviance diagnostic on influential observations

It could be noticed that observation 20.07 and 18.942 appear to be outliers that could potentially influence the chi-square and the deviance fit statistic. Though a few of the remaining ('after') observations (above H-L dD #5) appear to be outliers, they are, however, left undeleted since they do not have a powerful influence on the outcome.

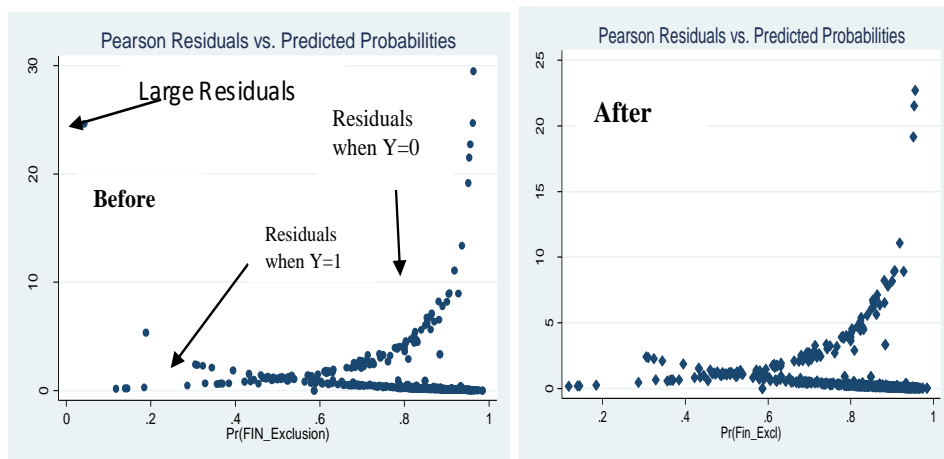


Figure 8.5: Diagnostic using Difference-in-Chi-Squares (before and after dealing with the leveraged observation).³⁸

Pregibon's $\delta\beta$ is applied to ascertain how each covariate pattern influences the parameter estimates of the model (Pregibon, 1981). Using $\delta\beta$ and dx^2 measures allows the spotting of the most influential observation points. The figures show both the residuals and influence on the same graph. This is done with the weight of each residual marker by the exact value of its influence. The use of 'before' and 'after' only distinguishes models before dealing with influential observation (as shown on Figures 8.4 - 8.6 using arrow pointers). The rest of the diagnostic outcomes are presented at the Appendix to this chapter (8.2A).

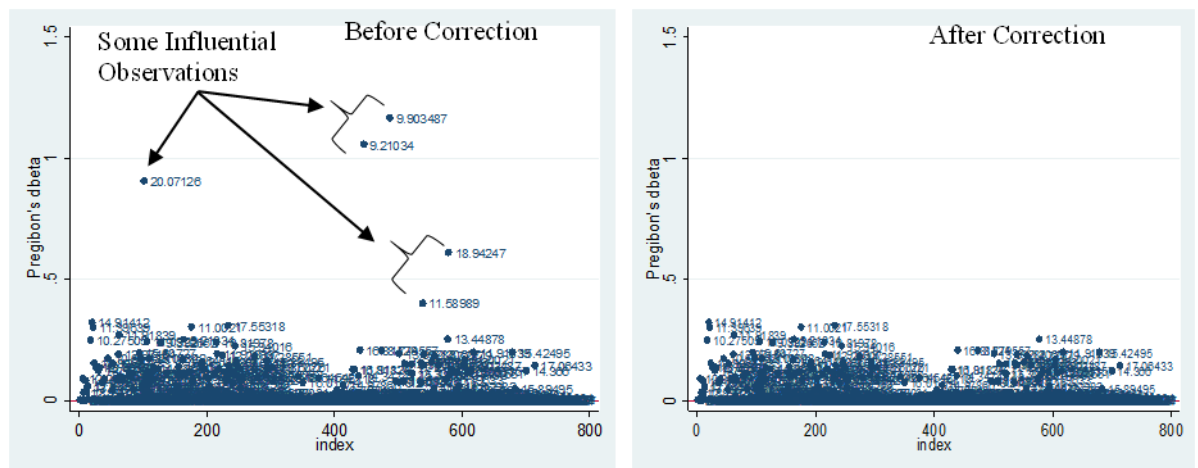


Figure 8.6: Showing diagnostic and correction on influential observations

The overall impact of dealing with the influential observation is seen from the model's fitted line (see Figure 8.7) using the follow-up data, as the baseline dataset did not appear to exhibit problems relating to influential observations. Figure 8.7 is

³⁸ Two distinct patterns of residuals One for $Y=1$, the other for $Y=0$, as indicated by the pointers.

further produced to ensure that the log-odds (logit) transformed model produces a linear association between the predicted variable and the covariates. Graphically, Figure 8.7 reveals both the linearity characteristics and the impact that the dropped influential observation has on the fitted model. Reasonably, the relationship can be deemed linear.

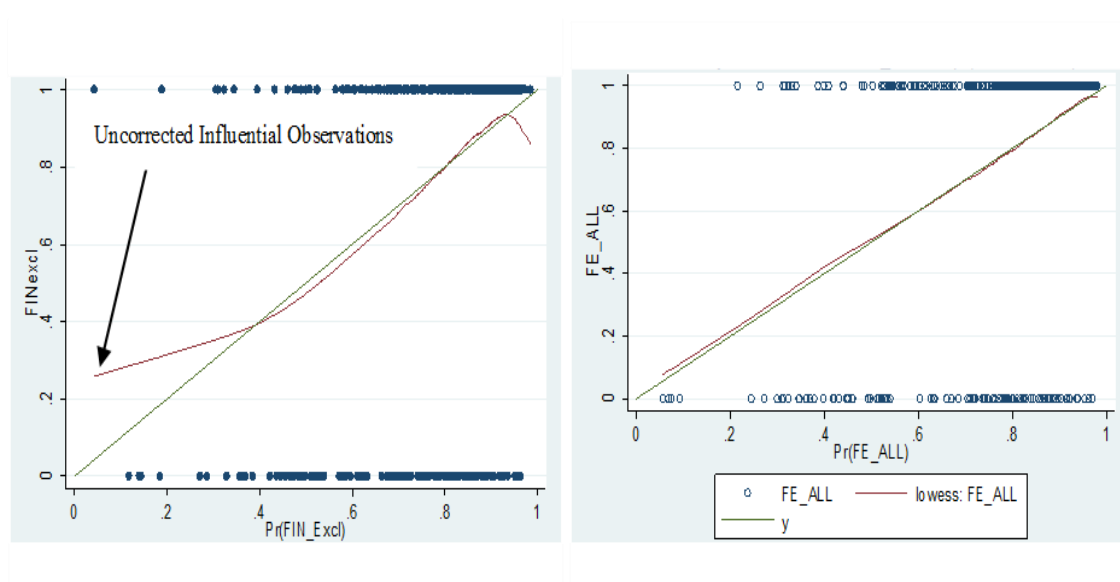


Figure 8.7: Linearity of the fitted models following logistic transformation

8.4 Chapter Conclusion

The chapter focuses on firm-level characteristics that either contribute to, or reduce their predisposition to the risk of being excluded from the use of financial services. These factors either incentivise or inhibit financial inclusion. Identifying the factors that widen a firm's financial exclusion gap is strategically important, given that SMEs are engines of growth (Beck & Demirguc-Kunt, 2006). The chapter identifies inclusion constraining and enabling factors that need urgent policy attention. Those firm attributes that address information asymmetry problems reduce firms' predisposition to risk of exclusion, becoming financial inclusion enablers.

Information asymmetry reflected in high transaction costs of serving SMEs is a key to the likelihood of exclusion occurring. In view of this, information technology in the form of *website ownership* helps reduce information asymmetry and transaction costs associated with lending to firms operating in an information-opaque sector. In

addition, firms located in an oil-rich region, operating in a retail sector, with many years of operation (matured) are found more likely to be financially included. Risk of financial exclusion appears higher among SMEs than larger firms. Again, sole proprietorship and partnership firms are found to have a high-risk disposition towards financial exclusion. Financing publicly listed companies where information opacity is less inherent due to full-disclosure listing requirements poses less risk for credit suppliers.

Using a logistic regression model as a link function and with a rich dataset from the World Bank Enterprise Survey on Ghana, the results suggest that firm age, size, sector of operation and ownership of website are key determinants for financial inclusion. The findings provide empirical support for hypotheses **H_{b(1)}**, **H_{b(2)}**, **H_{b(3)}**, **H_{b(4)}**, **H_{b(6)}**, **H_{b(7)}** and **H_{b(8)}**. However, the outcome did not support **H_{b(5)}**.

Externalities that emanate from structural changes and shocks that occur on the macro-front must receive both policy and research attention. This way, mitigation policy measures will be fashioned to address any negative confounders while any unintended gains are consolidated.

Industry players, donors and government regulatory agencies will harmonise efforts towards strengthening those inclusion enablers while marshalling plans, policies, and programmes to address the inclusion inhibitors. Firm growth and sustainability will be natural consequences of such coordinated efforts.

8A: Chapter Appendix

Further diagnostic outcomes are appended to the chapter for reference. This is to ensure the flow of thought in the main work is not cumbered with extraneous details.

Table 8.6A: Model specification outcome

<i>FE (Financial Exclusion)</i>	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]
\hat{y}	0.8732977	0.188709	4.63	0.000	.5034348 1.243161
\hat{y}^2	0.065032	0.0803494	0.81	0.418	-0.09245 0.222514
_cons	-0.0116179	0.1844146	-0.06	0.950	-0.373064 0.3498282

Number of obs = 536; LR chi2(2) = 93.39; Prob > chi2 = 0.0000; Pseudo R2 = 0.1771

Note: The specification test results in the table above suggest that the logit model is properly specified as the variable \hat{y} is a statistically significant predictor of the model, and the variable \hat{y}^2 has no significant predictive power, as expected. It is, therefore, assumed that there are no omitted relevant variable(s) and, as such, the link function is assumed to be correctly specified, since the \hat{y}^2 -the 'linktest' is not statistically significant.

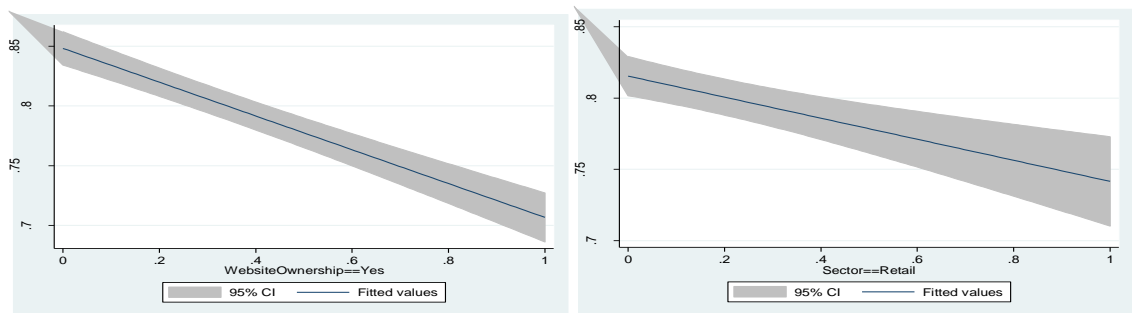


Fig.7.1A(i): Website Ownership and Exclusion; Fig. 7.1A(ii): Retailing Firms and Exclusion

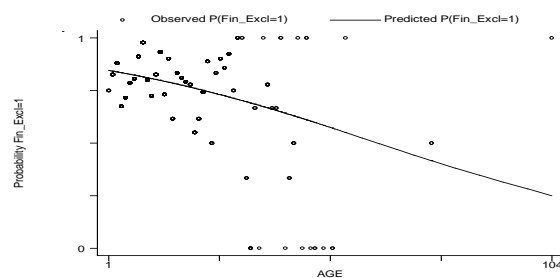


Fig. 7.1 A(iii): Firm's Age & Financial Exclusion (FE)

Figure 8.8A: Graphical presentation of selected firm's attributes and the likelihood of financial exclusion

A negative slope signifies that the variable concerned has reducing impact on financial exclusion.

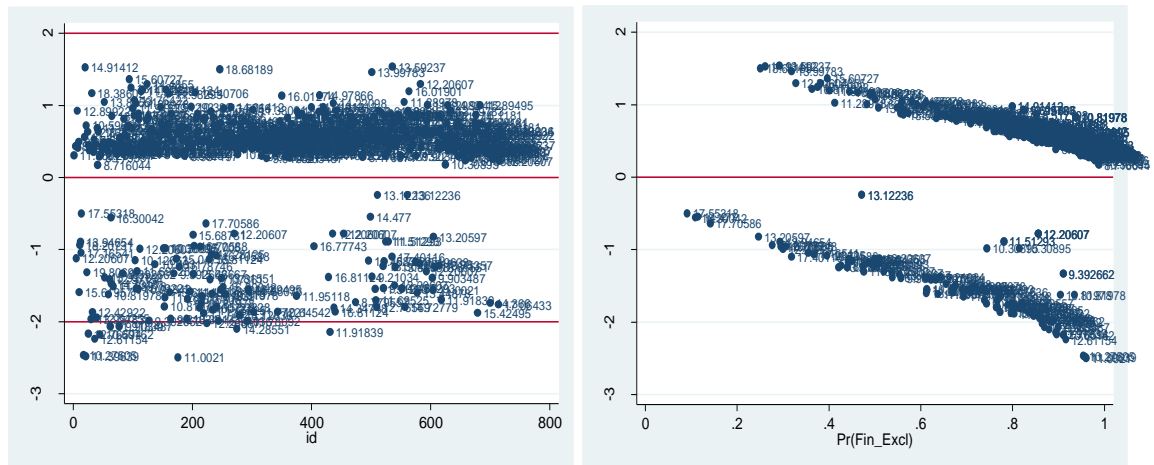


Fig.7.2 A (i) Plot of Deviance residuals

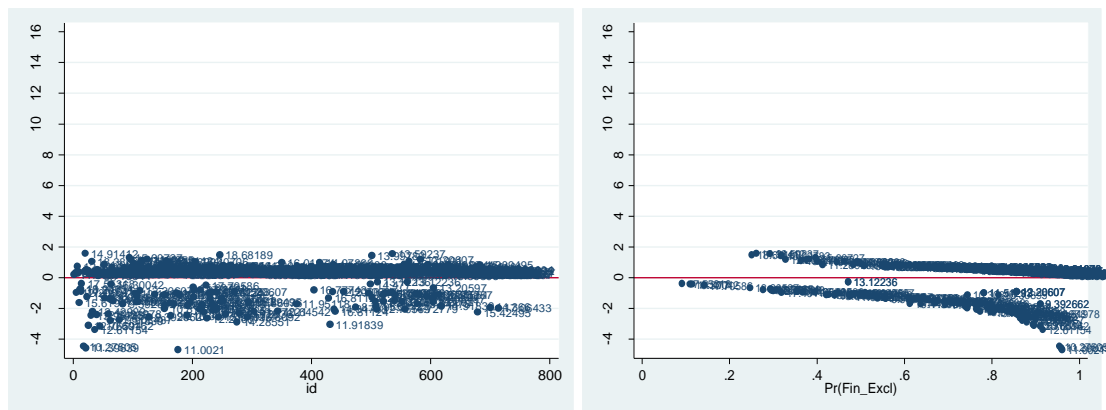


Fig.7.2 A (ii) Plot the Pearson's Standardized residuals

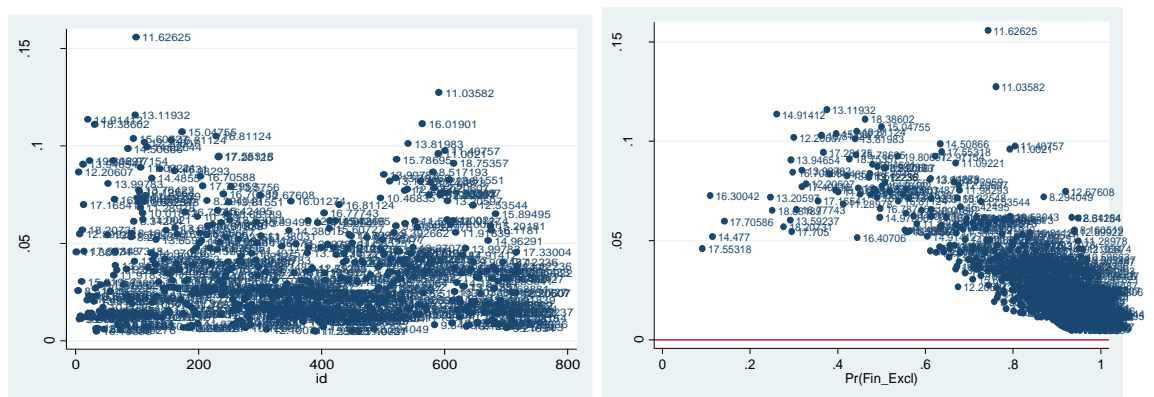


Fig.7.2 A (iii) Leverage Diagnostics of Influential Observations

Figure 8.9 A: Identification of potential influential observations

CHAPTER 9

FINANCIAL INCLUSION IMPACT: MICRO/HOUSEHOLD POVERTY LEVEL

9.1 Chapter Overview

The quality and impact dimensions of financial inclusion are examined in this chapter. The formal testing of hypotheses $H_{d(1-3)}$ as presented in Subsection 3.4.5 and equations 16.1 and 16.2 in Section 5.6.4 is discussed. As Imboden (2005) observes, the living standards of poor households are improved with an inclusive financial system. The linkages are explored in this chapter.

A summary of the descriptive statistics of the estimated models presented in 9.2 is followed by the regression analysis for the empirical model (Section 9.3). Discussion of necessary testing and inferences made are presented. The outcome on further robustness checks is presented in 9.4, while Section 9.5 presents a summary and conclusion for the chapter.

9.2 Descriptive Statistics of the Fitted Models

A total of 2,733 households' survey data comprising 1,628 clients of 17 MFIs and 1,105 non-client households of MFIs (serving as the control group) across Ghana is used in this chapter. Approximately 60 percent of the individuals sampled are clients who could be regarded as financially included and about 40 percent considered as excluded (Annim et al., 2014). This control group (approx. 40%) provides a very useful basis to trace the poverty-reducing impact of an inclusive financial programme of selected MFIs³⁹ as comparison is made between the treated (clients) and the control (non-clients). The inclusion of the non-client respondents is also used to control for heterogeneity in individual characteristics and address the

³⁹ Originally, the source of the data describes the MFIs as rural, ostensibly considering the number of rural and community banks that are captured in the survey. But the preference in this chapter is to simply refer to them as MFIs, given that the majority of their clientele captured in the survey are predominately urban-based.

identification restriction imposed by unobserved clients characteristics that may confound the outcome (Beck et al., 2009).

It is to be recalled that this chapter is based specifically on the rich, cross-sectional micro-dataset sponsored by the World Bank. Though this national household survey was originally conducted in 2004, its official release by ICPSR⁴⁰ was in 2014 (Annim et al., 2014). Since then, there has not been another national household survey dataset of such comprehensive nature, hence its usage in this study. Though the original source of data uses a poverty index (Annim et al., 2014), it is operationally renamed in this thesis as the welfare index (*Windex*). This is to forcefully convey the notion that the poverty index captures the relative living standard and general welfare of the household concerned. Table 9.1 summarises descriptive statistics of the variables used in the empirical model.

The evidence suggests that, on average, approximately 38 percent of the respondents were clients of rural and community banks (RCBs), 2.63 percent were members of Credit Unions (CUs), 16.39 percent were clients of FNGOs while 1.46 percent and 1.10 percent were clients of Savings and Loan companies (S&L) and Susu respectively.

Table 9.1: Descriptive statistics of the variables

Variable	Mean	Std. Dev.	Min	Max
Windex/PI	0.1392	1.009	-3.06	2.65
<i>Dummies for MFIs types</i>				
Rural Bank	0.3802	0.4855	0	1
Credit Union	0.0263	0.1602	0	1
NGO	0.1639	0.3703	0	1
S&L	0.0146	0.1201	0	1
Susu	0.0110	0.1042	0	1
DG	0.0589	0.2355	0	1
DD	0.0871	0.2820	0	1
GG	0.0977	0.2969	0	1
MM	0.3449	0.4754	0	1
<i>Programme type dummies</i>				
RMFI's own programme	0.3491	0.4768	0	1
Gov't programme	0.1592	0.3659	0	1
Donor agency programme	0.0878	0.2831	0	1
<i>Gender dummy</i>				

⁴⁰ Data can be found at <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/35296> and also <http://dss.princeton.edu/cgi-bin/dataresources/newdataresources.cgi?term=92> (retrieved May, 12th 2016).

Male	0.1382	0.3451	0	1
Female	0.4550	0.4981	0	1
<i>Rural/urban dummy</i>				
Rural clients	0.2731	0.4456	0	1
Urban clients	0.3228	0.4676	0	1
FAMSIZE	5.2425	2.4798	1	20
RATLITAD	0.5953	0.3825	0	1.5
DEPRATFS	0.3428	0.2222	0	0.833
FI_(Ln Loan)	13.701	1.0971	10.30	18.2
Act_FI	0.5274	0.4993	0	1
Age	35.6274	9.6269	15	94
<i>Welfare/Poverty Quintiles:</i>				
Lowest quintile	0.2058	0.4043	0	1
Below aver. Quintile	0.1359	0.3428	0	1
Average quintile	0.1758	0.3808	0	1
Above aver. Quint	0.2172	0.4124	0	1
Higher quintile	0.2652	0.4415	0	1

Note: Number of observations ranges between 1,538-2,734. The control group accounting for the difference.

Source: Author's estimation using ICPSR's datasets (Annim et al., 2014).

The dominance of RCB clients (approx. 38%) might partly explain why Annim et al. (2014) consider the MFIs as rural. However, the author simply refers to them as MFIs, considering that more than half the 60 percent of MFIs' client sampled are urban dwellers (32.3%). That RCBs serve more urban clients seems contradictory to the original basis for their establishment as unit banks (Steel & Andah, 2008). However, the outcome here appears consistent with the observation made by Steel and Andah (2008) that most of the RCBs "target urban middle-income and high-net worth clients" (p. 3), due perhaps, to concerns over their sustainability.

The mean age of approximately 36 years suggests that the participants were, on average, adults who had a reasonable appreciation of the contents of the survey instruments. The minimum age (15) of the participants is consistent with other similar household surveys, such as the Global Findex data (Demirgüç-Kunt et al., 2015). The mean welfare quintile shows that approximately 20.6 percent of the participants have the lowest standard of living compared to those in the higher welfare quintile (26.5%). That the percentage of participating households is above average in the welfare quintiles suggests participants (financially included) are better off than non-participants (excluded). The majority of the participating households underscores that most of the inclusion programmes specifically targeted women.

9.3 The Multiple Regression Model Outcome

9.3.1 Regression Diagnostic Outcome: The Issue of Endogeneity

To ensure that the understudied relationships are carefully modelled and investigated requires a diagnosis that guarantees robust outcomes. Some basic and critical diagnostic tests, such as endogeneity, model identification restriction and instrument weakness test, are critical for the instrumental variable (IV/GMM) models. In addition, validation of the core classical linear regression assumption underlying the ordinary least square (OLS) model is also carried out to generate robust, consistent and efficient parameter estimates.

The Hansen/Sargan C (difference-in-Sargan) statistic, which follows chi-square distribution, clearly indicates that endogeneity is endemic in the multiple regression relating to household welfare, given the significance of the test (*p-value 0.000*). This significantly informed the choice of IV estimation method.

As noted in Chapter 5, meeting the over-identification restriction criteria is key in the use of the GMM estimation process. Following Baum et al. (2007), *Hansen's J statistic* which follows a chi-square distribution is used to test the orthogonality condition in which over-identification restriction is established. Thus, the test suggests that the model is over-identified and well-specified with the chosen instruments, as the result turns out to be statistically insignificant (with *p-values*>0.1) in both equations (see Table 9.4).

Testing that the instruments used are not weak is key for validating the GMM model outcome. The use of a Wald test allows for testing of the hypothesis that the instruments used are weak, with an implied alternative hypothesis of non-weak instruments. The minimum eigenvalue statistic (F-stat value) exceeds any of the critical values produced by the Wald test, which does not provide enough grounds to accept the null hypothesis that the instruments chosen are weak. The null hypothesis is accordingly not accepted: therefore the model and the chosen instruments are valid.

In addition, a test for the presence of any endogeneity problem using the Durbin-Wu-Hausman (DWH) test (*p-value approx. 0.794*) suggests no serious endogeneity issues in the second model (Eq. 16.2), making the use of OLS an ideal model that produces consistent and efficient estimators of the parameters. The OLS regression output is presented in Tables 9.3 and 9.4. It is worth noting that OLS is considered

a part of GMM, according to Baum et al. (2003). The motivation for using OLS to estimate Eq. 16.2 is also informed by the realisation that none of the CLRM assumptions underpinning OLS was violated. Baum et al. (2003) caution the risk of using the IV method when the orthogonality condition test suggests that the disturbance term (u) and the regressors (x_s) are unrelated (Baum et al., 2003, 2007).

The application of Breusch-Pagan / Cook-Weisberg test for heteroscedasticity helps test the null hypothesis that the error term has constant variance (homoscedastic). The test outcome (with p-value 0.0002) signals the presence of heteroscedasticity. This is, however, corrected by specifying heteroscedasticity-robust standard errors (Stock et al., 2007). Additionally, Ramsey's reset test using powers of the fitted values of the model, suggests no need for the inclusion of additional variables. The link test also confirmed that the model is well-specified, with coefficient of determination of 44.1 percent. Again, the mean variance inflation factor (VIF) of 2.31 suggests that the fitted model does not suffer from problems relating to multicollinearity. Most of the covariates are categorical taking on binary values (0,1), and this partly guarantees the absence of a multicollinearity problem.

The outcome of the multiple regression models is presented in this section. The purpose of conducting the survey, according to Annim et al. (2014), was to assess delivery strategies of microfinance institutions in Ghana with the aim of identifying best practices to guide operations of the industry. Application of a more robust econometric methodology to track these routes of 'best practices' and 'delivery/implementations strategies' of MFIs' inclusion programmes define the 'quality' dimensions of financial inclusion (Triki & Faye, 2013).

The motivation is to investigate the extent to which the *quality* aspect of financial inclusion can translate into poverty-alleviating *impact* on the household clients. The 'quality' here is captured in two aspects; first the type of MFIs and their inclusion activities, and second, the implementation strategies/routes observed earlier. The *implementation routes* refer to whether the actual implementation is by state agency, donor agency or the MFIs themselves. Identifying the delivery mechanisms that lead to significant poverty-reducing impacts, is expected to influence policies towards sustainable inclusion. Table 9.2 is a cross-tabulation which guides the identification of 'route of implementation' of the three sources of financial inclusion programmes. The criteria used is that a cross-tabulated outcome that falls below 1 percent (cut-off) point is excluded.

Table 9.2: Cross-tabulation of financial inclusion programme sources and implementation routes/agencies

		Type and source of Inclusion programme funding			
		Government	Donor	MFI's own	Total
Implementing Agencies	Control group (Financially Excluded)	0	0	0	1,104
	MFI's (M)	13 (0.80%)	6 (0.4%)	935 (57.4%) (MM)	954
	Government (G)	267 (16.4%) (GG)	161 (9.9%) (DG)	7 (0.43%)	435
	Donor agency (D)	1 (0.06%)	238 (14.6%) (DD)	1 (0.06%)	240
	Total	281	405	943	2,733
Total Financially Included		281	405	943	1,629

Note: The cross-tabulation of *Source of inclusion programme funding* and the *Actual implementing agency* helps the generation of dummy variables (GG, DG, DD & MM) used in the regression analysis. In using the cross-tabulation technique, the cut-off point of 1% has been used. Thus, any (cross-tabulated) outcome that falls below 1% point of the 1,629 (being the sampled household clients who participated in MFIs programmes) was excluded from the empirical estimation. This explains why: (i) donors implementing: MFIs programme (0.06%), government programme (0.06%); (ii) the MFIs implementing: government programme (0.8%) & donor programme (0.4%); and (iii) finally, government implementing: MFIs' programme (0.43%) were completely omitted.

9.3.2 Drivers of Household-level Financial Inclusion

Tables 9.3 and 9.4 present the outputs of the OLS regression estimates. The outcome presents a puzzle that requires unravelling. The puzzle lies in this paradox: among the MFIs studied, only FNGOs, which are often donor-supported (Steel & Andah, 2008), do not appear to be inclusion-inducing ($\beta = -0.1683$). The paradox lies in the deeper understanding of the operations of each of these MFIs.

Except for the FNGOs, all these semi-/informal intermediaries (MFIs) sampled practise what could be described as *an open-ended inclusion* to clientele service. What this means is that opportunities exist for every household to participate in the inclusion programmes for such MFIs, except for the FNGOs. With the focused nature of their activities, which are often strategically tailored to meet the needs of a specifically-targeted group, FNGOs' implementation model could be considered a *closed-ended inclusion*. For instance, the survey identified some donor-funded programmes focusing solely on 'women's development.' This outcome accords reasonably well with the description of FNGOs by Steel and Andah, (2003) as

practising “poverty focused” inclusion programmes which “leads them to relatively deep penetration to poor clients” (p. 4).

Table 9.3: Estimated multiple regression on key drivers of financial inclusion

FI (log Loan Amount) Dep. variable	β /[se]	T-Statistic
<i>TYPE MFI-dummy</i>		
Credit Union	0.9375***[0.1387]	6.76
FNGOs	-0.1683**[0.0717]	-2.35
S&L	2.6608***[0.1484]	17.93
Susu	1.1243***[0.2439]	4.61
<i>Client's Gender Dummy</i>		
Female	-0.1839***[0.0598]	-3.08
FAMSIZE	0.0154 [0.0098]	1.57
DG	0.4955***[0.1426]	3.47
DD	0.5225***[0.1537]	3.40
MM	0.2541**[0.1262]	2.01
GG	-0.1530[0.1292]	-1.18
<i>Rural-urban dummy</i>		
Urban clients	0.2489***[0.0500]	4.98
Act_FI	0.7008***[0.0516]	13.59
<i>Gender of H/head</i>		
Female	0.0136 [0.0524]	0.26
_constant	12.8346***[0.1441]	89.09
<i>Model's Summary Stats</i>		
Goodness-of-Fit	$R^2 = 0.4410$; $Adj. R^2 = 0.4403$	
Test for Multicollinearity (<i>Mean</i>)VIF	2.31	
Number of observations	1,536	
Ramsey's RESET test of specification error for omitted variables	F(3, 1519) 1.27; Prob > F 0.2840	
Model Specification test (Link test)	$FI = -2.0149 + 1.283_HAT - 0.0099_HATsq$ <i>t-stat</i> (2.23) (-0.49) (-0.49) <i>P>t</i> (0.026); (0.622)	
D-W-H for endogeneity (orthogonality condition)	Durbin (score) $\chi^2(1)$.0683 (p 0.7939); Wu-Hausman F(1,1521) .06761 (p 0.7949)	
Test of Joint Significance	F(2, 1533) 604.83; Prob > F 0.0000	
Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	$\chi^2(1) = 13.77$ (p-value 0.0002)	

Note: Table 9.3 presents results on how the implementation agency and different MFIs foster financial inclusion among those participants in the MFIs/donor/government financial inclusion programme, using household-level data from ICPSR⁴¹. The outcome variable is financial inclusion (FI), with the natural log of amount borrowed from MFIs as a proxy. The levels of significance are denoted by asterisks (*) and interpreted as; 1% (***), 5% (**) and 10% (*). Robust standard errors are in parentheses. Estimation technique is OLS as the DWH test for endogeneity (p-value 0.94) suggests no serious endogeneity problem.

⁴¹The ICPSR stands for, Inter-University Consortium for Political and Social Research, and data is World Bank sponsored.

The robust regression outcome can also be seen in Table 9.4 with each of the MFIs used as the reference dummies in each column. What is becoming consistent is that while FNGOs are less inclusion-driven, S&L is a direct contrast. Thus, *column 4* suggests that *relative to S&L companies*, none of the MFIs appears inclusion-fostering. This outcome has much significance.

First, it suggests that not all the institutions may be practising full-open inclusion. This suggests that some MFIs may be practising *fully-closed*, *semi-open* and *fully-open* outreach or inclusion strategies. In this instance, it appears only the S&L companies engage in fully open-ended inclusion, though RCBs appear close. Second, understanding this phenomenon is key for policy formulation and implementation that can achieve desired inclusion outcomes at the household level.

The records of Ghana's central bank reveal S&L companies as formal NBFIs registered as such (BoG, 2017). The unique position occupied by RCBs, based on the nature of their operations, places them in a separate register from the rest of the MFIs. FNGOs are registered as micro-finance (semi-formal) institutions with a focused and tailor-made inclusion strategy (Annim et al., 2014; Steel & Andah, 2008). Credit unions and Susu groups are informal institutions whose operations are open only to registered or participating members. This leads to the kernel of the puzzle. In practice, only S&L companies accept deposits and give loans to the wider public. Steel and Andah, (2008) acknowledge their operation as being no different from banks. Can the reasons for the establishment and existence of these NBFIs offer a clue to their inclusion/outreach strategies?

Apart from the S&L companies that are privately established with commercial motives (Steel & Andah, 2003), all the others (RCBs, CUs, FNGOs and Susu) may often be driven by motives other than profit. They are nonetheless expected to break even as normal economic profit is necessary for their sustainability. The profit motivation serves as the driving force for S&L companies pursuing a financial inclusion agenda that is both more open and broader than the other MFIs. Consequently, competition among them is needed if profitability and sustainability are to be maintained. This competition, fuelled by profit, will translate into a desire to reach out to as many clients as possible and, hence to broader inclusion.

In brief, RCBs are established to pursue a rural financial inclusion agenda (Steel & Andah, 2008), while FNGOs provide specialised financial services, usually to an

identifiable targeted group. As noted by Annim et al. (2014), FNGOs have different operational mandates from other MFIs. These reasonably support the regression outcome in this study suggesting that FNGOs' operations are less financially inclusive.

Similarly, credit unions are established to provide soft and inexpensive credits to their contributing members (Annim et al., 2014), while the Susu group operate exclusively on the principles of savings mobilisation among their members (Steel & Andah, 2008). This suggests that both CUs and Susu groups are *only partially (semi-open) inclusion-fostering*, in that their credit programmes are inclusive only to their members (Annim et al., 2014). The question of whether this mode of implementing financial inclusion programmes determines inclusion outcome needs to be addressed.

The results suggest that donor-funded inclusion programmes appear to be largely inclusion-inducing. This is after controlling for the agency that implements it; be it donor-agency (DD) and/or government agency (DG). Additionally, the outcome also indicates that MFIs implementing their own funded inclusion programmes (MM) are inclusion-engendering. As expected, state-funded inclusion programmes implemented via state agencies (GG) are found to be non-inclusion engendering, though the outcome is not economically significant (see Tables 9.3& 9.4).

The concept of financial inclusion has always been spatially influenced (Leyshon & Thrift, 1995). The empirical regression outcome reveals that financial inclusion is significantly higher among urban households than rural. The findings accord reasonably well with what the FinScope (2010) survey on Ghana reveals (Ackah & Asiamah, 2014). This appears reasonable, especially if placed within the context of inclusion facilitation through the S&L companies that are profit-motivated. Profit motivation would naturally suggest less incentive to serve rural clients where the ability for loan repayment appears lower with potentially high default risk.

In addition, clients' family size (*FAMSIZE*) and gender are not significant determinants of their inclusion in the financial system. However, they are useful, serving as controls to ensure family size and gender do not become obstacles to obtaining loans. The findings on gender are in line with prior studies by Annim et al. (2014) using the same dataset with non-econometric investigation procedure. The caveat is that gender seems to play a significant role in a household's decision

to participate in an MFI program, which further has implications on household welfare, as presented in Section 9.3.3.

Table 9.4: Estimated multiple regression on key drivers of financial inclusion

Regressors [abbreviated]	(2)	(3)	(4)	(5)	(6)
	The outcome variable: (FI: natural log of amount borrowed)				
	$\beta/(se)$	β/se	β/se	β/se	β/se
CUs	0.937*** (0.139)	—	1.106*** (0.150)	-1.723*** (0.197)	-0.187 (0.275)
FNGOs	-0.168** (0.0717)	-1.106*** (0.150)	—	-2.829*** (0.158)	-1.293*** (0.250)
S&L	2.661*** (0.148)	1.723*** (0.197)	2.829*** (0.158)	—	1.537*** (0.280)
Susu	1.124*** (0.244)	0.187 (0.275)	1.293*** (0.250)	-1.537*** (0.280)	—
RCB	—	-0.937*** (0.139)	0.168** (0.0717)	-2.661*** (0.148)	-1.124*** (0.244)
Fem Clients	-0.184*** (0.0598)	-0.184*** (0.0598)	-0.184*** (0.0598)	-0.184*** (0.0598)	-0.184*** (0.0598)
DG	0.495*** (0.143)	0.495*** (0.143)	0.495*** (0.143)	0.495*** (0.143)	0.495*** (0.143)
DD	0.523*** (0.154)	0.523*** (0.154)	0.523*** (0.154)	0.523*** (0.154)	0.523*** (0.154)
MM	0.254** (0.126)	0.254** (0.126)	0.254** (0.126)	0.254** (0.126)	0.254** (0.126)
GG	-0.153 (0.129)	-0.153 (0.129)	-0.153 (0.129)	-0.153 (0.129)	-0.153 (0.129)
Urban Client	0.249*** (0.0500)	0.249*** (0.0500)	0.249*** (0.0500)	0.249*** (0.0500)	0.249*** (0.0500)
Accout_Own	0.701*** (0.0516)	0.701*** (0.0516)	0.701*** (0.0516)	0.701*** (0.0516)	0.701*** (0.0516)
Constant	12.83*** (0.144)	13.77*** (0.203)	12.67*** (0.160)	15.50*** (0.208)	13.96*** (0.280)
<i>GHh/head</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>FAMSIZE</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	1,536	1,536	1,536	1,536	1,536
R-squared	0.441	0.441	0.441	0.441	0.441

Note: Table 9.4 presents outcomes on how the implementation agency and different MFIs foster financial inclusion among the participating households in the (MFIs/donor/government) financial inclusion programme. Micro/household-level dataset used is from ICPSR. The outcome variable is financial inclusion (FI), using natural log of amount borrowed from MFIs as a proxy. The levels of significance are denoted by asterisks (*) and interpreted as; 1% (***), 5% (**) and 10% (*). Robust standard errors are in parentheses. Columns 2-6 are all based on an OLS estimation process, using different dummies of the MFI types as reference category as indicated by a dash (-). This allows the observation that the MFIs are consistent in terms of their inclusion (outreach) drive. FNGOs and S&L are the only MFIs whose inclusion programmes are consistently negative and positive respectively. Family size (*FAMSIZE*) and gender of head of household (*GHh/head*) female dummy are included as control variables but not reported.

9.3.3 Participation in the Financial Sector and Individual's Welfare

This section presents empirical estimates of the welfare impact of households' participation in financial inclusion programmes. The comparison is made between those who are financially included (as clients of the MFIs) and those excluded (as control group/non-clients). This is an empirical outcome of the hypothesis that *significant difference exists between the welfare of participants (clients) and non-participants (control group) of financial inclusion programmes (H_{a(1-i)})*. Table 9.5 shows how participation in the financial sector increases the living standard of the individuals ($\beta = 1.298$). Because the welfare index of the higher quintile lies between 0.90 and +2.65 (Annim et al., 2014), the estimated welfare impact of participating in an FI programme (approx. 1.3) seems economically significant. This suggests that financial inclusion has positive impacts on people's welfare as it allows individuals to participate in daily economic activities. Economic inclusion is, therefore, expected from a carefully implemented financial inclusion programme. Controlling for households' attributes such as family size, dependency ratios, rural-urban dichotomy and gender among others, helps to clearly establish the impact of finance at the household level. The result is presented in Table 9.5.

The inclusion of household expenditure on clothing, including school uniform, reveals a positive relationship. This succinctly suggests that a household's spending level has a direct significant impact on the individual's welfare. The outcome is consistent with both economic theory and prior studies (Brewer, Goodman, & Leicester, 2006). Further, the adverse well-being impact of household's food constraints is established (see column 4).

Many empirical research studies have established a negative relationship between poverty level of a household and the family size (Lanjouw & Ravallion, 1995). The possibility of an individual's educational attainment or occupation influencing his/her family size exists. Instrumenting family size with these two variables, a positive relationship is observed (column 1). However, family size reduces an individual's welfare when that individual's education and occupation are not factored in. The implication is that whether a household's welfare increases with its family size, depends on other factors of which educational attainment and occupational types are a key part. The choice of educational level as an instrument is informed highly educated families being, a priori, expected to have smaller families.

Table 9.5: Welfare and poverty-alleviating impact of MFI's inclusion programme

VARIABLES	(2)	(3)
<i>Outcome Variable: Welfare/Poverty Index (Windex) with GMM-estimation</i>		
	β /[se]	β /[se]
FI	1.298***[0.0657]	0.456*** [0.0600]
<i>FI_A/C OWN</i>		0.498***[0.0308]
FAMSIZE	0.101***[0.0348]	-0.0392***[0.00594]
DEPRATFS	-0.716** [0.283]	0.149[0.132]
DEPENRAT	-0.0139[0.0603]	-0.153***[0.0396]
FEM Dum	-0.584***[0.0534]	-0.117***[0.0420]
RURAL Dum	-1.265***[0.0398]	-0.813***[0.0349]
Edu*Occup. H/Head	0.0302***[0.0010]	0.0248***[0.00082]
Food Const- Dum		-0.133***[0.0320]
Tot_ Exp. (<i>Natural Log</i>)		0.150***[0.0119]
AGE	<i>Yes</i>	-0.00951***[0.00105]
AGESQ	<i>Yes</i>	<i>No</i>
Constant	0.0424[0.180]	-1.572***[0.171]
<i>Model Summary Statistics</i>		
<i>White/Koenker nR² test statistic: 283.53 Chi-sq(10) P-value = 0.000/ 80.426 Chi-sq(19) P-value = 0.000</i>		
Observations	2,701	2,529
Root MSE		0.59315
Wald chi2(11)		5172.77
Prob > chi2		0.0000
R-squared	0.433	0.643

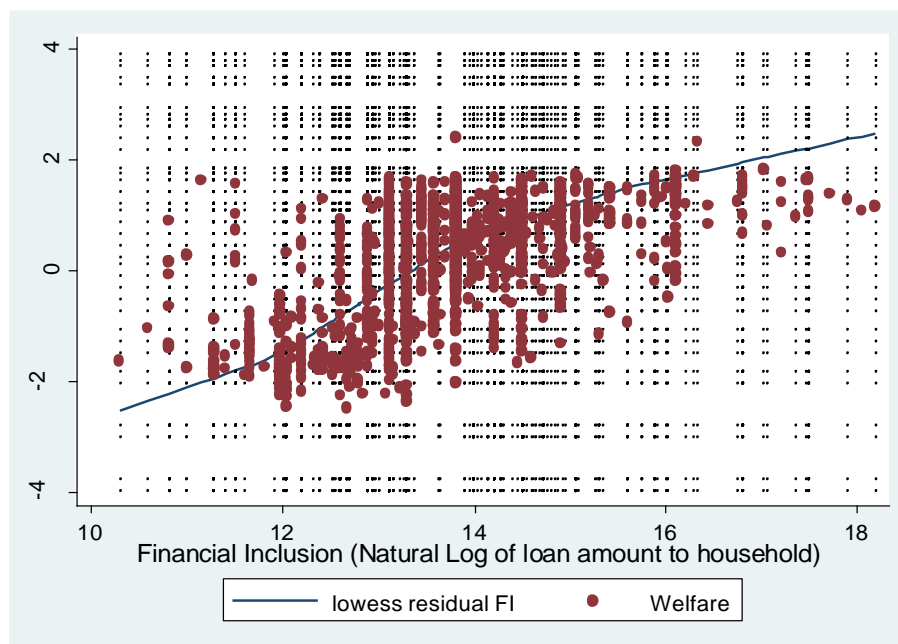
Note: Table 9.5 presents the outcome of the welfare impact of financial inclusion among the household participants as against non-participants (control group) of the financial sector; and how participation in the financial sector affects the living standard (captured by the poverty/welfare index) of the individuals. Household-level data from ICPSR is used. The dependent variable is welfare/poverty index (*Windex*). The levels of significance are captured by asterisks (*) interpreted as; 1% (***), 5% (**) and 10% (*). Robust standard errors are in parentheses. The difference between columns (2) & (3) is whether *Family size* is instrumented and the inclusion of log of household expenditure (*Tot_Exp.-Natural Log*) and dummy variable for households who face food constraints (*Food Const- Dum*). Age and age square are included but not reported in column 2.

9.3.4 Welfare Impacts of Financial Inclusion among Clients of MFIs

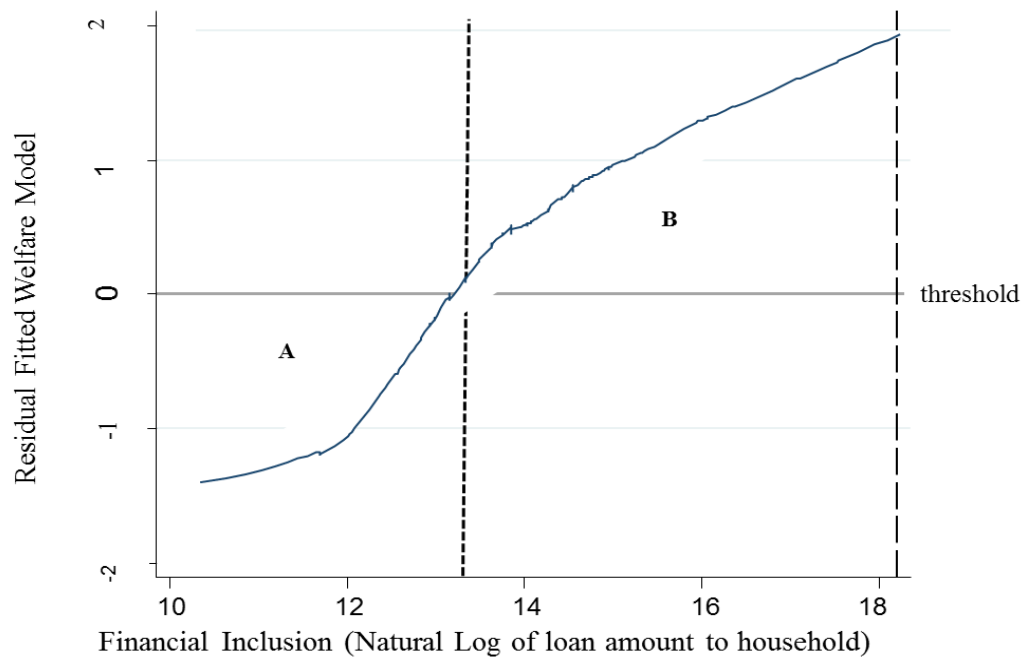
This section tracks the poverty-alleviating impact of a financial inclusion programme among the household participants. The success of any financial

inclusion programme (either donors, government or MFIs) is gauged by how it affects the welfare of the household recipients.

The results suggest that any GH¢1 received by the clients improves their living condition by 0.71 as captured in the welfare index ($\beta = 0.713$). This is robust, after controlling for the source of funding, implementing agency and the financial intermediaries concerned. Figure 9.1 (a & b) shows the positive welfare-inducing impact of financial inclusion (natural log of loan amount). The figures show that the positive-welfare effect of financial access occurs only at some threshold. This suggests that too little loan amounts may have no or adverse effect on an individual's welfare. In spite of the loan repayment burden it imposes, small loan amounts can barely accomplish much for the borrower. It is instructive to note that in the positive quadrant (B), welfare increases with finance, albeit at a diminishing rate. The policy ramifications for both policymakers and MFIs on where inclusion/outreach efforts must focus cannot be ignored. The diagram is consistent with the concepts of under-included and overly included as discussed in Section 4.1.1.



(a)



(b).

Figure 9.1: (a) Lowess residual plot and scatter plots of financial inclusion and welfare index (*Windex*); and (b) Showing the residual plot of the fitted model against the financial inclusion indicator.

Many empirical studies on the welfare impact of financial access and inclusion lend support to the findings (see e.g., Beck & Demirgüç-Kunt, 2008; Karlan & Zinman, 2009). In a cross-country study of 70 developing countries, Honohan (2004) found that poverty reduces as the financial system deepens.

Financial inclusion affords poor households an effective way to minimize vulnerability that arises from unpredictable incomes, and reduces predisposition to risk. With a steady stream of income, the individual is able to manage his/her cash-flow to smooth his/her intertemporal consumption (Collins, Morduch, Rutherford, & Ruthven, 2009; Johnston & Morduch, 2008). Participating in the formal financial platform implies access to financial services such as savings, transfers and payments in a cost-efficient manner. Periodic saving helps the accumulation of wealth that can be invested against the future. Practically building assets through investment in small enterprises becomes feasible, although Aghion and Bolton (1997) admit poverty-alleviation impact does not occur in the short run. Table 9.6 presents the multiple regression outcome of the welfare-inducing impact of a financial inclusion programme.

Table 9.6: Empirical results on welfare-inducing impact of financial inclusion

VARIABLES	(2)	(3)	(4)	(5)
<i>DV: Welfare/Poverty Index</i>				
Model:	GMM	GMM	GMM	GMM
FI_(Ln Loan) ⁴²	0.713*** (0.0656)	0.713*** (0.0656)	0.713*** (0.0656)	0.192*** (0.0138)
RCB	0.452*** (0.171)	0.349*** (0.119)	1.494*** (0.194)	0.162*** (0.0558)
FNGOs	0.554*** (0.186)	0.451*** (0.139)	1.596*** (0.220)	0.152** (0.0631)
Susu		-0.103 (0.182)	1.042*** (0.205)	0.238*** (0.0674)
Credit Union	0.103 (0.182)		1.145*** (0.173)	0.226*** (0.0674)
S&L	-1.042*** (0.205)	-1.145*** (0.173)		
DG	-1.404*** (0.177)	-1.404*** (0.177)	-1.404*** (0.177)	-0.354*** (0.0945)
DD	0.519*** (0.0958)	0.519*** (0.0958)	0.519*** (0.0958)	0.0943 (0.0981)
GG	-0.590*** (0.163)	-0.590*** (0.163)	-0.590*** (0.163)	0.105 (0.0920)
MM	-0.294*** (0.0999)	-0.294*** (0.0999)	-0.294*** (0.0999)	-0.0349 (0.0904)
MFI's Fund	0.759*** (0.121)	0.759*** (0.121)	0.759*** (0.121)	
Gov't Fund	1.443*** (0.190)	1.443*** (0.190)	1.443*** (0.190)	
Female	0.113*** (0.0404)	0.113*** (0.0404)	0.113*** (0.0404)	0.0280 (0.0253)
Rural clients	-0.485*** (0.0401)	-0.485*** (0.0401)	-0.485*** (0.0401)	-0.555*** (0.0253)
<i>FAMSIZE</i>	-0.0417*** (0.00723)	-0.0417*** (0.00723)	-0.0417*** (0.00723)	-0.0384*** (0.00523)
RATLITAD	1.111*** (0.0651)	1.111*** (0.0651)	1.111*** (0.0651)	1.389*** (0.0320)
DEPRATFS	0.254*** (0.0708)	0.254*** (0.0708)	0.254*** (0.0708)	0.268** (0.118)
DEPENRAT				-0.00449 (0.0365)
FI_Account Own				0.302*** (0.0295)
Constant	-10.89*** (1.039)	-10.78*** (1.024)	-11.93*** (1.127)	-3.260*** (0.239)
<i>Summary Model Statistics</i>				
Observations	1,534	1,534	1,534	1,534
R-squared	0.683	0.683	0.683	0.853
Hansen's J chi2(1)	0.333	(p 0.5640)	3.65588	(p 0.1607)
Test of endogeneity GMM C (<i>Hansen/Sargan</i>) statistic chi2(1) 95.4405 (p 0.000)				

⁴² Instrument is FI (natural log of loan amount borrowed). Two excluded exogenous variables used are account ownership and age of the household adults (shown in column 1-3).

Wald chi2(16) (5310.9; P-val 0.0000) (10638.35; p-val 0.000)
White/Koenker nR2 test statistic: 60.274 Chi-sq(16) P-value 0.0000

Note: Table 9.6 presents the outcome for how the welfare level of those who *actually participated* in the MFIs/donor/government financial inclusion programme is affected. Household-level data from ICPSR is used. The dependent variable is welfare/poverty index (*Windex*). The levels of significance are denoted by asterisks (*) and interpreted as; 1% (***), 5% (**) and 10% (*). Robust standard errors are in parentheses. Columns 2-4 treat FI as the endogenous covariate while column 5 presents empirical estimation with family size endogenously treated. GMM Models in columns 2-4 vary the reference dummy for the MFIs as Susu (2), CU (3) and S&L (4).

The hypotheses that the poverty-reducing effect of financial inclusion significantly depends on the source of funding and the implementing agency are tested. Donor-funded inclusion projects implemented via state agencies (DG), are found to have negative welfare impact ($\beta = -1.4$) (see column 2 of Table 9.6). In contrast, donor-funded inclusion projects implemented via donor agency (DD), mostly through FNGOs (Steel & Andah, 2008) are found to have positive poverty-alleviating effects ($\beta = 0.52$). State-funded inclusion programmes implemented via ministry, department and agents (MDAs) of state are found to have negative poverty-reducing impacts on household recipients ($\beta = -0.59$). MFIs implementing their own-funded inclusion projects (MM) produced a negative poverty-reducing impact ($\beta = -0.29$).

The significantly positive poverty-reducing impact of donor-implemented (DD) inclusion projects underscores the implementation quality emphasised in this chapter. Several factors contribute to this outcome. That donor-implemented inclusion programmes are tailored to address specific needs cannot be ignored. Best practice that comes from quality assurance, stringent supervision and monitoring helps eliminate corrupt tendencies. The findings are supported by prior studies (Bester et al., 2008); that is, direct or indirect donor involvement in donor-funded inclusion programmes in LICs has poverty-reducing impacts.

The negative poverty-reducing impacts of state-implemented inclusion programmes is not without cause. Many factors which border on implementation inefficiencies contribute to these. Agency problems can generate adverse selection and moral hazard issues which can translate into nepotism and corruption. Even when donor funding is involved (DG), disregard for due diligence and clearly defined implementation strategy may result in misallocation (or misapplication) of these funds.

In support of this, Brownbridge and Gockel (1996) observe that directed lending under the military regime in the 1970s led to distress among the publicly owned

banks. This was partly due to non-repayment of loans lent to the military officials and their allies. This is an example of *corruption-induced adverse selection* which is not directly attributable to market imperfection. The corruption, cronyism and nepotism that attend such state-implemented financial inclusion programmes create information problems as potentially risky borrowers not being well screened. Moral hazard among borrowers occurs when funds are diverted into social events such as funerals, weddings, and the like, rather than the purpose for which the credit is granted.

The findings are supported by prior studies (Beck et al., 2009; UN Departments of Economic & Capital Development Fund, 2006) which allude to the counterproductive nature of direct involvement by the state in implementing financial inclusion programmes (Brownbridge & Gockel, 1996). UN's (UN Departments of Economic & Capital Development Fund, 2006) findings reveal that direct state lending to the poor has mostly been sub-optimal in achieving the goal of poverty reduction. Weak governance and political patronage often lead to very low repayment rates.

Profit-driven MFIs such as S&Ls are compelled to charge high interest and other fees to their unsuspecting borrowers. The relationship-based strategy allows MFIs to offer flexible loan terms (Steel & Andah, 2008) that may ultimately culminate in high interest charges. There are instances where this leads to the collapse of their client's enterprises. It seems reasonable that MFIs own inclusion programmes are found to be anti-poor and less welfare-enhancing. This finding is consistent with prior studies which suggest that the inability of the small borrowers, often considered riskier (Steel & Andah, 2008; Steel et al., 1997), to meet the higher premium imposed by the formal intermediaries, pushes them into the hands of informal lenders who tend to be loan-sharks (Mashigo, 2006).

The question of whether the implementation strategies of MFIs (Annim et al., 2014) have an impact on clients' welfare is also addressed. Earlier, discussion on how these strategies influence financial inclusion at household level was carried out in Section 9.3.2.

The implementation strategies of MFIs are crucial to determine whether their clients will have a better standard of living. The findings suggest that the implementation strategies of RCBs ($\beta=0.452$), FNGOs ($\beta =0.554$), and CUs ($\beta=0.103$) produce positive welfare impacts for their clients. Susu has mixed outcomes but most

instructive are S&Ls (-1.042) whose implementation strategies seem to have negative welfare implications for their clients. These findings are consistent with other studies. As an instance, Annim et al. (2014) observe that the RCBs and FNGOs outreach covers clients who are spread out in all the poverty quintiles, a contrast with the other MFIs.

The 'unit nature' and ownership structure suggest that RCBs will be more receptive to the needs of their clients with tailor-made financial products. In Ghana, most government financial programmes are channelled through the RCBs, especially in remote districts where public banks find it unattractive to operate. As observed earlier, FNGOs mostly implement donor-funded inclusion programmes. As non-depositing MFIs, strict adherence to the donors' monitoring means that best financial practices and standards are ensured. The outcome of such efficient means of financial service delivery is reduced poverty for their clients. Prior studies have underscored the role such efficient implementation strategies of FNGOs plays in improving the welfare of their clients. Regarded as 'welfare-oriented agencies' (Steel & Andah, 2008), FNGOs are seen as having facilitated best practice among the MFI industry in Ghana as they employ methods that are internationally tested and standardised (Steel & Andah, 2008; Steel et al., 1997). What seems obvious is that the positive-welfare impact of MFIs' operational strategy does not guarantee wider inclusion, as noted earlier. As observed by Steel and Andah (2008), the FNGOs' "poverty focus leads them to relatively deep penetration to poor clients using microfinance methodologies" (p. 4) but tends to be limited both in scope and scale of operations. The results are, therefore, consistent with Annim et al. (2014) who applied a non-econometric method in their study, and found clients of FNGOs to be well-off and, on average, falling outside the poor class. The outcome on the implementation strategy of S&Ls and its impact is instructive.

Savings and loan companies (S&L) operate mostly as private, semi-formal, profit-driven NBFIs (Steel & Andah, 2008). As the name implies, savings mobilisation that is onward lent to deficit units is core to their operations. Their source of profit is mainly the spread between the lending and the deposit rates they offer to their clients. Because they deal with households and small businesses⁴³, their interest charges are often higher than that which the formal banks charge, as noted by prior

⁴³ mostly at the informal sector perceived as riskier

studies (see e.g., Steel & Andah, (2008) and Annim et al. (2014)). The possibility of some S&Ls borrowing from the money market for on-lending also accounts for the high interest charges. The negative poverty-reducing impacts of S&L activities on their clients as found in this study seem reasonable. What may also be a contributing factor is an observation by Steel and Andah (2008), that by law, S&Ls in Ghana are “restricted to a limited range of services” (p. 3). This combination of factors may partly explain why S&L’s wider inclusion and outreach programmes do not translate into increased welfare. This contradicts studies by Annim et al. (2014) whose findings suggest that clients of S&L (and Susu) are towards the richest quintile.

Credit unions operate on the principles of cooperatives and are mostly concerned with maximisation of member welfare rather than profit. Members are able to access loans that often exceed their accumulated savings/contributions. Interest charges are often at the barest minimum to cover basic administrative and overheads costs. This, coupled with flexible lending terms, guarantees a positive poverty-reducing impact to their members.

The high risk of a Susu collector absconding with a contributor’s savings partly accounts for the mixed outcomes on poverty-reducing impacts. It is to be recalled that Susu loans are mostly administered by a roaming collector who collects clients’ contributions on a daily basis (Steel et al., 1997).

It is important to put the regression results on some key demographic controlling factors in perspective. The study finds the welfare impact of MFIs’ financial inclusion programme higher among rural households than urban. This is consistent with the findings of Annim et al. (2014), that the rural clients of MFIs’ inclusion programmes have low standards of living compared with their urban clients. Family size (*FAMSIZE*) is found to negatively influence the welfare of MFI clients. The poverty-reducing impact of MFIs’ inclusion programmes is positive for female clients.

Gender plays a key role in financial inclusion programmes. The outcome suggests that living standards among female participants is higher than their male counterparts. The finding is, however, consistent with prior studies by Pitt and Khandker (1998) who find higher welfare impacts for female participants in credit programmes in Bangladesh. Dzisi and Obeng (2013) find that living conditions and

general welfare of women improved after accessing credit compared with periods prior to that.

However, in comparison with those included (clients) and those completely excluded (non-client/control group), the results suggest otherwise. The author finds male living standards to be better than female when both clients and non-clients of MFIs are combined. A combination factors may account for this.

Intuitively, most of these programmes appear to target women, as they are believed to be financially marginalised (Quartey & Martin, 2008). The descriptive analysis reveals that over 76.7 percent⁴⁴ of the clients are females, which points to the possibility of selection bias. It may be surprising that using the same dataset with a non-econometric approach, Annim et al. (2014) find poverty profile of client households by sex of the head or recipient of the loan less significant towards welfare.

As revealed in Figure 9.2, most donor and government financial inclusion programmes target specific groups of individuals, mostly women. The figure shows that of the thirteen donor/government assisted inclusion programmes used in this study, three are exclusively targeted to women. These are the Women in Development (WID) fund, Women's Development Fund (WDF) and the Ministry for Women and Children Affairs (MWCA) funds (Annim et al., 2014). In LICs, women are front runners when it comes to income generation through petty trading and micro-enterprising. Women are less likely to be reckless in their risk-taking and spending, especially when guided through a donor-supported programme. They tend to have the ability to accumulate wealth and build assets over time; which are necessary to alleviate poverty.

⁴⁴ This figure is arrived at based on the female mean score of 0.455, expressed as a percentage of the 60% participating clients of the MFIs inclusion programmes.

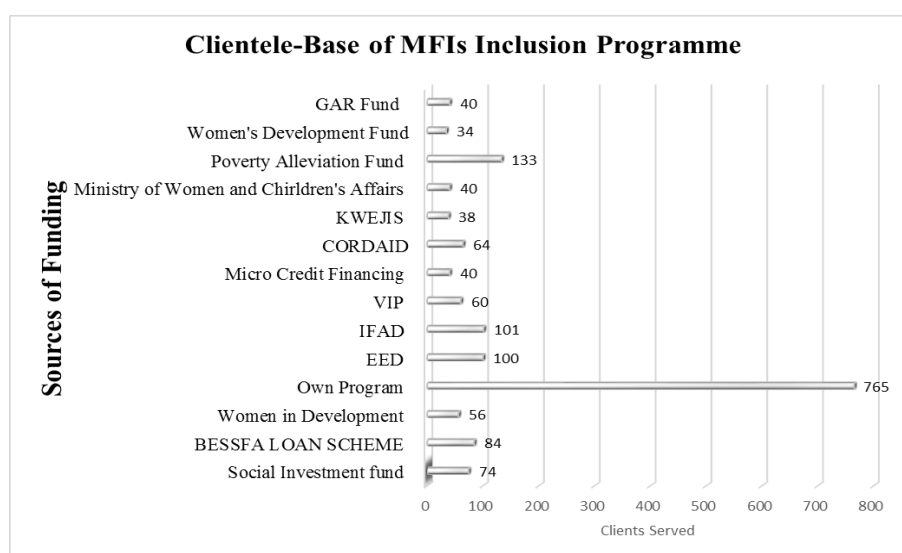


Figure 9.2: Participating donor/government inclusion programmes

9.4 Model Extension and Further Robustness Checks

As a further robustness test, this section critically examines the likelihood of a household's participation in the financial system, given their socio-economic and demographic attributes. A two-step probit with endogenous regressors is used. The dependent variable is financial inclusion, defined as 1 if an individual is a participant in an MFI outreach programme, in which case he/she is financially included, and 0 otherwise ((also the control group, (Annim et al., 2014)). The IV probit regression results are presented in Table 9.7.

Family size (*FAMSIZE*) and welfare/poverty index (*Windex*) are endogenously treated with instruments including maximum educational attainment level of household's head, ratio of literate adults within a given household (*RATLITAD*), and dependency ratios: i.e., [(child/adult) (*DEPENRAT*) and (child/famsize) (*DEPRATFS*)].

It is instructive to note that family size per se is not an obstacle to inclusion in the financial sector. Also noteworthy is the outcome on the occupation type determining whether someone is financially included or not. As an instance, the result suggests that self-employed individuals in non-farm activities and public servants are more likely to participate in microfinance programmes. In contrast, self-employed in agricultural sector, students or apprentices under training, domestic workers, unemployed and those who are unable to work (e.g. retired) are more likely to be financially excluded. Private sector salary workers may have a

high inclination to deal with formal sector intermediaries such as banks. Consequently, the results show that they are likely to be non-participants in MFIs' inclusion programmes.

Table 9.7: Determinants of a household's likelihood to participate in a financial inclusion programme

VARIABLES:	(1)	(2)	(3)
INDEPENDENT VARIABLES: Model:	IV-Probit	IV-Probit	IV-Probit
FAMSIZE	0.0649 [0.0274]**	0.0723[0.0272]***	0.0671 [0.0273] **
LnAge	0.0243 [0.127]	0.0326[0.125]	-0.0472[0.126]
Self Employed in Agric	-0.694 [0.135]***	-0.772[0.132]***	-0.789[0.133]***
SE (Non-Farm Enterprise)	0.280 [0.0778]***	0.234[0.0769]***	0.290(0.0838)***
Casual, unskilled wage worker	-0.423 [0.132]***	-0.442[0.132]***	-0.380[0.135]***
Regular salaried worker(Priv sec)	-0.410[0.116]***	-0.425[0.113]***	-0.303[0.121]**
Public servant	0.189[0.121]	0.175[0.119]	0.292[0.128]**
Student/Apprentice	-0.0669[0.363]	-0.0473[0.363]	0.0665[0.367]
Domestic worker	-0.565[0.298]*	-0.599[0.293]**	-0.584[0.296]**
Unemployed, looking for a job	-0.868[0.186]***	-0.859(0.182)***	-0.803[0.185]***
Unwilling to work or retired	-0.289[0.151]*	-0.346[0.150]**	-0.260[0.154]*
Not able to work(Handicapped)	-0.491[0.207]**	-0.567[0.205]***	-0.532[0.206]***
Welfq2	-0.471[0.0913]***		
Welfq3	-0.0704[0.0895]		
Welfq4	0.127[0.0941]		
Welfq5(Rich)	0.299[0.101]***		
WelfT2(Mid)		0.0382[0.0721]	
WelfT3(Rich)		0.417[0.0818]***	
Windex (Aggregate)			0.0993[0.0422]**
Constant	-0.181[0.553]	-0.383[0.544]	0.0538[0.532]
Wald test of exogeneity: $\chi^2(2)$	(1.94;p= 0.1641)	(2.54; p= 0.1110)	(11.99;p=0.0025)
Observations	2,699	2,720	2,720

Note: Table 9.7 presents the outcome on key factors that affect a household's probability of participating in a financial sector inclusion programme. The outcome variable is binary composite financial inclusion ($FI_{composite}$), assigned 1 if a participating household and 0, otherwise (i.e., non-clients as a control group); Household-level data from ICPSR is used. The levels of significance are denoted by asterisks (*) and interpreted as 1% (***), 5% (**) and 10% (*). Robust standard errors are in parentheses. The estimation process is an IV Probit method. Columns 2,3, and 4 include Welfare quintiles, Welfare tercile and the Aggregate Welfare index, respectively.

The welfare quintiles (and the tercile) explain who is likely to participate in the financial inclusion programme. As expected, the results reveal that households found at the lower ends of welfare quintiles and tercile, are less likely to participate in MFI activity. In contrast, those at the upper bounds have a significantly higher likelihood of being included financially. This underscores the relevance of income distribution towards financial inclusion even at the household level. For instance, the rich quintile group has approximately 30 percent likelihood of participating in

the financial sector compared with 12.7 percent for those found in the fourth (lower) quintile. In addition to these, the outcome using the aggregate welfare index (Windex) also corroborates this trend. Many empirical studies have established the positive relationship between income and the likelihood of being included financially. Honohan (2004), for instance, noted that a 10 percent rise in average per capita income results in 1.6 percentage point fall in poverty. Financial inclusion serves as the linking synergy that allows income growth to translate into poverty reduction (Demirgüç-Kunt & Klapper, 2012a).

9.5 Chapter Summary and Conclusion

The poverty-reducing impact of financial inclusion is strongly established in this chapter using a more robust method of investigation. Participation in the formal financial system, which defines financial inclusion, allows households and businesses to build assets as they accumulate wealth through consistent savings. Investment into wealth-creation and income-generating activities becomes possible. As economic agents meet financial needs and mitigate risk disposition, poverty-reducing impacts will be guaranteed. Financial inclusion will, therefore, translate into broader economic and social inclusion.

The impact of financial inclusion programmes, as emphasised in this chapter, depends largely on the quality of their implementation. Quality of *access* and *utilisation* play important synergistic roles in sustained impact. Impact is, therefore, defined by the ability of economic inclusion to emerge from financial inclusion. Within this context, donor-funded financial inclusion programmes implemented via donor-agencies (FNGOs) are found to have positive poverty-reducing impacts on the beneficiaries. The issues of nepotism, cronyism and corruption that often characterise state-implemented financial inclusion programmes often undermine expected impact. Table 9.8 below provides a summary of the combinations of factors that determine both broader inclusion and stronger welfare impacts.

Table 9.8 gives a summary of how the puzzle that motivated this chapter is resolved.

Table 9.8: Metrics of welfare-impact and broadness of inclusion funding sources and implementation routes

Source of Funding	Implementation Agency					
	Inclusion-engendering			Welfare-impact of Inclusion		
	Donor	Gov't	MFI	Donor	Gov't	MFI
Donor	Yes (+)	Yes (+)	-	Yes (+)	No (-)	-
Gov't	-	No (-)	-	-	No (-)	-
MFI	-	-	Yes (+)	-	-	No (-)

Note: Table 9.8 provides a summary of the combinations of factors that determine both wider inclusion and stronger impact. The signs (+ or -) show the regression outcome in terms of inclusion and welfare-promotion. Yes/No simply suggests that the factor concerned improved/not improve respectively, either inclusion or welfare.

As a red alert is raised for state's direct implementation of inclusion programmes, strict supervision is required to ensure both broader inclusion and higher welfare impacts. The right balance is key to ensuring an outcome where a poverty-alleviating impact is not traded for broader inclusivity.

In the face of endemic system failure that breeds information asymmetry and the presence of high transaction costs to serve the poor households, incentives play a key role to motivate private-sector participation. Incentivised by the prospect of high profitability, MFIs (e.g. S&Ls) are found to significantly drive wider inclusion through outreach programmes. The high interest rates often charged to ensure their sustainability appears to undermine any efforts towards welfare impacts.

Though the optimal scenario is a donor-funded programme implemented through a donor agency, wider adoption of such a model may not be practically supported. The way forward? A careful combination of the matrices as summarised in Table 9.8 will ensure optimality, at least in the sense of welfare impact. Donor- and government-funded inclusion programmes channelled through MFIs for implementation achieve two mutually inclusive ends: first, MFIs' sustainability will be independent of their interest charges; and second, such funds will translate diametrically towards the borrower's welfare maximisation. This is contingent on the assumption that strict compliance to standards will be ensured. In the case of state-funded inclusion programmes, the expectation is the minimisation of state influence that breeds corruption and political patronage. The government's regulatory role tends to have a more positive impact on the financial inclusion agenda than direct implementation, which often leads to sub-optimal outcomes.

The poverty-reducing impact of some informal NBFIs, such as the CUs and the Susu groups, underscores the need to carve policy aimed at integrating such institutions into the formal financial system. Their significant role in mobilising domestic financial resources from the informal sector and the provision of pro-poor financial resources to their members cannot be underestimated.

Policy that focuses on developing an infrastructural interface that allows these informal financial actors to actively participate in the formal financial system will lead to much deeper and broader inclusion.

CHAPTER 10

SUMMARY, CONCLUSION, AND POLICY RECOMMENDATIONS

10.1 Chapter Overview

A summary of the major findings, conclusions and policy implications from the empirical investigations are given in this chapter. The summary is made with careful consideration to the hypotheses that guide the study in a way that offers answers to the research questions posed in this study. The chapter allows the trajectory of financial inclusion towards inclusive economic system to be tracked. The rest of the chapter proceeds as follows. Section 10.2 summarises the findings, Section 10.3 offers contributions the study makes towards the existing body of literature on financial inclusion. Section 10.4 presents policy implications of the relevant findings, while Section 10.5 outlines limitations of the study as a basis for further future research. Section 10.6 concludes the thesis.

10.2 Summary of the Thesis

Overcoming structural rigidities, financial imperfections and vast informalities endemic in LICs is one cogent means to ensure pro-poor and inclusive growth. The *theory of asymmetric information* that explains why financial exclusion is endemic in LICs is well applied in this study. Financial exclusion is inimical to the growth prospect of firms, especially the small businesses that have liquidity constraints. Hence, an inclusive financial system is desirable.

Broadened financial access is said to be deepened when the outcome is accelerated economic growth. Financial inclusion is, however, not expected to occur in a vacuum. The role that institutional contexts play in achieving a broader and more inclusive financial system cannot be over-emphasized. The study has emphasised the significance of governance, and institutional and regulatory frameworks in stimulating financial inclusion. This is to ensure that the private agents become the winners in an economic and institutional environment that promotes wider financial inclusion. Technological advancement that ensures accessible and affordable digital

financial services' delivery to those who were previously unbanked is strongly emphasised. The agenda of financial inclusion and technological advancement in LICs, if pursued in a healthy balanced manner, will lead to pro-poor growth. This is expected to drive policy and resource allocation to achieve the desired outcomes.

Considering the significant role SMEs play in driving growth, dealing with exclusion risk factors will help contain factors that lead to their failure. Policy and capacity building on enterprise growth and sustainability will be strategic in targeting the inclusion-inhibiting factors. Simultaneously, measures that strengthen policies enabling firm attributes that are inclusive-inducing are particularly significant. Moreover, externalities that emanate from structural changes and shocks that occur on the macro-front are expected to receive both policy and research attention. This allows mitigation policy measures to be fashioned to address any negative confounders while unintended gains are consolidated. The expectation is that industry players, donors, and government regulatory agencies will harmonise efforts that aim to strengthen those inclusion enablers. Plans, policies and programmes that address the inclusion inhibitors will guarantee firm growth and sustainability.

Understanding the impact an inclusive financial system can have on growth at the macro-level is crucial. In view of this, the study adopts an in-depth country-specific approach to investigate the complex relationships between financial development, inclusion and economic growth in Ghana. This approach is a remarkable shift in the existing paradigm where findings of cross-country studies often fail to capture country-specific policies, structures, and the general financial environment within which a country develops.

The study provides a strong case that the potential growth effect of financial institutions in LICs is much stronger than that of the capital market. Logically, a deepening financial sector allows for the creation of the new institutions and products necessary to generate broader financial inclusion. The existence of financial institutions predates the establishment and operations of stock markets. It is, therefore, rational to expect inclusion that engenders growth to emerge as financial institutions make credit accessible to the private sector at reasonable cost. This, complemented by the liquidity and risk hedging guaranteed by the emerging stock market, means sustained growth is very likely. The study, therefore, makes a significant contribution to understanding the age-old finance-growth nexus by

emphasising the growth-facilitating role financial systems play to ensure wider inclusion in Ghana. Growth therefore emerges, as financial development reduces both *transaction and information costs*. This further underscores the importance of the growth-facilitating role finance plays via inclusion.

Inclusion at the household-level is necessary to ensure economic participation by all active agents. Assessing the impact of financial inclusion programmes and the quality of their implementation at the grassroots level therefore becomes essential. The trajectory of financial inclusion towards economic inclusion significantly defines financial inclusion impacts. The impact of such policy outcomes, as established in this study, is greatly dependent on the synergistic role of the quality of both the *access* and *utilisation* dimensions of financial inclusion.

The positive poverty-reducing impact of donor-funded financial inclusion programmes implemented via donor-supported FNGOs, beckons policies to refocus. The two-edged sword of financial market failure within an environment where wide-spread political patronage exists, as in most LICs, calls for a paradigm shift in the implementation of financial inclusion programmes. The trade-offs between the poverty-alleviating impact of finance and the objective of pursuing broader inclusion in the financial sector requires the right balance that guarantees greater welfare for the household recipients.

Incentives play a key role to ensure private-sector participation in the financial system. This is even more crucial in LICs where systemic failure has generated information asymmetry resulting in high transaction costs to serve the poor households. Incentivised by the prospect of high profitability, micro-financial institutions (MFIs) could drive significantly wider inclusion through outreach programmes. Concern over their own sustainability in a hostile lending environment, MFIs often resort to high interest rate charges (Mashigo, 2006) which ultimately undermines and conflicts with borrower's welfare.

Although, donor-funded inclusion programmes implemented via donor-supported agencies such as FNGOs appear optimal, wider adoption of such models seems unlikely. The way forward lies in a careful combination of payoffs that ensure some level of optimality, at least in the sense of welfare impacts. Donor and government inclusion funds channelled through MFIs for implementation will allow MFIs to achieve sustainability without compromising the borrowers' welfare maximisation.

Policy focusing on developing an infrastructural interface that allows informal financial actors to actively participate in the formal financial system become crucial to ensure much deeper and broader inclusion.

Participation in the formal financial system allows both households and businesses to build assets. Through regular savings that allow investment into income generating activities, welfare-maximisation is likely. This ultimately provides financial security and stability against unforeseeable future risks. This way, balanced and pro-poor growth is expected to be the natural outcome as inclusion equips economic agents to meet financial needs and mitigate risks. The poverty-reducing impact of financial inclusion will then be guaranteed as financial inclusion leads to broader socio-economic inclusion.

10.2.1 Summary of Overarching Empirical Findings

The thesis, motivated by this existing gap, focuses on the big question that defines inclusion. The question of whether financial resources are available, accessible and most importantly, affordable to most active economic agents within the institutional contexts of LICs is particularly important. The core dimensions of financial inclusion (see Chapter 4) and how those dimensions work harmoniously together towards an inclusive financial system are central to the study. This thesis, therefore, helps to establish a key developmental pathway that connects economic and social inclusions to financial inclusion. As Ghana emerges as a lower-middle income economy, the shared attributes of both LICs and LMICs places it in a strategic position that promises a reasonable basis for generalizing the findings within the broader contexts of LICs and LMICs, particularly those in Africa.

The search for answers to the issues raised requires empirical investigation that relies on micro-econometric techniques of regression analyses focusing on the key relationships to lend support to the theoretical literature available. The use of rich multi-sourced datasets from the World Bank domains and the ICPSR datasets on Ghana (Annim, Awusabo-Asare, Abane, Amonoo, & Acheampong, 2014), and the application of robust empirical methods of investigations, provide informative findings.

The empirical investigations are carried out along two thematic areas: first, determinants of financial inclusion; and second, the impacts of financial inclusion. By determinants, the study focuses on the first two dimensions of financial

inclusion: *access* and *usage*. In this, the objectives were to i) identify the regulatory and institutional factors that influence financial inclusion in Ghana; ii) examine the crucial role technological advancement in the form of digital financial services (DFS) plays in narrowing the financial exclusion gap in Ghana; and iii) identify attributes that are most significantly predisposed to a firm's risk of being excluded from formal financial services.

In addition, the impacts part focuses on the other two remaining dimensions of financial inclusion: *quality* and *impact*. Following this, the study first identifies the most efficient means through which financial inclusion can influence economic growth in Ghana. The focus is on whether growth-inducing inclusion is realisable through the institutions (e.g., banks) or via the stock market. Further, as it investigates the impact of inclusion at the household level, the study explores the linkages between financial and economic inclusion, and how that defines the welfare-inducing impact of inclusion programmes in LICs.

The empirical outcomes of the investigations help an understanding of the conduit through which financial inclusion engenders growth at the macroeconomic level, while simultaneously translating it into economic inclusion at the household level. This way, the trajectory of financial inclusion leading to economic inclusion is trackable to serve as a basis for inclusion policy formulation in LICs. The next section provides a brief summary of the empirical findings in this thesis.

(i) *Financial Inclusion, Technological Deepening and Institutional Context*

Recognising that financial inclusion does not occur in a vacuum, the study establishes the role institutional and infrastructural factors play in the drive towards financial inclusion in LICs. The issue of whether institutional context matters to ensure a deeper and broader inclusive financial system is resolved. The role of the quality of national-level governance, corruption perception, economic freedom and technological deepening are identified as key factors. Rule of law that ensures contract enforceability, political stability, regulatory quality coupled with voice and accountability, are governance indicators found to significantly influence financial inclusion.

Additionally, financial inclusion appears incentivised by the advancement in technology. The study has empirically established the importance of technological

deepening in advancing financial inclusion in LICs. The use of mobile phones and the internet helps offer digital-based branchless financial services to the poor. This helps reduce both information asymmetry and transaction costs in providing financial services. The resultant benefit goes to both financial service providers and recipients, as the cost of rendering services is reduced by technological amenities.

The findings suggest that bank-based DFS provision appears discriminatory on demographics such as age and income status of users more than the non-bank-based DFS. Again, the inclusion driven by bank-based DFS reduces over time while non-bank-based simultaneously rises. Such substitutability observed in this study defines the contemporaneous trade-off of bank-based DFS and non-bank-based DFS. This is confirmed by the applied DID estimation technique. A technologically conducive atmosphere is, therefore, becoming a key requirement that will guarantee financial inclusion in Ghana and other LICs/LMICs. That way, positive externalities will arise out of technological advancement. This is expected to translate positively through the financial system to further deepen the financial inclusion process.

(ii) Financial Inclusion and a Firm's Risk of Exclusion

Focusing on the firm-level characteristics that either contribute to or reduce a firm's predisposition to risk of being excluded from the use of financial services is one of the key themes that motivated this thesis. The outcome of the investigations has helped identify those factors that either incentivise or inhibit financial inclusion among firms in Ghana. Identifying the factors that widen a firm's financial exclusion gap is strategically significant. These constitute the constraining factors that need urgent policy attention. Similarly, those attributes that reduce a firm's risk of exclusion are financial inclusion enablers that deserve strengthening.

Using a logistic regression model and with a rich dataset from the World Bank Enterprise Survey on Ghana, the results suggest that firm age, size, sector of operation and ownership of website are key determinants of financial inclusion.

Consistent with the theory of information asymmetry, the empirical findings suggest that a firm's risk of exclusion is reduced with website ownership. Technological innovations such as websites ameliorate problems of asymmetric information that generate high transaction costs of lending to an information-opaque sector such as SMEs (Hannig & Jansen, 2010). The findings further suggest

that matured, retailing and high sales firms have a better chance of accessing credit from financial intermediaries. The risk of financial exclusion is found to be higher among SMEs than larger firms, which is consistent with prior studies (Abor & Biekpe, 2006; Abor & Quartey, 2010; Beck, 2007; Beck & Demirgüç-Kunt, 2006; Beck, Demirgüç-Kunt, & Maksimovic, 2005).

Again, sole proprietorship and partnership firms are found to have a high risk disposition when it comes to credit constraints, compared with publicly listed companies. Intuitively, the formal financial sector is more likely to finance publicly listed companies where information opacity is less endemic due to full-disclosure listing requirements.

The study further reveals that certain key structural changes at the national level account for the observed differences in empirical results based on the WBES baseline and follow-up datasets used. The significant difference-in-difference (DID) outcomes critically confirm this. The political change from the private sector-led regime (baseline) to the social democratic regime (follow-up), the discovery of oil in commercial quantities and the eight-month post-election hearing by the country's Supreme Court are when the identifiable structural changes occurred. These have played a part in exerting latent impacts on financial exclusion/inclusion, especially among Ghana's SMEs. As noted earlier, these events inadvertently account for the differences observed between regression estimates using both data points. These outcomes then suggest that macro-phenomena could potentially have an unintended impact on the micro-variables with wider externalities. This, therefore, has policy ramifications on how such structural changes must be monitored both by policymakers and researchers.

(iii) Financial Inclusion and Macro-Level Growth

The investigation in this section is informed by the notion that an inclusive and a broadened financial system leads to growth (Beck et al., 2015; Triki & Faye, 2013a). The econometric outcome supports Hannig and Jansen's (2010) observation that "financial institutions contribute to growth by reducing information asymmetries" (p. 11) that often hamper the efficient allocation of financial resources. Prior empirical studies on the impact of finance on both growth and poverty have often been mixed. These mixed outcomes beg the question of whether inclusion was part of the equation. Indeed, the debate over whether finance

reduces poverty via growth seems resolved when the financial system includes all active economic agents.

The study finds financial inclusion positively influences growth through the efficiency of the financial institutions. The capital market's impact on growth is weak though positive. As it guarantees liquidity that allows lumpy and risky investment to be undertaken, the stock market indirectly contributes to growth.

Ghana's financial market, like most LICs, is still at the early stage. Prior to the establishment of Ghana's stock market in the early 1990s, the financial landscape was dominated by banking financial intermediaries, some dating back to the pre-independence era. Against this background, it is logical to expect that financial inclusion that facilitates growth is plausible via financial (institutions) development, other than the stock market. The dominance of financial institutions as drivers of both inclusion and growth is strong. Financial institutions engender inclusiveness across a wider spectrum of private economic agents through credit allocations. The reason for policy efforts to strengthen the financial intermediaries in developing countries to ensure more inclusion becomes both valid and a promising conduit to achieving meaningful growth. In line with the countervailing theory, the entire financial system facilitates Ghana's economic growth as both the institutions and the market complement each other to guarantee a deeper and highly inclusive financial sector. It is evident from the study that for LICs, the banks' growth-facilitating role is much stronger than that of the financial market. This accords reasonably well with prior studies suggesting that stock markets tend to have more impact in advanced economies (Levine, 2002).

(iv) Welfare Impact of Financial Inclusion at the Household-Level

The study establishes the poverty-reducing impact of financial inclusion at the household level using a more robust method of investigation. The econometric analysis suggests that participants of financial inclusion programmes have improved living standards compared to non-participants (control group). The study reveals that individuals in high-income quintiles are more likely to be financially included. This outcome is consistent with many prior studies (see e.g., Honohan, 2004; Demirgüç-Kunt & Klapper, 2012a). Hannig and Jansen, (2010) observe that low-income individuals have both collateral and information constraints. Further,

female participants are found to have more improved welfare than both male participants and female non-participants.

Participation in the formal financial system, which defines financial inclusion, allows households and businesses to build assets (Imboden, 2005). Wealth accumulation takes place through consistent savings. This provides financial security and stability against risks. It further allows individuals to be better equipped for managing their cash-flow, make intertemporal decisions about their present and future to achieve smoothed consumption over their lifecycle (Collins, Morduch, Rutherford, & Ruthven, 2009; Johnston & Morduch, 2008). Consequently, balanced and pro-poor growth is expected from inclusion programmes that enable households to meet their financial needs now and to mitigate future risks.

An investigation into household-level inclusion has revealed that the impact of financial inclusion programmes depends largely on the quality of the implementation process. This study underscores that the impacts of such inclusion policies depend on the synergistic role of the *quality* of both the *access* and *utilisation* dimensions (as discussed in Chapter 4). Within this context, donor-funded financial inclusion programmes implemented by donor-assisted agencies such as FNGOs are found to have positive poverty-reducing impacts on beneficiaries, more so than those programmes implemented by government agencies. Thrikawala (2016), as an instance, finds a positive impact on MFIs' outreach programmes with donor involvement, or via their representation on a board of directors. As summarised in Table 9.8, whether a financial inclusion programme truly achieves meaningful impact at the household level depends on both the sources of funding and the implementation routes (agents).

The empirical analysis reveals state implementation of financial inclusion programmes leads to unfavourable welfare outcomes. This suggests that market failure in the financial market does not warrant direct state intervention (UN Departments of Economic & Capital Development Fund, 2006).

As revealed in the study, poverty-alleviating impacts could be traded for broader inclusivity if the right balance is not ensured. As an instance, clients of financial NGOs are found to have high welfare improvement compared with that of S&Ls' companies. Paradoxically, S&Ls' outreach strategies are found to drive wider

inclusion than FNGOs. This outcome suggests that in the face of endemic system failures that generate information asymmetry and high transaction cost of serving the poor households, incentives play a key role. Incentivised by the prospect of high profitability, S&Ls are found to drive wider inclusion through outreach programmes, though their programmes are not welfare-inducing. The observation that when behaving as loan sharks MFIs charge their clients unreasonably high interest rates (Mashigo, 2006) fits in this context.

The study's outcomes suggest that the optimal implementation scenario will result from donor-funded programmes implemented through donor agencies. However, as reality may not allow wider adoption of such a model, a careful combination of the matrices summarised in Table 9.8 may guarantee some optimality, in terms of welfare impacts.

Donor-funded or government-funded inclusion programmes channelled through MFIs for implementation will assure their sustainability without sacrificing clients' welfare. MFIs' sustainability will not depend on their interest charges, though realisation of meaningful impact will depend on ensuring strict compliance to standards.

Table 10.1: A Summary of the key empirical findings as related to the hypotheses

Main Hypotheses	Sub-Hypotheses	Tested Relationships	Sign Expected (A Priori)	Sign (Per Empirical Estimations)	Chapter Reference
H _{a(1)}		Governance indicators and financial inclusion (FI)	+	+	Chapter 6
H _{a(2)}		Improvement in corruption index (CPI) and financial inclusion	+	+	
H _{a(3)}		Economic freedom and financial inclusion	+	+	
H _{a(4)}		Economic growth and financial inclusion	+	+	
H _{a5(i-iv)}		Technological deepening and financial inclusion	<i>Outcome as revealed by the sub-hypotheses H_{a5(i)}- H_{a5(iv)}</i>		
	H _{a5(i)}	Mobile phone roll and financial inclusion	+	+	
	H _{a5(ii)}	Internet usage and financial inclusion	+	+/-*	
	H _{a5(iii)}	Income/poverty status and non-bank-driven financial inclusion	+	∅	
		Income status and bank-driven financial inclusion	+	+	
	H _{a5(iv)}	Mobile-based DFS and financial inclusion over time	+	+	
		Bank-based DFS and financial inclusion over time	+	-	
H _{b(1)}		Firm's size and financial exclusion (FE)	-	-	Chapter 8
H _{b(2)}		Website ownership and financial exclusion	-	-	
H _{b(3)}		Firm's age and financial exclusion	-	-	
H _{b(4)}		Firm's location and financial exclusion	+/-	+/-	
H _{b(5)}		Firm's registration and likelihood of financial exclusion	+/-	∅	
H _{b(6)}		Structural changes and financial exclusion over time	+/-	+/-	
H _{c(1)}		Financial inclusion (a key component of financial development) and economic growth	<i>Outcome as revealed by the sub hypotheses H_{c(1-i)}- H_{c(1-ii)}</i>		Chapter 7
	H _{c(1-i)}	Banks' credit to the private and economic growth	+	+	
	H _{c(1-ii)}	Stock market development (MCAP) and economic growth	+	+	
H _{c(2)}		Financial structure and economic growth	<i>Outcome as revealed by the sub hypotheses H_{c(2-i)}- H_{c(2-ii)}</i>		
	H _{c(2-i)}	Financial structure (efficiency) and economic growth	+	+	
	H _{c(2-ii)}	Financial structure (size and activity) and economic growth	+	+	

H _{d(1)}	H _{d(1-i)}	Financial inclusion and household welfare (poverty-reduction)	+	+	Chapter 9
H _{d(2)}		Implementation/institutional quality and welfare (poverty-reduction)	Outcome as revealed by the sub hypotheses H _{d(2-i)} - H _{d(2-vi)}		
	H _{d(2-i)}	Donor-funded/implementation and household welfare	+	+	
	H _{d(2-ii)}	Donor-funded/state implementation and household welfare	-	-	
	H _{d(2-iii)}	Donor-funded/state-agency implementation & financial inclusion	+	+	
	H _{d(2-iv)}	Government-funded/implementation and financial inclusion	-	-	
	H _{d(2-v)}	Government-funded/implementation and household welfare	-	-	
	H _{d(2-vi)}	MFI-funded/implementation and financial inclusion	+	+	
	H _{d(2-vii)}	MFI-funded/implementation and household welfare	-	-	
H _{d(3)}		MFI type and household welfare	+/-	+/-	

Note: Table 10.1 summarises the core outcomes of the empirical investigations. The hypotheses that guided the study, the relationships tested under each hypothesis and a comparison between the expected (a priori) signs and the actual signs are shown. Symbols (+), (-) and (⊖) represent positive, negative, and no significant relationships, respectively. * mean indicator has mixed outcomes; positive impact on financial inclusion at the micro-economic level but negative impact at the macro-level.

10.3 Contribution to Existing Knowledge

The overarching contribution this thesis makes to the existing body of knowledge is its ability to track the trajectory of financial inclusion to economic inclusion. This section outlines key specific contributions to the literature on the concept of financial inclusion.

Though empirical scholarly works on financial inclusion have been emerging, the focus has mostly been limited to some specific dimensions. Cognisant of their interrelatedness and interactions, the author examines all the four key dimensions of financial inclusion in this study as identified by AFI (see Triki & Faye, 2013a; Hannig & Jansen, 2010). The aim is to underscore how these dimensions work harmoniously towards economic inclusion that reduces poverty. In doing this, the study distinguishes itself from the existing prior studies by igniting deeper thoughts and understanding on the concept of financial inclusion. A whole being said to be better than the sum of its parts, following the gestalt definition, defines synergy in this study (Franke, 1997). Paying attention to each of the identifiable dimensions of financial inclusion (see Chapter 4) is important for two reasons. First, it helps in understanding how the dimensions are inter-connected in way that produces harmonious outcomes. Secondly, it allows the author to trace the trajectory of financial inclusion towards economic inclusion. This, to the best knowledge of the author, is the first of its kind, promising to shape future research in that direction. Thus, when the *impact, quality, usage* and *access (IQUA)* dimensions of financial inclusion (Triki & Faye, 2013a; Hannig & Jansen, 2010) are carefully modelled and studied together as a whole, it allows both policymakers and researchers see the bigger picture. This approach helps to gauge the unique role each dimension plays in ensuring economic inclusion emerges from financial inclusion efforts. That way, both policy formulation and implementation will harmonise to ensure a synergised outcome.

Another contribution that the thesis makes to the knowledge community is the paradigm proposition it has put forth. At present, and to the best knowledge of the author, the framework (*see Section 4.3 in Chapter 4*) promises to be a useful and the only unified theoretical framework that attempts to explain why financial exclusion exists, and appears pervasive in LICs. The absence of such a framework implies that past and present policy formulations and implementations on financial inclusion, especially in LICs, are done without sound theoretical foundations.

Contrary to the existing theories that regard FIs as mere creators/sharers of information (Brealey et al., 1977), safeguards of depositors' interest as delegated monitors (Diamond, 1984), or as risk-managers (Scholtens & van Wensveen, 2003), the proposed paradigm distances itself. Viewed as a profit-maximising firm, the model offers a more rational basis to explain why FIs refrain from serving a section of society, which leads to their exclusion. Thus, the profit-maximisation goal implies FIs will minimise costs imposed by institutional and environmental constraints. Embedded in *asymmetric information theories*, informality and opacity that give rise to high transaction costs are a significant part of such constraints. In LICs where financial market imperfection is endemic, this framework becomes crucial to deepening our understanding of why financial exclusion appears widespread.

The study further contributes to the knowledge in its in-depth, country-specific approach. The problem of over-generalisation, which undermines country-specific critical factors (often suppressed by fixed-effects imposition) typical of cross-country studies, is avoided. Focusing only on Ghana allows the author to carefully trace externalities that have unintended impacts on financial inclusion among enterprises in Ghana (see Chapter 8, Section 8.4).

Indeed, the choice of Ghana is strategic to allow for contextualised generalisation. Recently emerging as a lower-middle income country (LMIC) after the World Bank rebasing in 2009, Ghana shares attributes of both LICs and LMICs (Demirgüç-Kunt et al., 2015). Thus, within the context of countries classified as either LIC or LMICs, the findings could be generalised with a minimum error margin.

In addition, the study offers a unique way of defining exclusion that highlights some basic details often ignored by existing definitions. With such a contextualised definition, the thesis extends the frontier of knowledge on how financial inclusion/exclusion can be perceived. The proposed definition recognises that a mere non-participation in the formal financial system does not qualify an agent to be financially excluded. Policies to address financial exclusion can now be focused with such a fine-tuned definition (see Section 3.3.1).

Finally, the methods of investigation also add to enriching our understanding of financial inclusion as an emerging scholarly concept. The use of a Logit model succinctly reflects the dichotomous nature of the whole concept of financial

inclusion. Thus, one is either financially included or excluded, with no middle ground. This explains why most prior studies adopted binary models (Triki & Faye, 2013b). The methodological innovation is the application of a generalised linear model with logit as a link function that produces risk ratios. This allows the author to carefully separate firms' attributes that are predisposed to their risk of being excluded from obtaining a line of credit, from those that are not. Also, the application of GMM underscores the problems of endogeneity endemic in most household/micro-studies (Khandker & Pitt, 2003; Khandker, 2005).

Few researchers have attempted to investigate the role technological infrastructure plays in inclusion (Diniz et al., 2012; Kpodar & Andrianaivo, 2011; S. Rasmussen, 2010; Sarma & Pais, 2008). However, there appears to be no comparison made between bank-driven DFS and non-bank-based DFS to ascertain where strong inclusion efforts exist in LICs. In an attempt to fill this research gap, the thesis establishes *contemporaneous trade-off between bank-based DFS and non-bank-based DFS*, which defines the rate of commodity substitution between the two DFS over time. This simply suggests that although technology appears to be driving inclusion in most LICs, the nonbank sources of technology such as mobile network operators (MNOs) deepens over time, while bank-based DFS tends to reduce over the period. As revealed in the outcome based on the DID estimation technique, the rate of commodity substitution between bank-driven DFS and mobile-driven DFS across time is negative for the former and positive for the latter. The key extension to the existing knowledge needs to be highlighted. That is, as we expect technological deepening to occur over time, its impact on incentivising the 'usage dimension of financial inclusion' lends itself to cross-substitution rather than parallel usage between the DFS offered by the traditional intermediaries and nonbank firms (e.g., MNOs).

10.4 Policy Implications

The findings from the investigation as carried out promise myriad policy recommendations. Financial inclusion is becoming a key priority for many policymakers and donor agencies. Even more crucial is the issue of inclusion within the context of LICs where prevalence of structural bottlenecks, administrative lapses and infrastructural gaps often tend to widen the exclusion gap. Indeed, several policy implications are supported by the thesis for donor agencies such as

the World Bank, the IMF and the IFC. The national-level institutions responsible for advancing the financial inclusion agenda will undoubtedly benefit from the policy recommendations the study proposes. The empirical findings in this study will be useful in shaping policy towards a more inclusive financial system. Given SMEs are engines for growth (Beck & Demirguc-Kunt, 2006), dealing with exclusion risk factors will help contain factors that lead to their failure.

At the household level, it is obvious from the study outcomes that the impact of any financial inclusion programme is realisable. However, the quality of programme implementation needs to be very strategic to ensure access and utilisation (which are at the centre of financial inclusion).

In this section, the author outlines core policy implications that are pertinent to the advancement of a financial inclusion agenda for both Ghana and other LICs/LMICs. Considering the urgency of the issue of financial inclusion, the following policy recommendations promise to make an impact.

- i) The recognition that technological infrastructure and amenities do significantly influence the agenda towards financial inclusion provides both challenge and opportunity for LICs. The policy recommendation is unambiguous; developing countries aiming for a financially inclusive society must pay attention to these institutional contexts with more emphasis on technological infrastructure.
- ii) For donor agencies, the thesis provides a cogent case for the urgency in directing efforts to strengthen technological infrastructure such as the internet in LICs. The increased access to such infrastructure must be an important metrics on the donor scoreboard in a bid to push the financial inclusion agenda within the recipient countries, especially in LICs.
- iii) Given the non-discriminatory nature of DFS provided on a mobile technological platform, a pro-poor inclusion policy agenda should focus on technology.
- iv) The contemporaneous trade-offs observed between mobile-based DFS and bank-based DFS should inform central banks and other policymakers about where the greater effort towards pro-poor growth and a deepened inclusive financial sector must be directed.
- v) The findings from the study point to those areas where money invested is likely to have the greatest impact on expanding financial inclusion.

Policy and regulatory efforts must, therefore, focus on where meaningful inclusion impact is realisable.

- vi) Policy attention needs to focus on firm attributes that are predisposed to their exclusion from the formal financial sector, while strengthening policies for those that are inclusive-inducing. Policy and capacity building on enterprise growth and sustainability will be strategic in targeting the inclusion-inhibiting factors.
- vii) Firm-level constraints that confront small, individually-owned businesses, when addressed, will both ensure their inclusion in the formal financial system, and most importantly, their growth and sustainability.
- viii) Externalities that emanate from structural changes and shocks that occur on the macro-/national front must not be ignored by policymakers and researchers. This way, mitigation policy measures will be fashioned to address any negative confounders while any unintended gains are consolidated.
- ix) The need to strengthen financial intermediaries to ensure much wider inclusion is underscored in this study as a necessary factor towards macro-level growth in LICs. For donor agencies, a clear signal is given: channel pro-growth funds through the financial intermediaries where wider financial inclusion is guaranteed. State actors and policymakers aimed at promoting financial inclusion among the private sector agents can rely on the intermediary role of financial institutions.
- x) The capital market development in Ghana needs more policy and a participatory boost. This will ensure that the full benefits arising from the market's complementary role in delivering financial services in LICs are realised.
- xi) To ensure maximum impact at the household level, donor-funded inclusion programmes must not be left to the state implementers. Financial non-governmental agencies established by the donors to directly see to the tailor-made financial inclusion programmes in LICs should be the policy goal.
- xii) Instances where donor-financed inclusion programmes are to be implemented via state agency or local MFIs, stringent guidelines and monitoring that guarantee compliance, strict adherence to standards and best practices must be ensured.

- xiii) The government must concentrate on its regulatory functions that promise a positive impact on financial inclusion. This is necessary to avoid sub-optimal outcomes that arise from direct state implementation of financial inclusion programmes in LICs.
- xiv) The poverty-reducing impact of some informal nonbank non-deposit taking institutions, such as credit unions and the Susu group, underscores the need for policy aimed at integrating such institutions into the formal financial system. Their significant roles in mobilising domestic financial resources, especially from the informal sector, and providing their members with pro-poor financial resources must not be lost to policymakers. Developing an infrastructural interface that allows informal financial actors to actively participate in the formal financial system ought to be a policy priority in Ghana. This will guarantee deeper and much broader inclusion.

10.5 Scope, Limitations, and Suggestions for Future Research

10.5.1 Scope of the Thesis

The genre of this research is within a family of in-depth country-specific studies. The institutional context is Ghana's financial sector and the provision of financial services to enterprises and households in Ghana. From a geo-demographic context, the study is on Ghana, a West-African country of lower-middle income status (Demirgüç-Kunt et al., 2015)⁴⁵, with a population of approximately 28.3 million (in 2016) (Ghana Statistical Services, 2016). As a former British colony, the regulatory framework and legal amenities mimic the English model, though Ghana's neighbouring countries are all French-speaking. In a relatively stable political environment, Ghana has for the past two-and-half decades upheld democratic tenets, reflected in political power alternating from one political party to another. This has been reflected significantly in the dominance of the private sector in the financial sector with much stronger contract enforcement institutions.

⁴⁵ According to the recent World Bank rebasing of the country's economic growth.

In respect of micro-level analysis, enterprises and households, as captured by the World Bank enterprise survey data, Findex survey data and ICPSR database were covered. The macro-level analysis, however, relates to the entire economy.

10.5.2 Limitations

Despite robust empirical findings reported in this study, there are nonetheless some limitations. The acknowledgement of the existence of these limitations does not in any way obliterate the significant contributions this study makes to the knowledge community. Rather, it allows further opportunities that could be explored to further deepen our understanding of financial inclusion as an emerging concept, especially within the developing countries' context.

As a single-country impact study that focuses on financial inclusion, generalisations ought to be made with caution. For LICs and other LMICs within the African sub-region with institutional characteristics similar to Ghana, extension and application is plausible. Ghana's transition from LIC to LMIC offers unique potential for generalisation, especially among countries of similar economic and political features. This is possible because some of its institutional and economic features are common to both LICs and LMICs. This notwithstanding, generalisation needs to be made cautiously and ought to be guided by a given context. The recognition that countries with institutional similarities may not imply diametric institutional attributes must guide such generalisation.

In addition, caution needs to be exercised when applications and generalisations to other LICs are made outside of the African context where significant institutional gaps may exist.

10.5.3 Direction for Further Work

Data limitation did not allow for the use of panel analysis. As World Bank enterprise surveys and the Gallup poll Findex dataset become available for significant numbers of years, panel data for Ghana may further enrich future studies. This promises to extend the frontier of knowledge on financial inclusion more deeply. Furthermore, meaningful comparisons and inferences beyond the two data points as new datasets become available offer the prospect of more refined analysis. The question of whether or not the peaceful resolution of the 2012

electoral dispute assures investors and the wider financial market actors of the reliability of the country's property rights and contract enforcement mechanism may be addressed with greater robustness in future studies.

The present study establishes causation within the limits of nonparametric analysis influenced by the small number of observations in the macro-dataset. In future, with sufficient data, researchers may be able to apply a Granger causality test for financial inclusion and growth. Also, the operation of equity markets in LICs may be characterised as somewhere between a cosy club and money laundrettes. Efficient market testing of risk pricing in LIC exchanges is a necessary component for building an efficacious regulatory framework to support growth. As further data sets become available, methods such as GMM may have much to offer. Additionally, research on the subject focusing on other LICs is recommended. This will ensure that the findings in respect of the established causality in the present study are both replicated and widely generalizable.

Finally, the thesis presents two challenges to researchers and academics; first, the established relationship of financial and technological deepening, and an inclusive financial system that guarantees inclusive growth, deserve further probing within the context of other LICs outside the West African Sub-region. Thus, the question of whether financial and technological deepening will incentivise (→) financial inclusion (→) that guarantees inclusive-pro-poor growth towards (→) poverty reduction, must be further interrogated. Future research may focus on such other matters as financial literacy and staff development in financial institutions that may influence inclusion but were beyond the scope of the current research. Further research can also focus on the integration of the informal financial sector into the formal sector and how that promotes financial inclusion.

Secondly, the proposed theoretical paradigm as an attempt by the author to offer a unified theoretical basis for explaining why exclusion exists and appears widespread in LICs, will further be subjected to empirical scrutiny.

Practical application: though this thesis is pure academic research, (Booth, Colomb, & Williams, 2003) its practical application is conceivably proposed. It is envisaged that the outcome of this study may motivate an establishment of “The African centre for financial inclusion and small business finance”, supported by the IMF and the World Bank. That is, a policy research centre that will partner national

governments, private sector enterprise organisations and donor communities to offer training and conduct research on wider aspects of inclusion with greater emphasis on enterprise growth and sustainability in the West African Sub-region.

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