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MICROFINANCE PARADIGM: INSTITUTIONAL PERFORMANCE AND OUTREACH

A thesis submitted to The University of Manchester for the degree of

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THE UNIVERSITY OF MANCHESTER
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ABSTRACT

Microfinance research concerns addressed in this thesis relate to: (1) targeting of clients vis-à-vis financial sustainability; (2) loan size effect of interest rate and clients' well-being status; (3) economic governance and the dual objectives of microfinance institutions; and (4) patterns, trends and drivers of microfinance institution's efficiency. The thesis emphasises operational issues that affect institutional performance and outreach of microfinance institutions rather than impact of microfinance intervention on poverty reduction. The thesis revolves around four empirical chapters that seek to address the above research concerns.

Both micro and macro-level analyses have been explored with the aim of identifying institutional and public policies that drive the success of microfinance interventions. Micro level data from households in Ghana and cross country data mainly from the Microfinance Information Exchange (MIX) market are used. Varied microeconometric techniques (ordinary least squares, instrumental variable estimation, quantile regression, pooled regression, fixed and random effects estimations, Hausman-Taylor, Fixed Effects Vector Decomposition, stochastic frontier analysis and non-parametric efficiency estimations) are used depending on the hypotheses being considered in each of the empirical chapters.

The main findings are: observed trade-off between financial sustainability and reaching poorer clients; formal institutions dispensing their own funds target poorer clients; pronounced variations in responsiveness of loan size to interest rate changes; semi-elasticity of loan amount responsiveness to a unit change in interest rate is more than proportionate and very significant for the poorest group; lesser time in securing property and availability of credit information show positive effects in targeting poorer clients; both type (pure technical and scale) and scope (narrow and broad) of financial efficiency show varying trends; and lastly, negative effects of bureaucracies in property registration and lack of credit information on social efficiency are also observed.

This thesis suggests the following recommendations both for management of microfinance institutions and other stakeholders including international microfinance investors and government: harmonizing microfinance programmes irrespective of the source of funds; segmenting microfinance outreach markets based on socio-economic well-being; curtailing bureaucracies in property registration; and providing credit related information. These are paramount to the success of the microfinance paradigm, especially in achieving its social objective.

DECLARATION

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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DEDICATION

This thesis is dedicated to the Microfinance Unit of the Ministry of Finance and Economic Planning, Ghana.

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The completion of this thesis would not have been possible without resource support received from some institutions and individuals. Before expressing my hearty appreciation, I give thanks to God for his unrelenting grace and mercies that has seen me through my programme's course.

I am indebted to the Ghanaian Government and its implementing institutions (Ghana Scholarship Secretariat and Ghana High Commission, United Kingdom) for providing financial support through the course of study. To the University of Cape Coast, I thank you for the confidence reposed in me, and for allowing me to follow this study while my job remained intact.

The pedagogic and professional support received from my supervisors Dr. Katsushi Imai and Prof. Thankom Arun has been invaluable and no amount of words can describe my depth of gratitude. The working relationship has been superb and it is by no means surprising that we have reached the end my PhD work at a time when collaborative research between us has kindled.

The support from my wife Sarah and my son Kobina has been emotionally reinforcing, as they contributed their quota to the successful completion of my thesis. Spiritual and motivational support from my parents, siblings and in-laws moved potential barriers and paved the way for endurance.

Last but not the least to my colleagues and lecturers both at the University of Cape Coast, Ghana and the University of Manchester, United Kingdom, it was gratifying interacting with you all when it mattered most. Eliciting your opinion on diverse issues including directions on my thesis was very inspiring, challenging and above all useful.

THE AUTHOR

The author's aim to pursue a degree of Doctor of Philosophy (PhD) in Economics was underpinned by both passion and professional ambition. Although the former contributed in settling on a broad research topic, as a member of the teaching staff of the University of Cape Coast, Ghana, undertaking a PhD was more of a necessity.

Beyond the inevitable career path demand for a PhD, the choice of a research topic was competitive. Over the years, the author gained interest and built research capacity in microfinance and household health decision-making issues. The author, prior to his PhD, was involved in a World Bank/Government of Ghana sponsored microfinance research on the theme "Poverty Assessment and a Comparative Study of Rural Micro Finance Institutions and Government Credit Programmes in Ghana". In spite of skills developed from engaging in health research projects and the Health Economics focus of the author's Master of Philosophy thesis, the timing, data coverage (nationally representative) of the microfinance project, and anxiety among social scientists on the capability of microfinance to lead a development path influenced the choice of the thesis topic.

As a member of the core research team on the microfinance project, the author interacted with most of the stakeholders (Government, donors, the poor and vulnerable, community leaders and microfinance practitioners), which confirmed several conjectures surrounding the capability and resonance of microfinance paradigm. In spite of the much touted success stories across the globe including the famous Grameen experience of Bangladesh, the nervousness generated by the conjectures triggered the need for an academic research in the area of microfinance.

Beyond the microfinance issues addressed in this thesis, the author in collaboration with other researchers including his PhD supervisors (Dr. Katsushi Imai and Prof. Thankom Arun) has produced three academic journal articles on microfinance. Also, the author has extracted two empirical papers from this thesis as published working papers. These papers are:

- 2010 "Microfinance and Household Poverty Reduction: New Evidence from India" *World Development* – doi:10.1016/j.worlddev.2010.04.006; with Imai, K and Arun, T.

- 2009 "Who is reaching whom? Outreach of Microfinance in Ghana. International" NGO Journal Vol. 4 (4), pp. 132-141; with Awusabo-Asare, K, and Abane A.

- 2008 "Spatial and Socio-economic dimensions of clients of Microfinance institutions in Ghana", Journal of Geography and Regional Planning. Vol.1(5), pp. 085-096; with Awusabo-Asare, K. and Asare-Mintah, D.

- 2009 "Targeting the Poor versus Financial Sustainability and External

Funding: Evidence of Microfinance Institutions in Ghana" BWPI Working Paper No 88, [http://www.bwpi.manchester.ac.uk/resources/Working-Papers/index.html ISBN: 978-1-906518-87-5

- 2009 "Sensitivity of Microfinance Loan Size to Lending Rates: Evidence from Ghana", MPRA Paper 21280: University Library of Munich, Germany.

In addition to the above, the author has other publications on health, child labour and policy effects of changes in macroeconomic variables on poverty reduction.

The PhD programme's life span witnessed professional engagements related to research. The author in collaboration with his supervisors currently has three international projects on-going. In two of the three international projects, the author has been involved in the entire research process that is from proposal writing to the currently on-going implementation phase. This provides the author with added skills that is normally rare to ascertain during a PhD programme.

The research projects are:

1. British Council Fourth Round DelPHE Project – "A Multi-country study on Microfinance, Gender and Poverty";
2. African Economic Research Consortium Project – "Integrated Financial Services and Child Nutrition: Are there any Spill-over Effects? – Evidence from Ghana"; and
3. Economic Research Council Research Project – "On the Change of Poverty and Undernutrition in Rural India".

Further to the above, the author gained three years international teaching experience during his PhD programme. As a Graduate Teaching Assistant, he was involved in tutoring both undergraduate and graduate courses. Specifically, UK Micro and Macro Economics, Applied Economics, Computing for Social Sciences and Micro Finance.

In view of the forgoing and established career path, the author looks forward to engaging more in the area of teaching, research and outreach as per the mandate of an academic.

CHAPTER 1

INTRODUCTION

1.0 Background

The notional view of microfinance as a panacea to poverty reduction has attracted wide empirical research and public policy discourse in the past couple of decades. For instance, claims such as: "In 2007, more than 100 million of the world's poorest families received a microloan…. this goal touches the lives of an estimated half a billion family members" (Daley-Harris, 2009; p. 1) have contributed to the growing literature on microfinance paradigm. Microfinance has emerged as a developmental strategy in the past four decades, with the aim of reducing poverty by building financial, human, physical and social capital. Through the delivery of both financial and non-financial services, microfinance loyalists have consistently articulated the paradigm's capability and resilience even during the global economic turmoil which was ignited by crisis in the financial sector (Littlefield and Kneiding, 2009).

In 2007, it was estimated that the amount of funds invested into microfinance by development partners totalled approximately five billion USD. Further, the past four decades has witnessed a tremendous proliferation of MFIs across Asia, Africa and Latin America. Global trends between 2004 and 2006 continue to show rapid growth in loan portfolios (34 percent), borrowers (23 percent) and deposits (24 percent) (Microbanking Bulletin, 2008). In spite of theoretical concerns about bottom-up development paths and scepticism about microfinance being over ambitious, the sector possesses a strong goodwill among development partners and tends to be a core component of the development strategy of most developing countries.

1.1 Microfinance Knowledge Gap

The microfinance literature in the past decade has produced a plethora of poverty impact studies. This is precedent on the assumption that all MFIs have a poverty reduction orientation. A question then emerges as: what is the extent of MFIs' inclination to poverty reduction, given the over-riding profitability (financial sustainability) priority of most business entities? While policy makers, researchers

and practitioners grapple with the search for a response, an urgent resolution is imperative given the increasing mixed microfinance-poverty impact study results (Khandker 2005 and Roodman and Morduch 2009)[1]. Although the mixed impact results have largely been attributed to methodological limitations (Mosley, 1997; Hulme, 2000; and Karlan, 2001), reflecting on the wide variation in operational strategies of MFIs provides an alternative perspective for assessing the validity of microfinance impact studies. Thus, while most of the recent microfinance impact studies are making conscious effort to resolve methodological limitations (Roodman and Morduch 2009; Banerjee et al. 2009, and Karlan and Zinman, 2009), an examination of potential differences in delivery strategies and cost structures of MFIs is worth considering. The rationale for this examination is motivated by the 'ying-yang' problem of microfinance (Rhyne 1998) and Cull et al's (2009) assertion that, heterogeneity of microfinance operations implies multiple paths of impact in the future. These arguments suggest that microfinance debates on poverty reduction and financial sustainability are probably misplaced given the wide contextual and differences in operational features, delivery strategies and cost structures of microfinance institutions.

To this end, resolving methodological limitations will only deal with one part of the reasons for the mixed findings. It is therefore imperative for some empirical studies to investigate the determinants of successful MFI operational issues such as targeting, pricing, governance and efficiency. This in our opinion is an equally important policy inquest compared to impact studies. Also, identifying differences in operational characteristics and delivery strategies[2] will enhance the classification of MFIs into homogenous groups for impact studies to be carried out. Though the latter is not categorically addressed in this thesis, the findings on determinants of successful MFI operational indicators is a major step to categorizing MFIs based on their delivery strategies and operational characteristics. This thesis therefore side-

[1] In spite of the use of the same data, different impact outcomes are observed for the two studies.
[2] While some impact studies have identified acknowledge the importance of the effect of different MFI characterisation, use of legal status fails to capture differences in operational features and delivery strategies. Apart from the broad limitation of the use of legal status in revealing the operational features of MFIs, we find country level variation in the characterisation of MFIs.

steps impact studies and makes a case for the implications of variations in operational features of microfinance institutions.

Typically, variations in operational strategies of MFIs have generated adverse concerns. The pessimism have been ignited by the following: (1) changing trends of microfinance funding; (2) high operational costs relative to traditional banking institutions; (3) low repayment rates that can be linked to inefficiency in monitoring loans; and (4) lack of evidence in support of the connection between the broader economy and microfinance. For instance, the recent drive towards commercializing MFIs has partially led to a vindication of the concerns of microfinance sceptics. Recent evidence of MFIs' commercialization points to their engagement in initial public offerings [3] (IPOs) and structured finance such as collateralized debt obligations (CDOs). The undisputable profit motivation underlying such sources of funds generates debate on the relationship between financial sustainability and poverty reduction. Furthermore, while microfinance has proven insulate to previous financial crises in different regions, the immediate past's global downturn has signalled signs of repayment difficulties and pessimism in some regions (Chen et al., 2010).

Further to the above, the heterogeneity and dominance of most MFIs in the informal sector have yielded an unrestricted scope and undefined mode of operations, especially in terms of service delivery among institutions. MFIs' evolution, like any other institution, is influenced by historical and legal factors, sources of funds, prevailing wave of the development paradigm, international practice, and cultural, individual and social motivation. Depending on the economic governance of a country, the above set of issues can potentially inhibit the ability of microfinance institutions in achieving the simultaneous goals of poverty reduction and integration into the broader financial sector.

[3] Examples are Compartomos, Mexico (2007) and SKS, India (2010)

1.2 Objectives

In the light of compelling positive evidence between institutions and development (Casson et al., 2010; and Pande and Udry, 2005), this thesis attempts to identify specific channels through which microfinance institutions (MFIs) contribute to poverty reduction without compromising their financial sustainability. As a de facto institution, differences in financial delivery strategies and external factors have contributed to wide knowledge gaps. We broadly argue that these differences have contributed to mixed perceptions and contrasting empirical evidence on the impact of microfinance. Microfinance research concerns addressed in this thesis relate to: (1) targeting of clients vis-à-vis financial sustainability; (2) loan size effect of interest rate and clients' poverty status; (3) economic governance and the dual objectives of microfinance institutions; and (4) patterns, trends and drivers of microfinance efficiency. The thesis emphasises operational issues that affect the institutional performance and outreach of microfinance institutions rather than impact.

The specific objectives are to:

i. investigate the trade-off or mutuality between financial sustainability and outreach of MFIs in Ghana;
ii. examine loan size sensitivity to interest rate changes given the poverty level of clients in Ghana;
iii. identify internal and external governance mechanisms that are likely to influence the dual objectives of microfinance paradigm (MFIs reaching poor clients and being financially viable); and
iv. examine patterns, trends and drivers of efficiency of microfinance institutions.

In view of the above microfinance knowledge gaps and objectives, the four empirical chapters of this thesis respectively test the following eight hypotheses:

i. formal MFIs mobilizing their own funds through loans, equity, shareholding capital and/or deposits target clients who are relatively less poor;

ii. concentrating on the achievement of financial sustainability causes MFIs to target non-poor clients;
iii. clients at the margins of socio-economic status are sensitive to interest rate changes relative to the majority in the middle band;
iv. external governance (property rights, contract enforcement and voice and accountability) enables microfinance institutions to achieve their poverty lending objective better than internal governance systems;
v. internal governance systems (corporate governance) coupled with better operational performance are sufficient for the financial viability objective of microfinance institutions;
vi. operational financial sustainability[4] complements efficiency (financial and social) of MFIs;
vii. MFIs targeting women trade-off their financial efficiency for social efficiency; and
viii. external environment (credit information, property rights and financial development) has a significant positive effect on MFIs' social efficiency, while financial development impacts only on financial efficiency.

1.3 Contribution

The contribution of this thesis is viewed from three perspectives. First, from a policy perspective, operational and interventional guidance have been provided to both management of microfinance institutions and other stakeholders including government and development partners. The following are the policy recommendations. First, to help achieve the social objectives of MFIs, the following are important. Harmonization of microfinance programmes irrespective of the source of funds; setting interest rates based on client's responsiveness; reducing delays in property registration and providing credit information on both MFIs and clients.

[4] Sustainability is measured either from an operational perspective or financial perspective (Consultative Group to Assist the Poor (CGAP)'s distinction between operational and financial self sufficiency). The difference depends on the treatment of subsidies. In the context of microfinance, it is important to distinguish between social and financial objectives. Hence the phrase 'operational financial sustainability' refers to the financial objective of MFIs but from an operational sustainability view point.

Second, the application of varied microeconometric analysis generates academic discourse on the validity of the several microfinance conjectures. Using ordinary least squares, instrumental variable estimation, quantile regression, pooled regression, fixed and random effects estimations, Hausman-Taylor, Fixed Effects Vector Decomposition, stochastic frontier analysis and non-parametric efficiency estimations provides a platform for scientific validation of the various hypotheses on microfinance institutional performance and outreach. In a wider context, the range of microeconometric techniques can be replicated for different sectors.

Finally, this thesis adds to the scant literature on evidence of microfinance operations in sub-Saharan Africa, especially Ghana. More specifically, the thesis incites studies on operational performance to understand the latent behaviour of economic agents on issues such as motivation, preferences and then attitudes and performance. This will help link objectives of MFIs with exact outcomes and provide a better understanding on impact results.

1.5 Structure of Thesis

The thesis is structured around four empirical chapters that seek to address the above research objectives. The empirical chapters are preceded by two chapters that respectively introduce the thesis and provide a discussion on the relationship between finance and development. While the latter discusses the finance-growth nexus, its emphasis is on microfinance paradigm. The last chapter of the thesis provides a summary of the empirical chapters and policy recommendations, caveats and areas for further work. Appendices are included with the aim of providing further clarity on the following: financial sector stylized facts; country context (Ghana); poverty measurement and details of estimation technique. This has been detached from the respective chapters to prevent distraction from each of the hypotheses under consideration.

CHAPTER 2

FINANCE AND DEVELOPMENT: MAKING A CASE FOR MICROFINANCE PARADIGM

2.0 Introduction

This chapter reviews literature on the functioning of a financial sector in an economy. This is imperative as the ramification of the 2008 financial crisis has unveiled the extent of knowledge gap on the operations of the financial sector and its implication for the real economy. Momentarily, this has rekindled the discourse on finance and development. As this thesis focuses on a sub-sector (microfinance) of the broad financial sector, we cursorily review some of the debates surrounding the complex relationship between finance and the real economy, with the aim of contextualizing microfinance paradigm. Green et al. (2005) provide a detailed perspective on the links between finance and development by discussing the theoretical relationships and collating a number of empirical papers. We discuss the finance-development nexus followed by an attempt to identify perceived and potential linkages between microfinance, the broad financial sector, economic growth and/or development and poverty reduction. A discussion of the microfinance paradigm precedes the chapter's conclusion.

The rationale of this chapter is to; (1) identify the functional link between microfinance sub-sector and an economy's overall financial sector and (2) broadly motivate the need for empirical studies on microfinance operations. Though the broad literature on finance and opportunity is explored, we focus relatively more on the latter rationale in this chapter. Other literature review related issues are addressed in each of the four empirical chapters. For instance, in the first empirical chapter (Chapter Three) of this thesis, we rationalize the choice of focusing on microfinance operational issues as opposed to impact studies.

2.1 Historical Overview

King and Levine (1993) argue that Schumpeter might have been right about the importance of finance and economic development. Since at least the 18th Century,

interest in monetary functioning and systems has clouded an important segment in discussing the determinants of real growth and development of an economy. The 1911 famous paper by Joseph Schumpeter inspired the consideration of key elements such as the role of the financial sector, innovation, inventions and technology for any economic development path. Financial markets' primary functional roles were specified as: first, to facilitate the accumulation of capital, and second, manage the risk inherent in particular investment projects and industries (Bagehot, 1873; cited in Boissonneault, 2003). These early conceptualizations in the 19th and the first decade of the 20th centuries were among the initial notions that incited discussions on the role of money markets, interest rates, capital accumulation, and allocation and inflation in an economy pre and post the great depression in the 1930s. Modern macro theories of finance from an economist's perspective are attributed to the Modigliani and Miller (1958)[5] theorem, which espouses the linkage between macroeconomics and finance.

The role of monetary policy (instruments) in triggering or subverting recessions and/or booms was an element of the earlier strands of discussion between the Classical and Keynesian, which later resurfaced between the monetarist and the real business cycle. The argument pivoted around the notion that either money is a veil or that it does affect real variables such as unemployment and growth in an economy. While the latter posits that monetary policy is pro-cyclical, that is, it influences the business cycle, the former argues that financial sector development is an off-shoot of a developed economy. This dual proposition was informed by the demand-side and supply-side mitigating strategies that followed from the Great Depression in 1930. The policy direction of either fiscal or monetary policy attracted much concern for both academic and political attention. Milton Friedman, who is associated with monetarism, in 1956, attributed the Depression to the flaws of the operations of Central Banks in regulating money supply. This viewpoint suggested

[5] The theorem is premised on the argument that the manner by which a firm finances its operations either through equity or debt is independent of the value of the firm. This theorem dismisses the sources of funds on the assumptions of the efficient market hypothesis, equal borrowing cost, perfect market, and no income tax.

his inclination to the view that money was not a veil and that a poor monetary instrument is capable of dampening the real growth cycle of an economy. Friedman, a decade later, argued that monetarism was effective only in the short-run but indeed is a veil in the long-run. This 'time-influenced' contradiction spurred on deeper discourse on the role of monetary policy in an economy.

Proponents of the former argument, that money is a veil, include Joan Robinson and Robert Lucas. Both assert that although there appears to be some association between money and growth, causation remains unfounded. Robust and efficient financial markets, however, were acknowledged to be an off-shoot of an advanced economy. The period between 1950 and 1970 witnessed minimal use of monetary instruments, which accounted for interest rate caps and government direction of credit allocation to 'preferential sectors'. Most developing economies that followed a controlled financial sector regime, according to McKinnon (1973), were repressed, which defeated Schumpeter's advocacy for finance promoting innovation and technological progress. Reviewing the thinking that emerged in the later part of the 1960s without mentioning the influence of the stylized facts developed by Goldsmith (1969) leaves the discussion incomplete (see Appendix I). On the basis of the broad finance and development academic antecedents, our next sub-section reviews the observed functional role of financial intermediaries, particularly, during the second half of the 20th century.

2.2 Financial Intermediation

To explore the importance of financial intermediation[6] in an economy, it is essential to understand carefully its meaning, scope, and agents (institutions) as well as its main and auxiliary functions. Lack of this exploration (conceptualization) and contextualization partly accounts for the mixed findings that characterize the finance-growth nexus. The scope of finance, for instance intermediation between and within different countries, generates varied concerns in terms of what is

[6] Worth mentioning is the range of terminologies that have been used in the literature, barring their adjectival, verbal and noun interpretations. These include: financial development, financial systems, and financial mechanisms. A review of the usage of various terms and measure (indicator) provides an inclination for the expected results given any shock or policy intervention.

expected to be achieved. In the context of microfinance, there is the tendency of an over-concentration of microfinance investment by development partners and domestic governments to the detriment of much more important sectors (USAID, 2006). This section of the chapter outlines some of the conditions identified for harnessing the full potential of financial intermediation with a focus mainly on bank-like financial intermediaries.

The theoretical debate on the linkages between financial intermediation and other macroeconomic variables such as inflation, foreign direct investment, exchange rate, consumption, savings, investment and ultimately growth, is quite extensive. The debate is informed by the twists of whether or not financial intermediaries are a veil. The discourse, succinctly, focuses on whether or not financial intermediation achieves both economic and distributive efficiency through transfer of funds from excess sectors to deficit sectors with a number of caveats. Economic efficiency is to be achieved with minimizing cost and reaching out to all segments of the market while distributional efficiency targets risk diversification in investment portfolios. Financial institutions' ability to operate at a minimum cost, reach out to all segments of the market and diversify risk is perceived as a precursor to the finance led growth hypothesis.

Among the notable and recent definitions and attempts to conceptualize financial intermediation include: Diamond (1984; 1996), who identifies with the initial proposition that information asymmetry between lenders and borrowers forms the most essential argument for the existence of financial intermediaries. This concern has gained a prominent stance in the literature due to the accompanying problems of moral hazard (hidden action) and adverse selection (hidden information), precipitating market failure. Contributions made by Diamond to the literature are centred on how to reduce the transaction cost based on the argument that sourcing information through monitoring and providing incentives for financial intermediaries is costly. In this respect, diversification through the dual process of sub-dividing individual risks and adding more independent risk is proposed. To this end, financial

intermediaries increase and transform the set of economic activities that can take place both within and across communities, alongside monitoring and controlling activities, and providing asset transformation services at lower cost. A more succinct definition of the functional roles of financial intermediation was made evident by the work of Levine (1997). According Levine (1997), from a functional role perspective, four (but detailed) channels of intermediation can be identified. These are: enhances savings mobilization; ensures resource allocation; exerts corporate control and monitoring managers; and facilitate trading, hedging, diversifying and pooling risk. The end product is physical capital accumulation and allocation, which are essential for growth.

While these functional roles have well been documented, clear, distinctive features of financial intermediaries in developed and developing countries have spurred on massive debate from approximately the end of 1990 until the present. Characteristic of the differences are: density of financial institutions; availability and mutuality between types of financial products, for instance, insurance, mortgages and support services; extent of reliability within the legal and broad institutional systems that complement the activities of financial institutions, especially the risk component; and diversity of the scope of financial products in absorbing risk. Partly, these variations led to the exploration of the relative influence of different types of financial intermediaries by mainly distinguishing between bank-based[7] and market-based[8] driven economies. Though these distinctions had been previously identified in the early part of the 1990s by Mayer (1990) and Allen (1990), recent studies have deepened the empirical search. Most recent studies have tilted more in favour of bank-based economies (Chakraboty and Ray, 2006), while a considerable number of the studies still identify mixed and inconclusive findings depending on the financial structure of the economy (Demirguc-Kunt and Levine, 1999; Levine, 2002).

[7] Gorton and Winton (2002), provide a clear distinction on 'bank-like' financial intermediation and capital markets. They posit with evidence from Mayer (1990) that in the savings and investment process, households with resources to invest will deposit them with the bank through the purchase of securities. In turn, the banks will invest the money by lending it to borrowers.

[8] These are stock and security markets from which firms can directly source funds for investment at the neglect of the bank.

The path of transition in the literature still leaves the state (structure, performance and channels of operations) of a developing economy's financial sector in the dark. As envisaged by McKinnon (1973, p.3), "accepted theories of monetary and financial processes – whether they be it the Keynesian or Monetarist - cannot explain the dominance of real money balances in the operation of capital markets in poor countries. Both of these prevailing theories assume that capital markets are essentially "perfect" with a single governing interest rate or a term structure of interest rates, whereas the brute fact of underdevelopment is overwhelmingly fragmentation in real rates of interest". In no unambiguous term, such brute facts complicate empirical research in developing countries.

Financial sectors in developing countries, especially in Africa, are characterized by mainly bank-like financial institutions that are primarily foreign owned banks with limited scope of storing the funds of potential depositors. The drive for competition that is expected to push real interest rates down is still missing, coupled with stringent regulation that prevents innovation, and a high level of transactional cost. Among the factors engendering the above scenario are weak institutional arrangements such as the legal systems and a heavy reliance on the informal sector. Table 2.1 gives evidence of the disparity of some selected financial indicators in a number of developed and developing countries. In a sequence, the countries reflect characteristics of high income, upper middle income, low middle income and low income economies. Firsthand observation supports the notion that the structure of influence of the financial sector is diversified in developed countries. Both bank-like and stock markets are well developed relative to developing countries. The selection of the financial indicators provides a snapshot overview of the three main indicators of financial depth (bank deposit and stock market capitalization both as a proportion of GDP), financial penetration (domestic credit provided by the banking sector), and access to financial services (bank branches per 100,000 people). Evidently, all three indicators in high income economies far outpace all the lower income economies

with the exception of the South Africa stock market capitalization, which in this context is an outlier.

TABLE 2.1 - SELECTED FINANCIAL INDICATORS

COUNTRY	BANK DEPOSIT/GDP	STOCK MARKET CAPITALIZATION/ GDP	DOMESTIC CREDIT PROVIDED BY BANKING SECTOR - percent OF GDP	BANK BRANCHES PER 100,000 PEOPLE
UNITED KINGDOM	0.68	1.30	215.5	18.3
UNITED STATES	1.32	1.34	159.1	30.9
SOUTH AFRICA	0.57	2.53	86.7	6.0
MEXICO	0.23	0.35	38.4	7.6
BOLIVIA	0.34	0.22	52.5	1.5
INDONESIA	0.35	0.30	48.8	8.4
GHANA	0.21	0.12	30.5	1.6
UGANDA	0.14	0.01	11.0	0.5

Source: World Development Indicators, 2006 and http://econ.worldbank.org/programs/finance

In spite of the 'misdirection' of the literature against the realities of developing countries, there is another emerging wave that fails to capture the peculiar state of financial markets in developing countries. Central to this are questions of the role of financial intermediaries in an era of rapid technological advancement, which again is also not a germane argument for developing countries. These new trends in the literature have revisited the role of financial systems with the mind of value-creation and market segmentation as the reasons for the existence of financial intermediaries. Value creation through risk absorption has been identified as a more optimistic justification for the existence of financial intermediaries (Scholtens and Wensveen, 2003). The argument of value creation is precedent on the assumption that financial intermediaries have sufficiently large portfolios of investment that enhance their capacity to absorb risk and operate in a very competitive industry. These assumptions facilitate product development, which adds value, to both savers' and investors' satisfaction. The risk embedded in product development for different market niches is the central contemporary function of financial intermediation.

While these theoretical arguments have been empirically verified in the context of most developed economies, this has not been the case for developing economies. Poor infrastructure culminating in information asymmetry is among the factors leading to lack of supporting evidence in developing economies.

The motivation for heavy reliance on microfinance by developing countries is informed primarily by 'opportunity' [9], positing the existence of a huge unserved market and its consequential usury interest rates by informal money lenders. Limited outreach capacity and the stringent requirements of traditional institutions are also among the overarching reasons for the emergence of microfinance. The operations of moneylenders have created a further gap between the path pursued by developed countries and the state of financial systems in developing countries. Operations of moneylenders have derailed the quest of driving interest rates down through competition, minimizing information asymmetry with advancement in technology, developing comprehensive financial systems (bank-based, market-based, insurance and support systems), and integrating the financial markets with the goods markets.

Microfinance institutions emerged, quite ambitiously, not only to demise the operations of moneylenders but to deepen financial sector performance and end the poverty menace. The point of entry (resolving the market distortion caused by informal money lenders) and the ultimate goal of microfinance institutions have created teething concerns regarding its capability. Without a clear model of operation, the microfinance paradigm has generated enormous discourse. Wide and complex systems of operations that cut across all three categories of institutional arrangement (formal, semi-formal and informal) have emerged under the umbrella of microfinance. This has created inconsistent revelations of the sub-sector's

[9] The operational characteristics such as short term loan schemes and relatively high interest rates provide an impulse for financial entrepreneurs with short-term goals to flood the market. Euphoria synonymous to speculative pressure (expectation-induced) is created to incite potential financial entrepreneurs to enter the market. The euphoria stimulates illusive gains for financial entrepreneurs with short term ambitions at the expense of long term investment goals.

capability in achieving two of its primary objectives (financial sustainability and poverty reduction).

In addition to the growth of microfinance programmes and institutions in developing countries, the sub-sector's attraction of huge capital flows across borders requires careful investigation. According to Stiglitz (2005), the strength of a country's financial system is its ability to channel capital to appropriate sectors. This requires equipping and incentivizing financial institutions. Further to this, financial institutions must be geared to providing capital for small businesses and micro-credit facilities, attracting foreign direct investment, specifically for long term investment portfolios to enhance economic development, and promoting domestic savings. Finally, Stiglitz (2005) alludes to the fact that high interest rates have a detrimental effect by increasing the return to asset stripping. To this end, any discussion on the performance of a country's financial sector should explore issues of incentives, intermediation and interest rates.

The literature on microfinance performance has two broad dimensions: (1) assessing institutional level performance (internal characteristics) that enhances the identification of best practices for the achievement of proposed goals, and (2) determining external (exogenous) factors. The latter investigates issues related to both the macroeconomic and global context.

The literature on the macroeconomic and the global context of microfinance institutions though scant reveals interesting results. Synonymous to the broad literature on finance and growth as per the earlier discussion of this chapter, a plausible conjecture in the microfinance-macroeconomic debate is that microfinance institutions can thrive better in a fast growing economy (Ahlin et al., 2010). In this case microfinance performance is a function of the economy (Ahlin and Lin, 2006). The reverse causality hypothesizes that either growth in the macro economy or foreign direct investment (proxy for global context) is a function of the degree of financial sustainability of MFIs in a country. Though empirical studies on either of these conjectures are quite grey, some work has emerged on the former. While

significant variations exist among the GDP growth rates of major microfinance economies coupled with wide gaps in the flow of foreign direct investments (FDIs), studies on microfinance seem to relegate the impact of these exogenous factors.

2.3 The Microfinance Paradigm

Microfinance is defined as the informal and formal mechanisms of offering financial services to the poor (Brau and Woller, 2004). The informal character of the microfinance paradigm allows for an unrestricted scope and undefined mode of operations among institutions. Its evolution, like any other institution, is precedent on diverse causes, notably: historical, legal, source of funds, wave of development paradigm, international practice, and cultural, individual and social motivation. These varied and unsystematic reasons augment criticisms of the role of institutions in development. However, the purported capability and substantial financial inflows (Xavier et al., 2008) into the subsector make it imperative for academic research to be carried out.

The orientation of microfinance has been broadly categorized into the minimalist and integrative perspectives (Woodworth and Woller, 2001). Reaching the poor through a minimalist perspective restricts the operational function of MFIs to financial services. Conceptualizing microfinance from a minimalist perspective is built on some perceptions about the poor's financial dealings. Reviewing the literature, this thesis identifies the following eight notions which have either been validated or not:

- presence of an unserved market by the traditional banking sector (Anand and Rosenberg, 2008; World Bank, 2006) and labelled as poor;
- unserved market hitherto perceived as 'unbankable' in reality, are 'bankable' (Rutherford, 2000; World Bank, 2006);
- willingness and ability of the unserved market to engage in economic activity (Imran et al., 2002; Mondal, 2002);
- access to financial services, especially credit, is the major constraint of microenterprises (Parker et al., 1995; Psaila, 2007);

- group solidarity, a potential guarantee for high repayment in the absence of collateral (Ledgerwood, 1998; Armendariz de Aghion and Morduch, 2000);
- group solidarity, forced/compulsory savings and social punishment are expected to minimize traditional lending constraints such as: fungibility, moral hazard and adverse selection **(**Ghatak and Guinnane, 1999; Fiebig et al., 1999);
- ability to save as the poor set aside their excess resources in very small amounts or as other forms of assets (Rutherford, 2000; Deshpande, 2006);
- transacting with the poor is financially viable either because the poor are insensitive to high interest rates or because costs can be minimized through economies of scale, diversification and value-chain (economies of scope), market segmentation, and technological innovation (Morduch, 2000; Cull et al., 2008) .

These issues, though extensive, are not exhaustive of the reasoning underpinning a minimalist perspective of microfinance. In the past decade and a half, a plethora of microfinance empirical studies have been produced with the aim of addressing some of the above notions. Some of these have yielded mixed results and added to the dilemma as to whether microfinance is simply a wellbeing strategy or can contribute to development. In spite of huge research interest in microfinance, some of the notions outlined above remain unresolved especially from a contextual perspective. For instance, spatial variability questions the generic adaptation of the above notions across continents based on a framework of 'microfinance best practices'.

The above notions have culminated in delivery strategies with a wide scope, extending beyond merely mundane financial services (credit, savings and insurance) to non-financial services. MFI non-financial service delivery can be identified along the lines of credit with education programmes, reaching out to post-conflict geographical areas, and packaging products for vulnerable people including HIV/AIDS patients. These varied delivery mechanisms and non-financial services reinforce the sub-sector's commitment as a developmental tool and especially its

capability of achieving the Millennium Development Goals. Woodworth and Woller (2001) refer to this as the integrative perspective of microfinance. Further to this, recent literature advocates a scaling-up of the integrative perspective; that is, from an intra-institutional perspective to an inter-institutional/policy perspective. The inter-institutional integrative perspective is aimed at tapping synergies between development programmes and microfinance activities. In the light of this, Hashemi and Rosenberg (2006) assert the need to harmonize microfinance intervention with other social protection[10] programmes such as safety nets[11]. This prescription holds on to well-identified comparative advantages of programmes/institutions to fully tap the benefits of division of labour and specialization.

The evolution of MFI non-financial services directly underlies the double and triple bottom line objectives of the microfinance paradigm. Spill-over effects such as better nutrition, improved education and empowerment are among the most widely touted non-financial attributes.

The forgoing points to a complex relationship (both direct and indirect) between microfinance, financial development and the real sector of an economy. At all three levels of an economy (micro, meso and macro) the direct and indirect linkages between microfinance, the financial sector and the real economy can be identified. Svensson (2007) shows the micro and macro direct and indirect relationship between microfinance, financial systems and the real sector. The meso-level effects can be identified through the spill-over effects harnessed by the solidarity approach that underpins microfinance delivery.

While we grapple with the relationship between microfinance and the rest of an economy, the quest of achieving the dual objectives of poverty reduction and financial sustainability has eluded most MFIs. The latter has been the major constraint for most MFIs, especially in sub-Saharan Africa. Microbanking Bulletin

[10] Defined as public interventions to assist households and communities to manage risk and provide support to the critically poor.
[11] Safety nets include food aid or guaranteed employment.

(2009) shows that all regions but sub-Saharan Africa consistently recorded an average financial self sufficiency score of less than 100 percent over the period 2005-07. The intractable constraints faced by MFIs are akin to issues identified with earlier financial oriented development interventions such as rural finance. Among the problems are: high transactional costs, information asymmetries, social networks, high covariance of cash flows between rural depositors and borrowers, and market distortions (Gonzalez-Vega, 2003; Binswanger and Rosenzweig, 1986). In microfinance, client targeting, especially farmers, has been less successful in view of their lending product strategy which is usually short term in nature. This has generated another wing of criticism of the sub-sector's desirability for development given the dominance of agricultural sector's contribution to gross domestic product (GDP) in most developing countries. Among the questions is how microfinance envisages averting the initial problems of rural finance in deepening access to finance. That is, researchers are faced with the question: how can MFIs contribute to improved financial sector performance in the face of their typical constraints of high transactional costs, limited risk diversification and stimulate growth, by channelling resources to sectors where long and optimal gains can be ascertained?

Sen's (2005) comment on Armendariz de Aghion and Morduch's (2005; back page) book, calls for circumspection by asserting that:

> "*the microfinance movement is bringing hope, prosperity, and progress to many of the poorest people in the world. It is necessary to use critical economic reasoning to understand why the movement is such a success and how its exact achievements can be assessed and scrutinized*".

In the context of the above statement, academic researchers cannot be better motivated to engage in both theoretical and empirical research that tries to understand the microfinance movement.

2.4 Conclusion

The above suggests that after four decades of microfinance emergence, the sub-sector still grapples with cutting edge issues that contrast with some economic

theory. For instance, the notion of clients' interest rate insensitivity to borrowing/loan size contrasts the core tenets of neo-classical economics which is premised on rationality and completeness of information that enables decision-making. Some presumptions are also rather difficult to assimilate. For instance, mutuality between financial sustainability and targeting poor clients, and microfinance capability in driving the entire economy whilst bearing in mind their small loan amounts and operational difficulties in reaching clients.

The next four chapters address some of these issues by revisiting some presumptions (mutuality between financial sustainability and targeting poor clients, and interest rate insensitivity) and identify drivers (external governance and efficiency) of the dual objectives of microfinance institutional operations.

CHAPTER THREE

TARGETING THE POOR VERSUS FINANCIAL SUSTAINABILITY AND EXTERNAL FUNDING: EVIDENCE OF MICROFINANCE INSTITUTIONS IN GHANA

3.0 Introduction

In view of the current global financial crisis and economic turmoil it is imperative to question the vulnerability of Micro Finance Institutions' (MFIs') financial sustainability and targeting of poor clients. MFIs' receive a substantial share of both government and development partners' planning and budgeting. Relying on data from 2005 to 2007 there was a potential annual increase of 55 percent [12] in outstanding portfolios of Development Finance Institutions to microfinance institutions (Consultative Group to Assist the Poor (CGAP), 2008). Subsequently, the number of borrowers across the globe increased on the average by 23 percent (Microbanking Bulletin, 2008). In sub-Saharan Africa (SSA), as at 2007, Ghana was ranked the highest recipient (about USD$186m) of development partner's donor funding into microfinance (CGAP, 2008). We therefore provide an empirical investigation into the challenge posed by the reliance on external sources of funding to MFI institutional building. The specific objective is to estimate the effect of financial sustainability[13] and source of funds on client targeting. Rhyne (1998) argues that as opposed to external funds sourced by MFIs, institutional own funds that are mobilized through owner's equity, savings and shares aim at financial sustainability rather than poverty reduction. In the light of this, we find a knowledge gap with empirical studies that only investigate the relationship between financial sustainability and reaching poorer clients, without considering the effect of source of funds.

[12] The computation is based on Compound Annual Growth Rate.

[13] As the measure of financial sustainability is self-sufficiency the terms are used interchangeably in the hereafter.

Microfinance, indicative of reducing poverty by building financial, human, physical and social capital, has received mixed recognition partially due to the lack of strong evidence on its impact. Architects of microfinance, mainly practitioners, development partners and government, assert its capability. However, some sceptics, mainly academics contend the paradigm's resilience to the test of time. For instance, Navajas and Gonzalez-Vega (2000), Sautet and Daley (2005) and Ditcher and Malcolm (2007) argue, among other issues, that disbursement of meagre loan amounts and covariate risk characterizing group methodology as pioneered by the Grameen model [14] threatens the success of microfinance. Barr (2005) further questions the ability of microfinance to achieve financial stability through sustained operations to stimulate the economy's broad financial sector operations and reduce national poverty. Imperative to these concerns is the association and/or causation between a microfinance institution's (MFI's) financial sustainability and targeting of poor clients. Current research in microfinance is skewed towards poverty oriented impact studies to the neglect of a potential trade-off between financial sustainability and targeting of poor clients. This chapter tests two principal hypotheses; (i) interacting own mobilized funds with formal institutions microfinance organizations reach less poor clients and (ii) concentrating on the achievement of financial sustainability causes an institution to target non-poor clients.

Research on the trade-off or mutuality between financial sustainability and outreach, and the overall impact of microfinance abounds in different forms but with mixed findings. Zeller and Meyer (2003) tagged the triple point relationship between financial sustainability, outreach and impact as 'the critical triangle of microfinance'. The base of the triangle, impact, has attracted much interest, both among researchers and policy makers as it is perceived as the ultimate target of microfinance. The process [15] of achieving impact, however, seems to have been ignored despite early concerns about the potential divide between financially and socially oriented microfinance paradigms. Variation in institutions' operational

[14] Mohammed Yunus was awarded the Nobel Peace Prize partly for his contribution to the success of Grameen Bank (a microfinance institution in Bangladesh), the much touted microfinance model.
[15] The *Social Performance Management Tool* has been introduced in recent years to track the gradual process from mission through to objectives and targeting and to desired outcomes.

mission, vision, goals, objectives and targeting has been minimally researched although these determine the outcome of any impact study. Investigations into the socio-economic characteristics of clients being reached (targeting/market niche) and the implications for financial performance have been swamped by impact studies that seek to investigate whether poverty levels have been reduced as a result of microfinance intervention.

The motivation for an institution's existence crucially determines *who* and *how* to deal with a potential beneficiary. The Consultative Group to Assist the Poor (2001; p.1), poses two questions: "Does the substantially larger average loan balance of regulated microfinance institutions represent a natural evolution toward a maturing target group or does it represent a mission drift?" And "Are today's unregulated NGOs aiming at a target group poorer than the target group of the pioneering institutions that have transformed themselves into regulated entities?" These questions underlie the motivation to consistently revisit the nature of MFIs' operations. The 'institutionist-welfarist' (commercialization-targeting poor clients) debate sums up the different orientations of microfinance institutions (Woller et al., 1999; Morduch, 2000). The discourse in some arena of the literature has been misconstrued as an issue of strict precedence in opting initially for either poorer clients or financial sustainability. However, Rhyne (1998) categorically states that the debate is not an 'either-or' argument but an issue of the degree of emphasis and what happens when trade-offs appear. The lack of clarity of an institution's initial mission on the degree of inclination has led to different impact outcomes and this has created a rift between the two schools. While financial systems approach at the outset of their operation advance concerns for break-even[16], the poverty approach charts a path of reaching poorer clients and therefore explores the demographic and socio-economic characteristics of potential clients.

Microfinance literature in the past decade has produced volumes of impact studies on the general assumption that all MFIs are strictly poverty reduction oriented

[16] Cost of operations compared with profitability/revenue.

(Hulme and Mosley, 1996; Coleman, 1999, 2002; Khandker, 2005; Imai and Arun, 2008). The inherent assumption underpinning impact studies of microfinance intervention is the rhetoric of poverty reduction. Parallel orientation and practices other than poverty reduction suggest a tendency to provide mixed and misleading results in microfinance poverty impact studies (for instance Pitt and Khandker, 1998, compared to Morduch, 1998). This may have contributed to the mixed pattern of impact study results, although it has mainly been attributed to limitations associated with methods of study (Mosley, 1997; Hulme, 2000; Karlan, 2001). The over-concentration on impact studies has led researchers to abandon rudimentary questions and interrelationships such as: (i) what are the implications of the varied sources of funds? (ii) who and what are the socio-economic characteristics of an institutional clientele base? (iii) does institutional financial sustainability matter in targeting poor clients? (iv) do household and external characteristics preclude certain categories of households from participating in microfinance? and (v) what is the accuracy level of indicators used in measuring socio-economic characteristics and financial performance?

We revisit the 1990's agenda of trade-off or mutuality between financial sustainability and targeting poor clients in microfinance and extend the empirical investigation to capture potential problems of endogeneity and sample selection. The empirical evidence suggests a trade-off between financial sustainability of microfinance institutions and targeting of poorer clients. The use of Instrumental Variable (IV) estimation offers insights into the possibility of measurement error. The policy relevance points to streamlining microfinance activities to allow them to achieve the mutual goals of serving poorer clients on a commercial and sustainable basis. This generates the need for integrated poverty reduction strategies, as the beneficiaries of microfinance programmes tend to possess initial peculiar socio-economic and financial characteristics.

The remaining sections are organized as follows. The two succeeding sections review literature with an emphasis on sustainability and outreach and their

connection, and present potential data and measurement problems characterizing microfinance intervention. The methods of study are then described, with description and justification for the sampling approach, univariate estimation of both dependent and main independent variables and estimation models. The results and discussion section precedes the conclusion, highlighting points of departure from previous studies, the contribution of the current study, making policy recommendations and suggestions for future research directions. The limitations of this chapter are acknowledged in the course of discussion.

3.1 Related Work

This section contextualizes the need for an empirical paper that seeks to revisit the trade-off or mutuality between microfinance institutional sustainability and socio-economic characteristics of their clients. The need for this study is driven by the overt implications of the current financial and global economic turmoil on developing economies especially African countries that are heavily dependent on donor funds. The theoretical debate revolves round the capability of institutions to concurrently operate in a competitive environment and target poorer clients. Proponents of New Institutional Economics (NIE), including Ronald Coase, Douglas North, Robert Bates, Oliver Williamson and John Toye, provide insightful literature on paths of development via institutions in contrast to 'institution free' neoclassical economics. Thus, premised on the new institutional economics framework, we assert that distinguishing between different types of institutions based on source of funds distorts the capability of microfinance in achieving the desired goals of poverty reduction and financial deepening. In this sub-section, we provide a theoretical discussion of outreach in the first part followed by a review of the empirical relationship between financial sustainability and outreach in the context of depth of poverty.

Theoretical Framework

Schreiner (2002) was the first to provide a theoretic framework of self sustainability and poverty approaches to microfinance by reconciling these schools of thought to the long standing social welfare theory in economics. The basic difference between

these approaches according to Schreiner (2002) rests on the logic of selfishness and selflessness. In the case of self sustainability, microfinance institutions seek to reach less poor clients in the early stages of operation with the aim of building a sound financial base prior to targeting very poor clients. The poverty lending approach in contrast, makes a case for fulfilling the poverty objective of microfinance paradigm in the very short term by targeting poorer clients. From a client perspective, the contrasting feature between self-sustainability and poverty lending approaches is number and depth of poverty of microfinance beneficiaries, respectively.

Schreiner (2002) proposes a framework of outreach (net social benefits of microfinance) to facilitate an understanding of the assumptions that underpin the two approaches to microfinance. The rationale for the theoretical framework is to identify the motivation for the different approaches and its implications for society as a whole (wider impact of microfinance). Identifying six dimensions of outreach, namely; worth[17], cost, depth, breadth, length, and scope, Schreiner (2002) argues that the poverty lending approach measures social benefits and the self sustainability approach concentrates on the social cost. The first three dimensions focuses on the poverty approach while the latter three perspectives are associated with the self sustainability debate. In effect, society will only benefit based on the net gain between social benefit and social cost. This is summed as "the social benefit of the outreach of a microfinance organization is the net gain weighted by depth, summed across breadth of clients and across scope of contracts and summed and discounted through length of time" (Schreiner 2002, pp. 12).

In spite of the contrasting perspectives, a closer observation at the orientation of the two approaches shows that these schools of thoughts are constrained not in terms of

[17] Rather than defining each of these dimensions, two measurable indicators of each dimension based on USAID (2006) has been provided to facilitate an understanding of the intent underlying each of them. Worth (client retention rate and type of market research conducted); Cost (Real yield on gross loan portfolio and weighted average number of days to approve and disburse loans after completion of loan application); Depth (Average loan size as a percentage of GNI per capita and percentage of female clients); Breadth (Number of borrowers and voluntary savers as a percentage of borrowers); Length (Profit margin and return on assets); and Scope (Number of distinct enterprise loan products and number of other financial services)

opinion but by the degree of weight attached to either self sustainability or poverty lending. Rhyne (1998) could possibly be right in indicating that, a hard stance on either side of the debates is inappropriate. While Schreiner's (2002) theoretic framework has been pivotal, the concluding note of a trade-off between the six dimensions of outreach has complicated the interpretation of empirical studies that either uses one dimension or a few of them. However, most studies as per the empirical section below tend to rely on either one or just a couple of the six dimensions.

Empirical Literature on Depth of Poverty Outreach and Financial Sustainability

The literature on the realism of microfinance, promises a 'three plus one'[18] strands of possibilities. The first strand outlays mutuality between microfinance sustainability and serving the poorest clients (Christen et al., 1995; Simanowitz and Walter, 2002). This side of the 'three plus one' possibilities, though marginally supported with less rigour on the methods of study justifying its realism is, paradoxically, the pivot of the microfinance hype. The second possibility runs parallel to mutuality and asserts a trade-off between achieving financial self-sufficiency and reaching the poorest clients (Rhyne and Otero, 1994 and Morduch, 2000). Thirdly, a bunch of evidence (see Brau and Woller, 2004; Armendariz de Aghion and Morduch, 2005) reveals mixed findings on the achievability and posits of conditional mutuality [19] or trade-off. The mixed findings and conditional association between financial sustainability and serving poor clients is accounted for by (i) narrow definitions of both poverty outreach (henceforth outreach) and financial sustainability as argued in the preceding section; (ii) influence of other institutional practices or delivery mechanisms such as lending mechanism (group or individual), loan structure, repayment rates, corporate governance, type of institution (formal or informal), etc. (Park and Ren, 2001; Hartarska, 2005); and (iii) variations

[18] Three main outcomes have emerged from studies on the association between financial sustainability and serving poorer clients, and a fourth outcome inferred from an impact study which suggest targeting of MFIs.

[19] Conditional mutuality refers to the ability to achieve both objectives subject to certain 'good practices' such as efficient management.

in the theoretical perspectives and methods of study applied to the empirical exposition (Conning, 1999; Navajas et al., 2000).

The fourth possibility or 'plus one' is from studies that sit on the fence. These studies approach the argument from a defensive angle as they do not make any assertion but rather claim the implausibility of enough evidence to make an assertion of either mutuality or trade-off (Balkenhol, 2007). Also close to this category is the study by Hulme and Mosley (1996) that propose the need for institutions to make a choice of either striving to achieve financial sustainability or making a dent on poverty. Hulme and Mosley (1996) assert a transmission mechanism in explaining trade-off between serving poorer clients and financial sustainability. Their argument posits that higher interest rates and voluntary and/or compulsory savings crowds out poor clients. Known characteristics of the poor, including (i) living in remote rural areas; (ii) dispersed populations; (iii) lack of infrastructure and institutions; (iv) volatile economic activities predominantly dependent on the vagaries of the weather and other natural occurrences; and (v) weak and fragmented markets for goods and services, justify the need for higher interest rates and initial forced or voluntary savings. Von Pischke (1996) summarizes these into three factors, namely increasing marginal costs of delivery, bad debt losses and a poor nose for risk. The last is associated with the monotonic nature of economic activities of microfinance clients. Based on this, Hulme and Mosley (1996) argue that the poorest clients served by microfinance institutions face a host of constrains that impair their ability to translate financial services into household income. This assertion partially generated the widespread interest in impact studies as their famous study inadvertently places a premium on the end of the microfinance paradigm.

The notion of jointly achieving financial sustainability and serving poorer clients depends on perceived microfinance attributes of excess demand culminating in potential economies of scale and a variety of cost reducing delivery strategies such as group lending. These variations partially explain the mixed results, leading to sidelining of operational issues and paving the way for impact studies. Though

impact study is the definitive target, other potential mission drift factors (endogenous and exogenous to the institution) of financial services remain important and determine performance of MFI. For instance, as institutions determine their market niche by varying financial instruments and delivery strategies such as interest rate and lending mechanism, client responsiveness based on their needs and characteristics determines outcome. Also, anecdotes are available of external influence on principal-beneficiary relationships emerging from government and donor sources of funding. Situations such as interest rate cap dispensation and predetermination of clients hamper screening and subsequent monitoring.

The reliance and implications of government and donor funding are currently mixed and geographically influenced. While Hulme and Arun (2008) suggest that most MFIs are adopting a financial systems approach, the Microbanking Bulletin (2008) shows an aggregate picture of African MFIs being financially unsustainable, which signals their reliance on other sources of funds. This parallel suggests a need for country-level assessment on the degree of reliance at the micro level and the extent of influence on institutional targeting and operation. In a recent finding, Zeller and Johannssen (2006) reveal that character type premised on legal status influences targeting of different socio-economic clients in microfinance. Providing country-level evidence from Peru and Bangladesh, Zeller and Johannssen (2006) suggest that not-for-profit MFIs or Microbanks with not-for-profit MFI traits reach out to poor clients. Their finding suggests the potential of other institutional characteristics influencing outreach. This wave of study provides another justification to revisit the association between sustainability and outreach of microfinance institutions, taking into consideration other factors such as the source of funds, which varies across countries.

3.2 Methods of Study

Trade-off or mutuality between financial sustainability and outreach charts a different path from the routine impact studies that have characterized research in microfinance. Issues concerning unit of analysis and its characteristics, selection and estimation techniques vary with respect to the objectives underpinning the research.

The orientation of institutions is best assessed from the perspective of targeting. Hence, the focus of selection is new or potential clients. This enables a response to the question "given the financial resilience of the institution, which segment of the population is reached?"

Data Sources

Data for the study matched lender to borrower by randomly selecting households from institutions purposely identified. Non-client households are nationally representative and the random selection procedure was dependent on client location. The survey was conducted on behalf of the Rural Financial Services Project of the Bank of Ghana in 2004[20].

Sampling

Selection of Institutions

The informal nature of microfinance as a development paradigm has allowed for a wide scope of institutional types. Most institutions aligned with microfinance evolved from a historical social mission to serve the needs of poor (religion inclined), government policy direction (rural and agricultural finance), donor motivation and private sector profit maximization. The microfinance landscape in Ghana is divided into seven broad categories, namely, Rural and Community Banks (RCBs), Savings and Loans Companies (S & Ls), Credit Unions (CUs), Financial Non-governmental Organizations (FNGOs), Susu Collectors and Associations (SCAs), other church-based organizations and government microfinance institutions. The rationale underpinning the evolution of each category of institution underscores its allegiance to the notion of 'best practice'. Brau and Woller (2004) identify a number of management practices including outreach, financial viability, type of lending mechanism, targeting and regulation as the guidelines often used to characterize best practice in microfinance. For the study, institutional types that are not regulated in any form, do not keep records and possess a high instinct for social mission are excluded.

[20] The Consultancy Unit of the University of Cape Coast and Asamoah and Co. were the clients engaged by the Bank of Ghana to execute the household and institutional surveys respectively. The author was a member of the core team for the household survey.

Restricting choice to allow for commonality among institutions implied the use of purposive sampling through a consultative approach. This aided identification of institutions based on several factors including location, reporting standards and operational focus. Though marked differences (ownership structure, market niches and strategies) exist among the broad microfinance formal categories RCBs, CUs, FNGOs and S & L Companies, some balance was ensured to capture the diversities.

A total of 16 microfinance institutions were used for the study with the following breakdown: nine rural banks, four credit unions, four financial non-governmental organizations and one savings and loan. The skewed distribution of institutional types was based on the multi-stage sampling which considered first the geographical spread of institutions and secondly their inclination to financial self-sufficiency and social mission. All categories of institutions, with the exception of rural banks, are disproportionately spread in the regions of the country due to their evolutionary orientation. Including these institutions in the study was imperative to enable at least some generalization for the industry.

Selection of Clients

Matching clients with institutions, random sampling was used to identify client household respondents. The sampling procedure considered some other issues, including financial product accessed by client and affiliation to a particular source of funding. This was occasionally invoked as institutions offered different products and administered a variety of programmes based on source of funding. The distinction of products is either informed by the type of financial service, such as credit, savings and transfer; or, given the same type of financial service, the delivery strategy such as group or individual lending mechanism; for instance, savings product based on compulsion is different from voluntary saving. Institutions administered different programmes depending also on the source of funding, that is institutional own mobilized deposits, government and donor funded programmes. Categorizing programmes in the context of sources of funds for different clients within the same

market niche is prudent due to the varied conditions that accompanied each type of funding. For instance, interest rate varied among the three types of sources of funds.

This background information from the pilot survey guided the design of the sample frame. In spite of the diversity in product, credit and savings emerged predominantly in all the institutions although some did not have the mandate to mobilize savings. Clients of the selected microfinance institutions were randomly selected and their households served as the unit of analysis for the study. A sample of 1,589 clients was interviewed.

Selection of Non-clients

The selection of this sample, like the client selection, was nationally represented. Across the three ecological zones of the country, 70 enumeration areas (EAs) were randomly selected using the frame from the 2000 Population and Housing Census. The distribution of EAs was proportional to the total number in each ecological zone and consistent with the selection of households for the Living Standard Survey. All households (17 or 18) within the selected EA were targeted for interview depending on availability. This gave a potential sample size of between 1,190 and 1,260 households. Out of the target, 1,102 non-client households were successfully interviewed and available for data analysis.

Univariate Estimation

Poverty

The debate on poverty measurement has evolved at a tremendous pace in the past decade. Appendix II provides an extended review of poverty conceptualization, contextualization and measurement. Different perspectives on the drivers of poverty and its varied types (chronic, transient among others) have led to calls for both quantitative and qualitative as well as monetary and non-monetary approaches to poverty (Hulme and McKay, 2005 and Lawson et al., 2006). This chapter and the one immediately following rely on a poverty measure that combines both monetary and non-monetary indicators in measuring poverty. This section briefly discusses the Microfinance Poverty Assessment Tool (MPAT) used.

The theoretical underpinning of MPAT as developed by the Henry et al. (2003) is multidimensional (multiple indicator), in contrast to the uni-dimensional (single indicator) technique that has attracted widespread criticism because of its narrow perspective. In developing economies, uni-dimensional measures of poverty, especially those of income and money-metric characteristic, are problematic as some forms of assets do not translate easily into units of measurement. The multidimensional approach seems more convincing as it pools a multiplicity of factors and attaches relative importance to a number of dimensions to estimate well-being. Compared to the Living Standard Measurement Survey (LSMS) which is credited for its detail, the MPAT approach is less expensive, is time saving and more importantly uses both ordinal and cardinal variables in its approach to estimating a household index. The MPAT surmounts the LSMS strict adherence to a monetary and an absolute approach. It relaxes the rigid adherence to cardinality and caters for ranked variables, subjective perspectives, a relative approach and comprehensible scope of poverty.

The approach collects household-level data using a contextualized generic instrument which has six main subcomponents: Demographic structure and economic activities, footwear and clothing expenditure, food security and vulnerability; housing indicators; land ownership and ownership of assets. (See Table 3.1 for final variables used in computing the poverty score.)

The estimation procedure is built on two main descriptive statistical methods: first, Linear Correlation Coefficient (LCC); and second, the Principal Component Analysis (PCA). The MPAT approaches the computational measure with a bias for household per capita expenditure on footwear and clothing as this is chosen as the benchmark variable. The LCC is the primary means of filtering poverty indicators to ascertain variables that best captures variations in relative household poverty (Henry et al., 2003). The initial step is to run a bivariate correlation test of all the other indicators against household per capita expenditure on footwear and clothing. The statistical criteria of $P<0.01$ and $P<0.05$ significance levels have been designated to

identify variables that correlate very strongly and strongly respectively. Further details of MPAT have been provided in Appendix III.

Table 3.1 - Variables used in Constructing Poverty Index

Components	Indicators
Geographical Location	Urban or Rural location in rural savannah
Food Security and Vulnerability	Coping Strategy: frequency of reducing number of meals
Quality of the House	Index for type of ownership, access to water, electricity, quality of roof, walls toilets, etc.
Assets of the Household	Motorcycle, bicycle, TV, stereo, radio, fridge, stove, sewing machine, fan, iron, etc.
Access to basic needs	Time (in minutes) to the nearest secondary school and pharmacist.
Education	Literacy and level of schooling of HH head, percent of adults who have completed primary schooling, ratio of literate adults
Occupation	Number of adults self-employed in food crop agriculture and distance to the nearest food market.
Expenditures	Clothing and footwear expenditures per person.

Source: Derived from Field Survey Data, 2004.

The PCA allows for the computation of a linear combination of indicator variables. The 'component-loading' which represents the amount of correlation between the component variable and the indicator variable is successively revised based on factor analysis to arrive at a household relative poverty score. Due to its multidimensional nature, the approach is very sensitive in discriminating among different levels of poverty (Henry et al., 2003). Computed household poverty scores normally range between $\pm$ 3. For both client and non-client households in this study, poverty scores ranged -3.05 and +2.65. The use of MPAT attracts the defect of a relativist measure and as such constrains comparability especially across space, however in the context of a country specific study it is useful for a baseline assessment on future benchmarking.

Use of Poverty Indices

In spite of the validation check on our poverty scores with national estimates that are based on the LSMS – expenditure method, it is worth noting that the use of poverty indices is subject to theoretical limitations. Broadly, two strands of criticisms (1) general problems related to the use of indices or any summary measure that attempts to explain a complex and/or heterogeneous set of issues and (2) theoretical complexities on poverty conceptualization and measurement[21] have been identified. While the theoretical literature is evolving and leading to a growing number of axioms being stipulated for any 'good' poverty measure (Bourguignon and Chakravarty (2003), translating these axioms into real world use remains a challenge especially for policy makers. In this sub-section, we highlight the implications of using indices in the context of poverty measures.

Following Sen's seminal work on functionings and capabilities, leading to the widely used UNDP's Human Development Poverty Index, a significant number of studies have evolved using an index (multiple indicator approach applying either a uni-dimensional and multi-dimensional measurement) to measure poverty. Filmer and Pritchett (2001) and Sahn and Stifel (2003) are examples of studies that use a uni-dimensional poverty index in a similar fashion as the MPAT used in this chapter. While the latter study shows that uni-dimensional poverty indices are comparable to expenditure (money-metric) measures, their use are susceptible to a number of constraints and as such must satisfy a number of properties. See Foster and Shorrocks (1991); Zheng (1997) and Thorbecke (2005) among others, for the required properties in using uni-dimensional and multi-dimensional poverty indices. In particular, poverty indices are susceptible to problems of weighting[22] of different indicators constituting the index; differences in units of measurements (especially in the case of cardinal and ordinal indicators); aggregation complexities; the

[21] Central to this discourse is the issue of appropriate poverty space (in terms of indicators) and how the space maps unto real world experiences.

[22] Although in the case of income/expenditure measure of poverty, use of prices as weights is also problematic, weights attached to each of the different components in the case multiple indicator poverty measures are more daunting given the variability of importance associated with each indicator/component by different people and overtime.

implications of substitutability and complementarity between the different indicators; determination of thresholds across different categories of indicators and for different people and choice of deflator for standardizing the index both over time and across different geographical settings. Standardization in the case of uni-dimensional and multi-dimensional poverty tends to be more complex relative to expenditure poverty measures and inhibits comparison of poverty scores. In sum, our use of MPAT is theoretically susceptible to the above constraints and does not categorically address (either in terms of approach or validation) Sen (1976a and 1979) basic axioms (focus[23], monotonicity[24] and weak transfer[25]) of poverty measures Appendix II further discusses the complexities in measuring poverty.

Financial Self-sufficiency

To arrive at a composite index for FSS, we apply the (CGAP, 2003) specification of the formula: Adjusted Financial Revenue/Adjusted (Financial Expense + Net Loan Loss Provision Expense + Operating Expense). The ratio adjusts for three main factors, namely subsidized cost of funds, in-kind subsidy and inflation.

3Model Specification

Ordinary Least Squares Regression

The hypothesis of a trade-off is estimated by modelling a cross-section regression equation with poverty score of households on the left-hand side of the equation and a composite of institutional (endogenous to the institution) and household and external variables (exogenous to the institution) on the right-hand side. Alternative estimation techniques such as treatment effect estimation and non-parametric estimation were considered, however, the focus of identifying mutuality and potential measurement error allows for the use of comparing ordinary regression with instrumental variable estimation. Table 3.2 provides a summary of the variables, their measurement and *a priori* expectation.

[23] The measure should be focus on the income of the poor only.
[24] There should be a positive relationship between the income of the poor and the measure.
[25] Transfer of income among the poor should have a corresponding effect on the measure.

Table 3.2 - Description and *a priori* Expectation of Explanatory Variables

Variable	*Description*	*Measurement*	*A priori* Expectation
Financial Self-sufficiency	Provides MFIs' financial viability in the context of zero subsidies. Therefore MFIs can expand only through the institutions commercial-cost liabilities.	Adjusted Financial Revenue/ Adjusted (Financial Expense + Net Loan Loss Provision Expense + Operating Expense).	+/-
Operational Self-sufficiency	Provides MFIs' financial viability in the context of subsidies. Technically, it is the ratio of operating revenue over its expense. However, it is recommended that financial expense and loan loss provision expense should be included in this calculation as they are a normal and significant cost of operating. (CGAP, 2003).	Financial Revenue/ (Financial Expense + Net Loan Loss Provision Expense + Operating Expense).	-
Efficiency	Reflects an MFIs efficient use of resource in the context of its assets.	Adjusted Operating Expense/ Adjusted Average Gross Loan Portfolio.	-
Interest Rate (Nominal)	Normalized (duration and rolling over method) rate of interest without adjusting for inflation, opportunity and transaction cost.	Institutional level rate of interest.	+
Amount Borrowed	Amount of loan received from MFI	Amount of loan received from MFI.	+
Gross Outstanding Loan Portfolio	MFI's outstanding loans, including current, delinquent, and restructured loans, but not loans that have been written off. It does not include interest receivable. Regulated MFIs include the balance of interest accrued and Receivable	Gross Loan Portfolio, adjusted for standardized write-offs.	+/-
Lending Strategy	Loan delivery strategy	= 1 if client belongs to a group lending scheme.	-
Age of Programme	Years of microfinance administering respondents programme.	Completed years of microfinance administering respondents programme.	-
Number of Savings Account	All types of institutional based savings.	Number of functional savings account owned by respondent.	+
Own Programme	Ownership structure (funder) of microfinance programme	= 1 if client belongs to a programme solely financed by the MFI.	-
Vulnerability	Probability/risk of falling into poverty	= 1 if respondent made a distress in the last twelve months.	-
Age of Household Head	Age of household head	Age (completed years) of household head	+/-
Female-headed Household	Sex of household head	= 1 if respondent household head is female.	-
Repayment	Provides an indication of MFIs portfolio quality.	Actual paid back loans within expected timeframe over amount outstanding yet to be paid.	-
Rural Bank Client	Legal and operational type of MFI	= 1 if respondent is a client of a Rural Bank	-

The hypothesis of the study is addressed by regressing each vector of institutional and household factors on household poverty score (Equations 3.1a and 3.1b). Further to the main hypothesis we argue that use of MFIs' own funding targets less poor clients. This inclination is supported by some anecdotes that government and donor funding are eager to make a rapid dent on poverty and as such target very poor clients relative to financial resources mobilized by the institution. The model bundles government and donor funding on the grounds of both being external to the institution relative to own mobilized funding. This enables the generation of a dummy (own funds or otherwise) to estimate its effect on client targeting. This subsequently allows for building an interaction term (*own funds X Formal Ins.*) that extracts the effect of these variables on client targeting. The relevance of interacting dummies is to generate different slopes and intercept terms (Wooldridge, 2006). For instance by interacting, we are able to estimate the joint effect of Rural Banks (representing formal institutions) dispensing programmes funded by their own mobilized funds.

The respective true and estimated function and equation are specified in the form

$$Pov = f(Access\ and\ use\ of\ \ Financial\ Services, Household\ Characteristics, ...) \quad \text{- 3.1a}$$

$$Pov_i = \beta_0 + \beta_1 Ins'_{1i} + \beta_2 HH'_{2i} + \beta_3 (Own\ funds\ X\ \ Formal\ Ins)_{33} + U_i \quad \text{- 3.1b}$$

Where *i* denotes each observed household; Pov_i is the poverty index of the household; Ins and *HH* represent vector of institutional and household variables for each household respectively; *Own funds X Formal Ins* is the interaction between institutional type and source of fund for each household observed and *U* is the disturbance term.

The true functional relationship specified in 3.1a, which is estimated by Equation 3.1b, uses the vector of institutional factors (financial and operational self-sufficiency, repayment rate, efficiency and interest) to explain household access to and use of financial services. Using institutional self-sufficiency (operational and

financial) as a demand-side measure of access to and use of financial services signals a potential measurement error capable of instituting endogeneity. This assertion is dependent on the broad limitations of using cost (supply side) and income (demand side) as a measure of access to and use of financial services. Stiglitz and Weiss (1981) argue that other factors peculiar to the financial sector, such as information asymmetry obscure the use of cost and income to determine the relationship between access and use. Claessens (2006) further asserts that the potential disparity between access and use is dependent on the choice of financial indicator used. Depending on the type, range and quality of financial service, Claessens (2006) infers from Morduch (1999), four criteria (reliability, convenience, continuity and flexibility) for assessing household access to and use of financial services. Our use of operational and financial self-sufficiency at the outset fails to adequately measure access and use of financial services based on Claessens' (2006) framework. In spite of the definitions of reliability, convenience, continuity, and flexibility[26] being utopian, vague and non-quantifiable the choice of OSS and FSS fall short of demand-side arguments.

These reasons and a plausible bi-causal relationship make operational and financial self-sufficiency susceptible to measurement error as one of the routes for endogeneity. Morduch (1999) and Honohan (2005) both allude to such threats and advocate a comprehensive assessment of measurement error leading to endogeneity and displacement effects. Displacement effects in quite recent studies (Khandker 2005 and Imai and Arun, 2008) have witnessed the use of propensity score matching, treatment effects, randomised studies and Heckman-two-stage estimation to assess selection problems in microfinance impact studies. Although cognizant of this, germane to this study is endogeneity arising from measurement error.

Second Stage Estimations

Endogeneity emerging from measurement error in the case of the Classical error in Variable (CEV) is premised on the assumption of independence between the

[26] Flexibility means tailoring products to consumer needs, convenience refers to ease of access and reliability denotes availability at the time of need.

unobserved variable and error-in-variable. This accordingly engenders a correlation between the error term and observed variable. The direction and amount of inconsistency in OLS is a result of the covariance between the observed variable and measurement error (Hausman, 2001). The effect of the inconsistency is proven to drift close to zero based on the asymptotic properties of probability limits (Wooldridge, 2006). Wooldridge (2006) suggests that one possibility of obtaining an IV is to identify another measure of the unobserved term but on condition that the measurement error in the new term and that of the observed term are uncorrelated. The selection of an instrument is not limited to economic theory but considers practical issues, information from other sources (broader unit of analysis), adaptation from other empirical work and intuition (Angrist and Krueger, 2001; Larcker and Rusticus, 2008). Though the use of IV is quite nebulous, its use apparently is the most common way to overcome measurement error problems for linear models (Bascle, 2008). Bound et al. (2001) suggest that violating the independence between the unobserved variable and the measurement error which is the thrust of the CEV could be more damaging than OLS ignoring measurement error. However, in recent literature some tests, including Sarjan, Hansen and Hausman post-estimation techniques, have evolved to measure reliability or susceptibility to potential problems (Kennedy, 2008). In view of this, we correct for errors emerging plausibly from measuring both financial and operational self sufficiency using number of microfinance institutions in a region and lending mechanism (group/individual) as instrumental variables.

The equations below set out the specification of the instrumental variable equations;

$$Pov_i = \beta_0 + \beta_1 FSS_i + \beta_2 OSS_i + \beta_3 X_{1i} + ... + \beta_{2+n} X_{ni} + u_i \quad - \quad 3.2a$$

$$FSS_i = \pi_0 + \pi_1 Group_i + \pi_2 N0.MFI_i + \pi_3 X_{1i} + ... + \pi_{2+n} X_{ni} + \upsilon_i \quad - \quad 3.2b$$

$$OSS_i = \gamma_0 + \gamma_1 Group_i + \gamma_2 N0.MFI_i + \gamma_3 X_{1i} + ... + \gamma_{2+n} X_{ni} + \eta_i \quad - \quad 3.2c$$

$$Pov_i = \beta_0 + \beta_1 \hat{FSS}_i + \beta_2 \hat{OSS}_i + \beta_3 X_{1i} + ... + \beta_{2+n} X_{ni} + u_i \quad - \quad 3.2d$$

where equations 3.2b and 3.2c are the first stage (reduced form equations), 3.2a is the structural equation and 3.2d is the second stage. The instruments in each of the reduced form equations are represented by the coefficients γ and π. The set of other covariates in the model as per the original equation in 3.1b are represented by *X*. The empirical estimation uses a joint F-statistic test of the residuals on an OLS of the structural model to test for endogeneity.

The choice of instrument is informed by both theory and practice. As explained earlier, access and use of financial services is uncorrelated with the measurement error in financial and operational self-sufficiency. Also, from a practical perspective, measurement error in either lending mechanism or number of microfinance institutions in a region is uncorrelated with the error in measuring financial and operational self-sufficiency. We apply the Hausman and Hahn (2002) test to validate the choice of IV in addition to the intuitive argument alluded.

Potential selection bias is explored using Heckman two-stage estimation. This is possible with increased sample size to include non-clients and the identification of an exclusive variable explaining selection into a microfinance programme.

We therefore estimate an outcome equation as;

$$LS_i \mid x_i \; ; Cl_i = 1 = \alpha_1 Ins'_{1i} + \alpha_3 Ext_{3i} + \sigma_{12} \hat{\tau}_i (\hat{z}_{4i}' \gamma_4) + \eta_i \quad - \qquad 3.2e$$

where σ_{12} denotes the error term emerging from the two equations; $(\hat{z}_{4i}' \gamma_4)$ is the variable representing Inverse Mills Ratio(IMR) for each of the observed households computed from a participation equation; τ is the coefficient of the IMR and η_i is the normal stochastic term for an OLS. All other variables are consistent with their definitions in the earlier equations.

3.3 Results and Discussion

Descriptive Statistics

The socio-demographic data (Table 3.3) of clients and non-clients describes both general trends of household heads and more importantly the poverty description of client and non-client samples and key household features based on their discriminatory power. The pattern of the non-client sample for gender of household head, settlement, marital status and highest education of household heads was consistent with country-level demographics from other sources such as the Living Standard Measurement Survey (LSMS). For instance, consistent with the findings of Ghana Statistical Service (2007), female-headed household and rural settlement accounted for 23 percent and 62 percent respectively, compared to 24 percent and 63 percent in this study. Also consistent with the Ghana Statistical Service's findings (GSS) (2007) is the proportion of household heads engaged in the informal sector. Comparable figures of about 74 percent (current study) and 76 percent (GSS) represent the heads of household in the informal sector. Although in some cases, heads of household of the client sample followed the same pattern, this was not expected as the client sample was purposive to the focus of the research. However, settlement and occupation seemed to follow similar patterns of informal sector and male-headed household dominance. Settlement, on the contrary, showed a reversed pattern as clients of microfinance institutions were mainly peri-urban and urban, accounting for 54 percent of the sample. Comparing the current client and non-client datasets, it emerges that the heads of household of the client sample seem to have relatively higher levels of education and employment. For instance, there is a 5 percent difference in the unemployment rate in favour of the client sample. This finding provides an initial signal of the capability of household variables to influence the decision to participate in microfinance programmes.

The mean poverty score of (-0.001) for non-client households compared to 0.217 for clients (Table 3.3) evidenced higher poverty levels among non-clients than clients. The test of significance of the difference in the mean values was significant at one percent, signalling the relevance of the variation. As expected, the proportion of non-client households not having a savings account was almost twice that of the

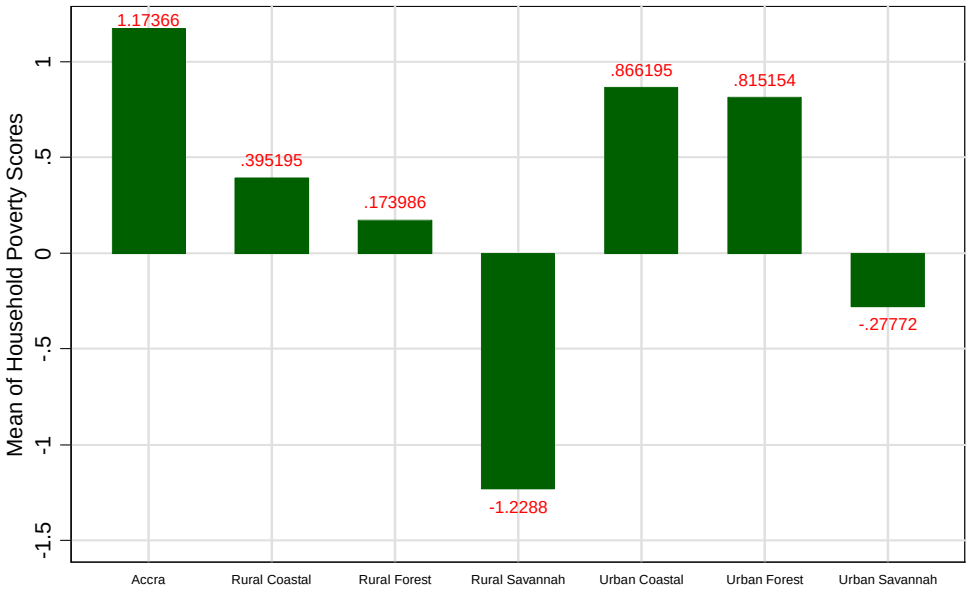
client sample. This can be related to the impetus placed on savings (normally forced) and other financial demands required prior to joining a microfinance scheme. Although the difference between proportions of households that owned land in each of the two samples was small, it is worth mentioning that the client sample evidenced a greater margin of 8 percent in favour of land ownership.

Table 3.3a - Demographic and Poverty Characteristics of Households

DEMOGRAPHIC/POVERTY ISSUES	HOUSEHOLDS - (N=2691)	
	CLIENT (1589)	NON-CLIENT(1102)
Gender of Household Head		
Female	25% - (N=391)	24% - (N=269)
Male	75% - (N=1198)	76% - (N=833)
Settlement		
Rural	46% - (N=734)	62% - (N=679)
Urban	54% - (N=852)	38% - (N=423)
Marital Status of Household Head		
Married	80% - (N=1274)	71% - (N=783)
Single	5% - (N=80)	8% - (N=86)
Divorced	8% - (N=123)	10% - (N=107)
Widowed	7% - (N=112)	11% - (N=126)
Highest Education of Household Head		
None	32% - (N=503)	34% - (N=375)
Primary	8% - (N=134)	10% - (N=112)
Junior Secondary School	37% - (N=580)	38% - (N=415)
Senior Secondary School	9% - (N=140)	8% - (N=87)
Vocational	5% - (N=79)	3% - (N=37)
Post Secondary/Vocational	10% - (N=153)	7% - (N=76)
Occupation of Household Head		
Unemployed	6% - (N=89)	11% - (N=123)
Informal	79% - (N=1258)	76% - (N=836)
Formal	15% - (N=242)	13% - (N=143)
Poverty Description		
Mean (SD)	0.217(0.025)	-0.001(0.030)
T-Test	-5.5437	
Highest	2.40	2.65
Lowest	-2.49	-3.05
Discriminatory Household Variables		
Number of Savings Account		
None	34% (N=538)	67% (N=746)
One	53% (N=845)	27% (N=303)
Two	10% (N=165)	4% (N=42)
Three	2% (N=30)	1% (N=8)
≥ Four	1% (N=11)	1% (N=3)
Land Ownership		
Yes	58% - (N=926)	51% - (N=563)
No	42% - (N=663)	49% - (N=569)
Ratio of Children Attending School		
Mean (SD)	0.681(0.011)	0.572(0.015)
T-Test	5.948	
Ratio of Sick Children		
Mean (SD)	0.122(0.006)	0.156(0.009)
T-Test	-2.958	

Benchmarking the distributional features of the dependent variable, poverty, with the country's LSMS is imperative for later inferential derivations and reliability of policy recommendations. For this reason, location and household socio-demographic characteristics were compared and regressed on poverty scores to establish degree of comparability and consistency in patterns and magnitude of effects. This validation at the outset of the estimation reposes initial confidence in the use of the dataset. Figure 1, below, shows household mean poverty score over geographical location and compares the findings with the 2005 LSMS. Household mean poverty for Accra (National Capital) and Rural Savannah are at the polar opposites, with the former depicting less poor households. Broadly comparing the rural and urban patterns, it emerges that poverty in Ghana remains a rural phenomenon as all the urban areas from the study show higher mean scores depicting less poverty relative to their rural counterparts. The GSS summary report of the 2005 LSMS reveals similar patterns as it shows that the incidence of poverty in Rural Savannah is 45 percent compared to 2.0 and 2.9 in the Urban Coastal and Urban Forest regions respectively. Another striking feature justifying consistency of the current dataset with LSMS is the higher incidence of poverty in the Urban Savannah than the Rural Coastal region.

Figure 3.1 - Mean of Household Poverty Score by Geographic Location



The bivariate validation of the reliability of the current data was augmented with a multivariate analysis that estimated partial association between location and other household variables such as literacy and gender of household heads on poverty. From Table 3.4 the bivariate analysis further supports the geographic patterns of poverty as all the three northern regions evidence an inverse relationship, significant at one percent. This literally, is interpreted as - being poor as a result of residing in any of the regions in North. In a similar interpretation, residing in Accra indicated lower household poverty score. The two other household characteristics revealed the expected results, as literate and female heads of household tend show evidence of less poverty. The latter has been a consistent finding in Ghana over the last three LSMS (GSS, 2007).

In addition to Table 3.3a, we present descriptive statistics of central tendencies for all variables and a correlation matrix (Tables 3.3B and 3.3C) to facilitate a better understanding of the estimations that follows in the next sub-section.

Table 3.3B Correlation Matrix

Variable	Poverty Score	Financial Self Sufficiency	Operational Self Sufficiency	Log of Gross Loan Portfolio	Interest Rate	Repayment Rate	Efficiency	Age of Programme	Source of Funds	Number of Savings Account
Poverty Score	1	-0.05	-0.51	0.22	0.12	0.04	0.2	-0.19	0.13	0.56
Group Lending	0	0	-0.53	0.31	-0.5	-0.05	-0.02	-0.29	-0.18	-0.05
Number of MFIS in a Region	0.62	0.14	-0.43	0.28	-0.13	-0.07	0.41	-0.21	0.4	0.39
Operational Self Sufficiency	-0.51	-0.18	1	-0.21	0.29	0.08	-0.26	-0.06	0.11	-0.37
Financial Self Sufficiency	-0.05	1	-0.18	0.16	-0.39	-0.5	0.67	0.17	0.16	0.07
Vulnerability	-0.32	-0.02	0.27	-0.13	0.01	0.01	-0.17	0.07	-0.11	-0.21
Formal Financial Institution	-0.26	0.82	0	0.01	-0.32	-0.47	0.54	0.01	0.12	-0.04
Age of Household Head	-0.25	0.15	0.09	-0.02	-0.08	-0.12	0.03	0.05	-0.07	-0.07
Log of Gross Loan Portfolio	0.22	0.16	-0.21	1	0.18	0.34	0.09	-0.12	0.22	0.14
Efficiency	0.2	0.67	-0.26	0.09	-0.23	-0.32	1	-0.23	0.26	0.13
Age of Programme	-0.19	0.17	-0.06	-0.12	0.11	-0.02	-0.23	1	0.26	-0.01
Household Size	-0.15	0.08	0.13	-0.07	-0.03	-0.13	-0.04	0.04	-0.04	0.03
Location	0.14	-0.03	-0.09	0.42	0.04	0	-0.1	0.03	0.09	0.05
Source of Funds	0.13	0.16	0.11	0.22	0.19	0.05	0.26	0.26	1	0.07
Interest Rate	0.12	-0.39	0.29	0.18	1	0.51	-0.23	0.11	0.19	0.13
Formal MFI*Source of Funds	-0.08	0.71	-0.07	0.07	-0.14	-0.32	0.62	0.06	0.45	0.05
Female Head Household	0.07	-0.02	-0.12	0	-0.03	0.03	0.04	-0.07	0	0
Repayment Rate	0.04	-0.5	0.08	0.34	0.51	1	-0.32	-0.02	0.05	0.03
Number of Savings Account	0.56	0.07	-0.37	0.14	0.13	0.03	0.13	-0.01	0.07	1
Ratio of Children Attending School	0.08	0.02	-0.01	-0.00	0.06	0.04	0.10	-0.05	0.10	0.10

Table 3.3c Summary Statistics

Variables	N	Mean	SD	MIN	MAX
Poverty Index	1589	0.217	1.002	-2.487	2.396
Financial Self Sufficiency	1589	98.629	25.13	41	133
Operational Self Sufficiency	1589	134.219	50.074	76	323
Log of Gross Loan Portfolio	1589	22.064	1.048	19.75	23.974
Interest Rate	1589	32.067	8.843	0	48
Repayment Rate	1589	77.018	23.838	19.35	100
Efficiency	1589	45.707	20.186	7	97
Age of Programme	1589	6.661	6.109	1	30
Source of Funds	1589	0.877	0.328	0	1
Number of Savings Accounts	1589	0.827	0.758	0	6
Female Headed Household	1589	0.246	0.431	0	1
Age of Household Head	1589	46.927	11.995	21	88
Rural Bank	1589	0.648	0.478	0	1
Location	1589	0.050	0.219	0	1
Vulnerability	1589	0.256	0.437	0	1
Household Size	1589	5.335	2.317	1	17
Group Lending	1589	0.82	0.384	0	1
Number of MFIs in a Region	1589	68.768	38.728	11	151
Ration of Children Attending School	1589	0.636	0.470	0	1

Multivariate Analysis

The estimation of a plausible mutuality between institutional sustainability and reaching the poorest, as specified in Equation 3.2b and informed by the true functional relationship of Equation 3.2a, is preceded by a correlation matrix of the variables with the aim of minimizing some potential rudimentary problems. The estimations also corrected for possible heteroskedasticity by applying robust standard errors. The initial estimation of poverty determinants as reported in the second column of Table 3.5 reveals contrasting results to institutional ability of simultaneously reaching poorer clients and being financially independent. Comparing the signs of the two main variables describing financial dependence (OSS and FSS) of a microfinance institution and its effect on targeting, the regression output shows that by ignoring the effect of subsidies (operational self-sufficiency), poorer clients are reached. However, assuming that all funds available to MFIs are sourced at commercial and competitive interest rate thereby discounting subsidies (financial self-sufficiency), institutions fail to reach poorer clients. The initial glimpse of the result's reliability of 'fit' and directional effect of these variables is strongly supported with an *R-squared* of 62 percent and a p-value of one percent for both OSS and FSS. Although the study reports robust standard error, and precedes the regression with a correlation matrix, post-estimation tests using STATA commands 'hettest and VIF' were explored to test potential violation of these OLS assumptions. However the coefficients associated with the explanatory variables are interpreted with much caution due to the concentration and characteristics of the poverty index.

Table 3.4 - Cross Section Regression Validating Household Poverty Scores
Dependent Variable – Household Poverty Score

Covariates		***Robust Coefficients***	***t-Value***
Upper West Region		-1.006***	-5.83
Upper East Region		-1.212***	-7.01
Northern Region		-0.913***	-5.27
Brong Ahafo Region		0.058	0.34
Ashanti Region		0.009	0.05
Eastern Region		-0.086	-0.51
Volta Region		-0.041	-0.24
Greater Accra Region		0.285**	1.67
Central Region		0.150	0.89
Western Region		0.023	0.13
Female-headed Household		0.135***	6.18
Literate Headed Household		1.120***	44.64
Number of observations	=	*2691*	
R-squared	=	*0.7515*	

****Significant at one percent & ** Significant at five percent*

The findings at the outset are consistent with Morduch's (2000) and Cull et al.'s (2006) scepticism of mutuality. The signs of the coefficients of FSS[27] and OSS indicate that the former constrains the targeting of poor clients while with the aid of external funds institutions are capable of targeting poor clients. The magnitudes of the coefficients are however incredibly small. In the case of OSS, a 10 percent increase causes a change in reaching poorer client's households by a marginal difference of 0.08 poverty score. Given that poverty score of client households range between -2.49 and 2.40 a drift from one poverty band to another on a quartile threshold will require at least a change in poverty by 1.0. Compared to a change in poverty score of 0.08 for a 10 percent increase in OSS post estimation concerns and theoretical concerns are imperative. Compared to the 'three plus one' possible outcomes of the theoretical and empirical relationship between sustainability and outreach, the current study concurs with the second and part of the third possible outcomes alluding to a trade-off.

[27] The degree of association between FSS and OSS is 0.18.

However, three variations can be identified with both the second and third clusters of outcomes suggesting a trade-off. Firstly, evidence on reaching poorer clients and operating profitably in a commercial and competitive environment (discounting the effects of subsidy) are mostly verified by individual client and/or single institutional performance scenario (Armendariz de Aghion and Morduch, 2005). Secondly, sample-based studies (Cull et al., 2006) have been masked with the use of financial practices (lending mechanism) and proxies in measuring sustainability and socio-economic characteristics of clients. Brau and Woller (2004), report the use of loan size/structure, repayment rate and efficiency as proxies for measuring profitability. Thirdly, studies such as Christen et al. (1995) and Park and Ren (2001) have demonstrated some results of mutuality based on merely univariate and bivariate analysis.

The current study overcomes these criticisms through the application of: (i) broader as well as phenomenon-specific indices, that is financial and operational self-sufficiency, in measuring institutional sustainability and a multidimensional poverty index in assessing the socio-economic characteristics of clients; (ii) encompassing financial indicators (interest rates, gross outstanding loan portfolio, repayment rate, efficiency, FSS and OSS) to investigate their concurrent partial effect in targeting clients; and (iii) post-estimation techniques to explore potential data and measurement problems from (i) and (ii). Specifically, measurement errors and sample selection bias that might lead to a misjudgement of actual directional and magnitude of interrelationships and causation between microfinance variables are explored.

Table 3.5 - Ordinary Least Squares and Instrumental Variable Regression Results

	OLS	IV	Test for Endogeneity OSS	Test for Endogeneity FSS	Hausman IV-OLS
Explanatory Variables	(1)	(2)	(3)	(4)	(5)
Financial Self Sufficiency	0.02	0.11	0.01	0.01	0.090
	[11.77]**	[11.06]**	[7.89]**	[6.93]**	
Operational Self Sufficiency	-0.01	-0.01	-0.01	-0.01	-0.003
	[-18.07]**	[-9.39]**	[-17.52]**	[-18.62]**	
Log of Gross Loan Portfolio	-0.08	-0.61	0.02	0.25	-0.528
	[-4.12]**	[-7.78]**	[1.33]	[10.62]**	
Interest Rate	0.03	0.06	0.02	-0.01	0.033
	[11.87]**	[10.67]**	[7.78]**	[-3.02]**	
Repayment Rate	-0.01	0.00	-0.01	-0.01	0.011
	[-6.50]**	[2.30]*	[-6.60]**	[-9.14]**	
Efficiency	-0.01	-0.06	-0.01	-0.00	-0.052
	[-4.96]**	[-9.98]**	[-3.79]**	[-0.30]	
Age of Programme	-0.07	-0.20	-0.03	-0.05	-0.128
	[-15.90]**	[-13.19]**	[-6.11]**	[-8.84]**	
Source of funds (Own or otherwise)	0.44	0.58	-0.82	0.41	0.136
	[6.69]**	[3.18]**	[-8.62]**	[4.19]**	
Number of Savings Accounts	0.37	0.13	0.36	0.30	- 0.241
	[14.92]**	[2.65]**	[17.22]**	[13.85]**	
Female Headed Household	-0.14	-0.32	-0.16	-0.19	-0.183
	[-3.71]**	[-4.53]**	[-4.87]**	[-5.72]**	
Age of Household Head	-0.01	-0.01	-0.01	-0.01	- 0.002
	[-7.34]**	[-5.26]**	[-8.03]**	[-6.83]**	
Type of institution (Formal)	-1.77	-5.52	-2.08	Dropped	-3.753
	[-14.84]**	[-13.10]**	[-17.38]**	Dropped	
Vulnerability	-0.14	-0.20	-0.15	-0.07	-0.057
	[-3.75]**	[-3.37]**	[-4.31]**	[-2.05]*	
Household Size	-0.01	-0.01	-0.02	-0.01	0.002
	[-1.73]+	[-0.85]	[-2.85]**	[-2.07]*	
Interaction (Own funds *Formal MFI)	0.61	2.27	1.41	0.10	1.660
	[5.80]**	[9.55]**	[13.08]**	[1.59]	
Predicted Operational Self Sufficiency	-	-	0.01	-	-
	-	-	[13.27]**	-	-
Predicted Financial Self Sufficiency	-	-	-	-0.03	-
	-	-	-	[-10.94]**	-
Group	-	-	Dropped	-1.44	-
	-	-	Dropped	[-17.24]**	-
Number of MFIs in a Region	-	-	0.01	0.00	-
	-	-	[15.05]**	[3.05]**	-
Constant	2.07	8.26	-0.33	0.36	-
	[5.85]**	[6.40]**	[-0.91]	[0.95]	-
N	1589	1589	1589	1589	-
Adj. R^2	0.658	0.110	0.713	0.713	-
F – Statistic	258.73	147.56	286.84	286.84	-
Log-likelihood	-1397.61	-	-1256.29	-1256.29	-
Hausman Test	-	80.91(0.00)	-	-	-
Robust score chi2(2)	-	35.76 (0.00)	-	-	-
Robust regression F(2,1563)	-	18.63 (0.00)	-	-	-

**** Significant at one percent; ** Significant at five percent - Coefficients & Robust Standard Errors*

The second column of Table 3.5 shows evidence of all exogenous variables being significant at one percent, but family size, which is significant at five percent. Clients receiving financial services from institutions that are efficient, with a high repayment rate and possessing a huge gross outstanding loan portfolio, fall within lower socio-economic categories. Like OSS and FSS, the coefficients associated with these indicators are quite negligible given the poverty score of households. For instance, a 10 percent increase in gross outstanding loan portfolio impacts on reaching a household with a lower poverty score by 0.0079. Worth recognizing, however, is the effect of interest rate in reaching clients. Unlike other financial indicators, interest rate like FSS posits a positive causation with household poverty. The estimated coefficient indicates that a 1percent increase in interest rate causes institutions to reach less poor households by 0.028 poverty score. Although also marginal, that is comparing its magnitude, moving a household from one poverty quartile to another seems to have a relatively higher effect than other financial performance indicators.

Institutional character based on regulation and source of funds both had a significant and hefty impact on household poverty scores. Characterization based on regulation and licensing (formal) showed an effect of reaching extremely poor clients by 1.765 in the case of a formal MFI. On the other hand, categorizing institutions based on source of funds showed that institutional funding reached less poor clients. Both observations were consistent with *a priori* expectations; as in the case of the latter, the general expectation is that institutions tend to be much more circumspect in dispensing their own mobilized funds relative to government and donor funding. Comparing this finding to the argument underpinning the two main variables of interest (OSS and FSS), some common ground can be identified. Comparing own funds with formal institutions, it is observed that clients fall in the relatively non-poor category. The coefficient for the interaction term posits that formal institutions dispensing their own funds target less poor clients by 0.612, relative to other combinations between categorization of institutions based on regulation and source of funds. It is, however, not surprising to see huge effects associated with the

characteristics (type) of institutions as the sample is constrained to microfinance institutions. This raises the possibility of sample selection endemic in the estimation. Comparatively, direct household variables showed less impact (magnitude) on household poverty scores. The number of savings accounts held by a household appeared to have a 0.37 increase in household poverty level.

The potential problems of measurement error and sample selection bias and slight empirical indication of a violation of the normality assumption suggest the test for endogeneity and sample selection bias. The third and fourth columns of Table 3.5 identify lending mechanism and number of MFIs in a region as an instrument to test for endogeneity. As alluded to earlier, both variables are theoretically expected to deepen competition which is argued not to be directly related to access and use of financial services (unobserved variable), but is related to institutional sufficiency as measured by OSS and FSS. Both regressions in columns three and four are preceded by first stage regressions (reduced form) that regresses two separate models using OSS and FSS. In each of these the predicted values are estimated and plugged back into the structural equation together with the identified instruments. In both instances, predicted financial self-sufficiency and operational self-sufficiency exhibit significant values of one percent, which rejects the null hypothesis of exogeneity. These results make it imperative to run an instrumental variable equation in the fourth column to identify the two main variables of interest with lending mechanism and number of MFIs in a region. Although in the case of multiple covariates attenuation bias is quite complicated and, more importantly, cannot be the only attribute for smaller/bias coefficients in OLS, measurement error remains a possibility. A comparison of columns 1 and 4 shows consistent directional effect for all the covariates but notable increases in the coefficients of the IV as evidenced in column 5 of the Hausman Test. The Hausman chi-square test, as reported in the last but one row, shows significant differences between the OLS and IV estimates.

Table 3.6 - Ordinary Least Squares and Heckman Regression Results

	Dependent Variable – Poverty Score Coefficients & z and t-Values		
Covariates	**OLS [Robust] (1)**	**Participation Equation (2)**	**Outcome Equation (3)**
Operational Self Sufficiency	-0.010 (-20.26) ***	-0.135 (-7.04)***	-0.010 (-23.47)***
Predicted Financial Self Sufficiency	0.099 (20.29) ***	1.445 (7.17)***	0.102 (20.84)***
Age of Pr.	-0.175 (-24.10)***	-3.745 (-7.30)***	-0.180 (-24.51)***
Rural bank	-5.128 (-22.57)***	-49.191 (0.000)	-5.176 (-22.53) ***
Efficiency	-0.053 (-18.24)***	-2.001 (-7.38)***	-0.055 (-18.20) ***
Own Programme	0.505 (7.29)***	-37.731 (-4.64)***	-0.494 (-6.53) ***
Interest Rate	0.051 (19.21)***	-2.612 (-7.00)***	0.053 (19.93)***
Own Prog. X Type of Institution	2.090 (15.98)***	131.039 (0.000)	2.168 (15.70) ***
Repayment	0.002 (2.14)***	1.038 (7.32)***	0.003 (3.05) ***
Log of Gross L. Portfolio	-0.489 (-14.62)***	-10.711 (-7.25)	-0.523 (15.20)***
Location	-0.309 (-4.52)***	-2.531 (-4.77)	0.0296 (3.69) ***
No. of Savings Acct.	0.276 (12.21)***	0.954 (6.23)	0.275 (12.73)***
Vulnerable	-0.174 (-4.98)***	-1.897 (-6.41)***	-0.185 (-5.52)***
Household Size	-0.023 (-3.15)***	-0.095 (-2.46)**	-0.016 (-2.44)**
Female headed Household	-0.283 (-8.03)***	-0.969 (-3.86)***	-0.287 (-8.38)***
Ratio of Children. Att. School	0.085 (2.48)**	0.525 (2.75)***	-
Constant	6.44 (13.03)***	220.701 (7.07)***	7.013 (13.61)***
R-Squared and No. of Obs.	(0.71) 1589	1102 + 1589 = 2691	1589
Rho	-	Z = 4.46	0.000
Wald Chi Square Test	-	-	15.20(0.000)

**** Significant at one percent; ** Significant at five percent*

The evidence emerging from Table 3.6, points to selection bias using ratio of sick children as the exclusion variable between the participation and outcome equations. However, we are hesitant in interpreting coefficients of the Heckman two-stage

estimation as the regression results with predicted financial self sufficiency (column 1 of Table 3.6) offer consistent estimates.

3.4 Conclusion

In this chapter, the research revisits the traditional argument of mutuality or trade-off between microfinance institutional self-sufficiency and reaching poorer clients. Its contribution to the discourse is mainly empirical, emerging from sampling, indicator measurement and estimation procedures. The main finding of the study upholds the sceptic's view of a trade-off and reveals the effect of source of funds and other institutional characteristics in targeting poor clients. The quantitative exposition clearly shows institutional inability to mutually operate competitively and reach poorer clients. It offers insights into the variation between the effect of formal microfinance institution and source of funds in targeting poorer clients. The interaction between own funds mobilized and formal institutions emerged as significant in reaching less poor clients. This research contributes to the microfinance literature in this area by categorizing institutional type from the perspective of sources of funds, that is (i) institutional own mobilized funds through owners' equity, commercial lending or deposits; (ii) government subsidized credit; and (iii) donor grant or subsidized credit. Also striking is the relative significance of all institutional factors including performance, delivery strategies and characteristics. This suggests the relative/unmatched influence of supply-side factors in client targeting.

The research also posits plausible data problems leading to endogeneity and sample selection bias. Similar to existing methodological literature on impact studies that extend the analysis to investigate data and estimation constraints, this chapter offers revealing potential problems likely to characterize the measurement of financial indicators. The likelihood of attenuation bias emerging from measurement error of FSS and OSS and plausible sample selection bias is evidenced in this study. The use of lending mechanism (group or individual) and number of microfinance institutions as instruments reveals the implicit endogeneity characterizing the use of FSS and

OSS. Also, the use of a detailed poverty measure (multiple indicator approach) offers a more accurate perspective of well-being in contrast to income and average loan size as a proportion of GNP.

The theoretical relevance is consistent with the current thinking on the linkages between institutions, growth and poverty. Departing from state and/or market oriented development paradigms to a hybrid between these has imperatively raised a number of questions on the capability, economic efficiency and sustainability of institutions. Among the main criticisms is the lack of a clear path of transmission mechanism between institutions and development, due to the varied modes of evolution and operation. Heterogeneity of microfinance institutions due to varied prompts of evolution and existence confirms the major theoretical criticism of Institutional Economics. The connection between institutions, growth and poverty models remains vague due to the inability of institutions to clearly specify guidelines for achieving desired objectives. Among the numerous factors that prompt the evolution of microfinance institutions are source of funds, government policy and individual, community and development partner initiative. Characterizing the type of microfinance based on any of the possible institutional evolution prompters culminates in varied level of the relative importance attached to the dual objective. Unlike other traditional institutions that are predominantly profit oriented, the dual objective of microfinance provides a fertile ground for the 'Jack-of-all-trades, master-of-none' syndrome. It appears that, with the qualitative information of the mission and attaching scores to the relative importance for each of the two objectives, institutions seemed fairly unsure of their inclination.

Although the intuition underpinning impact studies is upheld, other equally important primary and intermediate goals such as targeting, source of funding and financial self-sufficiency might be compromised under the assumption that all institutions are geared toward poverty reduction. Research into the process for achieving poverty impact has the potential for unraveling institutional orientation and differences to inform policy on relative market niches. This research shares the

philosophy of deepening the search for local sources of funds exclusive of government direct sourcing such as linking capable deposit taking institutions with informal microfinance institution.

CHAPTER FOUR

SENSITIVITY OF LOAN SIZE TO LENDING RATES: EVIDENCE FROM GHANA'S MICROFINANCE SECTOR

4.0 Introduction

One of the most provocative questions in the microfinance sector is related to its relatively high interest rates. Despite the commendation of MFIs intervention of mitigating wide interest rate variation (of about 50 percent between formal financial institutions and moneylenders), (Armendariz de Aghion, and Morduch, 2005), spatial differences within the sector nonetheless continue to incite concerns. Rosenberg et al. (2009) estimate an average interest rate yield of 30 percent and basing their argument on some benchmarking analyses, conclude that microfinance lending rates are not usurious. However, country specific high interest rates of 80 percent per annum evidenced in Mexico and South Africa has engendered enormous concerns. Among these concerns is the perceived adverse effect of high interest rate on average returns from economic activity and sustainability of clients in a microfinance scheme. In a related argument, Paranjape (2008) questions the interest rate rigidity of microfinance institutions in an era of low and changing lending rates. This chapter proposes an approach to determining levels of lending rates based on an assessment of clients' loan size sensitivity to interest rate changes. We argue that the client's socio-economic status linearly combines with interest rates to determine loan amount. This chapter's focus on how differences in clients' poverty levels affect the expected relationship between loan size responsiveness and interest rate changes is broadly motivated by the discourse on what works for the poorest (Lawson et al. 2010)[28].

[28] In particular, Lawson et al. (2010) offer insights into the potential limitations of individual interventions such as microfinance in reaching the chronically poor.

The drift from subsidized credit to commercial borrowing, led by the famous Mckinnion and Shaw hypothesis[29], ignites an assessment of the responsiveness of poor borrowers. While repayment rates in the microfinance sector provide an indication of the poor's response to changes in interest rates, we call for an investigation into the impact of subsidy removal via average returns on economic activity. This offers a more accurate understanding of the poor's coping strategy as repayment can either be influenced by the adverse consequences of default or financed from other sources including clients multiple affiliation with several microfinance institutions. In view of data constraints on returns from economic activity, we use borrowers' socio-economic status as a proxy variable and argue that the relationship between interest rate and amount of loan take-up is moderated by client's well being. This chapter hypothesizes that those clients at the margins of socio-economic spectrum are increasingly sensitive when compared to the majority in the middle band. This is partially premised on the positive externality of group mechanism in minimizing information asymmetry amongst the extreme poor. The policy thrust of the chapter is to explore the much-advocated need for market segmentation in microfinance with greater emphasis on clients' socio-economic status.

The pricing of loans, much like any other financial institution, theoretically depends on the cost of funds for on-lending, the transaction cost[30], the investment income and the mark-up. However, there are two issues that are unique to the pricing of loans in microfinance. The first of these is the attempt to disentangle the role of subsidies that are very much present in microfinance operations. Microfinance practitioners who are aware of the effect of subsidies either discount subsidies at the outset or mitigate their effect through an exit approach over time. Neither of these approaches is a familiar practice in traditional banking and there is ample evidence of its adverse

[29] The fundamental tenet of the Mckinnon and Shaw hypothesis asserts that thorough liberalization of financial markets overcomes repression arising from interventions such as provision of cheap external finance and imposition of tariffs. Mckinnon (1973, pp. 15) assert that "artificially low-cost loans or subsidized credit programmes may be both unnecessary and unwise" (Mckinnon, 1973; pp. 15)

[30] The term transaction cost in this context refers to cost incurred by the financial institution in processing loans.

consequences on the microfinance market (Morduch, 1999). Secondly, microfinance markets contend with high, volatile and differential transaction cost of the poor and operations. While volatile and high costs can be associated with the characteristics of the poor, differences in transaction costs emerge as a result of variations in operational strategies. The informal operations of microfinance have partially contributed to the occurrence of the latter. The strategies accounting for variations in transaction cost include: group[31] vs. individual loans, voluntary and compulsory savings, technological intensity (electronic service devices and mobile phone), branchless (mobile) banking and product mix. These factors, unique to microfinance, place strain on the applicability of mainstream theoretical argument on interest rate and borrowing.

Central to Stiglitz and Weiss' (1981) argument on demand for credit is the thesis that rationing and outcomes are issues of information asymmetry, interest rate and collateral. The two outcomes of their work - attracting risky borrowers (adverse selection) and rationing -stumble in the case of microfinance clients. Three reasons can be identified for this: First, microfinance clients' economic activities are mostly homogenous and the poor in general are risk averse. Secondly, assuming that the notion of client insensitivity is upheld, the theoretical relationship between interest rate and adverse selection is no more valid. Thirdly, non-use of financial and physical asset-based collateral limits the options of microfinance lenders when it comes to enforcing rationing.

The implausible connection between credit market theory and microfinance practice has led to a mixed range of policies in attempt to offer alternatives in gauging interest rates in different economies. This includes interest rate caps, market segmentation based on economic activity, government direct involvement in retail financing and other examples. Most of these interventions in the past decade have either failed or remain at the experimental phase. The dilemma of the nature of the

[31] This is premised on the use of social collateral for screening, monitoring and enforcement of repayment in contrast to asset-based collateral

relationship and gradient between interest rate and loan size still ultimately remains unresolved. The obvious way forward is to revisit the validity of the assumptions characterizing the poor's perceived insensitivity to interest rate charges. This motivation has inspired some empirical research on the subject matter in recent years. Among these include; Dymski, (2003); Dehejia et al., (2005); Karlan et al., (2007); Briones, 2007 and Karlan and Zinman, (2008). An emerging consensus from these studies points to a demystification of the notion of client insensitivity. Very commendable, most of these studies are characterized by rigorous econometric approaches. Econometric tools such as randomized experiments, fixed and random effects, instrumental variable estimation and heckman two-stage estimation are used to resolve potential problems caused by unobserved heterogeneity (more broadly, endogeneity) and sample selection. However, conspicuously missing is any consideration for the socio-economic characteristics of the client and the variation in sensitivity across different categories of poor borrowers.

In this chapter, we use quantile approach to observe potential skewness (outliers) of loan amount, effect of loan amount at varied thresholds and to partially justify the application of interaction procedure in least squares to estimate the poor's sensitivity to loan price. Empirical analysis relies on data from Ghana which consists of a sample of both clients and non-clients. We further explore the robustness of our estimates by addressing potential problems of endogeneity and sample selection using traditional second stage methods of instrumental variable and heckman estimations. The distinguishing contribution of our argument is that we advocate the use of the entire sample to verify the poor's sensitivity, rather than using sub-samples, as is the case in some of the recent papers cited above. The estimation procedure is done as follows: in the first stage we estimate a quantile regression of a basic loan size equation at different percentiles to assess variations in responsiveness for all covariates especially interest rate; the second stage employs the interaction procedure for household poverty scores and lending rates at varied statistic to identify differences in clients' responsiveness; finally we compare our results with

sub-sample approach, test and correct for problems of endogeneity and sample selection.

In contrast to least squares estimation showing a less than unitary downward change in loan size for a small change in interest rate, we observe a pronounced gentle downward slope between the 20th and 40th quantiles. Coupled with this observation are the respective positive and relatively flat curves at the tails and between the 40th and 65th quantiles. Karlan and Zinman's (2008) inclination of the potential effect of poorer clients on the relationship between interest rate and loan size is empirically verified with a multiplicative interactive procedure. Subsequently, we show that the semi-elasticity of loan amount responsiveness to a unit change in interest rate is more than proportionate (≈ 1.96 percent) and significant with a statistic explaining the distribution of the poorest 20 percent. In sharp contrast, the coefficient of interest rate using the 50th percentile is price inelastic and insignificant.

The next section of the study discusses the theoretical debates and recent empirical findings on the determinants and levels of interest rate and client sensitivity. It draws on some of the main issues indebted to interest rate fixing and relates those to arguments for and against a market-driven competitive microfinance industry. Macro level factors such as prime rate and general macroeconomic environment are perceived as exogenous to the focus of this chapter and therefore are not discussed. This section will be followed by a brief description of the microfinance industry in Ghana. Sections four and five discuss the methods of study and results respectively. The final section concludes and identifies two core policy issues emerging from the discussion and analysis.

4.1 Debates

The analysis of Mckinnon and Shaw's hypothesis sets the tone for financial sector deregulation in most countries. Since then, interest rate determination in formal financial institutions has experienced a transition from various forms of direct regulation to a system deregulation. The latter permits the market through the

demand and supply of loans to determine rates. The principal justification for the turnaround is the plausibility of financial repression in a regulated regime. Black et al. (1997) posits that denying financial service providers the opportunity to charge interest rates at the market equilibrium leads to spiral shortages, as potential lenders are sidelined due to government direct involvement in retail financing. Thus, regulating interest rates through diverse means such as caps, high bank reserve and liquidity ratio requirements discourage innovation and diversification of loan products.

Although this viewpoint is usually accepted, Levine et al. (2000) identify broad financial functional roles of the state[32] to mitigate some lapses that emerge as a result of market determination of interest rate. Credit markets interest rate determination through the economic forces of demand and supply of loans causes rationing as a result of imperfect information (Stiglitz and Weiss, 1981). Stiglitz and Weiss (1981) argue from the perspective of a pool of borrowers that react to interest rate and collateral set by banks. Riskiness of projects and attitude of borrowers constrains banks to continuously increase interest rates and collateral requirements even in the case of excess demand for loan. The obvious consequences of adverse selection and moral hazard stare in the face of banks. Overtime banks have developed other mechanisms to mitigate these potential problems. For instance, during all three[33] principal phases of a loan life non-asset based strategies[34] are employed to minimize loan default, fungibility and to stimulate and redirect investment to prioritized sectors of an economy.

This backdrop of information on the state of play in traditional banking systems shows that there remains an open question of whether or not this theory and practice is applicable to the microfinance market. The starting point for any discussion is to acknowledge that the market for microfinance is a residual of the traditional banking

[32] This includes legal frameworks for contract enforcement and broad accounting and reporting standards.
[33] Screening, Monitoring and Enforcement.
[34] Among the non-asset based strategies include credit history, submission and assessment of business plans and their viability and other demographic and communal records.

market. The philosophy underpinning the emergence of microfinance was to serve the neglected market niche of the traditional banking system. This market niche is hard to define and in practice has been given different names. These include the 'unbankable', poor, brave poor, economically active poor and others. A plausible reason for the different labelling is the on-going identification of a group of clients capable of responding favourably to banking needs and services. Operational strategies of making loans to the poor adds to the difficulty of finding an 'ideal' group of clients that hitherto had been neglected by traditional banks but viewed as 'bankable' clients in microfinance. Practices such as group lending, joint liability, receipt of subsidies, grants and government direct intervention, small and frequent loan repayments, forced savings, maintenance of a minimum balance of savings throughout the loan life and incorporating other non-financial services complicates the adaptation of banking theory to suit microfinance. These issues directly or indirectly affect the core factors of determining interest rate (cost of funds for on-lending, loan loss, transaction cost and mark-up). We discuss briefly in the following sub-sections issues mainly surrounding transaction cost as it is the main perceived driver of interest rate.

Efficiency and Interest Rate

Proponents of microfinance paradigm argue strongly in favour of the capability of the method to drive down interest rate by achieving efficiency via economies of scale. While this notion is consistent with basic economic literature, Rosenberg et al. (2009) asserts that this is plausible only after reaching a clientele base of 2000 active borrowers. In their viewpoint, economies of scale cannot do much to offset the added expense emerging from the dispensation of small loans and frequent servicing. Added to this, other factors such as competition, lower transaction costs and subsidies are indispensable in trying to achieve efficiency. Porteous (2006) rely on the market development continuum framework[35] to assess price competition

[35] The market development continuum framework identifies four stages of development. Stages one and two describe the pioneering and take-off phases which is supply driven in terms of price determination. While stages three and four asserts the consolidation and maturity phases which offers

within the microfinance industry in three countries (Bolivia, Bangladesh and Uganda). An intriguing finding of Porteous' assessment is the possibility that microfinance markets can delay unduly price competition as observed in the Bangladeshi microfinance market. In contrast, the Bolivian microfinance market drove down interest rates through price competition at a very early stage of their market development, while the Ugandan market was observed to be entering the consolidation phase.

The aforementioned observations offer a significant number of caveats that worth considering in ascertaining the plausibility of driving down interest rates through competition, lower transaction cost, subsidy, efficiency and scale. We assert in this chapter that the success of these supply-side factors depends on the socio-economic characteristics of clients. Thus, average return on economic activity is an important determinant of the client's influence on the relationship between interest rate and loan take-up.

Transaction Cost

The pricing of microfinance services, like any other good or service, is a function of transaction cost[36]. Transaction cost in the delivery of financial services has three basic components; the cost of funds for on-lending, the cost of risk (loan loss) and the administrative cost (processing loan applications, educating or training of clients and monitoring for loan repayment)[37]. The above makes it imperative to reach the conclusion that absolute transaction cost per head of the poor is more expensive than a client of a formal financial institution. Received wisdom has long held that lending to poor households is not worthwhile due to high costs, great risks, low saving propensities and too few households capable of putting up collateral (Morduch, 1999). The likely consequences of these adverse characteristics have been dealt with

price competition and other lower cost driving factors such as efficiency and technological innovation. This stage is primarily driven by consumers (demand).

[36] Here transaction cost is used in a broader context.

[37] It is important to underscore the need non-quantifiable component of transactional cost normally emerging from the perspective of the borrower. This includes waiting time with or at bank premises, transportation cost and cost of delay in receiving loans.

through alternative mechanisms such as group lending and joint liability, forced savings and small and regular loans and repayment. These mechanisms seem to prove that microfinance can be sustainable. In spite of the ingenuity of delegated screening, monitoring and enforcement, transaction costs are high and it is used as the main argument for charging high interest rates.

In addition to the characteristics of poor clients (risky and remote settlement) contributing to high transaction cost, delivery strategies such as; small amounts of loans, and forced savings, and the provision of non-financial services have further increased cost of accessing financial service. For instance, Rosenberg et al. (2009) asserts that the effect of compulsory savings increases the effective cost of the loan to the borrower. In microfinance, cost components of animating groups, purchase of forms, implications of 'forced-savings' and frequent repayment rate constitutes the difference between real and effective interest rate. The precise magnitude of the difference is unknown but anecdotal evidence points to a gap of more than 100 percent. Less obvious, but added to this cost component is time spent and opportunity cost in servicing the loan. In the case of poor clients this is high due to the inclusion of non-financial services because loan beneficiaries spend more time with bank staff. Finally, non-use of high technological devices such as computerized operations increases the cost per unit.

Subsidies

Poverty reduction through subsidized credit was the centrepiece of the development strategies of many countries from the early 1950s through to the 1980s. Available evidence suggests that the strategy failed for a number of reasons. This includes low loan repayment rates which dropped to below 50 percent in some cases, increased costs to donor and worsening government fiscal deficit and diversion of credit from intended recipients to political favourites (Adams, Graham and Von Pischke, 1984). The justification for its re-emergence is the balance between social and economic objectives of microfinance. For instance, the Income Generation for Vulnerable Group Development (IGVGD), run by the Bangladesh Rural Advancement

Committee (BRAC), targets the destitute and as such has a strong inclination for its social mission. The compelling advocacy of financial systems approach provides a counterargument on the impact of subsidies.

The strategy, abandoned some years ago, has re-emerged in microfinance with further questions on the extent, nature and time of subsidy utilization as opposed to the either/or argument of subsidy. The current debate departs from the extremes and asserts the need on some form of subsidy, packaged in an 'ideal' manner and delivered to the 'right' beneficiary at the 'right' time. Open fields will always remain in an attempt to provide responses to these questions. For instance, amount and time of subsidy depends on peculiar characteristics of both institutions and its clients and the extent of competition and/or influence of the immediate environment. Armendariz de Aghion and Morduch, (2005) posit that the amount of subsidy depends on factors including sensitivity of credit demand to interest rates, adjustment time between increases in income and well-being, returns to investment by poorer households and negative externality of subsidized credit programmes to other lenders.

The debate is further stretched to the use of the subsidy. For instance, directing subsidies to institutional strengthening (implying that clients at the outset will pay full recovery rates) such as instituting credit bureaus that smoothens the delivery of financial services will only have a long term and broader impact. From a more pragmatic perspective, some institutions have rolled out client sourcing of subsidies over time and product. This allows institutions to offer some non-financial services such as food aid, health and education at subsidized rates and either later or concurrently roll-out commercial lending rate schemes. Though applauded for its integrated and collaborative approach the IGVGD programme of BRAC experienced a massive drop-out with clients who benefited from this intervention. Also closely related to this type of intervention is the emergence of cross-subsidy that segments the markets and discriminates in the pricing of loan. Segmentation has principally depended on the economic activity, repeated loans, and repayment and sometimes

the perceived average returns of the economic activity. These have been conceived from a theoretical perspective but most microfinance institutions grapple with its practical implementation. The main problem is attributable to lack of a thorough understanding of client responsiveness to pricing of loan.

Non-sensitivity of Interest rate

Theoretically positing a perfect inelastic demand for credit will lead to market failure, at least in the frame of neo-classical economics. Paradoxically, in the microfinance setting this stand-point has dominated for more than two decades. The perception that microfinance is designed for the poor who live on the fringes of survival partially justifies the non-responsive to loan amount. That is, due to the dire need for money to survive and other market constraints such as non-competitive market environment and information asymmetry, the cost of borrowing does not inform the decision to access a loan. Morduch, (2000) prioritizes this view point for the 'win-win' rhetoric. The perception that raising costs of financial service does not diminish demand triggers off a fertile ground for possible consumer abuse. The likely consequence of this in a market-determined system is shifting the total transaction cost, in addition to its inefficiency, onto the client. The existence of information asymmetry in the market as a result of non-disclosure of loan costs and entire portfolio by micro lenders also limits the options for the borrower.

Generally, ability to repay has been used as the benchmark for the success of microfinance programmes. What is not discussed are the strategies used for repayment and whether these translate positively into increased consumption and income and ultimately, into general well-being. Anecdotal evidence points to a situation where at the time of repayment, some household assets are sold out of distress. The adverse effect of this phenomenon is the creation of a vicious cycle of poverty. Karlan and Zinman (2008) assert that clients scout around and borrow from other sources to repay loans.

Recent empirical studies on client sensitivity (Dehejia et al, 2005, Briones, (2007)

and Karlan and Zinman, 2008) offer a contrasting outcome to the perceived borrowers insensitivity to changes in interest rate. The most recent study, Karlan and Zinman (2008) use randomized experiment to show that loan size is sensitive at the extensive margin of interest rate changes. This is observed in a hypothetical case of a 100 percent increase in monthly interest rate. However, they observe that loan maturity is more responsive of loan size than interest rate changes. In line with our main hypothesis, Karlan and Zinman (2008) estimate the effects of targeting females and low income category of clients on a reduced. They observe that these groups show much stronger effects of loan size sensitivity to interest changes.

The emerging consensus from recent studies is the sensitivity of microfinance clients. Dehejia et al. (2005) and Karlan and Zinman (2008) categorically show that the poor has a much stronger sensitivity. A unifying characteristic of these recent empirical studies is that their hypothesis is tested on a reduced sample. Though robustness is implied in most of the estimation techniques of the previous studies, compromising reliability as a result of using a reduced sample is inevitable. We are motivated by this to explore the same hypothesis using an alternative empirical method. Instead of estimating the effect of the poor's influence on a reduced sample we integrate poverty characteristics as a variable into the basic model. Quantile regression and interaction procedure in a least squares regression set-up are used to investigate the extent to which average returns (proxied by poverty status) moderates the relationship between loan size take-up and interest rate. Also, as demonstrated by Porteous (2006), the need for a country specific study that explores institutional differences based on character type and source of funds is imperative.

4.2 Microfinance Industry in Ghana

In Ghana, the practice of sourcing funds from non-formal financial institutions dates back to 1955, when the Canadian Catholic Missionaries established the first credit union in Northern Ghana. The concept was expanded at the beginning of the 1970s with the establishment of the first rural bank at Nyakrom. Since the activities of such institutions were not considered as part of mainstream financial sector, their

contribution to financial deepening was neither documented nor recognized until the latter part of the 1990s, when issues of poverty reduction became part of developmental agenda. The shift from growth-led strategies to poverty reduction strategies provided an avenue for pro-poor policies and programmes. Recognizing access to credit as a major constraint to the promotion of pro-poor activities, a number of institutions (governmental and non-governmental) emerged to provide financial services to the poor.

In 1996, a number of groups involved in implementing micro-financing projects came together to form the Micro Finance Action Research Network (MFARN). The aim of the network was to play an active role in policy discussion, formulation and implementation of programmes related to micro financing across the country. In 1998, the group changed its name to the Ghana Micro-finance Institutions Network (GHAMFIN). Among its objectives are: to strengthen the capacity of MFIs through training; to sensitize government and stakeholders; to contribute to the creation of employment opportunities; and provision of support and empowerment to the poor and excluded.

At governmental level a number of ministries, departments and agencies (MDA) have established desks or units for microfinance activities. Among the MDA with microfinance programmes are Ministry of Finance and Economic Planning, Office of the Senior Minister, Ministry for Women and Children Affairs, Bank of Ghana, Ministry of Local Government, Rural Development and Environment. In order to co-ordinate and streamline activities of the industry, a central body, known as the Microfinance and Small Loans Centre (MASLOC) was established in 2006. Its mandate is to co-ordinate all microfinance activities in the country especially government programmes and complement the activities of other microfinance apex bodies.

The number of microfinance implementing institutions cuts across both formal and informal organizations. Five broad categories of institutions provide financial and

technical services in the industry. These institutions are Rural and Community Banks (RCBS), Savings and Loans Companies (S & Ls), Financial Non-governmental Organizations (FNGOs), Credit Unions and Susu Collectors Association of Ghana. All these institutions have created their apex bodies and are spread in all the 10 regions of the country.

In addition, some formal banks and insurance companies have either linked up with existing microfinance institutions or created a microfinance department. The heightened interest and concerns of microfinance activities in Ghana drives the exploration of complementary services and signals the need for market growth towards competition. Stakeholders' sustained interest and concerns are partly explained by the perceived availability of effective demand for financial services.

4.3 Methods of Study

Data Sources

Data for the study is based on a survey of client and non-client households in Ghana[38]. For the survey, the country was divided into a northern zone, consisting of the Upper West, Upper East and Northern Regions, a middle zone made up of the Brong Ahafo, Ashanti and Eastern Regions and a coastal zone covering the Volta, Greater Accra, Central and Western Regions. Based on assessment of microfinance institutions by ARB Apex Bank, Credit Union Association (CUA) and GHAMFIN on the activities and the performance of their members, 16 institutions were selected from the three zones. In addition, an institution using Susu methodology to mobilize funds was selected, giving a total of 17 microfinance institutions. Clients of selected microfinance institutions were randomly selected and their households were randomly identified for the study.

[38] Data for the study was merged from two Bank of Ghana/World Bank sponsored projects under the broad theme - 'Poverty Assessment and a Comparative Study of Rural Microfinance Institutions and Government Credit Programmes in Ghana. The Poverty Assessment was carried out by the University of Cape Coast in which the author was a member of the core team. The Financial Performance was executed by Mawuko and Co. Consulting Services.

Clients of four rural banks, one Credit Union and two Financial Non-Governmental Organisations (FNGOs), were selected from the coastal zone; in the middle zone, two rural banks, one credit union, and one FNGO were selected. Finally, clients of three rural banks and one FNGO were selected in the northern zone. The 17 institutions provided funds from their own resources, or the government channelled through either the district assembly or a Ministry and donor sources such as International Fund for Agricultural Development (IFAD), the World Bank and other bilateral agencies.

To facilitate the test for sample selection effect, data on non-client households was assessed from the same study. A national representative data on 1102 non-clients households were randomly interviewed based on the framework of Ghana population census.

Collected data included socio-demographic and economic profile of clients' household, economic activities, employment history and institutional level indicators such as sources of finance and interest rates paid. Selected respondents were clients who had received loans for the first time within the last six months prior to the survey, or had been processed for loan.

The total sample size for the study is 2691 units consisting of 1589 clients and 1102 non-clients. The sample varied at different stages of the analysis. For instance, based on institutional mandatory limitations on the loans mobilization clients of one of the five main categories were excluded in the final analysis. The mandate of susu[39], like FNGOs are restricted in receiving deposits. But in the case of FNGOs some linkages with other financial institutions have permitted them to engage in receipt and dispensation of financial services. Steel and Aryeteey (1994) caution on the

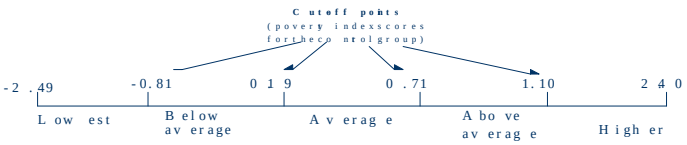
[39] Quite recently, Barclays Bank, one of the biggest commercial banks in Ghana, has initiated a product that fosters collaboration with susu companies. Among the principal objectives is to increase scale of operation, which implies exploration of deposit taking opportunities. Anecdotal evidence suggests that this has led to increased cost of operation and subsequently interest rates.

exclusivity of susu operations. Also Steel and Andah (2003) categorize individual susu collectors as informal. The final dataset for the analysis was based on respondents from rural banks, credit unions, savings and loan companies and financial non-governmental organizations. The analysis was restricted to clients of institutions that had received loan amount within the six months period prior to data collection. A potential demise of this approach is sample selection bias which has been addressed in this chapter. A total of 698 client households were analyzed. However, an exploratory and robustness check required additional dataset. The quantile regression estimation is based on a larger sample of 720 clients, which includes respondents paying back only the principal amount. Also, the robustness check for sample selection problems required the inclusion of a non-client sample making the total sample 2650 (698 +1102).

Poverty Score

This chapter relies on the same poverty score used as an independent variable in the preceding chapter. Also, Appendix III provides some more detail discussion on the Microfinance Poverty Assessment Tool used in generating the poverty score. To enable the investigation of responsiveness of loan size in the context of changes in interest rate given the poverty level of the client, we categorize poverty scores into quintiles. Figure 4.1 below offers a description of the cut-offs.

Figure 4.1 - Definition of Quintiles



The choice of quintile classifications over other cluster options is informed by the recent outcome of the category of extreme poor households in Ghana. Ghana Statistical Service 2007 shows a national extreme head count poverty of one out

every five persons. This benchmark is important for validation and consistent policy direction.

Specification of Econometric Models

The model specification is consistent with standard demand for loan amount theory. The *a priori* expectation of an inverse relationship is explained by the following two plausible transmission mechanisms. The first argument, typical to microfinance operations, asserts that a relatively high cost in administering smaller loans underpins the inverse relationship. In other words, as the loan amount increases per unit, the cost of administering reduces. The second reason subscribes to models of consumer inter-temporal choice, predicting a downward sloping demand curve with respect to price.

Parametric Quantile Regression and Least Squares Estimation

Inspired by the restrictions of Gaussian assumptions of linearity and zero conditional mean, Koenker and Basset (1978) proove that for any distribution, the median is a better measure of location, the regression median[40] is more efficient. In contrast to least squares, assuming that the expected value of the error term conditional on the covariates is zero, quantile regression sorts the data and identifies a threshold (τ) to estimate the coefficient (β) that minimizes the sum of absolute residuals. The general set-up of quantile regression, Equation 3.1 below is solved from an optimization perspective using linear programming.

$$\hat{\beta}_{(\tau)} = \arg\min_{\beta_\tau \in \Re^K} \sum_{i=1}^{n} \rho_\tau \left(y_i - x'_i \beta \right) \qquad 4.1$$

where estimated $\beta_{(\tau)}$ called 'tauth' (τth) regression quantile estimates the coefficient at a specified threshold (τ). τ is the sample quantile and takes on any value that between 0 and 1. The expression $\rho_\tau \left(y_i - x'_i \beta \right)$, the absolute value function, weights

[40] The proof of the median regression can is easily replicated for other to other percentiles (quantiles).

the absolute difference between y_i and $x'_i\beta$ with τ and by (1 – τ) for all observations below the estimated hyperplane. Koenker and Basset (1978) estimates conditional quantiles using the minimization procedure synonymous to least squares.

Interaction Procedure

The observation of varying interest rate at different percentiles of loan size pre-empts an investigation of the factors likely to affect the relationship between interest rate and loan size. Karlan and Zinman (2008) identify the external factors of targeting females and low income category of clients as potential influences on the relationship between interest rate and loan size. Based on this, we apply the interaction method to least squares and compare our results with the subsamples used in other approaches. The study's hypothesis informs the specification of a functional relationship positing that the effect of interest rate on loan size is moderated by the socio-economic well being of the client. This translates into the specification of Equation 3.2.

Jaccard and Turrisi (2003) suggest that there is a need for an initial null hypothesis test in order to verify the presence of an interaction term in a model. The null hypothesis asserts that the regression coefficient for the product term is zero. Also, assessing the strength and nature of the interaction term further justifies the choice statistic to be estimated based on the theoretical and intuitive propositions. The exploratory test uses the basic multiplicative approach to interact the two continuous terms of poverty scores and interest rate in our model. The test for the two equations (with and without the interaction term) indicates an F-value of 30, implying the presence of a statistical interaction between poverty score and interest rate in the loan size equation. In this chapter, we assume linear[41] dependence between poverty score and interest rate. We therefore reject the null hypothesis and confirm the assertion of Dehejia et al. (2005) and Karlan and Zinman (2008) that the poor moderates the relationship between interest rate and loan size. The strength of the

[41] We are cognizant of the other dimensions of dependence such as varying relationship along the slope and shape culminating into a non-linear relationship between poverty score and interest rate. But for brevity we limit the discussion to a theoretical bilinear relationship.

relationship from the multiplicative perspective shows that the interaction effect accounts for 2 percent of the variance in loan size. Interpreting coefficients in a model with an interactive term, especially in the case of multiplicative interacted variables, is always received with a pinch of salt. Aiken and West (1990) and Jaccard and Turrissi (2003) both suggest potential problems, notably multicollinearity in interpreting Equation 3.3 given product terms added to the right-hand side variables.

$$LS_i = \beta_0 + \beta_1 Pov_i - \beta_2 Int.r_i + \beta_3 Pov * Int.r_i + \beta_4 X + e_i \qquad 4.2$$

where LS[42] is the loan amount, Pov is the household poverty score; Int.r is the interest rate Pov*Int.r is the interaction for the centred variables of household poverty score and interest rate and X is the vector of other household factors that influence demand for loan amount. Specifying the equation in this form, implies that loan size responsiveness to a marginal change in interest rate for the ith borrower is dependent on β_2 and β_3 and a 'value' of poverty rate, normally the mean or any other measure that describes poverty levels in some intuitive manner. Equation 4.3 specifies the derivation of loan size responsiveness in the case of an interaction term.

$$\partial LS_i / \partial Int.r_i = -\hat{\beta}_2 + \hat{\beta}_3 Pov \qquad 4.3$$

As the choice of the 'value' is discretionary, interpreting models with interaction terms require caution. Aiken and West (1990) compare uncentred and centred variables in estimated equations and conclude that centred analysis be employed as it facilitates a more intuitive interpretation for interacted variables. With this background of evidence we explore the interaction effect in more detail using specific statistic (mean and different percentiles) of the moderating variable, poverty scores.

[42] The estimation takes the logarithmic form of loan size to calculate semi-elasticity.

Second Stage Estimations

We undertake Instrumental Variable (IV) and Heckman second stage estimations to correct for plausible endogeneity and selection bias respectively. Although the likely incidence of reverse causality is minimised with a restricted sample of new clients and current amount of loan take-up, endogeneity is still plausible. Multiple sources of endogeneity, including omitted variables, are likely to bias our estimates. Specific to this chapter, institutional features that complement the effect of interest rate on loan size are likely to affect our equation via an omitted variable perspective. Typically, one can argue that institutional performance can cause interest rate endogeneity. Identifying operational self sufficiency[43] as an instrument for interest rate and measure of institutional performance, we address the two pronged requirements for the use of IV. The initial testable requirement shows that the correlation between interest rate and operational self-sufficiency is 0.40. The second pre-requisite that requires intuition and theory points to a minimal association between operational self-sufficiency and the error term of the loan size equation. We argue that, due to institution's risk perception of first and repeated loans,[44] restricting the sample to new clients nullifies the plausible effect of institutional performance on amount of loan disbursed. In view of the above, we propose that the interest rate coefficient is biased downwards as a result of the inverse relationship between the instrument and loan size on one hand and the positive relationship between interest rate and operational self-sufficiency on the other

In the case of sample effect, Armendariz de Aghion, and Morduch (2005) points out that impact studies in microfinance are decidedly mixed as a result of methodological issues including selection bias. We attempt to correct for sample selection problems that emerge on the premise of; (a) probability of an individual participating in a microfinance programme and (b) likelihood of being a member and accessing a loan. Identifying an exclusive variable for the participation equation is

[43] Operational Self Sufficiency is measured as financial revenue/ (financial expense + net loan loss provision expense + operating expense). The unadjusted subsidy effect explains the effect of donors and government in amount of loan disbursed.

[44] Anecdote suggests that microfinance institutions use donor and government grants mostly for first time loans and as such are not very particular about its effect on the sustainability of their operations.

always daunting given the demise of a trade-off in the efficiency of our results. The potential of huge standard errors in second stage estimation is verified by comparing our results with least squares. Occupational category of respondent that is either self employed or otherwise is used as the exclusive variable. The choice of this variable is rationalized by the preponderance of self-employed entrepreneurs in microfinance.

We therefore estimate an outcome equation as;

$$LS_i \mid x_i \; ; Cl_i = 1 = \alpha_1 X_{1i} + \sigma_{12} \hat{\tau}_i (\hat{z}_{4i}' \gamma_4) + \eta_i \qquad 4.4$$

where σ_{12} denotes the error term emerging from the participation and outcome equations; $(\hat{z}_{4i}' \gamma_4)$ is the variable representing Inverse Mills Ratio (IMR) for each of the observed households computed from a participation equation; τ is the coefficient of the IMR and η_i is the normal stochastic term for an OLS and X is the vector of covariates in our outcome equation.

Finally, to compare our approach to that of previous studies, we estimate interest rate effect on two sub-samples. Equations 4.5 and 4.6 specify the estimation of two sub-samples {poorest sample (bottom 20 percent) and non-poor sample (upper 80 percent)}. Categorization of the sample into quintiles and the exploratory outcome of the box and whisker plot informed the specification of the two broad regressions. As observed, the variability between the poorest 20 percent and the other group is both economically and statistically significant [45] Equation 4.7 estimates an unrestricted model that includes a dummy to capture the effect of poverty.

$$LS_i = \beta_0 + \beta_1 Pov_i - \beta_2 Int.r_i + \beta_4 X + e_i \qquad 4.5$$

(Poorest Sample)

[45] Calculated t-value for the difference in average interest rate between the bottom 20 percent and the upper 80 percent is 4.5 denoting statistical significance of the variation for the two groups.

$$LS_i = \beta_0 + \beta_1 Pov_i - \beta_2 Int.r_i + \beta_4 X + e_i \qquad 4.6$$

(Otherwise Sample)

$$LS_i = \beta_0 + \beta_1 Pov_i - \beta_2 Int.r_i + \beta_4 X + \beta_5 Non - poor_i + e_i \qquad 4.7$$

(Unrestricted Model)

We apply the traditional Chow Test[46] to examine consistency in slope coefficients between the restricted (equations 4.5 and 4.6) and the unrestricted (Equation 4.7) models. Equations 4.5 and 4.6 are tested concurrently against the unrestricted model of Equation 4.7. Though robust estimation has been meticulously considered throughout this study, we are humble in asserting a definite uni-causality from interest rate to loan size due to the cross sectional nature of our dataset.

4.4 Results and Discussion

The central hypothesis posits that loan size sensitivity will have varying slopes as a result of the different socio-economic characteristics of clients. Karlan and Zinman (2008) observe a kinked demand curve, confirming stronger sensitivity effect at the extensive margins of interest rates. Though informative, we suspect that limiting the empirical investigation to a subsample blurs a possible higher frequent and deeper variation in loan size responsiveness among microfinance clients. Table 4.2b presents the mean and different percentiles of interest rates for each of the quintiles. The mean underpins regression analysis (maximum likelihood and least squares) used in previous studies and the potential percentile variations justify our choice of quantile regression and application of interaction procedures.

[46] The Chow Test like any other F-test, tests the hypothesis of equal slopes in the different subsamples (See Wooldridge 2006).

Table 4.2a - Loan Amount by Poverty Quintiles

Poverty Groups	N	Mean	Max	Min	Median
Extreme Poor	120	¢45,628	> ¢2,000,000	¢30,000	¢335,000
		US$5.06	*US$221.78*	*US$3.33*	*US$37.15*
Very Poor	153	¢1,284,999	> ¢10,000,000	¢50,000	¢1,000,000
		US$142.49	*US$1,108.89*	*US$5.54*	*US$110.89*
Poor	155	¢1,511,087	> ¢10,000,000	¢100,000	¢1,000,000
		US$167.56	*US$1,108.89*	*US$11.09*	*US$110.89*
Moderately Poor	124	¢2,271,049	> ¢40,000,000	¢100,000	¢1,000,000
		US$251.84	*US$4,435.57*	*US$11.09*	*US$110.89*
Non-Poor	146	¢5,805,849	> ¢80,000,000	¢100,000	¢2,000,000
		US$643.81	*US$8,875.17*	*US$11.09*	*US$221.78*
Total	698	¢2,313,587	> ¢80,000,000	¢30,000	¢1,000,000
		US$256.55	*US$8,871.15*	*US$3.33*	*US$110.89*

Table 4.2b - Interest Rate by Poverty Quintiles

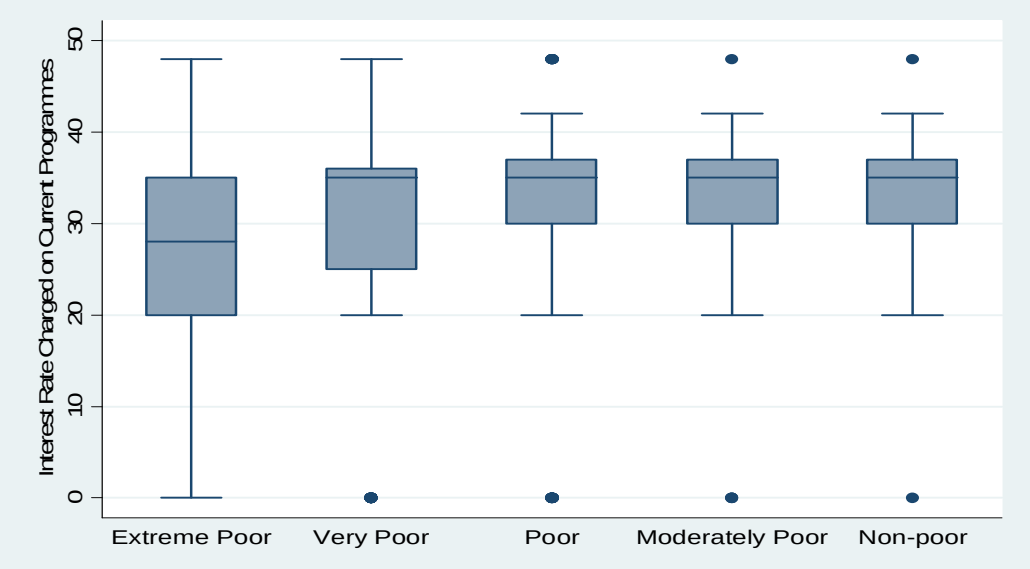
Poverty Quintiles	N	Mean	P5	P25	P50	P75	P95	Coefficient of Variation
Extreme Poor	317	30.49	20	20	28	35	48	0.324
Very Poor	320	30.68	0	25	35	36	42	0.213
Poor	318	32.52	20	30	35	37	42	0.183
Moderately Poor	317	33.06	20	30	35	37	42	0.188
Non-Poor	317	33.60	20	30	35	37	42	0.162
Total	**1589**	**32.07**	**20**	**28**	**35**	**37**	**48**	**0.220**

Univariate Analysis

Tables 4.2a and 4.2b clearly evidence the extent to which use of mean suppresses variations at different percentiles. The box and whisker plot of Figure 4.3 shows that the minimum and maximum interest rates are not restricted to a particular category of clients. Table 4.2a describes the loan amount received by different poverty quintiles. We observe different levels of variance between the groups based on the choice of statistic. While the mean shows a difference of about 30 times between the extreme and very poor the median accounts for a 3 times difference. Comparing Figure 4.3 and Table 4.2, heterogeneity in interest rate is observed at the lower end of the socio-economic distribution. For instance, the fifth percentile shows 0 percent interest rate for the very poor category compared to 20 percent for the other groups. Also, at the extensive margin it is observed that the 95th percentile is 48 percent for the extreme poor category compared to 42 percent for the other groups.

Additionally, interest rates tend to vary in an inconsistent fashion for the different categories of extreme and very poor clients, and changes in interest rates across the quantiles tend to show consistent variations for the poor to non-poor category. This observation makes the use of least squares susceptible to a blurred response as it is premised on the mean, which shows an increase in average interest rate from extreme poor to non-poor. The difference between groups based on choice of statistic has implications in drawing inferences and predictions using higher level estimation techniques precedent on either the mean or the median.

FIGURE 4.3 - Interest rate for Different Socio-economic Groups of Borrowers



In Table 4.2 we show the distribution of interest rates across the five socio-economic categories of microfinance clients at the mean and different percentiles. Noticing with much alacrity is the twist at 5th percentile which shows 0 percent lending rate for the very poor category compared to 20 percent for all the other groups including the extreme poor. This observation suggests a platform of plausible market distortion detrimental to the long term sustainability of microfinance. The uni-variate statistics of Table 4.3A offer a comparison between interest rate charged and the simple

average of poverty score for various programmes[47] of the respective microfinance institutions. The annualized[48] nominal[49] interest rates ranged from 0 percent to 48 percent with a respective mean and median of 32 percent and 35 percent for all the programmes of the institutions. The wide range of 48 percent characterizing microfinance evokes concerns on why and who benefits and of who pays what. The observed mean lending rate of 32 percent (Table 4.2) is more than twice the prime rate of 14.5 percent and about 11 percent more than the borrowing rate of traditional banking institutions to the public.

[47] Programme in this study is defined as the source of funds. That is either institutional own mobilized funds, sourced from donor or government. For the purposes of analysis we generate dummy for own programme interpreted as institutional mobilized funds and otherwise. The rationale is that funds sourced from donor and government are external to the institution.

[48] Worth mentioning is the use of adjustment factors. Due to the varied approaches of handling interest rate overtime including 'reducing balance' and 'flat' method, we annualize all the rates and adjust all methods of calculation to the 'flat method'. The 'reducing balance' method calculates interest rate based on the balance while the 'flat' method is based on the principal.

[49] A logical argument will be to apply either real or effective interest as the unit of analysis is the household. However due to respondent's lack of ability to quantify other transaction cost and variations in personal inflation rate we use the nominal interest rate.

Table 4.3A - Poverty Scores and Interest Rate Charged by type of Institution and Programme

MFI		Source of funds	Interest rate per annum	Poverty Score
CU1		Deposits	25%	1.057
RB2		Deposits	28%	-1.513
		Donor	25%	-1.515
RB3		Deposits	35%	-0.722
FNGO1		Donor	48%	-1.187
FNGO2		Donor	35%	0.924
		Deposits	35%	0.924
S & L		Deposits	7%	1.204
RB4		Deposits	36%	0.503
		Government	36%	0.274
FNGO2		Deposit	25%	0.238
RB5		Deposits	35%	0.023
		Government	0%	0.665
RB6		Deposits	42%	0.767
RB7		Government	20%	-1.374
		Donor	20%	-1.097
RB8		Government	20%	0.797
		Deposit	34%	0.561
RB9		Deposit	30%	0.709
		Deposit	30%	0.974
		Government	20%	0.555
		Government	20%	0.365
CU2		Deposit	36%	1.167
	Ashanti	Deposit	37%	0.483
FNGO3	Volta	Deposit	37%	1.057
	Eastern	Deposit	37%	0.957
	Brong Ahafo	Deposit	37%	0.642
SUSU		Deposit	-	1.226

In an earlier empirical paper, Amonoo et al. (2003) observed that the mean nominal lending rate to the poor in the Central Region of Ghana is about 45 percent per annum. In Table 4.2, the average lending rate shows a rate some 13 percent points lower. A potential cause of the variation is the different scope of the two studies. Since the current study is nationally representative, characteristics of the respondents in peri-urban and urban areas are likely to influence interest rates. The notion that transaction costs are higher in dealing with poor clients might be a potential justification for the high interest rate of 45 percent in the previous study, as it was

conducted in one of the four poorest regions of Ghana. On the contrary, we observe from the study that whilst the mean shows higher lending rates for less poor clients, the evidence is mixed at different percentiles. This signals other influences on lending rate such as source of funds. From Table 4.3A we observe that the cost of accessing a loan funded by the Government was on average a third lower than programmes dispensed with own funds. This augments contemporary knowledge that institutional funds mobilized through owner's equity, savings and shares are geared-up for commercialization as opposed to external funds (Rhyne, 1998).

The last column of Table 4.3A shows the poverty scores of client's households. The results indicate that RB2 with scores of -1.1513 and -1.515 for its two programmes and FNGO1 with a score of -1.1187 report reaching very poor clients. The principal reason accounting for this is the location of the institutions. These institutions are located in the northern part of the country where poverty is most endemic. Annim et al. (2008) assesses the spatial dimension and implication of microfinance institutions in Ghana.

The econometric estimations are preceded by a presentation of the summary statistics and correlation matrix (Tables 4.3B and 4.3C) of all variables used. The rationale is to facilitate a better understanding of the choice of variables and preliminary idea of the direction and extent of relationship between the variables.

Table 4.3b Summary Statistics

Variables	Definition/Unit of Measurement	N	Mean	SD	MIN	MAX
Current Loan Amount	Local Currency Unit (Ghana)	1589	1032291	4044590	0	80000000
Interest Rate	Percent	1589	32.06734	8.842656	0	48
Client Status	=1 if client receives multiple financial service	1589	0.254248	0.435575	0	1
Previous Loan Amount	Local Currency Unit (Ghana)	1589	773851.5	3088975	0	70000000
Sex of Client	=1 if client is female	1589	0.246067	0.430854	0	1
Poverty Score	Continuous Variable	1589	0.216987	1.002145	-2.5	2.40
Number of Savings Account	Discrete Variable	1589	0.826935	0.757584	0	6
Source of Funds	= if MFI relies on own funds for operations	1589	0.877281	0.328217	0	1
Household Size	Discrete Variable	1589	5.334802	2.316827	1	17
Location	= 1 if client is resident in either Greater Accra or Ashanti Region	1589	0.050346	0.218727	0	1

Table 4.3c Correlation Matrix

Variable	Amount Borrowed	Interest rate	Client Status	Previous Loan Amount	Sex of Client	Poverty Index	Number of Savings Accounts	Source of Funds	Household Size	Location
Amount Borrowed	1	-0.01	0.17	-0.04	0.08	0.17	0.13	0.06	-0.01	0.29
Interest rate	-0.01	1	0.04	-0.01	-0.03	0.02	0.09	0.17	0.02	-0.08
Client Status	0.17	0.04	1	-0.05	0.18	0.15	0.29	0.31	-0.03	-0.17
Previous Loan Amount	-0.04	-0.01	-0.05	1	-0.08	0.11	0.09	0.13	0.05	0.1
Sex of Client	0.08	-0.03	0.18	-0.08	1	0.05	-0.02	0.01	-0.17	0.04
Poverty Index	0.17	0.02	0.15	0.11	0.05	1	0.48	0.16	-0.15	0.22
Number of Savings Accounts	0.13	0.09	0.29	0.09	-0.02	0.48	1	0.24	0.07	-0.01
Source of Funds	0.06	0.17	0.31	0.13	0.01	0.16	0.24	1	-0.01	-0.34
Household Size	-0.01	0.02	-0.03	0.05	-0.17	-0.15	0.07	-0.01	1	-0.07
Location	0.29	-0.08	-0.17	0.1	0.04	0.22	-0.01	-0.34	-0.07	1
Operational Self Sufficiency	-0.12	0.4	-0.11	-0.05	-0.14	-0.51	-0.28	0.08	0.11	-0.15
Self employed	0.03	-0.01	0.12	-0.1	0.12	-0.37	-0.18	0.02	0.04	-0.17

Multivariate Analysis

Figure 4.4, demonstrates concisely the quantile responsiveness of loan size for each of the covariates. For brevity, we restrict our discussion to the main covariate interest rate and factors most likely to influence targeting (poverty and sex of client). The thick dashed line plots the respective least squares coefficient and the light point dots are the confidence intervals. The quantile regression coefficients are represented for the various percentiles with the curved lines and respective confidence intervals are shown with the dim background. At a glance, we observe broadly that interest rates show inconsistent responsiveness of loan size at different quantiles. The least squares shows that marginal upward variation in interest rate results in a 0.7 (less than unitary – Table 4.4) downward change in loan size. But the question remains as to whether this is consistent across all the segments of the distribution. The quantile regression shows that the change is much higher for the lower quantile (up to about 40th), fairly stable for the middle quantile (between 40th and 65th) and falls further for the higher quantiles.

Table 4.4 - Least Squares and Quantile Regression Estimates
Dependent Variable: Log of Current Loan Size Amount

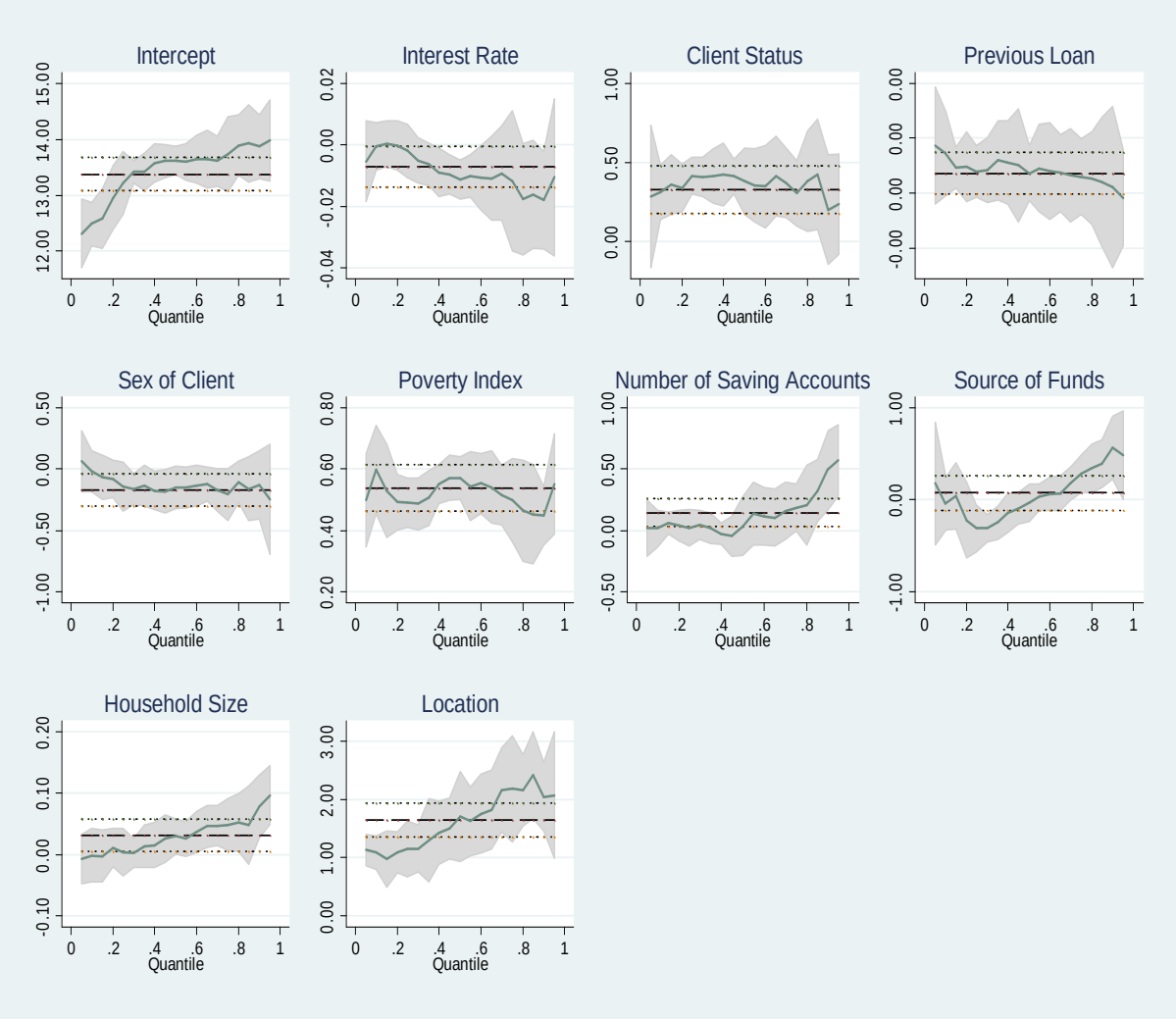
Explanatory Variables	Ordinary Least Squares	Quantile regression thresholds				
		10th	25th	50th	75th	90th
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate	-0.007	-0.000	-0.002	-0.011	-0.012	-0.018
	[-2.09]*	[-0.11]	[-0.50]	[-2.79]**	[-1.39]	[-2.10]*
Client Status	0.327	0.308	0.414	0.380	0.302	0.200
	[4.30]**	[3.09]**	[5.17]**	[3.59]**	[2.56]*	[1.11]
Amount of Previous Loan	0.000	0.000	0.000	0.000	0.000	0.000
	[1.15]	[1.88]+	[1.12]	[0.99]	[0.63]	[0.16]
Sex of Client	-0.170	-0.018	-0.141	-0.148	-0.208	-0.127
	[-2.55]*	[-0.19]	[-1.72]+	[-1.75]+	[-2.30]*	[-1.13]
Poverty Score	0.538	0.598	0.491	0.572	0.499	0.448
	[14.38]**	[8.54]**	[10.69]**	[12.77]**	[7.42]**	[5.50]**
Number of Savings Account	0.145	0.016	0.020	0.035	0.188	0.492
	[1.93]+	[0.16]	[0.29]	[0.29]	[2.09]*	[3.25]**
Source of Funds	0.074	-0.042	-0.311	-0.030	0.281	0.571
	[0.85]	[-0.24]	[-2.36]*	[-0.33]	[2.61]**	[3.10]**
Household Size	0.031	-0.001	0.003	0.029	0.048	0.078
	[2.11]*	[-0.06]	[0.19]	[1.97]*	[2.38]*	[3.21]**
Location	1.643	1.085	1.151	1.703	2.178	2.041
	[7.61]**	[6.86]**	[4.42]**	[4.81]**	[5.89]**	[5.19]**
Constant	13.377	12.486	13.222	13.620	13.740	13.870
	[85.14]**	[61.37]**	[54.22]**	[89.73]**	[53.50]**	[48.09]**
N	720	720	720	720	720	720
Adj. R^2	0.468	-	-	-	-	-
Wald test comparing with 50th Percentile	-	F=5.53(0.02)	F=5.10(0.02)	-	F=0.00(0.95)	F=0.68(0.41)

t statistics in brackets - + p<.10 (significant at 10 per cent), * p<.05 (significant at 5 per cent), ** p<.01(significant at 1 per cent)

On the other hand, sex of client demonstrates fairly consistent results across both least squares and quantile regression. The only observable variation is at the lower quantile. The least squares estimation shows that loan amount received by female clients is 17 percent less than their male counterparts. The 5 percent significance level observed from the least squares, is not consistent across the quantiles (Table 4.4). The inconsistency incites probes into the resilience and reliability of the least

squares estimates. We address these probes by exploring the interaction effect and checking for robustness using second stage estimation techniques.

Figure 4.4 - Least Squares and Quantile Regressions' Coefficients



Based on the observation from the quantile regression and the empirical verification of the presence of an interaction term in section 4.3, we hypothesise that client well-being moderates the effect of the relationship between loan size and interest rate.

Table 4.5 compares the effect of a model including interaction terms (specifically poverty scores interacted with interest rate) for the full sample with either reduced sample or restricted models. Using a basic specification test, Ramsey's test supports

the use of the full sample with interaction terms and rejects the null hypothesis of 'no omitted variables' in all the other four cases.The first column of Table 4.5 presents the model with the interactive term at the centred predictor, moderator and their interaction. We opt for centred of the variables as explained in section 4.3 of the chapter. We estimate this relationship bearing in mind the effect of other covariates including; number of savings account held by the borrower, location, sex of client, household size and others (see Table 4.5). The interpretation of the sign and coefficient of the predictor with an interaction generates much complexity depending on the statistic of the moderating variable (Wooldridge 2006). Our initial result at the centred value is to provide an intuitive interpretation of Equation 4.2 at the mean poverty rate. Thus, the semi-elasticity of interest rate to loan size is quite marginal (0.2^{50} percent, relatively inelastic) and is therefore insignificant. This provides insufficient evidence to reject the null hypothesis of microfinance client insensitivity. This initial result runs parallel to recent studies (Dehejia et al., 2005; Briones, 2007 and Karlan and Zinman, 2008) of an elasticity coefficient close to unitary.

[50] The net effect based on equation 4.3 would have been used in case the coefficient was significant.

Table 4.5 - Interaction Effect and Reduced Samples

Explanatory Variables	Interaction Term (1)	Poorest Sample (2)	Non-Poor Sample (3)	Impose Restrictions (4)	Without Interaction term and Dummies (5)
Interest Rate	-0.023	-0.044	0.011	-0.012	-0.012
	[-6.06]**	[-4.82]**	[1.92]+	[-2.80]**	[-2.80]**
Client Status	0.268	0.462	0.215	0.355	0.364
	[3.51]**	[2.38]*	[2.53]*	[4.71]**	[4.83]**
Previous Loan	0.000	0.000	0.000	0.000	0.000
	[1.86]+	[0.06]	[2.23]*	[2.64]**	[2.61]**
Sex of Client	-0.150	0.249	-0.219	-0.166	-0.151
	[-2.29]*	[1.36]	[-3.01]**	[-2.44]*	[-2.26]*
Poverty Score	-0.243	0.707	0.427	0.456	0.499
	[-1.79]+	[4.22]**	[6.53]**	[7.18]**	[13.86]**
Number of Savings	0.142	0.137	0.153	0.146	0.149
Accounts	[1.97]*	[0.86]	[2.04]*	[1.97]*	[2.01]*
Source of Funds	0.349	0.428	0.345	0.093	0.111
	[3.88]**	[1.70]+	[3.37]**	[1.07]	[1.32]
Household Size	0.033	0.106	0.011	0.029	0.029
	[2.30]*	[4.26]**	[0.64]	[1.94]+	[1.95]+
Location	0.553	Dropped	0.482	0.623	0.653
	[2.50]*	Dropped	[2.24]*	[2.87]**	[3.03]**
Interaction between	0.022	-	-	-	-
Poverty and Interest rate	[5.87]**	-	-	-	-
Interaction between	1.268	Dropped	1.294	1.229	1.192
the Poverty and Location	[6.11]**	Dropped	[6.18]**	[5.85]**	[5.85]**
Dummy for the	-	-	-	-0.148	-
poorest group	-	-	-	[-0.91]	-
Constant	13.090	14.023	12.813	13.562	13.496
	[68.45]**	[29.43]**	[54.39]**	[78.94]**	[80.00]**
N	698	120	578	698	698
Adj. R^2	0.514	0.490	0.361	0.491	0.491
F-Statistic	67.536	31.132	27.249	54.381	58.613
Log Likelihood	-818.918	-113.975	-688.867	-834.587	-835.063
Ramsey's	F = 1.18	F = 2.41	F = 3.16	F = 7.67	F = 8.38
Specification Test	(0.316)	(0.0710) +	(0.0243) *	(0.000) **	(0.000) **
Chow Test			6.14(0.00)		

t statistics in brackets - + p<.10 (significant at 10 per cent), * p<.05 (significant at 5 per cent), ** p<.01(significant at 1 per cent)

Table 4.6 - Coefficient of Key Covariates and Interaction at Varied Statistic

	Coefficients at Varied Statistics [t-values in parenthesis]			
Key Covariates	Mean	20th Percentile	50th Percentile	80th Percentile
Interest Rate	-0.004	-0.023	0.007	0.018
	[-0.98]	[-6.06]**	[1.26]	[2.58]*
Poverty Score	-0.243	-0.243	-0.243	-0.243
	[-1.79]+	[-1.79]+	[-1.79]+	[-1.79]+
Interaction	0.022	0.022	0.022	0.022
	[5.87]**	[5.87]**	[5.87]**	[5.87]**
Net Effect	-	-.018	-	.023

Table 4.6 compares interest rate at varied statistic and offers a deeper insight into which category of clients is sensitive. Each percentile of the interaction variable describes a segment of clients' socio-economic characteristics. The choice for the 20th percentile is informed by the extreme poverty statistics in Ghana and also the evidence of a high coefficient of variation for this group (Table 4.2). The 50th and 75th were selected due to the basic standardization of these percentiles. Column 3, Table 4.6 shows that estimating Equation 4.2 at a value that describes the characteristics of the very poor (20th quantile), the responsiveness of loan size to interest rate changes is more than unitary (2.4 percent), downward sloping and significant at less than one percent. The net effect based on Equation 4.3 yields [-0.0228431 + (0. 0223369 *(.2224695[51])) = -0.01787382 (≈ (1.78 percent)]. That is taking into consideration the moderating effect of clients' wellbeing of the poorest group, loan size will fall by 1.8% when interest rate increases by 1%. This shows strong responsiveness by the extreme poor and offers consistent finding with earlier studies. However, in each of the other statistics either the coefficient is not significant (mean and 50th percentile) or it shows a positive sign (50th and 75th percentiles).

The significant inverse response of loan size to a unit change in interest rate literally implies that poorer clients drop-out with higher interest rates. This finding might suggest some reasons for the failure of the IGVGD programme in Bangladesh. We

[51] This value represents the mean poverty score for the entire sample.

are tempted to support the preposition that microfinance is ideal for a particular segment of poor clients normally tagged as 'brave poor'. The labelling of microfinance clients as 'brave' can be interpreted from the perspective of the upper 80 percent that are non-responsive to interest rate changes. Assuming non-responsiveness implies repayment it is utterly important to identify channels of repayment. Among the unconventional means adopted by clients to repay are multiple borrowing from different institutions and sale of assets. Some anecdotal evidence suggests clients exhibit suicidal tendencies in the long-run when both conventional and unconventional modes for repayment are exhausted.

Columns 2-5, Table 4.5 offers a comparison both within and between the current study's approach and the use of subsamples. Comparing the coefficient of interest rate for the subsample of the bottom 20 percent with the interaction term of the 20th percentile we observe a consistent sign and significance level. Though in both estimates we observe more than unitary loan size responsiveness the difference of about 2 percent is worth considering. Worth observing from all five columns is a downward sloping demand curve for all estimates except the non-poor sample. The outcome of positive coefficient is supported by the 50th and 75th percentiles in Table 4.6.

We estimate equations 4.5 to 4.7 to empirically test differences in regression slopes across groups. In our context, it is the bottom 20 percent (column 2, Table 4.5) vis-à-vis the non-poor sample (column 3, Table 4.5) compared with the restricted model (column 4, Table 4.5). The significant chow test value of 14.47(0.000) implies the rejection of the null hypothesis that the slopes do not change if the subsamples used. This finding upholds the need to formally include a variable capturing the socio-economic characteristics of the poor into the estimation model instead of estimating subsamples as offered in previous studies.

Table 4.7 offers second stage estimation results that seek to correct for endogeneity and sample selection problems. Correcting for endogeneity, we observe that the

interest rate coefficient increase by a margin of 0.06. The use of operational self-sufficiency which is positively correlated to nominal interest rate and inversely related to loan size resolves the plausible underestimation. This suggests that using an effective interest rate is likely to show greater responsiveness relative to nominal interest rate. The Hausman test shows that the IV coefficients are better (statistical different from the OLS estimates) in spite of the huge standard errors.

Table 4.7 - Second Stage Instrumental Variable and Heckman Estimations

Dependent Variable: *Amount of Current Loan*	***Coefficients & Robust Standard Errors***				
	(1)	**(2)**	**(3)**	**(4a)**	**(4b)**
Explanatory Variables	**Least Squares**	**Instrumental Variable**	**Hausman**	**Heckman 1.**	**Heckman 2.**
Interest rate	-0.014 *(0.004)***	-0.074 *(0.010)***	- 0.060	- 0.016 *(0.005)***	- 0.013 *(0.005)***
Client Status	0.314 *(0.078)***	0.206 *(0.088)***	0.009	0.044 *(0.124)*	- 0.014 *(0.163)*
Number of Savings Account	0.146 *(0.076)***	0.205 *(0.066)***	0.059	0.171 *(0.59)***	0.139 *(0.58)***
Amount of Previous Loan	0.000 *(0.000)***	-0.000 *(0.000)***	0.000	0.000 *(0.000)***	0.000 *(0.000)***
Poverty Score	0.530 (0.036)***	0.499 *(0.043)***	- 0.031	0.526 *(0.038)***	0.537 *(0.039)***
Location	1.624 *(0.205)***	1.540 *(0.165)***	- 0.083	1.534 *(0.150)***	1.692 *(0.150)***
Source of Funds	0.136 *(0.086)*	0.555 *(0.015)***	0.419	0.235 *(0.105)***	0.019 *(0.110)*
Household size	0.029 *(0.014)***	0.031 *(0.024)***	0.002	0.027 *(0.014)***	0.030 *(0.014)***
Sex of Client	-0.1880 *(0.067)***	- 0.259 *(0.076)***	-0.079	- 0.297 *(0.079)***	- 0.268 *(0.078)***
Constant	13.581 *(0.170)***	15.252 *(0.319)***	-	13.867 *(0.202)***	14.047 *(0.270)***
R-Squared	**0.48**	**0.34**	-	-	-
Number of Obs.	**698**	**698**		**Censored - 850 Uncensored - 698**	**Censored - 1952 Uncensored – 698**
Operational Self Sufficiency [Instrument]	Correlation between Operational Self Sufficiency and Interest Rate – [**0.40]**				
Hausman Test	**Chi-Square 40.58 (0.00)**				
Self Employed [Exclusion Variable]	0.002 *(0.096)*			-	-
Heckman - Sigma				**- 6.49 (0.000)**	**- 5.74 (0.000)**
Heckman – Rho				**- 2.68 (0.007)**	**- 2.20 (0.028)**
Heckman – Test of Independence				**5.95 (0.014)**	**3.18 (0.074)**

**** Significant at one percent; ** Significant at five percent * Significant at ten percent*

Columns 4a and 4b address the problem of sample selection from two perspectives. The first perspective (column 4a) compares the effect of restricting the sample to only those who accessed loans vis-à-vis other microfinance clients and the second stage compares the former with both clients and non-clients. We propose that self

selection into microfinance programmes and ability to assess a loan is determined by whether the respondent is self employed or otherwise. The general belief is that more self employed people self select themselves into microfinance programmes because non-self employed respondents are likely to have access to traditional financial institutions and other sources of funds. The sample selection indicator (sigma) shows a much higher effect between those whose assessed loans and other microfinance clients. The test of independence between the participation and the outcome equations also shows significant results. Although the variation in interest rate is not huge, it is worth commenting that correcting for selection problems leads to significant changes in other covariates such as client status and source of funds.

4.5 Conclusion

Achieving financial sustainability and reaching poor clients concurrently has been the prime discourse of microfinance paradigm. The expectation is to provide services to the poor at low effective interest rates. Through this an institution achieves the dual purpose of reaching the poor and providing services on a commercial scale. Behavioural patterns of clients of MFI seem to vary in view of their differing socio-economic well-being. The major conclusion of this study supports recent findings of microfinance client sensitivity to interest rates changes but with a strong caveat. We assert the variability of borrower's responsiveness to interest rate as opposed to ascribing generic sensitivity for all microfinance clients. Poorest clients show significant and more than unitary responsiveness to loan amount for a marginal increase in lending rate. Among the main plausible reasons for this observation is the theoretical knowledge of the poor's aversion. Secondly, the dominance of group lending mechanism among the poorest group when compared to the non-poor potentially reduces information asymmetry leading to rationale economic behaviour of reducing loan amount as interest rate increases. Thirdly, poorer clients are likely to have less resilience to shocks and as such have a higher probability to decline loan offers as it price increases. The non-responsiveness of less poor clients may be associated with their enthusiastic desire to make a living ('brave poor') making them at least risk neutral if not risk lovers.

While one could surmise other reasons, including limited supply of loan market alternatives this is one area that needs further empirical exploration as part of the process of deepening the outreach of institutions.

The observed upward responsiveness between the second-stage instrumental variable and the first-stage estimations suggests the need to analyse clients' responsiveness from the perspective of their cost rather than institutional nominal interest rates. Cost from the perspective of clients reveals the difference between nominal and effective interest rates. Estimating the responsiveness from these two perspectives suggests the ineffectiveness of intervention strategies such as interest rate capping, since institutions are able to pass on cost to clients through channels other than phase value (nominal) interest rates.

Microfinance proponents have argued with the arsenal that the poor are capable of paying back loans with minimal consideration to hurdles encountered during repayment. Although some category of clients may be insensitive to interest rate as observed from the study, theoretical prepositions of adverse implications such as moral hazard and adverse selection threaten the long-term success of reducing poverty and augmenting mainstream financial sector. We subscribe to recent market segmentation advocacy but propose the use of borrower's responsiveness to complement traditional client differentiation methods including type of economic activity and community level indicators. This will enhance the achievement of client specific needs to complement location specific and type of economic activity driven needs. Secondly, a broader interventionist approach should be employed in the case of subsidy use. In this light, sensitivity thresholds will always pre-determine a likely drop-out. In a comprehensive sense, to prevent drop-out of poor clients as experienced from the IGVGD programme in Bangladesh, synergies between financial products, institutional structures and client socio-economic characteristics should be timely and concurrently administered.

Results from the quantile regression clearly suggest the use of either non-linear or

non-parametric estimation as an extension to existing analyses. Other areas for further work point to the use of extensive datasets to explore bi-causality between loan amount and its price in the case of repeated loans. Also, issues of effective interest rate and higher-order interactive terms that includes repayment rate, loan schedules and economic activity will offer in- depth policy direction for practitioners of clients responsiveness to a blend of strategies.

CHAPTER FIVE

ECONOMIC GOVERNANCE AND MICROFINANCE INSTITUTIONS' FUNCTIONALITY

5.0 Introduction

Until recently, microfinance institutions have been identified with the dual objectives of poverty reduction and financial sustainability. The inclusion of environmental sustainability as a third objective of MFIs (Yunus and Weber 2007) has further compounded the search for factors that drive the success of MFIs' operations. In essence, the multiple objectives engender MFIs to achieve a balance between profit maximization and non-profit maximization (minimization) objectives. The non-profit maximization (minimization) objectives of MFIs, have led to at least two issues worth considering. Firstly, the non-profit maximization (minimization) dimension of microfinance has led to several stakeholders (other than managers and firm owners) in the microfinance industry. With each stakeholder advancing the attainment of a different objective function compared to others, defining successful indicators both in terms of impact and operational issues is daunting. Among the stakeholders are government and development partners. Secondly, unlike profit maximization, non-profit objectives (either minimization or maximization) contend with measurement issues, typically poverty.

The multiple goals of microfinance paradigm have led to varied channels of evolution, regulation, and institutional characterization based on delivery strategies. It is therefore not surprising that most MFIs operate in the informal sector of an economy. The choice of any given pathway of evolution, regulation and delivery strategy is primarily dependent on the MFIs' corporate governance and the external business/economic governance environment. As a result, some studies (Hartaska and Nadolnyak, 2007; Mersland and Strom, 2009; and Cull et al., 2009) have attempted to identify which of these governance factors determine either of the dual objectives of MFIs. This chapter identifies two limitations in the previous studies. Firstly, the choice and scope of external business/economic governance indicators and secondly, type of estimation technique used to address the effect of slowing changing explanatory variables

(economic governance indicators). Consistent with the theory underpinning economic governance (Dixit 2009), we examine the effect of proxies for security of property rights; enforcement of contracts and collective action on the dual objectives of microfinance using the fixed effects vector decomposition.

This chapter subscribes to the notion that the complexity (multiple objectives), heterogeneity (varied operational strategies) and regulatory and licensing variations (formal and informal) can be resolved by identifying internal and 'external' governance structures and functional roles that provide systems of checks and balances. The overall hypothesis asserts that functional governance systems cause microfinance institutions to achieve their dual objectives of poverty reduction and financial viability.

The discourse on poverty-lending[52] vis-à-vis financial systems[53] approach to microfinance reached a consensus that, it is not an either/or argument, but the extent to which an institution pursues either of the goals and the potential consequences (Rhyne, 1998). A little over a decade thereafter, Cull et al (2009) asserted that the heterogeneity of microfinance institutions suggests that the future of microfinance is unlikely to follow a single path. The need to identify the extent of trade-off and the multiplicity of pathways of evolution, regulation and delivery strategy, imperatively calls for systems of checks and balances for the operations of microfinance institutions. In view of this, some earlier studies (Labie, 2001; Hartaska, 2005; Coleman and Osei, 2007 and Mersland and StrØm 2009) have explored the hypothesis of a directional causation from governance to microfinance objectives of outreach and profitability. In these papers, emphasis has been placed on the internal (corporate) governance indicators such as institutional board and management characteristics, disclosure, ownership structure and transparency. From this perspective, some insightful findings such as statistical significant effect of differences in board composition on firm performance have been observed to inform the management of MFIs. Beyond investigating the corporate governance effect on the objectives of microfinance

[52] This approach argues that poverty reduction is the only goal of MFIs and as such financial sustainability facilitates its achievement.
[53] Contrary to poverty reduction, the financial systems approach argues that the over-arching goal of any financial institution, including MFIs is profit maximization.

institutions, a couple of studies have examined the impact of some 'external' governance structures such as regulation, auditing and market competition (Hartaska 2005 and Mersland and StrØm 2009).

While we build on the initiative of exploring external governance effect on microfinance objectives, we argue that conceptualization and measurement of 'external' governance is crucial for any inference. We offer three reasons for the need of a careful conceptualization and estimation of 'external' governance. Firstly, from a conceptual perspective, we contextualize 'external governance' based on the functioning of institutions. The role of institutions in setting legal rules, enforcing contracts and inciting collective action both within and outside markets underpins the concept of economic governance popularized by the 2009 Economics Alfred Nobel Prize winners, (Elinor Ostrom and Oliver Williamson). Conceptualizing 'external governance' from the perspective of economic governance shifts the focus from a structure of systems to processes and adaptation of rules, enforcement and monitoring. This leads to the second point on measurement of external governance. We argue that time invariant factors (structure of systems) fail to capture the effect of governance on the functioning of imperfect markets such as microfinance. For instance, using traditional governance indicators such as a dummy to capture a democratic state or the presence press freedom constrains the ability to investigate causality using short panels. Thirdly, restricting governance to rules within the market such as regulation and auditing relies entirely on the microfinance institution. That is, the decision to become a formal institution thereby being regulated, in retrospect, will be positively correlated with the performance and future direction of the microfinance institution. This conjecture is likely to generate a bi-causal relationship between MFIs performance and decision for regulation and auditing. The foregoing inclines to a drift in both conceptualization and measurement of 'external governance' in the microfinance literature.

In this chapter, we identify 'external' governance indicators that are exogenous to the evolution, operation, regulation and sustainability of microfinance institutions to assess causality between governance and microfinance multiple objectives. Country level variables such as; contract enforcement procedures,

time required to secure property, credit information and voice and accountability are expected to have varying impact on the outreach and financial performance objectives of microfinance institutions. We hypothesize that 'external' governance causes microfinance institutions to reach poorer clients while internal operation is sufficient for financial sustainability. Our hypothesis is underpinned with a strong intuition that, MFIs will pursue the goal of profit maximization at least as an initial step when left alone.

We use ratio of average loan size to gross national product per capita and return on assets as proxies for microfinance outreach and profitability. The main finding of the study suggests that credit information availability and lesser time in securing property maximizes the objective of poverty lending focus of microfinance institutions. Product diversification leading to economies of scope also emerges to enable institutions to reach poorer clients. In the case of MFIs' financial performance, while 'external' governance systems appear to be of no need, good internal operational systems are sufficient.

The rest of the chapter is organized as follows; section 5.1 offers insights into the conceptual framework of governance and contextualizes it to the objectives of microfinance institutions. Sections 5.2 and 5.3 respectively discuss the econometric analysis and provide a description of the data and variables. The final two sections place the chapter's hypothesis in the context of the observed results and offer conclusions and recommendations.

5.1 Conceptual Framework

This section is underpinned by both a theoretical and an empirical argument. The theoretical framework situates the scope of governance in a microfinance setting. The empirical argument reviews the existing justification for a system of checks and balances in view of current debate on commercialization of microfinance institutions. While the latter has been addressed lately, we use the theoretical argument as a cradle for an extension of the scope of relationship between governance and microfinance dual objectives of reaching poorer clients and being profitable.

Williamson (1973) identified two types of opportunism that are likely to occur in an economic transaction. The less obvious type of opportunism emerges during execution of contract due to the lack of self enforcing mechanisms required to perpetuate transactional relations based on earlier promises. The role of monitoring to subvert the adverse effect of breach of contractual agreement demands a clear identification all stakeholders and their respective stakes. In contrast to the neoclassical profit maximization model, the social goals of microfinance institutions brings on board the behavioural theory of a firm. Simon (1959) argue that disparate objectives between internal stakeholders (managers, owners and workers) on one hand and other stakeholders such as the government leads to a drift away from profit maximization to satisficing. Satisficing require managers to identify minimum acceptable levels which is determined and evaluated by the most prominent stakeholder at any point in time. In this regard, setting and evaluating minimum standards for reaching poor clients and being profitable will require at least two conditions. First, reaching a consensus among microfinance stakeholders and secondly instituting a well functioning structure of checks and balances within a country to facilitate equal opportunities. In this chapter we concentrate on the latter.

The foregoing, places the argument of governance beyond the objectives of funds providers to include the goals of stakeholders who are inclined to poverty levels clients as well as non-clients affected by the operations of an MFI. Dixit's (2009) seminal paper provides both top-down and bottom-up approaches of governance that facilitates economic activity. In his paper, top-down strategies (securing property rights and contract enforcement) and a bottom-up (collective action) approach were identified as governance drivers. His central thesis was that for economic activities to perform well then the following should prevail.

Firstly, economic agents should have confidence that the fruit of their efforts will remain secured to benefit their own condition. Without this assurance people lose the incentive to save and invest. The twist in the case of microfinance is the direct protectionist role required from government and development partners to secure the savings and investment of MFIs, but more especially the poor. Instituting a system to promote security of property in the microfinance industry

should have the pronged objectives of ensuring that MFIs loans are protected and at the same time their intervention targets the poorer segment of the population.

Secondly, availability and functioning of contract enforcing institutions complement the process of securing properties. Dixit argues that economic agent's knowledge of the presence of an external system that ensures participating parties liability to a contract, promotes trust and facilitates honest engagement. Thus, a system promising that both formal and informal transactions shall be mutually enforced by trusting counterparts ensures joint satisfaction. In the absence of trust and confidence in the other party, people remain stuck in a prisoner dilemma which freezes all transactions. In view of the several stakeholders in microfinance, in an event of a mutual trust among any given set of economic agent (say MFI and client) their goal should complement other sets (say development partner and MFI) contractual goals. The immense presence of multiple principal-agent relationship as a result of several stakeholders in microfinance convolutes contract enforcement in microfinance.

Thirdly, proper functioning of institutions in ensuring security of property and facilitating contract enforcement can only be accomplished with well structured avenues for addressing common goals among people. Dixit (2009) argue that the outcome of most private transactions depends on sufficient provision of public goods and ability to minimize public "bads". The elements required for collective action are the functioning of groups and local information on alternatives. For instance, well informed activities of unionized workers, associations and consumer groups act as catalysts for seeking respective interests. Microfinance' group lending mechanism offers clients a spring board to galvanize action for sufficient provision of public goods and weave-out public "bads", however their impact has not been realized beyond the group's activities. In contrast, MFIs through their network associations have mobilized effort in most countries to address constraints facing the supply-side of the industry. Collective action manifested through active consumer (microfinance clients) groups and MFIs network is expected to ensure a mutual achievement of the poverty reduction and financial sustainability objectives.

The functioning of institutions securing property rights and enforcing contracts and avenues for collective action are expected to initially demystify unfounded stereotypes about financial service providers' rigidities, exclusivity, bureaucracies, high cost of service and barriers of entry. This will then open the frontiers of the primary stakeholders (MFIs) to both sides of the scale that is wholesale fund providers and clients. Subsequently, this will ensure that MFIs set minimum levels of objectives based on the consent of all stakeholders which will then lead to an all inclusive platform for the evaluation of performance through time.

Empirically, anecdotal evidence of a breakdown of trust between owners[54] and managers as a result of the multiple goals of reaching poorer clients and being profitable/sustainable has led to studies on the effect of corporate governance on microfinance performance. The motivation for these studies is the theoretical rift between managers and owners respective objectives of growth and profitability. In the context of microfinance institutions, this premise has reduced the scope of objectives to fund providers and managers. Subsequently, the current literature related to governance of micro-lending practices and microfinance institutions highlights the effects of specific internal governance patterns on outreach and profitability. A large majority of the literature focuses on internal control systems and management framework which are likely to affect either social or financial performance of MFIs (Labie, 2001; Hartaska, 2005; Coleman and Osei, 2007 and Mersland and StrØm 2009). Organizational and structural patterns of corporate governance such as size, composition, representativeness of the board and duality of Chief Executive Officer have been investigated (Hartaska, 2005 and Mersland and StrØm, 2009).

In view of the theoretical overview discussed above and scope of empirical evidence, it is imperative to investigate the effect of 'external' governance structure and functioning on the outreach and profitability of microfinance institutions. Offering evidence on the effect of 'external' governance on either or

[54] This includes development partners and government who provide funds wholesale funds for on-lending.

both of the objectives of microfinance institutions will set the tone for defining the role of other stakeholders, in particular the government.

5.2 Data

The quest of exploring the effect of 'external' governance factors and internal operations on performance of MFI dictates the use multiple sources of data. We rely on three secondary data sources for the empirical part of this chapter. The main data source is the Microfinance Information Exchange (MIX) and the other sources are the 'Doing Business' and 'Governance' data sources both of the World Bank. The MIX website reports institutional performance and operational indicators annually. This report is generated based on self reporting by the institutions however verification and authentication mechanisms are built into the procedures to ensure reliability of reportage. The 'Doing Business' and 'Governance' data of the World Bank offers us the opportunity to capture proxy variables for the three economic governance indicators, namely; security of property rights, enforcement of contracts and collective action.

MFIs' double bottom line objectives of reaching poorer clients and achieving financial sustainability makes it imperative to explore the effect of governance indicators from both perspectives. Depth of outreach and return on assets respectively, are used to measure the social and financial objectives of MFIs. Both measures are without flaws of measurement error, however comes in handy due their respective merits of standardization for reporting and comparison across different institutions and countries and easy, quick and less costly computation. These qualities of the measures have undermined known problems of interpretability. For instance, the measure for comparing institutions' inclination towards targeting poorer clients that is average loan size divided by gross national income per capita invites the long standing philosophical criticism on the use of gross national income.

The three main explanatory variables in the study are: number of procedures required for contract enforcement, time required for property registration and voice and accountability. Appendix 1 shows the measurement and interpretation

of these variables. In addition to these three 'external' governance indicators, we control for the effect of credit information index and regulation and other institutional characteristics. The correlation matrix (Table 5.2c) signals a variation in the association of each of the three economic governance indicators and the dual objectives of microfinance. The correlation indicates that longer duration in enforcement of contract is associated with reaching poorer clients and MFIs' achievement of higher profits. Both correlation signs are inconsistent with our expectations, as it is desirable to curtail bureaucracies. However, Ahlin et al. (2010) argues that the role of institutional factors on microfinance performance could be mixed in view of the informal characteristic of the sector. In the case of association between duration for property registration and the dual objectives of microfinance expected *a priori* signs are observed. The interpretation of the association or effect of the economic governance indicators on the dual objectives of microfinance institutions require caution due to measurement constraints that are likely to inhibit consistency between *a priori* expectation and our empirical findings. For instance, such measures fail to recognise the role and differences of public sector accounting systems.

Data for two hundred institutions is elicited from the MIX website based on regularity of reporting consecutively between 2004 and 2007. In view of the non-availability data for some of the 'Doing Business' indicators for 2004 and the seemingly slow rate of changes over a year for most of the indicators we restrict the econometric analysis to 2005-2007.

5.3 Econometric Analysis

We estimate a hypothesized functional relationship between MFI objectives (social and financial) and 'external' governance using least squares. In view of the potential effect of lagged variables not observed, reverse causality and omitted unobservable regressors, we compare results of pooled, fixed and random effects and static instrumental variable panel estimates. The latter is the studies main estimation technique as it allows for contemporaneous investigation of both time invariant and endogenous regressors. The peculiarity of microfinance objectives which is influenced directly by the vision and mission underpinning the evolution of the institution, justifies the use of an estimation

technique that takes into consideration the effect of omitted unobservable regressors. Also, the potential of reverse causality is imperative in our hypothesized functional relationship, as some country-level experience demonstrate the joint dependence between better performing institutions and governance. Lastly, characteristics of governance indicators that is fairly constant over time leading to time invariant regressors makes it prudent to estimate coefficients using lags of exogenous variables in the panel setting. These characteristics of microfinance paradigm are likely to hamper results emerging from a cross sectional least squares regression.

We run two separate regressions for each of the objectives of MFIs for the analysis. The general model is specified in Equation 5.1 below as;

$$DO_{ilt} = \alpha + \xi dT_t + \beta\lambda_{ilt} + \tau\gamma_{ilt} + \varepsilon_{ilt} \qquad 5.1$$

where DO_{ilt} represents either of the double bottom line objectives of the depth of outreach or return on assets for institution *i* in country *l* and time *t*. We include in the model, time dummy dT , vector of 'external' governance indicators λ and vector of institutional internal characteristics and credit information index γ. ε_{ilt} is a vector of mean-zero random errors. In the general set-up, the error term in assumed to capture both idiosyncratic error - μ_{it} (time varying) and unobserved institution and country heterogeneity - a_i. The latter error is of prime concern in view of the reasons enumerated earlier. Bundling the two errors (a_i and μ_{it}) into one (ε_{ilt}) as in the case of the general set-up causes correlation between the regressors and the error term leading to inconsistent and biased estimates.

In view of the data at our disposal, the estimation criteria for resolving the unobserved vision, competence and mission effect depends on whether they are time varying or constant factors. The specification of Equation 5.2 below supports the argument that the unobserved variables are time constant. This is a possibility, as anecdotes show that MFIs generating own funds for on-lending always gear-up for financial sustainability.

$$DO_{ilt} = \xi dT_t + \beta\lambda_{ilt} + \tau\gamma_{ilt} + a_{il} + \mu_{ilt} \qquad 5.2$$

Equation 5.2 decomposes the mean-zero random errors of Equation 5.1, into a time constant and random components and then sweeps-away the unobserved effects using either first differencing or fixed effects transformation (Wooldridge, 2006). The above specification suggests that in any time period there is an arbitrary correlation between the institution's vision and characteristics or 'external' governance. Practically the assumption of an arbitrary correlation between vision and institutional characteristics can be substantiated but caution is required in the case of a non-zero covariance between governance and MFIs vision.

The above argument implies the need to explore random estimation which assumes that a_i, λ_{ilt} , γ_{ilt} and μ_{it} are mutually uncorrelated.

$$DO_{ilt} = \alpha_i + \xi dT_t + \beta\lambda_{ilt} + \tau\gamma_{ilt} + \nu_{ilt} \qquad 5.3$$

The above equation include the intercept term α_i to ensure that the mean of the unobservable variables is zero [E (a_i) = 0] and ν_{ilt} is the composite error. The choice of random effect to either 'pooled' or 'between' estimation is informed by the application of generalized least squares (GLS) since the errors will be positively correlated for the same individual across time (Wooldridge, 2006).

While the Hausman test provides a decision criteria for the choice of either fixed or random effects, we proceed further to explore some potential caveats in using these techniques especially in the context of this chapter's hypothesis. The first caveat relates to general post estimation examination of regression (panel) analysis including serial correlation and heteroskedasticity. Secondly, in the context of this chapter, we examine the effect of time invariant and endogenous variables. In the case of the first caution, parametric bootstrapped and the feasible generalized least squares (FGLS) are estimated to investigate amount of

bias in the estimated coefficients, its standard error, and other aspects of its distribution.

The second caveat of general panel regression is of paramount interest due to the presence of time invariant explanatory variables that compounds the debate between the assumed strict exogeniety characterizing random effects and endogeneity associated with fixed effects estimation. In the presence of time invariant endogenous variables, the Hausman fixed/random effect selection is rendered redundant as the assumptions underlying each of the techniques are violated. Cameron and Trivedi (2009) posit that while fixed effects in most instances appear suitable for micro econometric analysis in providing consistent estimators, its use is hampered in an event where either one or more of the main covariate(s) is/are time invariant and endogenous.

In the context of a short panel (small T and large N) the likelihood of governance indicators remaining constant over time is high. For instance, once a microfinance institution transforms into a formal institution (associated with regulation and licensing) it is likely to remain as such for a sufficiently longer period of time. The reverse is also true for a microfinance institution that starts off as an informal institution. Also some institutional characteristics such as number of products offered remain constant over time. This is attributed to the risk associated with product innovation. The questionable homogeneity of the poor's characteristics has restricted expansion of microfinance products beyond basic credit and savings. In this sense, product diversification representing an institution that offers services beyond basic credit is time invariant. Although product diversity offers flexibility in accessing financial services its impetus has been restricted to respective institutional ability, risk characteristics and goals. Claessens (2006) identifies flexibility in the delivery of financial services as one of the core criteria for increasing access to financial services.

In addition to product diversification being time invariant it can be argued to be endogenous to the performance of the microfinance institution. Unlike other business enterprises that are driven by competition and for that matter consumer preferences influence product design, in the case of microfinance reaching a

competitive stage is yet to be realized in most countries (Porteous, 2006). In view of this the decision to launch a product is purely based on the discretion and competence of the microfinance institution. Finally, endogeneity of 'external governance' indicators is plausible due to; (i) measurement error (see Kaufmann and Kraay, 2008) and (ii) bi-causality between country level governance indicators and microfinance performance. In the case of the former 'external governance' might correlate with either μ_{it} in Equation 5.2 or ν_{ilt} in Equation 5.3 that is the idiosyncratic/composite error term in each of the estimations. The latter scenario is likely to generate correlation between the explanatory variables and microfinance specific fixed effects (a_{il}). Thus, random effect and pooled ordinary least squares (OLS) estimations yield inconsistent and bias coefficients. While this chapter limits the focus of endogeneity to correlation between the explanatory variables and unit specific effects, caution in interpreting the estimated coefficients is sounded due to the pervasiveness of micro panel data exhibition of measurement error (Baltagi, 2005). Also, though we try to resolve the problem arising from estimating time invariant variables, we are aware of the difficulty in disentangling its effect from unobserved and correlated individual effects.

The general fixed and random effects fail to deal with these problems due to their respective underlying assumptions as alluded to earlier. The forgoing presents three alternatives depending the type of problem (time invariant and/or endogeneity) and data availability. Traditional panel instrumental variable estimation emerges as a preferred choice in correcting endogeneity associated with potential measurement error of the governance indicators and either Hausman-Taylor estimator or the Fixed Effect Vector Decomposition estimator will be ideal depending on the correlation between time-variant and time-invariant variables and microfinance specific effect. As mentioned earlier, we restrict the estimation to Hausman-Taylor [HT] and the Fixed Vector Decomposition [FEVD]. In addition, to the HT and FEVD we explore the potential effect of three-way error components model in view of the fact that the institutions are grouped into different countries.

Beginning with the HT estimator we can specify Equation 5.4 below as;

$$DO_{ilt} = \xi_1 X_{1ilt} + \xi_2 X_{2ilt} + \beta_{1il}\lambda_1 + \beta_{2il}\lambda_2 + a_i + \mu_{it} \qquad 5.4$$

where ξ represent vector of time varying regressors but distinguished by (subscripts 1 and 2) in terms of whether they are correlated with the unobservable (a_i). In our context, all the explanatory variables with the exception of product diversification and regulation are time-varying regressors. β denotes the two time-invariant regressors – product diversification and regulation, both measured by a dummy variable. The subscripts 1 and 2 distinguish the endogenous time invariant variable (number of products offered by the microfinance institution) from the exogenous variable – regulation. As usual all the regressors are assumed to be uncorrelated with the idiosyncratic error term μ_{it}

.

Theoretically, HT is preferred to random effects as it tends to be less restrictive because at allows for some of the time varying explanatory variables to be correlated with the unit specific effects. While random effects estimation emerges as an obvious choice in the presence of time invariant explanatory variables it is restrictive due to the strict exogeneity assumption. The HT uses exogenous time-variant variables as instruments for endogenous time-variant variables and exogenous time-invariant variables (where available) and the unit means of the exogenous time-variant variables as instruments for the endogenous time-invariant regressors.

The estimation of HT follows the following procedure. In the first stage we estimate a standard fixed effects model. This sweeps away both λ_s and a_i in Equation 5.4 above. We then generate the residual (includes both λ_s and a_i and μ_{it}) and take the average (over time, for each i) to minimize the effect of the term. Representing the estimated residuals from Equation 5.4 with $\hat{\hat{\mu}}_{it}$ we can specify Equation 5.5 as;

$$\hat{\hat{\mu}}_{ilt} = \tilde{D}O_{ilt} - \tilde{\xi}_{FE} X_{1ilt} - \tilde{\xi}_{FE} X_{2ilt} \qquad 5.5$$

where ξ_s have been generated from the first stage fixed effects model and $\tilde{DO}_{it}$ are the predicted values of the dependent variable. Technically, $\hat{\hat{\mu}}_{it}$ of Equation 5.5 is made up the time invariant variables (λ_s) of Equation 5.4. In effect the β_s in Equation 5.4 are ascertained by running a regression of the averaged residual on λ_s using the fixed effects. The HT estimator is based on a transformation of the random effects (Cameron and Trivedi, 2009). In sum, HT uses lags to estimate and correct endogeneity problem on assumption that some of the regressors are uncorrelated with the errors.

The transformed estimable form of Equation 5.4, can be specified as;

$$DO_{ilt} - \theta_{il}\overline{DO_{il}} = \left(\xi_{1ilt} - \theta_{il}\,\bar{\xi}_{1il}\right)X_1 + \left(\xi_{2ilt} - \theta_{il}\,\bar{\xi}_{1il}\right)X_2 + (1 - \theta il\beta_{1il}\,\lambda 1 + 1 - \theta il\beta_{2il}\,\lambda 2 + [1 - \theta il\mu il + \hat{\hat{\mu}}_{ilt} - \theta il\bar{\hat{\hat{\mu}}}_{il}\,] \qquad 5.6$$

All other symbols consistent with earlier definition, the additional symbol, theta (θ) represents the adjusted covariance- variance ratio [55] of residuals of the structural form of Equation 5.5.

The empirical use of HT always requires an *a priori* identification of potential endogenous variables as we attempted doing earlier in the chapter. In this chapter two reasons are identified for the choice of explanatory variables that are likely to be endogenous. First, according to Kaufman and Kraay, (2008) in spite of the breakthrough made with regards measurement of governance indicators, they call for caution in its use due to measurement error. This potential error coupled with the slow changing characteristics of governance issues justifies the characterization of governance indicators as likely endogenous variables. Secondly, in view of the pervasive assumption of mutuality or trade-off between

[55] $\theta_{il} = 1 - \sqrt{\dfrac{\sigma_e^2}{\sigma_e^2 + T\sigma_u^2}}$

financial viability and outreach in the microfinance literature, we subscribe to a potential bi-causality. Based on the *a priori* identification of potential endogenous variables, HT estimation technique selects the other variables into different time varying/invariant and endogenous/exogenous groups. For instance, with the depth of outreach equation, the explanatory variables are categorized into; Time varying exogenous [Portfolio at Risk, Gross Loan Portfolio, Operating Expense, Cost per Borrower, Yield on Gross Loan Portfolio (Nominal) and Age of Institution]; time-invariant exogenous variables – regulation and product diversity; and time-variant endogenous (Voice and accountability, Property rights, Enforcement of Contracts and Credit information index).

While HT appears less restrictive relative to random effects estimations, the above suggests some discretionary and intuitive difficulty in the empirical world due to identification of exogenous explanatory variables that simultaneously correlate with the endogenous variables. Plümper and Troeger (2004) assert that researcher's discretionary role of choosing variables that are either exogenous or endogenous largely influence the results. Again Plümper and Troeger (2007) show that HT works well only when the instruments are uncorrelated errors and the unit effects are highly correlated with the endogenous regressors. In addition to these limitations, the other pre-requisite of a valid instrument which suggests correlation between the instrument and the endogenous variable is practically shelved. While this pre-requisite provides an intuitive underpin for employing instrumental variable estimation, HT solves endogeneity strictly of the functional form. In lieu of the forgoing, econometrically, the Hausman null hypothesis test of significant difference between coefficients (based on the strict exogeneity assumption) can be employed to determine whether estimates emerging from HT are significantly different from the fixed effects estimations (Baltagi, 2005).

An alternative perspective of Hausman-Taylor is Fixed Effects Vector Decomposition. The FEVD estimation is being popularized much more in comparative politics literature and since the chapter leans on to governance issues it is imperative to align with the current state-of-art. Plümper and Troeger (2004) suggest an alternative procedure to HT in view of its limitations. In

contrast to estimating a fixed effects model including time varying and time invariant explanatory variables in HT, the first stage estimation in FEVD runs fixed effects estimation on only the time varying regressors. In the second stage, we generate residuals from the fixed effects estimation and regress it on the time invariant variables. The rationale for the second stage estimation is to decompose the vector of residuals from the fixed effect into a part explained by the time invariant variables and an error component. Finally, to control for multicollinearity and degrees of freedom a third stage pooled least squares regression including all explanatory time variant variables, time invariant variables and the unexplained part of the fixed effects residual vector is estimated. Theoretically, the overarching advantage of FEVD over HT is the non-requirement of *a priori* knowledge of correlation between the explanatory variables and the unit specific effects.

We modify Equation 5.2, our initial fixed effects estimation and specify the first stage of FEVD in the context of this chapter as;

$$DO_{ilt} = \zeta + \xi X_{ilt} + a_{il} + \mu_{ilt} \qquad 5.7$$

Equation 5.7 drops the time invariant component. It is prudent to note that unlike Equation 5.5 of HT the generated residuals from Equation 5.7 do not include the time invariant explanatory variables. Equation 5.8 specifies the second stage that decomposes the residuals into observed time invariant factors and an error component.

$$\hat{\mu}_{il} = \gamma + \beta\lambda_{il} + \eta_{il} \qquad 5.8$$

where gamma (γ) is the intercept and eta (η) is the unexplained part.

With the same symbols as per the earlier equations, the third stage pooled least squares regression takes the forms;

$$DO_{ilt} = \alpha + \xi X_{ilt} + \beta\lambda_{il} + \eta_{il} + \varepsilon_{ilt} \qquad 5.9$$

Finally, we compare our estimates from the above estimation with the nested error components models due to the multi-level characterization of our dataset. Our dataset is nested within three components; that is institutional, country and over time. From an error component perspective we can decompose the multi-category potential effect as;

$$DO_{it} = \alpha + \xi X_{it} + \beta\lambda_{lt} + \eta_i + \psi_j + \mu_t + \varepsilon_{it} \qquad 5.10$$

Specification of Equation 5.10 above, suggests that estimating the functional relationship between governance indicators and microfinance objectives could potentially be affected by institutional (η), country (ψ) and time (μ) effects. Correlation between any of these errors and the vector of governance indicators (λ) will lead to endogeneity. In the previous estimation we concentrated on the institution effect hence we need to test the robustness of our estimates in the context of time and country level effects. The presence of 'age microfinance of institution' on the right-hand of the equation (estimable) subsumes the effect of time and this leads consistent coefficients whether or not time dummies are included in the model.

Andrews, Schank and Upward (2006) suggests that since we are only controlling for the effect of the error and not trying to estimate ψ_j taking the time-demeaning within each unique microfinance institution-country (spell) generates consistent estimators of the time varying coefficients (ξ and β).

5.4 Results and Discussion

This chapter's discussion focuses on the observed evidence of significant relationship between governance and microfinance dual objectives. We fail to narrow down on specific associations that will help identify possible transmission mechanisms between each of the different types of governance process and multiple objectives of microfinance institutions. This from our

perspective requires country specific analysis due to the heterogeneity of variations in country-level governance structures.

Two specific hypotheses can be derived from the main hypothesis mentioned earlier. Firstly, we posit that external governance is better placed to enable microfinance institutions to achieve their poverty lending objective rather than internal governance systems. The second hypothesis asserts that internal governance systems coupled with better operational performance are sufficient for the financial viability objective of microfinance institutions. The primary governance variables used in this chapter are regulation (internal) and property rights, enforcement of contract and voice and accountability (external). We also control for the effect of internal practices and performance (outreach, efficiency, risk and financial viability).

The analytical discussion draws a line of distinction between factors required for profitability and achievement of the social objectives of microfinance paradigm. We precede an in-depth discussion of the analytical part with a description of the operational and performance trends of the selected institutions and governance indicators of their respective countries. Table 5.1 of the appendix describes the variables used in this study, *a priori* expectations and data sources.

Table 5.1 - Variables, Description and Hypotheses

Variables	Description	Hypothesis	
		Depth of Outreach	**Return on Assets**
Depth of Outreach [a]	Measures of outreach (extent of reaching poorer client): Average loan bal. per borrower / Gross National Income Per Capita.	*	-
Return on Assets [a]	Measure of Overall financial performance: (Net operating income, less Taxes) / Assets, average.	-	*
Portfolio at Risk (30days) [a]	Measure of risk: The value of all loans that have one or more instalments of principal past due in excess of 30days / loan portfolio, gross.	-	-
Gross Loan Portfolio (GLP) [a]	Measure of outreach: All outstanding principals for all client loans	+	+
Operating Expense/ GLP [a]	Measure of efficiency: Operating expense/loan portfolio, gross, average.		
Cost Per Borrower [a]	Measure of efficiency: Operating expense / number of active borrowers, average	-	-
Yield on GLP Nominal [a]	Measure of revenue: Interest and fees on Loan Portfolio / Loan Portfolio, gross, average.	-	+
Product [a]	Measure of diversity of products offered by institution; = 1 if only loans and 0 otherwise.	+	+
Regulated [a]	Measure of 'internal' governance: Institution is regulated either by the central bank, ministry or some apex body.	+/-	+/-
Age of Institution [a]	Number of years of operation	+	+
Voice and Accountability [b]	Measures political, civil and human rights. Scores range from -2.5 to 2.5 with a mean of zero and a standard deviation of 1. With higher values indicating respect for rights and opportunity to enhance denial and violation.	+	*
Time taken to Register a Property [c]	Measure of 'external' governance: Captures the median duration that property lawyers, notaries or registry officials indicate as necessary to complete a procedure of registering a property.	+/-	-
Procedures for Contract Enforcement [c]	Measure of 'external' governance: Number of procedural steps necessary to enforce commercial disputes in relevant courts.	+/-	-
Credit Information Index [c]	This measures rules affecting the scope, accessibility and quality of credit information available at public and private credit registries. The index ranges from 0 to 6 with higher values indicating availability of more credit information that shapes lending decisions.	+	+/-

Sources: a – Mix Market; b – World Bank Governance Indicators and c – World Bank, Doing Business Indicators.

Table 5.2a - Descriptive Statistics – Yearly Data

	2004			2005			2006			2007		
Variables	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Depth of Out.	213	69.82	83.08	221	63.20	71.28	218	72.63	124.67	205	79.29	157.20
Return on Assets	214	1.31	15.77	211	2.51	10.30	220	2.58	8.22	206	2.96	7.34
Portfolio at Risk	194	5.69	9.50	202	6.01	9.14	204	5.96	11.18	196	5.37	10.09
Log of gross loan portfolio	217	15.05	1.88	220	15.34	1.69	221	15.69	1.70	208	16.14	1.89
Operating Expense/GLP	214	31.38	31.93	213	28.79	25.11	221	26.74	21.07	206	23.15	17.88
Cost Per Borrower	214	127.53	124.24	214	127.41	119.68	220	141.58	168.77	204	153.34	172.26
Yield on GLP Nominal	152	38.22	17.03	172	36.31	16.51	201	34.61	17.20	199	32.48	15.84
Products	221	0.64	0.47	221	0.64	0.47	221	0.64	0.47	221	0.64	0.47
Age of Institution	221	9.70	6.51	221	10.70	6.51	221	11.70	6.51	221	12.70	6.51
Regulated	221	0.62	0.49	221	0.62	0.49	221	0.62	0.49	221	0.62	0.49
Voice and Accountability	221	- 0.35	0.51	221	- 0.37	0.52	221	- 0.33	0.54	221	- 0.36	0.57
Time for Property Registration	-	-	-	219	104.82	136.35	219	105.01	136.45	221	95.97	111.02
Procedures for Contract Enforcement	208	39.22	3.65	219	39.01	3.62	219	39.00	3.62	221	38.88	3.68
Credit Info. Index	-	-	-	216	2.12	2.04	219	2.37	2.03	221	2.75	2.09
No. of Active Borrowers	218	44613	254303	221	59102	348806	220	71019	428337	205	87714	475643
Yield on GLP Real	152	31.023	14.601	172	27.772	15.028	201	26.495	15.890	199	34.477	145.56

Table 5.2b - Descriptive Statistics – Panel Data

Variables		Mean	Standard Deviation	Observations
Depth of Out.	Overall	71.094	113.480	N = 857
	Between		82.430	n = 221
	Within		77.766	T-bar = 3.877
Return on Assets	Overall	2.337	10.923	N = 851
	Between		9.350	n = 221
	Within		5.689	T-bar = 3.851
Portfolio at Risk	Overall	5.763	9.998	N = 796
	Between		8.554	n = 217
	Within		6.117	T-bar = 3.668
Log of gross loan portfolio	Overall	15.547	1.833	N = 866
	Between		1.734	n = 221
	Within		0.626	T-bar = 3.919
Operating Expense/GLP	Overall	27.548	24.730	N = 854
	Between		23.474	n = 221
	Within		9.435	T-bar = 3.864
Cost Per Borrower	Overall	137.305	148.230	N = 852
	Between		132.382	n = 221
	Within		65.567	T-bar = 3.855
Yield on GLP Nominal	Overall	35.189	16.729	N = 724
	Between		16.421	n = 208
	Within		5.807	T-bar = 3.877
Products	Between	0.674	0.469	N = 884
	Overall		0.470	n = 221
	Within		0	T-bar = 4
Age of Institution	Overall	11.201	6.598	N = 884
	Between		6.514	n = 221
	Within		1.119	T-bar = 4
Regulated	Overall	0.620	0.486	N = 884
	Between		0.487	n = 221
	Within		0	T-bar = 4
Voice and Accountability	Overall	- 0.354	0.536	N = 884
	Between		0.528	n = 221
	Within		0.981	T-bar = 4
Time – Property Registration	Overall	101.914	128.324	N = 659
	Between		125.255	n = 221
	Within		27.497	T-bar = 2.982
Procedures for Contract Enforcement	Overall	39.025	3.638	N = 867
	Between		3.614	n = 221
	Within		0.408	T-bar = 3.923
Credit Info. Index	Overall	2.415	2.069	N = 656
	Between		1.991	n = 221
	Within		0.569	T-bar = 2.968
Number of Active Borrowers	Overall	65269.25	384135.80	N = 864
	Between		370526.40	n = 221
	Within		87395.42	T-bar = 3.910
Yield on Gross Loan Portfolio Real	Overall	29.945	77.335	N = 724
	Between		48.981	n = 208
	Within		62.478	T-bar = 3.481

Table 5.2c Correlation Matrix

Variables	Depth of Outreach	Return on Assets	Portfolio at Risk	Gross Loan Portfolio	Operating Expense Ratio	Cost per Borrower	Yield on Gross Loan Portfolio	Regulated	Age of MFI	Voice and Accountability	Property registration	Enforcement of Contract	Credit Information Index	Product Diversification
Depth of Outreach	1.00													
Return on Assets	-0.02	1.00												
Portfolio at Risk	0.09	-0.33	1.00											
Gross Loan Portfolio	0.08	0.29	-0.17	1.00										
Operating Expense Ratio	0.01	-0.65	0.16	-0.51	1.00									
Cost per Borrower	0.16	-0.08	0.07	0.03	0.00	1.00								
Yield on Gross Loan Portfolio	0.02	-0.08	-0.02	-0.38	0.75	0.02	1.00							
Regulated	0.17	0.10	0.00	0.22	-0.25	0.08	-0.27	1.00						
Age of MFI	-0.02	0.10	0.06	0.32	-0.13	-0.08	-0.09	-0.15	1.00					
Voice and Accountability	0.05	-0.14	0.10	0.07	0.14	0.31	0.10	-0.12	0.18	1.00				
Property registration	0.17	-0.05	0.12	0.03	0.01	0.09	-0.03	0.02	0.00	0.08	1.00			
Enforcement of Contract	-0.03	0.05	0.06	0.17	-0.17	-0.16	-0.23	0.26	0.05	-0.17	-0.04	1.00		
Credit Information Index	-0.17	0.04	-0.15	0.21	-0.08	0.12	-0.04	-0.21	0.17	0.40	-0.07	-0.26	1.00	
Product Diversification	0.04	0.00	0.10	0.18	-0.15	-0.06	-0.20	0.05	0.16	-0.10	-0.06	0.12	-0.10	1.00

Tables 5.1 and 5.2 are important for the interpreting the estimated coefficients of Tables 5.3 to 5.5. For instance, an increase in depth of outreach is interpreted as reaching relatively non-poor clients since the loans size gets bigger than the gross national income per capita. Mutuality in this context is observed in an event where depth of outreach and return on assets move in opposite directions. While the mean of return assets on assets showed a consistent increasing trend over the four year-period, depth of outreach was mixed with a fall between 2004 and 2005 and thereafter increasing. At the minimum, one is tempted to probe further as the expected opposite trends is not easily identifiable.

In addition to the MFI outputs (targeting and profitability) showing indefinite results, some operational variables also incite further investigation. For instance, the two efficiency[56] factors (operating expense divided by gross loan portfolio and cost per borrower) exhibit parallel directional effects on depth of outreach and return on assets. The difference between these two measures is the denominator. While both measures rely on operating expense as the numerator, cost per borrower unlike operating expense is divided by number of active borrowers. Observing the parallel trends, one can surmise two possibilities. Firstly the decrease in operating expense divided by gross loan portfolio (OEGLP) is caused by increases in gross loan portfolio as shown from the trend in the log of gross loan portfolio and secondly, increases in cost per borrower is caused by decreases in the number of active borrowers. The latter deduction is ruled out as over the period number of active borrowers increased. Based on the above, we allude to a simplistic assertion that over the period efficiency of microfinance institutions has fallen.

Institutional efficiency and cost of microfinance services to beneficiaries remains one of the sensitive and much demanded areas begging for research. The two opposing views are that, microfinance institutions pass on their inefficiencies to microfinance clients through higher cost. The premise of this view point is supported by client's price insensitivity. On the other hand practitioners argue that then high price of lending charged are the real operational cost of dealing

[56] Efficiency is measured in the context of MFI reporting standards and relies on simple averages.

with the poor. While this is not the direct objective of this study, our descriptive finding with respect to efficiency and cost of financial services provides an added spring board to the debate and need for research on the issue. Due to wide variability in the measure of interest rate, yield on gross loan portfolio, has been used as a proxy variable (Rosenberg et al., 2009). We observe that the average yield on gross loan portfolio (YGLP) of about 30 percent is consistent with the earlier finding by Rosenberg et al., (2009). However, overtime, while one observes a decreasing trend in the case of nominal YGLP, real YGLP show an increase between 2006 and 2007 in spite of earlier decreases between 2004 and 2006. Arguing from the real perspective, one is tempted to subscribe to the notion that MFIs over time are passing on their inefficiencies in terms of higher cost to microfinance beneficiaries. This observation remains a conjecture due to lack of rigour estimation technique to substantiate this preliminary evidence. However it does stimulate the need for further studies into the relationship between efficiency and cost of microfinance operations.

The within variation for all the 'external' governance indicators approaches zero with the exception of time taken to register properties that fell by almost 10 percent points between 2006 and 2007. This finding of the country level governance variables is not surprising due to rigidity towards changing behavioural practices.

The analytical discussion compares coefficients emerging from estimating five different econometric techniques namely: pooled; fixed; random; HT and FEVD. The estimations are done for both the financial and social objectives of microfinance institutions. As indicated earlier, discussion of the estimates is mindful of the time invariant and endogenous features of our variables. In addition to the five estimations discussed we quietly estimate spell fixed effects, feasible generalized least squares (FGLS) and bootstrapped fixed and random effects to verify the robustness of our estimates.

We observe two broad patterns consistent with the hypothesis of the chapter. Firstly, external governance indicators significantly affect the proxy for depth of poverty in all five estimations. Secondly, with the exception of FEVD most of

the institution operational variables fail to explain MFIs reach of poorer clients. These two observations provide initial basis to argue that MFIs willingness to achieve the social mission of reaching poorer clients necessarily requires the role of an external institution.

The pooled estimates represented in Column 2 of Table 5.3 with its merits of using a larger sample size, less restrictive and ability to investigate the effect of changes over time by including time dummies shows consistent results with the random effects estimation. However, the underlying assumption of homogenous microfinance institution and country level effects leads to bias estimates. This is likely to generate omitted variable bias leading to endogeneity. In the post estimation tests of Table 5.5, we observe that the test of Poolability fails using both F-test of fixed effects and Lagrange multiplier for random effects.

Table 5.3 - Regression Analysis – Dependent Variable: Average Loan Size/GNIpc

Explanatory Variables	Pool	Fixed Effects	Random Effects	Hausman-Taylor	Fixed Effects Vector Decomposition
Return on	- 0.37	- 5.88**	- 1.60	- 5.85**	- 5.88***
Assets	(1.54)	(2.32)	(1.57)	(2.30)	(1.18)
Portfolio at	1.01	0.59	0.85	0.13	0.59
Risk	(0.78)	(1.21)	(0.86)	(1.06)	(0.66)
Gross Loan	10.59*	10.56	10.72**	- 0.45	10.56***
Portfolio (log)	(5.67)	(21.67)	(5.38)	(10.67)	(3.66)
Operating	- 0.12	- 3.89***	- 0.66	- 3.01**	- 3.89***
Expense	(0.66)	(1.36)	(0.94)	(1.32)	(0.73)
Cost per	0.10**	0.17	0.07*	0.02	0.17***
Borrower	(0.04)	(0.10)	(0.04)	(0.07)	(0.03)
Yield on Gross	0.67	-1.11	0.95	1.04	- 1.11
Loan Portfolio	(1.48)	(1.37)	(0.91)	(1.26)	(0.70)
Age of	0.01	7.17	0.14	2.48	7.17***
Institution	(0.80)	(10.63)	(1.20)	(2.20)	(0.83)
Product	6.64	-	4.28	12.61	- 30.55***
Diversification	(12.65)		(15.30)	(26.48)	(9.76)
Regulated	36.27***	-	36.68**	74.02**	17.34*
	(7.96)		(16.10)	(33.69)	(10.13)
Voice and	15.20	- 13.47	15.26	- 38.19	15.62
Accountability	(11.50)	(52.95)	(14.60)	(43.62)	(9.68)
Property	0.12	0.76***	0.15***	0.66***	0.09***
Rights	(0.13)	(0.16)	(0.05)	(0.15)	(0.03)
Enforcement	-	- 1.21	- 3.96*	- 34.58**	- 7.24***
of Contract	3.69***	(26.25)	(2.13)	(14.76)	(1.38)
	(0.89)				
Credit	-	- 7.37	-	- 14.84**	- 20.63***
Information	13.14***	(8.75)	12.77***	(6.50)	(2.53)
	(3.33)		(3.71)		
Eta	-	-	-	-	1.00***
					(0.05)
Constant	8.18	268.260	24.91	1354.35	621.49***
	(85.15)	(1065.99)	(114.30)	(574.35)	(79.82)
N	531	531	531	531	531
Adj. R^2	0.104	-0.448	-	-	0.397
F-Statistic	10.54	4.46	-	3.16	40.32
F-Statistic	2.26	-	-	-	-
[MFIs' Effect]	(0.00)***				
Log-Likelihood	-3294.97	-3058.07			

Robust Standards Errors (in parenthesis) *** One percent ** five percent & * ten percent*

In estimating both fixed and random effects we initially consider one error correction model in spite of the potential effect of time and country level effect. We justify the restriction of the estimation to only microfinance specific effect error based on the following: Firstly, the inclusion of age of institution appeared to be correlated with time effect. Secondly, we explore the country level effect

only as a post estimation analysis because estimating the extent of effect is not central to the focus of the current chapter. The defining variation of exogeneity for random effects and some amount of correlation between unit specific effects and the explanatory variables of fixed effects led to the observation of marked difference in the coefficients of between the estimations. Worth mentioned initially, was the expected inability of fixed effects to estimate the time invariant variables that is regulation and product diversification. While the random effect offered results for all the governance indicators, the Hausman test of Table 5.5, showed random effects coefficients were not consistent and that had biases which can be attributed to endogeneity.

This finding justifies the choice of a fixed effect related estimation technique such as HT or FEVD. Column 4 of Table 5.3 shows the ability of HT in estimating time invariant variables. This however was not without a cost on the efficiency of the coefficients. Inspecting all the estimations it is clearly evident that HT had the largest standard errors implying a compromise on the efficiency of our coefficients. Up to this point however, it is the HT taylor offers a more preferred results that are consistent with the hypothesis and findings from previous literature. For instance, regulation shows a positive association with average loan size and has been justified with the argument that prudential regulation leads to higher loan sizes. This finding is consistent with recent empirical studies including; Hartaska and Nadolnyak (2007), Mersland and Strom (2009) and Cull et al (2009). The FEVD hints on a possible reversal of this wave of emerging evidence as it shows that the positive association is significant only at 10 percent alpha level. The outcome can be associated with the capability of FEVD in capturing the time invariant specific effects at the second stage as shown in Equation 5.8.

Albeit variations in GNIpc the coefficient of property rights in Table 5.3 points to a positive association between duration for property registration and larger loan amounts. In this context MFIs will argue that longer duration increases their operational cost making lending in smaller amounts more expensive for clients and as such unprofitable. Barring all the ifs associated with this potential transmission mechanism between property rights and reaching poorer clients, this

finding inclines to the need to reduce duration for registering a property to enable MFIs achieve the poverty reduction objective. In a reverse fashion the coefficient of contract enforcement depicts a negative association between number of procedures in enforcing a contract and average loan size. Arguing based on Williamson (2000), although hierarchy of institutions makes the contract enforcement cumbersome it facilitates targeting of poorer clients. While we acknowledge the multiplicity of reasons that can be offered for the respective signs associated with the effect of property rights and enforcement of contracts on reaching poorer clients, the significant coefficients provides enough justification for country specific studies. On the backdrop of Williamson's assertion that "different kinds of transactions call for different governance structures" (cited on p.7, The Royal Swedish Academy of Sciences 2009) the country specific studies will explore the exact transmission mechanisms between these governance indicators and microfinance objective of reaching poorer clients.

Since poorer clients are better reached in an environment with less information asymmetry between borrowers and MFIs the negative sign associated with credit information is consistent with our *a priori* expectation. Cull et al. (2009) based on economic theory suggests that asymmetry information related problems hinder MFIs quest of serving the under-served.

The variable 'Eta' of Table 5.3, captures the unexplained term of Equation 5.8, and its significance suggests that errors associated with the time invariant and slow changing governance indicators are significant. This partially explains the relatively larger standard errors the other estimations especially the HT estimation. In this regard, the FEVD estimates offers much more efficient results compared with all other estimations as it tends to offer smaller standard errors.

Table 5.4 examines the effect of the same set of explanatory variables as in Table 5.3 on MFIs return on assets. In contrast to reaching poorer clients, we observe that most of the governance indicators are not significant for all the estimations. However, all the operational variables are significant in explaining the return on assets of MFIs. Observing the coefficient for the FEVD estimation of Table 5.4,

it is observed that regulation significantly affects MFIs performance. Again this finding with the FEVD is in contrast with earlier microfinance – governance empirical research including; Hartaska and Nadolnyak (2007); Mersland and Strom (2009) and Cull et al. (2009). The respective observations of significant relation between operational issues and regulation on MFIs performance uphold the second hypothesis. While voice and accountability and contract enforcement appear significant in the FEVD estimation, we hesitate in attributing a justification for the observation as it does not emerge consistently with the earlier estimations.

Table 5.4 - Regression Analysis – Dependent Variable: Return on Assets

Explanatory Variables	Pool	Fixed Effects	Random Effects	Hausman-Taylor	Fixed Effects Vector Decomposition
Average Loan Size/GNIpc	- 0.00 (0.00)	- 0.00** (0.00)	- 0.00* (0.00)	- 0.00*** 0.00	- 0.00*** (0.00)
Portfolio at Risk	- 0.14*** (0.05)	- 0.16*** (0.03)	- 0.15*** (0.02)	- 0.16*** (0.02)	- 0.16*** (0.02)
Gross Loan Portfolio (log)	- 0.50*** (0.13)	- 1.16** (0.52)	- 0.55*** (0.17)	- 0.71*** (0.26)	- 1.16*** (0.09)
Operating Expense	- 0.54*** (0.03)	- 0.48*** (0.02)	- 0.51*** (0.01)	- 0.51*** (0.01)	- 0.48*** (0.01)
Cost per Borrower	- 0.00*** (0.00)	- 0.00 (0.00)	- 0.00** (0.00)	- 0.00 (0.00)	- 0.00 (0.00)
Yield on Gross Loan Portfolio	0.48*** (0.03)	0.39*** (0.02)	0.44*** (0.12)	0.41*** (0.02)	0.39*** (0.01)
Age of Institution	0.07** (0.03)	0.18 (0.26)	0.07* (0.04)	0.11* (0.06)	0.18*** (0.02)
Product Diversification	- 0.26 (0.37)	- 	- 0.14 (0.51)	0.43 (0.96)	- 0.20 (0.23)
Regulated	0.56 (0.38)	- 	0.51 (0.54)	- 0.40 (4.74)	1.14*** (0.24)
Voice and Accountability	- 0.10 (0.39)	- 0.88 (1.27)	- 0.07 (0.46)	- 1.17 (1.05)	- 0.53** (0.23)
Property Rights	0.00 (0.00)	0.01 (0.00)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)
Enforcement of Contract	0.10* (0.05)	0.45 (0.63)	0.11 (0.07)	- 0.02 (0.47)	0.10** (0.03)
Credit Information	- 0.02 (0.10)	-0.23 (0.21)	- 0.11 (0.11)	- 0.33* (0.18)	0.04 (0.61)
Eta	-	-	-	-	1.00*** (0.03)
Constant	4.92 (3.00)	1.62 (25.60)	5.74 (3.68)	13.58 (16.98)	14.35*** (1.81)
N	531	531	531	531	531
Adj. R^2	0.815	0.549	-	-	0.927
F- Statistic	43.86	77.94	-	125.41	496.26
F-Statistic (MFIs' Effect)	4.94 (0.00)***	-	-	-	-
Log-likelihood	-1455.84	-1077.94	-	-	-

Robust Standards Errors (in parenthesis) **** One percent ** five percent & * ten percent*

Table 5.5 - Post Estimation Results

Test	Pool	Fixed Effects	Random Effects	Hausman-Taylor	Fixed Effects Vector Decomposition
Poolability	**X**	√	√	-	-
Hausman (FE and RE)	-	√	**X**	-	-
Hausman (FE and XTHT)	-	**X**	-	√	-
Serial Correlation	-	**X**	-	-	-
Joint Significance of Gov. Ind.	-	√	-	-	-
Country Level Effect	-	√	-	-	-
Over Identification of Ins.	-	-	-	√	-

The robustness of our estimates is summarized in Table 5.5. It is worth commenting on MFI specific effect shown by 'F-Statistic (MFIs' Effect)' in both Tables 5.3 and 5.4. The probability values show statistical significance of MFI specific effect, [F- values of 2.26 and 4.94 for Tables 5.3 and 5.4 respectively]. Hence any estimation that ignores this institution specific effect will generate bias coefficients. The next concern is the nature of the MFI-specific effects that is whether they are fixed overtime and/or correlate with the other observed explanatory variables in the model. Table 5.5 examines the implications for the different estimations. The joint significance of the governance indicators is empirically verified and they emerge significant at five percent. Although serial correlation is observed, we quietly estimate the differenced data and signs and significant coefficients remain unchanged for our main explanatory variable. Column three of Table 5.5 shows that after controlling for institution-country effect using the spell fixed estimation our main covariates remain resolute in terms of both significance and direction.

5.5 Conclusion

The relationship between microfinance institutions' objectives and governance roles performed by other bodies such as the judiciary, executive arm of government in-charge of securing property and collective action. In lieu of the inconclusive empirical evidence in support of MFIs' ability to achieve the win-win objective of poverty reduction and financial sustainability we fail to understate the role of MFIs for two reasons. Firstly, MFIs mitigating role in bridging interest rates between moneylenders/loan sharks and traditional bank

and secondly it's wider effect through non-financial services and community engagement. Evidence of microfinance mitigating the potential adverse effect of usurious interest rates of moneylenders and contributing to the overall paradigm shift of subsidy intervention makes it imperative to identify best operational strategies and enabling business environment and governance structures requisite for achieving their multiple objectives.

In this chapter, we investigate the effect of 'external' governance on the poverty and financial objectives of microfinance institutions. The study rationalizes a case for 'external' governance in achieving poverty reduction and other social objectives of microfinance. Two broad conclusions emerge from the study. First, unlike operational outcomes such as interest rate and operating expenses, 'external' governance indicators fail to cause changes in the profitability of microfinance institutions. Secondly, and in an opposite fashion, 'external' governance indicators emerge as significant variables for the poverty reduction objective of microfinance institutions. Specifically, shorter duration in completing a registering a property has the potential of procedure of reducing transactional cost which in turn is expected enable institutions target poorer clients. Availability of credit information also leads to the reach of poorer clients. The study offers three policy recommendations specifically for microfinance objective of reaching poorer clients. The above finding suggests a redefinition of the role of government and development partners. Both empirical and anecdotal evidence suggests that governments' and development partners' involvement in microfinance operational issues including retail financial and interest rates capping have failed. We prescribe the following roles for government and development partners. Firstly, reduce bureaucracies to expedite process of securing property; conduct institutional ratings and expand credit information bureaus and lastly establish confidence of the poor in institutions. While the latter is not a direct outcome of the current study, we deem it a necessary condition for tapping the benefits likely to be generated from a well structured set of institutions in any economy.

CHAPTER SIX

MICROFINANCE EFFICIENCY TRADE-OFFS AND COMPLEMENTARITIES

6.0 Introduction

Recent evidence of diminishing loan portfolio quality has heightened the drive to investigate the efficiency of microfinance institutions. Anecdotally, this has been attributed to the adverse effects of the global financial turmoil. Chen et al. (2010) show that in the latter part of 2008 and early 2009 credit quality and growth of microfinance institutions (MFIs) dropped in comparison to the period between 2005 and 2007. In addition, growing and unflinching interest from commercial banks and private capital investors in microfinance, coupled with high cost of service delivery, generates concern regarding the efficiency and financial sustainability of MFIs. The conceptual variation between efficiency and financial sustainability is imperative.

While empirical research on MFIs sustainability dominates microfinance literature, rigour efficiency assessment has been shelved. From an accounting/management perspective, the ratio of operating expense to gross loan portfolio has been the overriding index (Kneiding and Mas, (2009) and Blaine, (2009)) in measuring MFIs efficiency. Using data from the Microfinance Information Exchange (MIX) market, Figure 6.1 below, compares the median trend of operating expense ratio with gross loan portfolio (GLP). Consistent with findings from Blaine (2009), we observe that operating cost ratio dropped from 2004 to 2007 but stagnated thereafter showing a relatively flat curve between 2007 and 2008. This engenders two main reactions as to whether the level reached in 2007 is the farthest MFIs can reduce operating cost or the stagnation can be attributed to an external influence such as the financial crisis as being purported. While this measure reveals the trend of efficiency over the period, it is criticised for its' a narrow view point due to the use of a single input and output. Also such efficiency ratios merely scratch the surface of the problem rather than identifying reasons for a particular shape of the trend.

Based on the financial and poverty reduction goals (dual objectives) of MFIs, this study measures efficiency based on a multiple input/output framework and assesses estimates in the context of both pure technical[57] and scale[58] efficiency. We argue that: (1) patterns and trends of MFIs efficiency vary depending on the assumption underlying returns to scale (pure technical and scale); and (2) MFIs' inclination to either of the dual objectives (financial sustainability or poverty reduction), operational strategies and the external environment affects their efficiency. Specifically, hypotheses tested in this chapter are: (1) operational sustainability complements efficiency (financial and social); (2) MFIs targeting women trade-off their financial efficiency with social efficiency; and (3) external environment (credit information, property rights and financial development) has a significant positive effect on MFIs' social efficiency, while financial development impacts only upon financial efficiency.

In spite of the evidence of falling operating expense until 2007 (Kneiding and Mas, 2009), operating cost still accounts for about 50 percent of interest yields of microfinance' operations (Rosenberg et al., 2009). While questions on the depth and scope of the fall in operating expenses is imperative a more important concern is – what proportion of the cost borne by poor clients? This in our view crucially depends on the efficiency of MFIs. While we are cautious of subscribing fully to the notion that MFIs with lower interest yields (rates) as a result of declining operating expense are efficient, the reverse argument from efficiency to cost of borrowing is intuitive and as such must be pursued as a necessary condition. Thus, driving MFIs towards an efficiency frontier by identifying best performing institutions based on input-output relationship is imperative. MFIs' characterization of multiple objectives (financial and social) and sources of funds (commercial, subsidized and grants) generates some complexities identifying outputs for informed inputs.

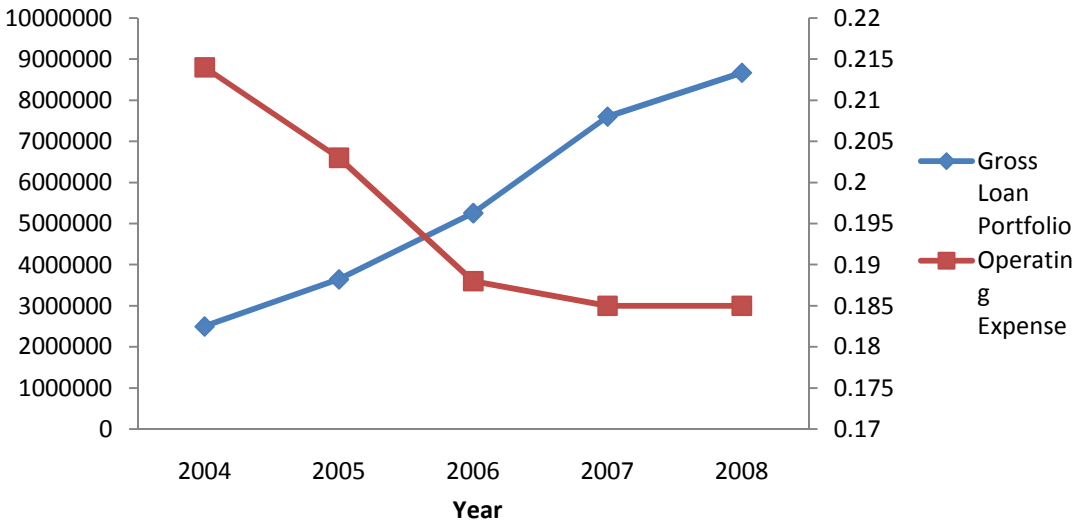
Gonzalez (2008) and Kneiding and Mas (2009) among others identify MFIs' operational channels for reducing operating expense (efficiency) to include; age,

[57] Pure technical efficiency is based on the MFIs' managerial ability to implement production plans and processes accurately.
[58] Scale efficiency focuses on the overall growth and planning of the MFI. The board and/or owner of the MFI are responsible for improving scale efficiency.

loan size, product diversification, competition and scale (clientele base – precisely, number of active borrowers). In spite of the relevance of these factors in achieving efficiency, their relative and joint effects remain unknown. For instance, it is intuitive that product diversification and competition are relatively slow and more demanding compared to reaching more clients. That is, on the backdrop information that a huge unreached market exist, the only condition for increasing size of operation is sourcing for more funds for on-lending. By contrast, product diversification and competition requires technical skills and external competition on product basis. Age of institution has proven to lower per unit cost of operation but in most instances it is correlated with size of the operation (Gonzalez, 2008 and Kneiding and Mas, 2009).

The apparent option of increasing size of operation has recently attracted concerns in view of the intricacies surrounding the perceived huge market requiring access to financial services (Beck et al, 2009 and CGAP 2009). Among the concerns is whether the poor really need microloans. The debate on access and use of financial services (Claessens, 2006) offers a justifiable platform to question the global and national estimates of demand for microloans. Anand and Rosenberg (2008) calls for caution in relying on reported estimates on the demand for microfinance services. Their initial assessment points to a potential overestimation of the demand for microloans. Despite these concerns, size of MFI remains the widely used tool in reducing operating cost (achieving efficiency).

Figure 6.1 - Trend of Gross Loan Portfolio and Operating Expense



In this chapter, we explore variants of efficiency measures (pure technical and scale efficiencies) in the context of narrow and broad perspectives of financial performance and breadth of outreach (targeting women). We therefore examine patterns and trends of efficiency from six perspectives. The motivation is premised on the different components of financial sustainability and outreach (Appendix IV). For the sake of brevity, we restrict the investigation of efficiency drivers to pure technical efficiency. As a result three perspectives of pure technical efficiency (narrow and broad financial performance, and breadth of outreach) are examined for the hypotheses.

This chapter's significance is dual. In addition to the above trend related issues, a probe into the conceptual difference between efficiency and sustainability adds to the rationale for this study. A casual definition of efficiency – deriving the best from available resources – maintaining focus into the future, clearly points to a 'necessary' and 'sufficient' perspectives. First from a management policy perspective, the calculation of relative efficiency scores will provide a benchmarking analysis to stimulate efficiency of MFIs towards the direction of best performing institutions. Secondly, estimating drivers of efficiency will generate public policy discourse. This in our opinion is a crucial step in determining microfinance resilience to shocks.

Based on reviewed microfinance economic efficiency empirical studies (Hermes et al. (2009); Haq et al. (2009); Gutierrez-Neito et al. (2009); Bassem (2008); Hermes et al. (2008); Gutierrez-Neito et al. (2007); Qayyum and Ahmad (2006); and Nghiem et al. (2006)), this chapter's contribution to the literature, is three-fold. Firstly, we use balanced panel data in the context of Data Envelopment Analysis (DEA) to examine patterns and trends of MFIs' efficiency and to investigate the effect of MFI characteristics and the external environment. This brings to the fore some empirical newness since we are able to disaggregate the efficiency of the same set of microfinance institutions into pure technical and scale efficiencies over time. Secondly, bootstrapping the efficiency scores to enhance statistical inference leads to comparability of DEA with parametric stochastic frontier analysis (SFA) including Gonzalez (2008) and Hermes et al. (2009). Finally, spinning off from Nghiem et al. (2006)[59] and Hermes et al. (2009), which respectively use DEA and SFA our second stage estimation will provide a platform to compare microfinance efficiency studies. With the backdrop that DEA efficiency scores are data specific, comparing results from different datasets is a 'pill hard to swallow'. However, recent developments in particular Simar and Wilson (2007) make comparison plausible even in the context of different datasets. This study uses both DEA and SFA. The use of parametric stochastic cost frontier analysis as a robustness test offers a two pronged support for this study. Firstly, we are able to validate our DEA estimates and observe potential differences given the limitations of each of the estimation techniques. Secondly, we are able to benchmark the social efficiency estimates of the DEA with the financial efficiency of SFA.

Amidst a plethora of efficiency methods, we use Data Envelopment Analysis (DEA) as our main estimation technique but support our findings with parametric stochastic frontier estimation. While the decision to use DEA was not based on its superiority over other parametric estimation techniques, the nature of available data, complexity of MFI multiple goals and the study's objective of disaggregating efficiency scores without forcing any *a priori* restrictions on the data contributed to its predominant (both descriptive and estimation) use. DEA's

[59] In this paper, Nghiem et al. (2006) using dataset from Vietnam shows that efficiency scores between parametric and non-parametric estimates are comparable in the context of MFIs.

plausibility of investigating second stage determinants of efficiency with a more robust technique (double bootstrapping) downsizes the scale of its criticisms. While the application of either least squares or tobit estimation is lamentable, Simar and Wilson (2007) provides a bootstrapping for the second estimation. The double bootstrapping and truncated regression respectively ensures the correction of biased and inconsistent estimates from the first stage and potential serial correlation between the estimators in the second stage.

The rest of the study is organized as follows. The next two sections respectively address broad issues related to the conceptualization and measurement of efficiency. The need for this exploration into the conceptual and measurement issues transcends mandatory and mundane academic paper requirements to address the growing concern of efficiency becoming a buzzword in the arena of development paradigm. The fourth section narrows down on efficiency in the microfinance sector with the aim of reviewing the complexity associated with multiple objectives and the attendant varying inputs and outputs. In the fifth part, we look at methods of study. Finally, the penultimate and final sections discuss the results and extract the main findings for policy recommendations both at the managerial and public policy levels.

6.1 Conceptualizing Efficiency

Efficiency discourse and measurement dates back to Pareto (1909) and Koopman (1951). In the context of the firms' (Decision Making Units) efficiency, Cooper et al. (2007) provide a Pareto-Koopman efficiency definition as "…. fully efficient if and only if it is not possible to improve any input or output without worsening some other input or output" (p. 45). The wide scoping implication of this definition has partially contributed to the varied measurement of efficiency that can be identified with different disciplines.

The inter-disciplinary approach to understanding and explaining developmental issues and phenomenon (efficiency of decision making units) engenders the need for operational conceptualization prior to measurement. Two strands of approaches, namely financial ratios (accounting perspective – single input and single output) and economic perspective (multiple inputs and outputs) have emerged in the assessing performance (efficiency), of decision making units. The

variation in accounting and economics conceptualization of efficiency is apparent from the perspective of scope. Cooper et al. (2007) indicate that drifting away from partial (use of financial ratios) to total (multiple inputs and outputs) factor productivity minimizes the error of attributing gains to a single factor as against several sources of contributing factors. Albeit the true reflection generated from the use of multiple inputs/outputs the cost complexity is worth considering. The aim of the next two sections is to provide an overview of efficiency conceptualization and measurement.

Accounting measures (financial ratios) of efficiency in microfinance include; operating expenses as a ratio of gross loan portfolio (operating expense); personnel expense divided by gross loan portfolio; operating expenses as a fraction of number of active borrowers (cost per borrower); personnel expense as a ratio gross national income (GNI) capita (average salary/GNI per capita); operating expense as a fraction of number of loans (cost per loan); number of active borrowers/number of loan officers (borrowers per loan officer) and number of active clients as a ratio of total number of personnel (active clients per staff member). Two main derivatives can be summarized from the multiple ratios used to capture accounting efficiency in microfinance. One being production (number of loans, staff and active borrowers) and the other cost (operating and personnel expense). Implicit in both is firm's profitability. As a result, efficiency has primarily been conceptualized from two perspectives namely; production and cost. For brevity, the ensuing discussion on economic perspective emphasises the production dimension of efficiency.

Literally, economists define an efficient firm as one capable of maximizing its output from a given set of inputs. In discussing economists' perspective of efficiency (economic efficiency) the following factors are worth mentioning; (1) orientation (input or output); (2) nature of the returns (constant, increasing and decreasing) and substitutability between inputs; (3) role of technological progress and (4) type of measurement. Farrell (1957) decomposes economic efficiency (EE) into technical and allocative efficiencies. From the perspective of the literal definition of efficiency cited above, technical efficiency (TE) measures the input-output relationship from a 'number' perspective while allocative efficiency (AE)

examines the input-output transformation from a 'price' (cost) perspective. While such decomposition is important the use of TE in referring to overall efficiency (TE + AE) has gained wide acceptance.

Based on the objective of a production unit (Decision making unit), its orientation (either input or output focus) is crucial to efficiency conceptualization. The decision making unit (DMU) in terms of efficiency could either have input or an output focus. A DMU with a focus on reducing number or cost of inputs is described as having an input orientation, while those focusing on changes in output with fixed input levels are said to be output-oriented. DMUs' strict adherence to either input or output orientation leads to specific efficiency outcomes.

The output returns generated from additional inputs underpins the second imperative for understanding economic efficiency. Elementary economics identifies three types of returns to output namely; economies of scale, diseconomies of scale and constant returns to scale. While the latter is easier to assimilate, in terms of the input-output ratio, economies and diseconomies of scale pose some complications in the context of multiple inputs and outputs[60]. Closely related to the nature of returns (scale efficiency) is the combination and substitutability among inputs (scale elasticity). Arrow et al. (1961) pioneered the discourse on the implications of assumptions underpinning capital-labour substitution and economic efficiency for empirical findings. The variation between scale efficiency and elasticity[61] and orientation of the DMU either independently or jointly determines the outcome of an index for measuring efficiency. The relationship between inputs and outputs has been described using several functional forms. Among the most popularly used models include; Cobb-Douglas, Translog and Zellner-Revankar production functions.

Solow (1957) among others pioneered discussion on the share of technical progress on different inputs and in turn how this impacts on production process, output and economic growth in general. Following these pioneering discussions,

[60] See Farrell (1957) and Fare and Lovell (1978)
[61] See Ray (1998)

production estimates have found it inevitable to include technical progress (technology) in efficiency estimates. Shades of including technical progress in a model have contributed to the existence of different efficiency techniques.

While we do not intend to showcase strengths and weaknesses of different estimation techniques[62], the next section briefly discusses some of the mostly used approaches in measuring efficiency of DMUs. This standpoint is informed by the primary focus of the study, nuance of data complexity and peculiarity of DMUs in the microfinance industry.

6.2 Measurement of Efficiency

Since Farrell (1957), a plethora of efficiency measures have evolved. Two broad measures of economic efficiency can be identified: (1) parametric[63] (econometric methods) and (2) Non-parametric [64] (Data envelopment analysis and related extensions including bootstrapping and stochastic approaches). Farrell (1957) path-breaking production frontier argument of overall efficiency underlies both parametric and non-parametric measures.

Parametric Estimation

As mentioned earlier, in addition to estimating efficiency via an a priori functional form it is imperative to clearly define issues related to conceptualization, that is type (production or cost); orientation (input or output); returns (constant, increasing and decreasing) and substitutability.

According to the specification of the error term deterministic and stochastic frontier techniques have emerged within the sphere of econometric methods. Deterministic frontier techniques [65] rely on least squares [66] and maximum

[62] Among the papers that attempts a comparative assessment of different efficiency measures includes; FØrsund, (1992); Coelli and Perelman (1999) and Murillo-Zamorano, (2004)
[63] Functional form of the efficient frontier is imposed or pre-defined.
[64] Functional form is calculated from the sample of observations without any pre-defined relationship.
[65] Earlier deterministic frontier methods used goal programming techniques to estimate technical efficiency (See Aigner and Chu, (1968) and Timmer, (1971))
[66] See Richmond (1974) for Modified Ordinary Least Squares and Gabrielsen (1975) for Corrected Ordinary Least Squares.

likelihood [67] methods to estimate variations in output via the error term. Explicitly including a variable in a parametric deterministic frontier estimation model to capture technical efficiency flaws the reliability of the estimate in view of the assumption that all inefficiencies can be attributed to the DMU. This is because the estimation procedure does not allow for random shocks (Murillo-Zamorano, 2004). Barring the implication of other efficiency conceptualization platforms yielding different models, the deterministic econometric frontier technique, like other parametric techniques predominantly assumes an output orientation. Despite the criticism, the intuition and estimation procedure of deterministic frontier technique is widely acceptable among economists and provides a platform for later robust estimations of efficiency.

The econometric stochastic frontier model (SFM[68]) emerged as a result of the above criticisms. Timmer (1971) instigated the action of resolving potential statistical noise by dropping some data points that were suspicious of errors. The thrust of SFM[69] was the introduction of a random term in the estimation model to capture inefficiencies beyond the control of the DMU. Thus two error terms as per Equation 6.1 below, were incorporated in the econometric frontier technique.

$$Y_i = \beta_0 + \beta_n X_{ni} + \nu_i - u_i \qquad 6.1$$

Equation 6.1 is of the form of a single-output SFM where, Y represents output; X being a vector of multiple inputs; ν_i random (statistical noise) and u_i is the technical inefficiency.

The distributional[70] properties of technical inefficiency (u_i) and its relationship with the statistical noise (ν_i) and inputs (X) have led to different estimations either in the form of least squares or maximum likelihood estimation. Albeit SFM's marked improvement in efficiency estimates, mundane econometric problems especially from a cross sectional data point of view need to be

[67] See Greene (1980)
[68] Kirkpatrick et al. (2008) compare two parametric techniques (SFM and Distribution Free Model) in their study on efficiency of commercial banks in sub-Saharan Africa.
[69] Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1997) formally introduced the incorporation of the statistical noise into the econometric estimation.
[70] Mostly used are half-normal, exponential and truncated from below at zero.

resolved. Typical of these include; exogeneity of covariates, independence between covariates (input variables) and technical inefficiency and distributional assumptions of the latter. To deal with the above, fixed and random panel estimations have proved capable. Cognizant of the daunting task in ascertaining a panel data, Schmidt and Sickles (1984) provides both a theoretical overview and an empirical use of Hausman-Taylor (HT) to attest the reliability of panel stochastic frontier estimation of efficiency. The use of (HT) implies the assumption of efficiency being time invariant. However latter developments have relaxed this assumption especially in the context of large T explored the use of panel estimation with consideration to time varying efficiency[71]. An improved variant of the application of SFM is the duality approach which allows for the estimation of a cost function instead of production. The availability of panel data and the duality representation[72] have facilitated the estimation of the various facets of efficiency conceptualization mentioned earlier. Thus using parametric techniques, multiple outputs, quasi-fixed inputs[73] and different behavioural objectives can be estimated either from a technical or allocative efficiency point of view.

Until very recently, panel SFM has muddied individual heterogeneity with technical inefficiency. The fixed effects estimation assumes that 'sweeping-away' individual heterogeneity takes care of technical inefficiencies. Greene, (2005) and Wang and Ho, (2010) propose alternative methods in distinguishing the technical inefficiency component from DMU specific heterogeneity. In search for both an intuitive and less cumbersome approach to distinguish between individual heterogeneity and DMUs inefficiency in a panel SFM context, Bayesian models have been explored. Bayesian analysis allows for the relaxation of the pre-defined distributional assumption characterising SFM. While this point to a significant resolution to the problems of SFM, Bayesian analysis is as yet in its incubatory phase of exploring various efficiency

[71] See Kumbhakar, (1990) and Battese and Coelli, (1992)
[72] The duality representation enables the estimation of other indirect functions such as revenue and profit.
[73] Quasi-fixed inputs adjust to their optimal level even in the very long-run. The inhibition inter alia could be as a result of cost and/or regulation.

conceptualization facets. Murillo-Zamorano, (2004) provides a review of recent empirical literature applying the Bayesian model.

While parametric estimation techniques are robust and reliable, its treatment of external environmental factors (quasi fixed inputs) in a single estimation model lacks intuition. Secondly, with the exception of the new development using Bayesian analysis, outcomes of parametric estimations heavily depend on data type (physical inputs or costs). This inadvertently constraints its applicability especially in an industry like microfinance in which good data structure in terms of comparability and availability is now gaining momentum.

Non-parametric Estimation

In the context of non-parametric, DMUs' efficiency are calculated and not estimated as in the case of parametric estimation. The application of mathematical linear programming (MLP) techniques and related recent techniques discounts *a priori* definition of a functional relationship and pre-definition of weights to different inputs. This accounts for the name - non-parametric estimation. In addition, by virtue of the calculation technique, concerns on sample size and units of measuring inputs and outputs (MLP) are non-existent.

Following Farrell's (1957) single input-output consideration, two main non-parametric efficiency analyses have emerged. Charnes et al (1978) and Deprin et al (1984) have respectively developed the Data Envelopment Analysis (DEA) and the Free Disposal Hull (FDH). In contrast to DEA, FDH assumes non-convexity of the production possibility frontier and relies on less stringent assumptions (Park et al 2000).

DEA calculates[74] efficiency scores in a multiple input-output framework by constructing a piecewise empirical production function based entirely on available data. The central idea underlying DEA is the computation of relative inefficiencies based on distance between observed performance points and a frontier of best practices. Best practicing DMUs lie on the frontier and as such

[74] Unlike parametric approach, since DEA calculates efficiency there is no room for noise.

any deviation thereof is attributed to inefficiency. Thus contrasting regression efficiency estimates that reflect 'average' behaviour based on error minimization. DEA identifies best performing DMU among homogenous firms and evaluates deviations from the frontier. The frontier is a convex hull of all institutions and this is premised on the intuition of an isoquant. The computation of efficiency scores requires adherence to inequality constraints to facilitate an increase (decrease) in certain outputs (inputs) without worsening other inputs (outputs) [Murillo-Zaorano, 2004].

Cooper et al. (2007) offers a step by step approach to understanding the intuition, mathematics and graphical perspectives of DEA. Prior to setting up the basic DEA as in Equation 6.2 below, it is imperative to mention some 'entry points', theorems and caveats. As an entry point, DEA calculates weights derived from the data available using fractional programming that maximizes the ratio between outputs and inputs. Secondly, similar to deterministic and stochastic frontier parametric estimations, the scope (number of inputs and outputs) and conceptualization of efficiency have yielded different entry points in DEA computation. In addition to formulation (primal or dual[75]); orientation (input minimization or output maximization) and nature of returns [Charnes-Cooper-Rhodes (CCR - constant) and Banker-Charnes-Cooper (BCC- variable)], DEA offers additional variants. Two of these variants are based on the following: (1) characterization of inputs (radial and non-radial)[76] and (2) specification of the MLP objective function that is treatment of input excesses and output shortfalls ('Additive'; 'Slack-based'; 'Hybrid' and 'Multiplicative' measures).

In solving a basic DEA optimization set-up, two theorems underpinned by some assumptions are worth mentioning. The first theorem that shows equivalence between fractional and linear programming is based on the assumptions of (1) non-zero weights of both inputs and outputs (2) sum of the product of calculated weights and inputs is equal to 1 and (3) outputs are at least less than or equal to inputs. The second and third theorems are based on an output orientation and will

[75] The duality approach facilitates the computation of both technical and allocative efficiency.
[76] Radial and non-radial respectively relies on the assumption underlying the proportional changes for each of the inputs and outputs. Proportional changes in output are reflected by the assumptions underlying the CCR and BCC models.

vary in the case of input and duality orientation. Second is the unit invariant theorem that allows for the computation of efficiency scores irrespective of the scale of input and output measurements.

On the premise of identified homogeneous and independent DMUs with non-negative and same data on inputs and outputs, a basic DEA assuming CRS (CCR model) can be specified as follows;

$$\widehat{TE_{k(CRS)}} := \max_{\rho,\omega} \sum_{n=1}^{N} \omega_{nk} y_{nk} \qquad 6.2$$

$$s.t \sum_{m=1}^{M} p_{mk} x_{mk} = 1 \qquad 6.3$$

$$\sum_{n=1}^{N} \omega_k y_{nj} \leq \sum_{m=1}^{M} \rho_{mk} x_{mj} \qquad 6.4$$

$$\rho_{mk}, \omega_{nk} \geq 0 \qquad 6.5$$

Using MLP Equations 6.2 – 6.5 sets out to calculate the maximum technical efficiency of firm '*k*' (TE_k) with a set of pre-calculated weights (ρ, ω) respectively for inputs (x) and outputs (y). Equation 6.2 purports to calculate technical efficiency based on an output orientation. Variants of this could either be the specification of a minimization objective function that is in terms of inputs or based on the duality approach using the ratio of weighted outputs to weighted inputs. The choice of specification should always be guided by the appropriate constraint which posits that for inefficient DMUs to move towards the frontier inputs (outputs) cannot be increased (decreased). The number of inputs and outputs suggesting the applicability to a multiple input/output framework is respectively symbolized with 'm' and 'n'. The specification of the first two constraints (Equations 6.3 and 6.4) suggests that the efficiency measure must be less than or equal to one. Coelli et al. (2005) argue that simply specifying the constraint such as weighted output over weighted input should be less than or equal to one, leads to multiple solutions hence the need to split it into two. This makes it imperative that when estimating DEA efficiency scores, the number of inputs across all the firms should be at least greater than the number of output. The last constraint imposes a non-zero restriction on the calculated weights therefore the pre-requisite of non-negative inputs and outputs for DEA computation.

Until recently, the decision to use DEA has come with two main criticisms; (1) inability to make statistical inference and (2) calculated efficiency scores tend to be heavily affected in an event of measurement error and noisy data including outliers. In an attempt to generate unbiased and consistent efficiency estimates that possess statistical properties required for inference, asymptotic analysis and stochastic methods (bootstrapping or alternative methods[77]) have been employed. While this area of research (statistical properties of non-parametric deterministic linear programming frontier analysis) is currently vibrant (Becker, 2008), its' antecedent can be identified with the work of Grosskopf (1996) and Ferrier and Hirschman (1997).

The quest of ascribing statistical properties to calculated DEA scores inadvertently leads to the need for at least a second stage analysis. In addition to known complexities of second stage analysis, some theoretical statistical and econometric analyses have been considered to stimulate research vibrancy in this area.

Among the plausible sources of biased and inconsistent estimates for the second stage estimation are; sample size (asymptotic properties), data generating process (DGP), serial correlation and curse of dimensionality. In view of the bounded outcome of calculated efficiency scores, earlier studies involving second stage estimations have either scaled up the scores for the application of ordinary least squares (OLS) or used 'tobit' regression. The latter is premised on the data being censored. In contrast, Simar and Wilson (2007) propose the application of single and double bootstrapping and truncated regression techniques. Two reasons underpin their choice of estimation techniques. First, the application of 'tobit' is criticized due to censored regression's inability to account for lost data from both ends of a scale, hence truncated regression. Secondly, in view of the bounded nature of data generation process, re-sampling based on traditional bootstrapping method yields inconsistent data, hence single[78] and double[79] bootstrapping. The

[77] Murillo-Zamorano (2004) identifies some of the recent alternative methods.
[78] The first stage bootstrapping generates consistent estimators.

robustness of their proposition is verified with Monte Carlo experiments that examine the statistical performance of the estimators.

6.3 Efficiency in Microfinance

In this chapter, we provide a working definition for efficiency in microfinance as: using an optimal combination of inputs (staff time, staff number and cost of operation) to respectively disburse and reach the maximum number of loans and clients, especially the deprived, while delivering a range of valued services. This definition clearly points to a 'necessary' and 'sufficient' distinction between efficiency and sustainability. The former is the necessary condition for financial sustainability. While the relationship between financial sustainability and targeting poor clients maintains its importance in microfinance literature, institutional efficiency has recently come into the spotlight (see Blaine, 2009; Kneiding and Mas, 2009; Hermes et al., 2008; and Gutierrez-Neito et al., 2007). Two main reasons can be identified for the increasing drift of focus to MFIs' efficiency. First is the conceptual difference between sustainability and efficiency and secondly, the changing trend of operational expense in the industryAs a result some questions have become apparent. These include: (1) does profitability/commercialization correlate with efficiency?; (2) does reliance on subsidies beyond the 1995 donor consensus of a seven to ten year transitional growth period of MFI imply inefficiency? And (3) what are the reasons for the sudden reversal of the falling operating expense/gross loan portfolio ratio? While this chapter does not attempt to provide responses to these questions, it offers a platform for understanding different dimensions of the changing patterns and trends and determines the drivers of efficiency.

In spite of the commonality in MFIs inputs and outputs as in the working definition above, production functions in the industry differ markedly both over time and space. Among the reasons accounting for the differences are: MFIs' inclination to either of the dual objectives (financial systems or poverty reduction); source of funds; regulation; external environment (information, competition and the macro economy); and delivery strategies. With the exception

[79] The second stage allows for inference about the estimated coefficient.

of delivery strategies, most of these factors are beyond managerial control. Examples of microfinance delivery strategies are: group vs. individual loans; voluntary and compulsory savings; technological intensity (electronic service devices and mobile phone); branchless (mobile) banking; and product mix. These different delivery strategies yield diverse production functions. Balkenhol (2007) asserts that collateral requirements and the extent to which cost is passed on to clients determine variations in MFIs' production functions. It is therefore imperative that empirical studies aimed at investigating MFIs' efficiency should take account of strategy heterogeneity, institutions' inclination to either of the dual objectives (financial and social), external environment and scope of sustainability measure.

The scope of financial sustainability measures MFIs' accounting/financial short and long term performance. Balkenhol (2007) articulates the distinction between financial/operational self sufficiency (measure of MFIs' sustainability) and efficiency. From a sustainability point of view, the thrust of the argument revolves around the source and nature of financing and default. The former suggests that institutions relying on grants (subsidies) are less likely to be sustainable. Also improper account of portfolio at risk both as an accounting report and monitoring threatens the long term operations of an MFI. To this end, Gutierrez-Neito et al. (2007) asserts that in the context of financial efficiency, broad and narrow perspectives should be considered based on the scope of financial sustainability. For instance, failure to make provision for loan losses yields a narrow view point.

Closely related to contextualizing the scope of MFI efficiency is the issue of intermediation and production approaches of measuring efficiency of financial institutions. As a financial institution, its functional role should be viewed either from an intermediation[80] or production[81] approach perspective (Berger and Humprey, 2007). The distinction is primarily linked with identification of inputs and outputs and has policy implications depending on how a country views

[80] As an intermediary, MFIs transfer funds from savers to borrowers.
[81] MFIs are viewed as production units that employ traditional factors of production (capital and labour) to produce output.

microfinance. In this paper, we argue that this distinction is masked by the dual (financial and outreach) objectives of MFIs. Table 6.1 catalogues some of the few microfinance economic efficiency empirical studies based on scope, methodology and orientation. While Table 6.1 identifies some conceptual inconsistencies in these studies - for instance, choice of variables for production approach between Haq et al. (2009) and Nghiem et al. (2006) - its aim is far from comparing the respective strengths and weaknesses of these studies. This is in view of the contrasting motivation between them. For instance, while some studies aim at comparing MFIs either within the same geographical area (Bassem (2008); Qayyum and Ahmad (2006)) or across different regions (Haq et al. (2009)), others attempt to explain determinants of an MFI's efficiency either based on a declassification of goals - financial and social (Gutierrez-Neito et al. (2009) - or assume homogeneity in the objective of all MFIs (Hermes et al (2008); Gutierrez-Neito et al. (2007)).

Table 6.1 - Orientation and Scope of some published Empirical Microfinance' Economic Efficiency Studies

Studies	Goal	MFIs' Dual Objective	Orientation	Estimation Technique	Production function	Approach	External	Inputs	Outputs	Study Area
Hermes et al. (2009)	Compare MFIs and investigate determinants of efficiency	Sustainability	Cost (Input)	SFA and second stage regression analysis	Translog	Intermediation	Type of MFI, trend, age, domestic credit, location, delivery strategy and average loan and savings balance	Operating Expense (Salary) Financial Expense (Interest on deposits) Total Expenses	Gross Loan Portfolio	Global
Haq et al. (2009)	Compare MFIs	Sustainability	Duality [+]	DEA[θ]	CRS[κ] and VRS[λ]	Intermediation and Production	Type of MFI	Number of personnel Cost per borrower Cost per saver Operating expense	Number of borrowers per staff member [I] Number of savers per staff member [I] Gross Loan Portfolio [P] Total Savings [P]	Africa, Asia and Latin America
Gutierrez-Neito et al. (2009)	Compare MFIs	Financial and Social Efficiency		DEA[θ]	CRS – (CCR)	Microfinance objective	Type of MFI and Country effect	Assets Operating cost Number of employees	Gross Loan Portfolio [F] Revenue [F] Number of Women Borrowers Poverty Index [S]	Africa, Asia Eastern Europe and Latin America
Bassem (2008);	Compare MFIs	Sustainability and outreach	Output	DEA[θ]	CRS[κ] and VRS[λ]	Production	Type and Size of MFI	Number of personnel Total Assets	Return on Assets Number of Women borrowers	Mediterranean (MENA)
Hermes et al. (2008)	Determine trade-off between efficiency and outreach	Efficiency and Outreach	Cost (Input)	SFA	Translog	Intermediation	Type of MFI, trend, age, type of lending, women borrowers, average loan balance and loan loss reserve	Operating Expense (Salary) Financial Expense (Interest on deposits) Total Expenses	Gross Loan Portfolio	Global
Gutierrez-Neito et al. (2007)	Compare MFIs and explore variations between financial and social efficiency	Sustainability		DEA[θ]	CRS – (CCR)	Microfinance objective	Type of MFI and Country effect	Credit Officers Operating Expense	Gross Loan Portfolio Number of Loan Outstanding Interest and fee income	Latin America
Nghiem et al. (2006)	Compare MFIs and investigate determinants of efficiency	Sustainability and outreach	Input	DEA[θ, γ] and Tobit regression	CRS[κ] and VRS[λ]	Production	Type, Age and Location of MFI	Labour cost Administrative expense	Number of savers Number of borrowers and Number of groups	Vietnam

[+] - The study examines both the input and output orientation of achieving efficiency; θ - Data Envelopment Analysis; κ - Constant returns to scale; λ – Variable returns to scale; I – Intermediation model; P – Production model; γ – DEA is compared with parametric linear programming (PLP) and Stochastic Frontier Analysis (SFA); S – Social Efficiency Index; F – Financial Efficiency Index.

Both parametric SFA and DEA have been employed in either calculating or estimating economic efficiency in microfinance. To the best of our knowledge, only one study (Nghiem et al., 2006) in the context of microfinance has compared efficiency scores from both parametric and non-parametric estimates. In their paper, they observe similar estimates/scores of MFIs' efficiency. This potentially suggests the comparability of both estimation techniques as asserted in the broader efficiency literature (FØrsund, 1992; Coelli and Perelman, 1999). As alluded to earlier, we remain silent on the superiority of either of these techniques; however, in the context of microfinance and the objectives of this study, DEA, in our opinion, facilitates detailed assessment of the various facets of efficiency, notably pure technical and scale efficiency variants. Decomposing efficiency into pure technical and scale yields an invaluable policy prescription for MFI management. Typically, they are able to identify phases of either increasing, constant and decreasing returns to scale. Also due to the multiple objectives of microfinance and data restrictions on input prices and output quantities, DEA intuitively seems more suitable than SFA. Following on from Berger and Humphrey (2007), one can argue that since the microfinance paradigm has multiple objectives, it blurs the conventional cost and profit functions at least from an operational view point, making the application of parametric SFA somewhat problematic. Thus, in spite of the ingenuity evoked by Hermes et al. (2008) and Hermes et al. (2009) in arriving at input prices, it is practically difficult to disentangle social and financial efficiency since total cost and inputs are assumed for the entire operation (financial and social) of the MFI.

In the context of macroeconomic drivers of MFIs' efficiency including financial development (depth), contrasting results currently exist. While Gonzalez (2008) fails to find any significant relationship, Hermes et al. (2009) show that financial development irrespective of the measure[82] improves MFIs' efficiency. However, an oversight remains since the MFIs' inclination to either financial or social objectives might yield varying relationships. This study subscribes to a positive and significant effect between financial development and financial efficiency.

[82] Four different measures of financial development were used in their study. These were: total liquid liabilities (measured as M3 to GDP ratio); lending minus borrowing interest rate; total domestic credit provided by the banks to GDP ratio; and total domestic credit to private sector to GDP ratio (Hermes et al. (2009)).

This is premised on the notion that financial development comes along with competition for the entire financial sector industry and therefore all things remaining the same, efficiency will be enhanced. However, the relationship between financial development and social efficiency is hypothesized to be negative since prudential regulation is likely to come along with financial development. That is, should enforcement of prudential regulation accompany financial development, MFIs are likely to divert their attention to financial efficiency to the neglect of social efficiency. Variants of this finding from a financial sustainability view point have been observed by Hartaska and Nadolnyak (2007), Mersland and Strom (2009) and Cull et al. (2009). Though we assert an association between financial development and efficiency (financial and social) the direction of causality needs careful and rigorous investigation.

Other external environment factors such as bureaucracy in property registration, contract enforcement delays, costs and complexities, and lack of information on credit availability are hypothesized to affect social efficiency negatively. In a previous study, Gonzalez (2008) finds that the credit information index, which measures the degree of credit information availability in an economy, improves MFIs' efficiency. Table 6.2 tabulates the *a priori* signs for all the explanatory variables.

Table 6.2 - Variable Definition, Measure and *a priori* Expectation

Variables	Description	Efficiency Hypothesis[e]		
		Financial	Operational	Outreach
Financial Expense [a]	This includes interest and fee expense on deposits and borrowings plus other financial expense.			
Operating Expense (x1) [a]	Personnel and Administrative (depreciation , utilities, office supplies, transport, etc)[d]			
Total Expenses (x2) [a]	Financial plus operating expense plus impairment losses[83]			
Personnel [a] (x3)	Total Number of staff members			
Financial Revenue [a] (y1)	Interest, fees and commissions on loan portfolio and other financial assets			
Gross Loan Portfolio [a] (y3)	Measure of outreach: All outstanding principals for all client loans			
Cost per staff (CPS)	Operating expenses to total assets ratio times total assets in US dollars, divided by total number of employees			
Cost per loan (CPL)	Financial Expense divided by number of active borrowers.			
Number of Women Borrowers [a] (y2)	Number of active women	-	-	+
Not-for-profit NGO [a]	MFI classification but doubles as a proxy for regulation	-	+	+
Age of Institution [a]	Number of years of operation	+	+	+
Domestic Credit as a Proportion of GDP [b]	Domestic credit provided by the banking sector including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits. This figure excludes credit by the central bank.	+	+	+
Credit Information Index [c]	This measures rules affecting the scope, accessibility and quality of credit information available at public and private credit registries. The index ranges from 0 to 6 with higher values indicating availability of more credit information that shapes lending decisions.	+	+	+
Duration for Property registration [c]	Measure of 'external' governance: Captures the median duration that property lawyers, notaries or registry officials indicate as necessary to complete a procedure of registering a property.	–	–	–
Duration for Contract Enforcement [c]	Measure of 'external' governance: Number of procedural steps necessary to enforce commercial disputes in relevant courts.	–	–	–
Operational Self Sufficiency	Financial revenue/(Financial expense + Impairment Loss + Operating expense)	+	+	+
Loan	Dummy = 1 if MFI relies on loans for on-lending and zero otherwise	+	+	–
Grant	Dummy = 1 if MFI relies on grant for on-lending and zero otherwise	–	+	+

Sources: a – Mix Market; b – World Development Indicators; c – World Bank, Doing Business Indicators; and d - (CGAP/World Bank, 2009); e – Signs are based on the Simar and Wilson (2007) statistical inference.

[83] This is a non-cash expense that estimates risk of default based on value of gross loan portfolio.

6.4 Method of Study

On the backdrop of the two preceding sections, the empirical exposition underpinning the study's aim of investigating patterns and trends in MFIs' efficiency, and identifying efficiency drivers, is described in this section. The section is sub-divided into four headings with the aim of explaining: choice of variables; datasets; production function; and estimation techniques.

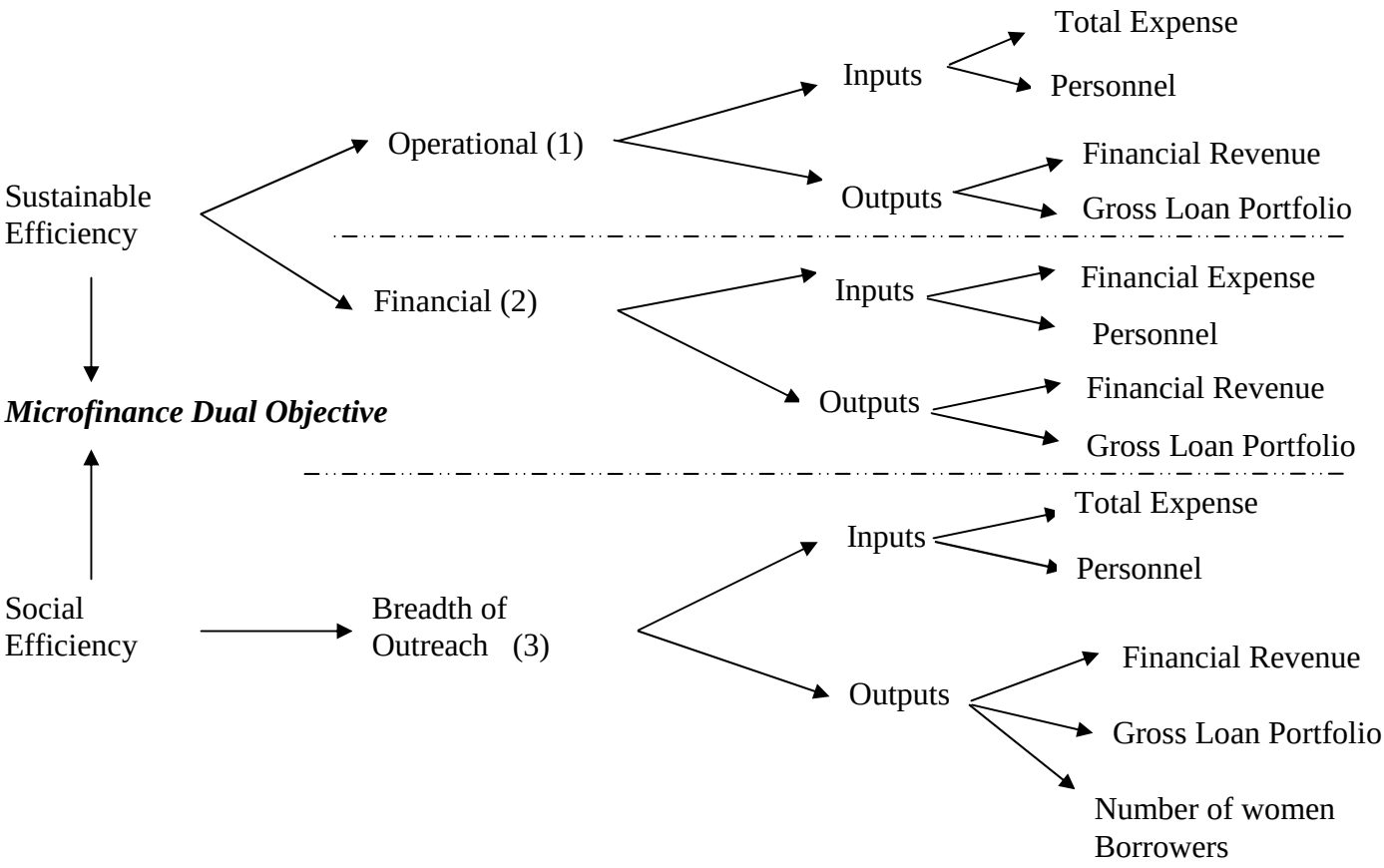
Selection of Inputs and Outputs, Orientation and Environmental Factors

In contrast to reliance on either an intermediation or production approach for the selection of inputs and outputs, we are guided by the dual objectives of the microfinance paradigm. Gutierrez-Neito et al. (2007) and Gutierrez-Neito et al. (2009) argue that choice of either production or intermediation could be daunting and therefore they respectively use microfinance scope (financial and operational) and objective (sustainability and outreach) for the selection of inputs and outputs. This study combines their respective approaches and asserts that in the context of microfinance it is reasonable to view sustainability and outreach in the light of intermediation and production respectively. Thus as an intermediary, an MFI's main objective is to provide financial services with a poverty reduction oriented goal. While potential overlaps are indispensable, this approach offers a policy undertone based on the orientation of the MFI.

In addition to the complexity surrounding the conceptualization and measurement of efficiency, Appendix IV shows that premised on MFIs' financial sustainability and outreach framework, five different perspectives can be examined. This chapter concentrates on three of the five perspectives identified (see Figure 6.2 below). As an extended version of Gutierrez-Neito et al. (2009), we exhaust both dimensions of financial sustainability (narrow and broad) and use number of women clients as an outreach (breadth) indicator. In effect, we calculate efficiency from three perspectives narrow and broad perspectives of financial sustainability; and breadth of outreach. Variation between the narrow and broader perspective is based on the scope of expenses with revenue remaining the same for both. From a narrow view point, MFIs' efficiency is calculated based on financial expense, while in the broader context, total expense is used (see Table 6.2 for definition and measurement of variables). In the latter

instance, we take into consideration provision for loan losses which implies that the MFI is accounting for all possible credit risk (default).

Figure 6.2: Scope of Efficiency Measure based on Microfinance Objectives



The forgoing emphasis on expenses offers an inclination for an input-oriented calculation of MFIs efficiency scores. Although the suitability of a duality approach in view of the concern that different categories of MFIs possess varying levels of command over either inputs or outputs, we focus on an input-orientation. The choice of an input orientation to that of an output is twofold. First, the notion of a huge segment of the population lacking access to financial services yields an output argument superfluous. Secondly, the approach to measuring MFIs sustainable efficiency as described above makes it imperative to use an input-orientation.

Unlike examining financial efficiency from both dimensions of sustainability (broad and narrow), outreach is restricted to breadth of outreach for the sake of

brevity. Despite this restriction, it is possible to measure the number of women reached from both depth and scale of outreach perspectives. Thus based on the notion that women are the vulnerable sex and the strong evidence of a positive association between vulnerability and poverty (Gaiha and Imai, 2004), a link can be deduced between breadth and depth of outreach. The use of number of women clients, invariably offers information on MFIs' efficiency based on scale of outreach. To this end, there are three inputs used, namely: financial expense, operating expense and number of personnel for different models. On the flipside, four outputs were employed, including financial revenue, net operating income, gross loan portfolio (GLP) and number of women clients also for different models.

Dixit (2009) and previous microfinance-efficiency related studies (Gonzalez, 2008; Hermes et al., 2009) respectively provide a theoretical and empirical justification for the choice of country level variables to represent the external environment. The second stage estimation regresses age of MFI (age), dummy on whether MFI is regulated or not (regulation), domestic credit as a proportion of gross domestic product (domcred), credit information index (credinfo), property rights (proright) and enforcement of contract (enfcont) on double bootstrap calculated efficiency from the first stage. The choice of variables is restricted to factors that are exogenous to the MFI production function as identified in the literature. This notwithstanding, we acknowledge a couple of caveats. Firstly, the inclusion of MFI type as a control variable and for purposes of comparison with previous studies such as Hermes et al. (2008) and Hermes et al. (2009) requires careful interpretation. This is because our experience in the industry and data cleaning process revealed that use of different category of MFIs (bank, not-for-profit financial non-governmental organization, etc) is country specific and not always informed by the classification of formal, semi-formal and informal financial institutions. Secondly regulation can prove endogenous, but the use of truncated regression in the second stage inhibits our ability to mitigate the effect of endogeneity through known techniques such as instrumental variable, HT and fixed effects vector decomposition. We are, however, optimistic that the estimation technique as described below to a considerable extent yields admissible results.

Data

Table 6.2 shows that multi-source data is employed in this study. While the calculation of efficiency scores relies solely on institutional level (MFI) data, the second stage estimation includes country level variables. The MFI data is sourced from the MIX market which is the most comprehensive and up to date global web based information on MFIs. We generate a balanced panel data and restrict data to only observations with non-missing values since in a DEA context missing values are detested. Appendix V describes the number of countries and MFIs used for the analysis. The rationale for despising an unbalanced panel data is to minimize the noise in the data mainly due to outliers. As mentioned earlier, DEA fails to take account of errors associated with the data. Although Simar (2003) and Tran et al. (2008) provide strategies for detecting outliers, and Simar and Wilson (2007) suggest estimation techniques that partially reduce the bias associated with noise from the data, we remain resolute on the need to institute a balanced data restriction for the same purpose. To this end, we engage 164 MFIs over a period of five years (2004 – 2008). Country level data for the second stage were sourced from World Development Indicators (domcred), the World Banks' Doing Business[84] data (credinfo) and the World Bank's Governance Indicators[85] (proright and enfcont).

Choice of production functional form

In view of CRS' implicit assumption that DMUs operate at their most efficient scale, we use VRS to help disentangle efficiency into pure technical and scale. The heterogeneity of MFIs delivery strategies and varying inclination to the dual objectives undermines the relevance of the presumption that all institutions are operating at their optimal efficiency scale. Disaggregating efficiency into pure and scale facilitates attribution of inefficiency to either implementers (credit officers and 'second tier' managers) or planners (Board, owners).

Estimation

This study follows a three-step approach. Firstly, using DEA's CCR(CRS) and BCC(VRS) models, we calculate MFIs' efficiency scores based on both scope of

[84] http://www.doingbusiness.org/MethodologySurveys/
[85] http://info.worldbank.org/governance/wgi/index.asp

financial sustainability measure (narrow and broad) and objectives of the MFI (financial and outreach). Using data for the period 2004 to 2008, we are able to examine patterns and trends of MFIs' efficiency. Secondly, we estimate Simar and Wilson (2007) bias corrected efficiency scores and run a regression on internal and external explanatory variables of MFIs' efficiency. Thirdly, results emerging from the second estimation are benchmarked with a Translog cost frontier parametric analysis.

CRS and VRS Input Oriented Efficiency Computation

The input-oriented technical efficiency is calculated by solving the following linear programming for each of the 164 MFIs in a particular year. Computing an input oriented technical efficiency literally, points to investigating the extent to which MFIs' inputs can be reduced relative to others with output remaining unchanged. DEA's computation of technical efficiency accounts for slacks in which case an MFI is efficient only if it is not possible to reduce input without worsening another input or output (Pareto-Koopmans definition of efficiency).

In Equation 6.6 below, we aim at minimizing input θ subject to the inequality constraint that offers two possibilities of either increasing output or decreasing inputs. In the case of VRS, the third constraint representing convexity restricts the sum of the weights to unity and that allows for the computation of only pure technical efficiency.

$$\min_{\theta,\tau} \theta \qquad 6.6$$

$$\sum_{j=1}^{j} \tau_j Y_{mj} \geq Y_j \qquad 6.7$$

$$\sum_{j=1}^{j} \tau_j X_{nj} \leq \theta X_j \qquad 6.8$$

For all n=1,…., N, m=1,…,M and θ and $\tau \geq 0$.

$$\sum_{j=1}^{j} \tau_j = 1 \qquad 6.9$$

where θ measures efficiency (extent to which inputs should be minimized in order for each MFI to operate on the frontier); τ represents weights computed from a fractional linear programming and represents intensity required to generate relative efficiency scores for each MFI; Y and X are respectively the amount of output (financial revenue and gross loan portfolio) and input (operating expense and personnel) produced by MFI j; and M and N symbolize number of outputs and inputs respectively.

With the estimation of both CCR (CRS) and BCC (VRS), we are able to decompose technical efficiency into pure technical and scale. Thus, by dividing CCR by VRS as in Equation 6.10 below, we arrive at scale efficiency values.

$$Scale\ Eff._j = {}^{\theta_j\ CRS}\Big/_{\theta_j VRS} \qquad 6.10$$

Bias Corrected Efficiency Scores and Second Stage Estimation

In view of DEA's lack of statistical properties, especially given the non-inclusion of data noise, Simar and Wilson (2007) suggest a coherent data generation process (DGP) via bootstrap method to enhance an approximation of the asymptotic distribution and to correct the biases of estimated coefficient. The aim of their paper was to provide a technique to resolve: (1) the bounded error nature of efficiency scores; and (2) some statistical problems, notably serial correlation. Simar and Wilson (2007, p. 19) argue that serial correlation is complicated in unknown ways given the following: (1) the error from the first stage efficiency frontier estimation is unquestionably correlated with the set of environmental factors; (2) parametric convergence rates of the maximum likelihood estimates of the coefficients will be slow; and (3) the expected zero mean of the bias associated with the estimated efficiency score from the first stage is not guaranteed. Following Simar and Wilson's (2007) Algorithm #2, we generate bias-corrected estimates in the first stage using parametric bootstrap and determine effect of efficiency drivers in the second stage using truncated regression.

Translog Cost Frontier Parametric Estimation

Following on from Battese and Coelli (1995) and as applied in Hermes et al. (2009), a Translog stochastic cost frontier function for MFIs requires information on total cost, output quantities, amd vector of input prices. Based on Hicks' assumption which implies that technical-technological progress is neutral, a simplified Translog production function can be specified in Equation 6.11 below as follows:

$$\begin{aligned} lnTC_{it} = \beta_0 &+ \beta_1 lnCPS_{it} + \beta_2 lnCPL_{it} + \beta_3 lnGLP_{it} \\ &+ \beta_4 lnCPS^2{}_{it} + \beta_5 lnCPL^2{}_{it} + \beta_6 lnGLP^2{}_{it} \\ &+ \beta_7 (lnCPS * lnCPL)_{it} + \beta_8 (lnCPS * lnGLP)_{it} \\ &+ \beta_9 (lnGLP * lnCPL)_{it} + V_{it} + U_{it} \qquad 6.11 \end{aligned}$$

where TC represents total expenses of the MFI; CPS corresponds to the unit price of a staff member; CPL symbolizes the unit price of handling loan portfolio; GLP stands for Gross Loan Portfolio (quantity of output); V_{it} is the traditional error term which is assumed to be independent and identically distributed (iid) with a mean of zero and a variance of $\sigma^2{}_v$ and U_{it} denotes non-negative random variables also iid but with truncated normal distribution with mean $z_{it}\delta$ and variance , σ^2. Furthermore, z_{it} represents a (1 x m) vector of explanatory variables associated with technical inefficiency and δ is an (m x 1) vector of unknown coefficients (Battese and Coelli, 1995). Predicted values generated from the above equation represent technical inefficiency of institutions and as such negative(positive) coefficients naturally signify that the explanatory variable in question improves(reduces) efficiency. Table 6.2 provides definition for variables used in Equations 6.11 and 6.12.

Following a one step maximum likelihood estimation of Battese and Coelli (1995), the external environment and MFI specific drivers of estimated inefficiency can be specified in Equation 6.12 as follows:

$$\begin{aligned} z_{it} = \beta_0 &+ \beta_1 PrR_{it} + \beta_2 EnfC_{it} + \beta_3 CrInf_{it} + \beta_4 OSS_{it} + \beta_5 WomB_{it} \\ &+ \beta_6 DomC_{it} + \beta_7 SFL_{it} + \beta_8 SFG_{it} + \beta_9 Age_{it} + \beta_{10} NNGO_{it} \\ &+ U_{it} \qquad 6.12 \end{aligned}$$

where PrR denotes duration for registering a property; EnfC symbolizes duration for contract enforcement; CrInf stands for credit information index; OSS signifies operational self sufficiency; WomB indicates number of women borrowers; DomC refers to domestic credit divided by GDP; SFL and SFG respectively mean sources of funds from loans and credit; NNGO (not-for-profit NGO) connotes type of institution and doubles as proxy for regulation; βs represent the coefficients of the set of external environment and MFI specific variables and the subscript '*it*' shows that the variables are for each institution (country) and for a given year.

6.5 Results and Discussion

We precede this section with a brief descriptive statistic (median) across regions. The input/output variables for the production function and the explanatory factors of estimated efficiency are described prior to a discussion on the inferential statistics. In line with the objectives of this study, the results and discussion are presented as follows: (1) patterns and trends of disaggregated efficiency (pure technical and scale) based on MFI scope of financial sustainability measure (narrow and broad) and objectives (financial systems or poverty reduction); (2) comparison of observed efficiency trends and previous studies using operating expense ratio; and (3) examination of the set of coefficients likely to drive efficiency of MFIs. Interpretation of results and inference are tailored to model specification and the type of statistical software used. The latter is as a result of the evolving nature of statistical and econometric software's incorporation of the various dimensions of efficiency computation. Efficiency scores to examine patterns are computed based on the DEA model and use of STATA 10. Ji and Lee (2009) for the first time provide a platform in STATA to estimate DEA based on Farrell's (1957) efficiency computation. Estimates derived are interpreted in the context of technical efficiency. Simar and Wilson's (2007) parametric bias-corrected efficiency estimates generate Shephard's (1970) distance function using FEAR 1.12 which is built on the R software platform. For the sake of consistency, we find the reciprocal of Shephard's (1970) estimates to arrive at Farrell's (1957) technical efficiency. MFIs with a score of one lie on the frontier, and the closer an institution is to the

frontier (one) the greater the level of efficiency. By contrast, the parametric stochastic frontier estimates technical inefficiency and for that matter has a reverse interpretation.

Descriptive Statistic

We rely on the median, for the summary statistic in view of observed outliers. For example, in terms of an MFI's personnel, BRAC in Bangladesh has a staff capacity of approximately 24,453 compared to an overall average of 459 (minus BRAC). Observed patterns of single indicators were consistent with our expectations. For instance, size of operations (Gross loan portfolio) is larger in South Asia (SA) and Latin America and the Caribbean (LAC) than the other four regions. This can be attributed to the predominance of microfinance activities in these two regions relative to the others. Examining operating expense and financial revenue to infer performance/efficiency based on a single input and output, we observe a positive correlation. This directly suggests that institutions investing more reap higher. However, some drift away from the above is observed given patterns of Gross Loan Portfolio and personnel in LAC compared to sub-Saharan Africa (SSA) and East Asia and the Pacific (EAP). That is, although LAC has a higher Gross Loan Portfolio, it employs only about 50 percent of the size of SSA as well as EAP.

Table 6.3a - Descriptive Statistic (median) across Regions

	Variables	Regions						
Input/output		*SSA*[1]	*EAP*[2]	*ECA*[3]	*LAC*[4]	*MENA*[5]	*SA*[5]	*ALL*
	Operating Expense [a]	2757443	1876923	1113221	1970971	1371735	3277104	1819579
	Personnel [a]	215	251	56	127	116	769	133
	Gross Loan Portfolio [a, b]	8186146	8133794	6771017	8302929	7647169	19900000	8005443
	Financial Revenue [a]	4284150	3137801	2141785	3377599	2214420	5472288	2868730
	Women Borrowers [a, b]	15278	40427	2427	11579	12412	83556	10885
	Cost per Staff [b]	12798	6802	21535	16390	12749	3664	14713
	Cost per Loan [b]	10.60	8.78	83.72	46.23	6.05	9.83	21.56
Efficiency Drivers								
	Age of Institution	12	13	8	14	10	11	10
	Operational Self Sufficiency	110	131	125	118	129	110	120
	Credit Information Index	1	0	4	5	2	2	4
	Duration for Property Registration	9	7	7	7	7	5	7
	Duration for Contract Enforcement	39	44	38	38	40	46	39
	Domestic Credit as a Proportion of GDP	17.50	16.23	31.54	42.84	90.71	59.28	40.79

1- Sub-Saharan Africa; 2 – East Asia and Pacific; 3 – Eastern Europe and Central Asia; 4 – Latin America and the Caribbean; 5 – South Asia; 6 – Middle East and North Africa; a – variable used DEA; b – variable used for parametric SFA.

Table 6.3b Correlation Matrix

Variables	Operating Expense	Personnel	Gross Loan Portfolio	Financial Revenue	Women Borrowers	Cost per Staff	Cost per Borrower	Age of MFI	Operational Self Sufficiency	Credit Information Index	Property Registration	Enforcement of Contract	Domestic Credit
Operating Expense	1.00												
Personnel	0.64	1.00											
Gross Loan Portfolio	0.95	0.64	1.00										
Financial Revenue	0.98	0.64	0.96	1.00									
Women Borrowers	0.60	0.98	0.60	0.61	1.00								
Cost per Staff	0.19	-0.17	0.19	0.17	-0.19	1.00							
Cost per Borrower	-0.01	-0.06	0.01	0.00	-0.07	0.27	1.00						
Age of MFI	0.34	0.39	0.33	0.33	0.37	-0.06	-0.12	1.00					
Operational Self Sufficiency	0.05	0.14	0.12	0.12	0.15	-0.08	-0.12	0.06	1.00				
Credit Information Index	0.11	-0.06	0.11	0.13	-0.06	0.37	0.05	0.10	-0.01	1.00			
Property Registration	0.02	0.05	0.02	0.02	0.03	-0.02	-0.06	0.11	0.05	-0.13	1.00		
Enforcement of Contract	0.14	0.12	0.14	0.14	0.12	-0.13	-0.14	-0.02	0.12	-0.22	-0.02	1.00	
Domestic Credit	0.01	0.06	0.02	0.01	0.07	-0.07	-0.12	0.05	0.05	0.19	0.03	-0.1009	1.0000

Similar to patterns of microfinance prevalence across regions, financial depth at the macro level shows that SSA and EAP have the lowest rates. In the context of the debate between financial sustainability and efficiency, the highest OSS is recorded in EAP. Comparing this pattern with the earlier observation on efficiency (operating expense) an early bird inference for EAP is a potential trade-off between operational sustainability and efficiency.

Patterns and Trends of Efficiency

In the context of pure technical and scale dimensions of efficiency, we focus on the location and institutional patterns of MFIs. As a recall, pure technical efficiency is mostly attributed to managerial/implementation decisions while scale efficiency is associated with the size of operations and normally aligned with the role of top management/owners. In view of the computational assumptions underlying constant and variable returns to scale, pure technical efficiency values are necessarily lower than scale efficiency scores. As indicated earlier, these dimensions of efficiency are examined in the context of the scope of financial sustainability and objectives of MFIs. Tables 4a and 4b show that overall (without disaggregating by location and type of MFI), pure technical and scale efficiencies have changed differently across patterns and directions over time. With the exception of an increase in narrow financial efficiency all other scores reveal a fall over the period 2007 to 2008. Since the broad measure takes into consideration the effect of loan losses, it provides a convincing true measure of the MFI's performance. This finding to a large extent validates observations emerging from the use of ratios to capture efficiency trends. Thus, the effect of the global financial crisis could have impacted adversely on the efficiency of MFIs.

Pure technical efficiency tends to show upward changes while scale (size of operations) points to a reduction. This pattern is observed irrespective of the scope of sustainability measure or objective of the MFI. The increasing efficiency score for pure technical efficiency signals improvement in MFIs' strategies. This can be attributed to the wide scope of innovations that have recently sprung-up in the industry. Among these are branchless banking and electronic service delivery. This finding is consistent with Haq et al.'s (2009)

conclusion that over time, cost efficient managers have better managed and monitored client's financial activities. On the flipside, the declining scale efficiency potentially suggests that MFIs have reached their optimum size of operations, in which case further increases are slowing performance. In this regard, revisiting the likelihood of an overestimated demand for financial services is a worthy course.

Table 6.4a - Patterns of MFIs Mean Efficiency across Regions and Overtime

Year	Region	Efficiency					
		Pure Technical (VRS)			Scale (CRS/VRS)		
		Sustainability		Outreach	Sustainability		Outreach
		Narrow	*Broad*	*Outreach*	*Narrow*	*Broad*	*Outreach*
2004	SSA	0.422	0.585	0.657	0.873	0.944	0.973
	EAP	0.342	0.480	0.600	0.758	0.924	0.984
	ECA	0.483	0.649	0.668	0.906	0.963	0.969
	LAC	0.448	0.577	0.613	0.836	0.935	0.951
	MENA	0.341	0.555	0.604	0.847	0.948	0.976
	SA	0.357	0.423	0.559	0.828	0.933	0.982
	ALL	***0.427***	***0.575***	***0.628***	***0.856***	***0.945***	***0.967***
2005	SSA	0.406	0.538	0.600	0.874	0.956	0.982
	EAP	0.367	0.518	0.620	0.759	0.932	0.986
	ECA	0.504	0.652	0.671	0.920	0.971	0.975
	LAC	0.460	0.596	0.630	0.853	0.936	0.957
	MENA	0.361	0.565	0.611	0.831	0.942	0.978
	SA	0.422	0.467	0.632	0.763	0.916	0.980
	ALL	***0.444***	***0.583***	***0.634***	***0.857***	***0.947***	***0.972***
2006	SSA	0.414	0.538	0.608	0.875	0.961	0.982
	EAP	0.390	0.554	0.626	0.750	0.926	0.986
	ECA	0.553	0.667	0.681	0..925	0.973	0.976
	LAC	0.492	0.613	0.645	0.852	0.932	0.956
	MENA	0.408	0.581	0.628	0.820	0.945	0.964
	SA	0.472	0.520	0.672	0.750	0.882	0.974
	ALL	***0.480***	***0.601***	***0.649***	***0.856***	***0.944***	***0.970***
2007	SSA	0.415	0.533	0.599	0.872	0.947	0.981
	EAP	0.444	0.585	0.665	0.749	0.918	0.980
	ECA	0.625	0.700	0.711	0.930	0.969	0.972
	LAC	0.527	0.637	0.672	0.864	0.933	0.953
	MENA	0.452	0.631	0.674	0.819	0.928	0.960
	SA	0.529	0.559	0.710	0.683	0.837	0.925
	ALL	***0.525***	***0.628***	***0.675***	***0.854***	***0.935***	***0.962***
2008	SSA	0.421	0.534	0.603	0.868	0.948	0.978
	EAP	0.488	0.586	0.675	0.742	0.924	0.974
	ECA	0.656	0.694	0.705	0.927	0.962	0.963
	LAC	0.532	0.622	0.653	0.865	0.926	0.946
	MENA	0.463	0.605	0.641	0.818	0.925	0.955
	SA	0.562	0.574	0.713	0.653	0.813	0.921
	ALL	***0.543***	***0.620***	***0.666***	***0.850***	***0.929***	***0.956***

While ECA consistently, recorded the highest pure technical scores, scale efficiency shows some variations depending on the objective of the MFI. Though lamentable, the increasing focus of commercial funding to the region in the past few years might be a reason for improved managerial efficiency. However, due to regional, country and MFI specific effects, it is largely difficult and inappropriate to push forward such plausible reasons. Comparing efficiency of MFIs across pure technical and scale, we observe that the most populated regions (ECA and SA) score high for the latter but not necessarily for the former. In the context of overall declining scale efficiency, this prompts the need for populated regions to assess strategies for improving their managerial operations. Broadly, these findings justify the need for identifying the best practices of efficient MFIs.

Efficiency superior of different categories of MFIs[86] varies consistently overtime depending on (1) pure technical and scale efficiency and (2) scope of financial sustainability measure and objectives of MFIs. Bank's superior efficiency advantage in the context financial managerial and technical operations (pure technical) is confirmed. Table 6.4b shows that out of the fifteen dimensions of pure technical efficiency (five institutions (over five year) and three different perspectives (narrow, broad and outreach)), Banks record the highest score eleven times. On the flipside, and unexpectedly, social efficiency (outreach) superiority of not-for-profit non-governmental organizations (NNGOs) is not consistently observed. From both pure technical and scale efficiency view points, Banks and Non-bank financial institutions (NBFIs) respectively emerge superior on the front of social efficiency. However, on average terms for scale social efficiency, NNGOs possess relative superior advantage. Therefore, in spite of the findings from average terms and earlier studies (Haq et al., 2009 and Gutierrez-Neito et al., 2009), the dichotomy between pure technical and scale social efficiency of different categories of MFIs is worth examining.

[86] Since the last category (other) is difficult to describe, we restrict the comparison of different types of MFIs to Banks, NBFIs, NNGOs and CUCs.

Table 6.4b - Patterns of MFIs Mean Efficiency across Type of MFI and Overtime

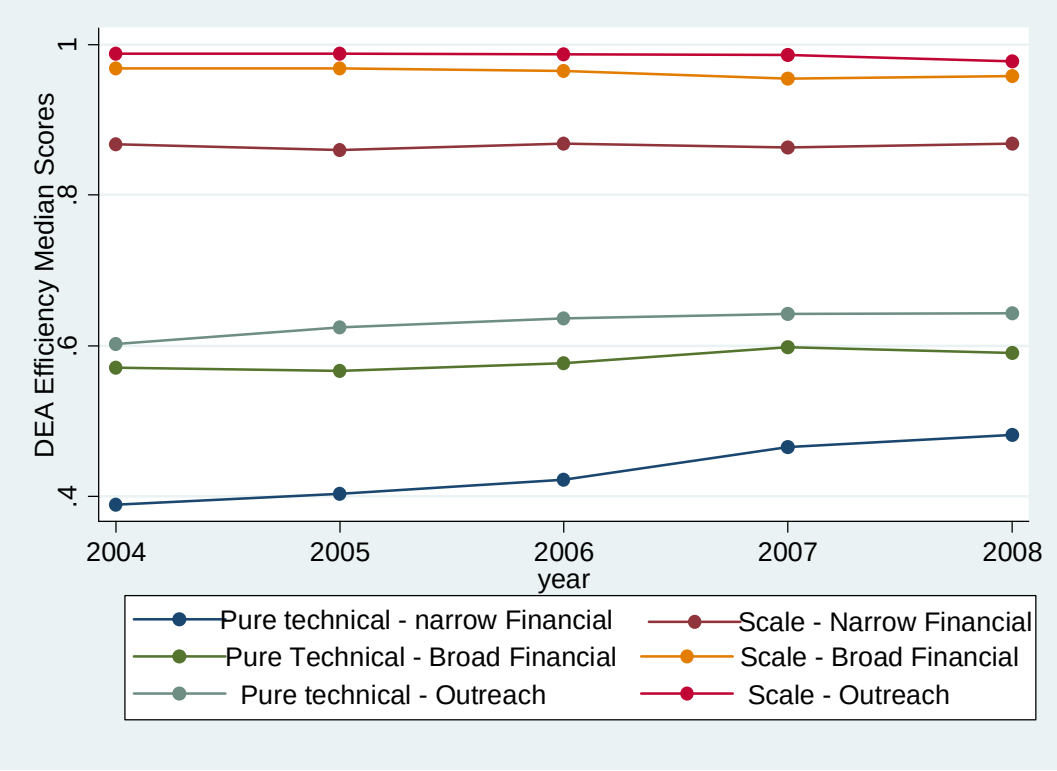
Year	Types of MFIs	Efficiency					
		Pure Technical (VRS)			Scale CRS/VRS)		
		Sustainability		Outreach	Sustainability		Outreach
		Narrow	*Broad*	*Outreach*	*Narrow*	*Broad*	*Outreach*
2004	BANK	0.509	0.607	0.626	0.848	0.946	0.955
	NBFI [a]	0.419	0.587	0.630	0.891	0.962	0.977
	NNGO [b]	0.404	0.554	0.631	0.819	0.924	0.960
	CUC [c]	0.583	0.644	0.645	0.895	0.953	0.956
	Other [d]	0.257	0.352	0.393	0.778	0.987	0.997
	ALL	***0.427***	***0.575***	***0.628***	***0.856***	***0.945***	***0.967***
2005	BANK	0.557	0.650	0.685	0.842	0.919	0.926
	NBFI [a]	0.455	0.599	0.643	0.887	0.966	0.983
	NNGO [b]	0.401	0.552	0.622	0.825	0.933	0.972
	CUC [c]	0.560	0.638	0.640	0.908	0.948	0.951
	Other [d]	0.287	0.404	0.433	0.813	0.981	0.991
	ALL	***0.444***	***0.583***	***0.634***	***0.857***	***0.947***	***0.972***
2006	BANK	0.623	0.669	0.701	0.826	0.905	0.916
	NBFI [a]	0.501	0.634	0.677	0.885	0.962	0.983
	NNGO [b]	0.428	0.558	0.621	0.824	0.933	0.969
	CUC [c]	0.556	0.631	0.634	0.923	0.942	0.946
	Other [d]	0.277	0.399	0.428	0.794	0.962	0.987
	ALL	***0.480***	***0.601***	***0.649***	***0.856***	***0.944***	***0.970***
2007	BANK	0.646	0.704	0.730	0.842	0.885	0.902
	NBFI [a]	0.577	0.661	0.701	0.876	0.954	0.975
	NNGO [b]	0.455	0.585	0.651	0.827	0.924	0.963
	CUC [c]	0.557	0.639	0.640	0.914	0.932	0.935
	Other [d]	0.245	0.452	0.494	0.795	0.938	0.983
	ALL	***0.525***	***0.628***	***0.675***	***0.854***	***0.935***	***0.962***
2008	BANK	0.684	0.697	0.722	0.850	0.894	0.901
	NBFI [a]	0.609	0.659	0.694	0.863	0.943	0.967
	NNGO [b]	0.455	0.565	0.631	0.829	0.923	0.961
	CUC [c]	0.577	0.677	0.678	0.911	0.909	0.910
	Other [d]	0.286	0.503	0.541	0.801	0.920	0.977
	ALL	***0.543***	***0.620***	***0.666***	***0.850***	***0.929***	***0.956***

a – Non-Bank Financial Institution; b – Not-for-profit NGO; c – Credit Unions and Cooperatives and e – Includes Rural banks and other financial institutions offering some form of microfinance.

Credit Union/Co-operative appears to possess competitive efficiency scores across different measures and objectives of MFIs. For instance, prior to 2006, Credit Union/Co-operative (CUC) was the most efficient category of MFI irrespective of MFIs inclination to either of the dual objectives. In terms of size of operations (scale), NBFI consistently emerged as the most efficient MFI category over time and across financial (broad and narrow) and social efficiency perspectives.

Benchmarking the observed findings with Figure 6.1, the concern ignited by the flat curvature depicting increasing and rising cost of operating expense is sustained. Efficiency scores from this study show varying trends and patterns depending on the type of measure and MFIs objectives. Figure 6.3 fails to reveal marked changes with the exception of the narrow definition of financial efficiency. As these findings spark a number of questions, the next section identifies the drivers of efficiency, to enable some inference.

Figure 6.3 - Pure Technical and Scale Efficiency of MFIs' Objectives



Drivers of Efficiency

Table 6.2 indicates that in our models (DEA bias-corrected truncated regression and parametric SFA) outreach (number of women); sources of funds (loans and grants) and regulation (Banks and NNGOs) are hypothesized to have different effects depending on the scope of financial sustainability and objectives of the MFIs. We argue that all other variables will have the same directional effect irrespective of the scope of financial sustainability measure and objective of MFI. The *a priori* signs are informed by both previous empirical studies and

intuition. For instance, it is intuitive to posit that longer duration in both property registration and enforcement of contract reduces the efficiency of MFIs. Also as established in the microfinance industry and empirically verified by Gutierrez-Neito et al. (2009), NNGOs are expected to have a positive (negative) sign in terms of social (financial) efficiency.

As a recall, the specific hypotheses are: (1) operational financial sustainability complements efficiency (financial and social); (2) MFIs' targeting women trade-off their financial efficiency; and (3) external environment (credit information, property rights and financial development) has a significant positive effect on MFIs social efficiency while financial development impacts only on financial efficiency. Tables 6.5 and 6.6 respectively use efficiency and inefficiency data as the dependent variable hence signs of the coefficients are interpreted in this regard. That is, positive signs in Table 6.5 are comparable to negative signs in Table 6.6. The same explanatory variables are used in both estimates for purposes of comparability. Consistent with long run neo-classical production theory which suggests co-movement in capital and labour, the parametric SFA results in Table 6.6 (using the translog production function of Equation 6.11), identify collinearity among the input variables. However, with the exception of cost per loan, other inputs and quantity of output significantly determine efficiency scores.

Operational self sufficiency, a measure of MFIs' financial sustainability consistently explains efficiency. Irrespective of an MFI's objective and estimation technique, operational self sufficiency (OSS) indicates a positive relationship with efficiency. The observed link between OSS and efficiency, augments the case for commercialization of MFIs since it transcends the promotion of financial efficiency to facilitate the achievement of the poverty reduction (outreach) objective. In contrast to OSS consistently complementing efficiency, mixed results emerge on the relationship between outreach and efficiency. Similar to the findings of Hermes et al. (2008) and Hermes et al. (2009), the hypothesis of a trade-off between outreach and efficiency is observed in the one step maximum likelihood parametric stochastic frontier estimation. This suggests that targeting women comes with a cost. However, the parametric

SFA estimation is unable to provide further information of the type of cost. While Table 6.5 indicates that there is not enough evidence to support the association between financial efficiency and outreach, the last column signals a positive relationship between the latter and social efficiency. The parallel results of a trade-off between outreach and efficiency in Table 6.6 and a complementary relationship in Table 6.5, set the stage for segmenting MFIs based on their relative efficiency in dispensing either of the dual objectives. This suggests that contextualizing type of efficiency and identifying best performing MFIs remains imperative for the success of the MFI industry.

In a similar vein and intuitively, other variables (source of funds and regulation) that were hypothesized in Table 6.2 to have varying signs depending on MFIs' objectives show contrasting results when we compare the estimates of the disaggregated efficiency scores in Table 6.5 with those of the parametric SFA in Table 6.6. Despite methodological issues, the contrasting results reinforce the need to contextualize scope of efficiency measure (broad and narrow) and MFI objectives. NNGOs consistently show a reducing effect on efficiency irrespective of methodology, scope of financial efficiency measure and MFI's objective. While this suggests a gloomy situation for NNGOs it needs to be interpreted in the context of pure technical efficiency since the descriptive statistics revealed that NNGOs had the highest overall social efficiency average score given size of operation (scale).

Table 6.5 - Efficiency Drivers of Bias-corrected Pure Technical DEA Estimates[87]

	Narrow Financial Efficiency		Broad Financial Efficiency		Social Efficiency (Breadth of Outreach)	
MFI specific characteristics and External Environment	**Coef.**	**z-value**[a]	**Coef.**	**z-value**	**Coef.**	**z-value**
Property registration	-0.011	(-1.24)	-0.001	(-0.89)	-0.006	-(3.96)**
Credit Information index	0.002	(0.16)	0.014	(10.48)**	0.009	(5.73)**
Contract Enforcement	-0.009	(-1.51)	-0.001	(-1.22)	0.002	(2.13)*
Operational Self Sufficiency	0.404	(3.01)**	0.369	(28.62)**	0.354	(23.70)**
Women Borrowers	0.000	(1.74) +	0.000	(0.40)	0.000	(2.22)*
Domestic Credit/GDP	-0.001	(-1.36)	0.000	(-3.30)**	0.000	(-0.11)
Loan as a source of Funds	-0.141	(-2.14)*	-0.016	(-1.74) +	0.016	(1.50)
Grants as a source of Funds	-0.151	(-3.39)**	-0.008	(-1.16)	-0.008	(-0.94)
Age	0.008	(0.75)	0.002	(1.11)	0.006	(2.25)*
Age^2	-0.001	(-1.64)	0.000	(-1.00)	0.000	(-2.19)*
Year Dummy for 04 -07	-0.118	(-2.83)**	-0.029	(-3.99)**	-0.020	(-2.23)*
Bank	-0.007	(-0.14)	0.027	(2.27)*	0.029	(2.29)*
Not-for-profit NGO	-0.078	(-1.67)+	-0.040	(-6.57)**	-0.017	(-2.39)*
Constant	0.690	(2.74)**	0.154	(4.37)**	0.088	(2.33)*
Sigma[88]	0.342	(4.12)**	0.073	(28.70)**	0.088	(32.95)**
Number of Observations	753		753		753	
Wald Chi-Square (Prob.)	59.67.72 (0.000)		1342.36 (0.000)		820.91 (0.000)	

a - Z- values are based on 1000 bootstrap estimations of the truncated regression. ** - significant at one percent; * - significant at five percent; + - significant at ten percent

Table 6.5 shows that in contrast to most of the external environment factors explaining social efficiency (credit information, duration for registering a property and enforcing contract), none of them is significant in determining narrow efficiency and only a couple explained the broader perspective of financial efficiency. This finding is consistent with the argument that the outreach objective of MFIs requires an external drive and their financial performance is mainly internally determined.

[87] The variation in sample size for the two estimations is as a result of the different estimation techniques. For instance, the truncation from Table 6.5 drops observations at the extremes.
[88] This tests the null hypothesis of no inefficiency. The probability value suggests a failure to accept the H_0

Table 6.6 - One Step Maximum Likelihood Parametric Stochastic Frontier Estimation [28]

Estimating Inefficiency			Determining Drivers of Efficiency		
Input prices, quantity of Output and Hicks' Natural technical-technological progress	**Coef.**	**z-value**	**MFI specific characteristics and External Environment**	**Coef.**	**z-value**
ln of (cost per staffsq)	0.368	(3.52)**	Property registration	0.035	(6.11)**
ln of (cost per loansq)	-0.043	(-0.69)	Credit Information index	-0.008	(-1.14)
ln of (Gross loan portfoliosq)	0.553	(9.66)**	Contract Enforcement	-0.001	(-0.45)
ln of (cost per staff)*ln of (cost per loan)	-0.031	(-2.89)**	Operational Self Sufficiency	-0.778	(-12.7)**
ln of (cost per staff)*ln of (Gross Loan Portfolio)	-0.034	(-2.58)*	Women Borrowers	0.000	(4.85)**
ln of (cost per loan)*ln of (Gross loan portfolio)	0.024	(3.78)**	Domestic Credit/GDP	-0.001	(-3.23)**
Year	0.020	(1.66)*	Loan as a source of Funds	0.047	(1.25)
Constant	-46.42	(-1.90)*	Grants as a source of Funds	-0.119	(-4.08)**
			Age	0.045	(4.78)**
			Age^2	-0.001	(-4.40)**
			Year Dummy for 04 -07	0.048	(0.95)
			Bank	0.007	(0.15)
			Not-for-profit NGO	0.096	(3.27)**
			Constant	1.176	(6.33)**
			Number of Observations	736	
			Wald chi-square(7)	9275.81 (0.000)	
			Lnsigma2[89]	-2.3945 (0.000)	

** - significant at one percent; * - significant at five percent; + - significant at ten percent

In Tables 6.5 and 6.6 longer duration of registering a property indicates a reducing effect on efficiency. However, there is lack of enough statistical evidence to support the link between duration for registering a property and financial efficiency in the case of the bias corrected DEA scores. In spite of this, the observed efficiency reducing effect of longer property registering duration indicates a transmission mechanism through which MFIs efficiency can be enhanced. Consistent with Hermes et al. (2009) an improving efficiency effect is observed for the measure of financial deepening in the context of parametric SFA. This finding is modestly articulate, as the DEA analysis fails to confirm the significant effect.

6.6 Conclusion

This study set out to examine patterns, trends and drivers of MFIs' efficiency in the context of underlying returns to scale assumptions (pure technical and scale)

[89] This is the logarithmic form of the sum of the two error components of Equation 6.11. The probability value suggests that we fail to accept H_0 of no inefficient MFIs

and the dual objectives (financial and social) of the microfinance paradigm. The anecdotal evidence of some connection between the recent global financial crisis and the slowdown of microfinance operations is sustained. This is primarily due to the observation that the broader financial and social efficiency measures exhibit a turning point in 2007. In contrast to the narrow financial efficiency measure, the broad and social efficiency measures provide a comprehensive and true picture of microfinance operations.

Mapping MFI classification onto the type of efficiency measure and objectives of the microfinance paradigm offers revealing relative advantage superiority results. The evidence of NBFIs and CUCs closely competing with Banks and NNGOs on their known respective advantages of financial and social efficiency provide alternatives for interventions and possibility of linkages to tap specialized niches of each MFI category.

On the front of efficiency drivers, complementarity between financial sustainability and efficiency is confirmed. The observed varying relationship between outreach and efficiency as a result of the nature of conceptualization, institutional goal and methodology indicates the need for: (1) identifying MFIs with their objectives, and (2) engaging in further country and institution specific studies. This study also confirms the argument that unlike the financial goal, MFIs' social efficiency and outreach require the role of external factors including other institutions providing services within the business environment. The ability of such institutions in reducing bureaucracy that unduly delays economic transactions and providing financial related information improves the social efficiency of microfinance institutions.

With most of the institutions depicting increasing returns to scale, identifying and absorbing any external adverse shock will add to the bright future of the microfinance paradigm. That is, in spite of the observed size of operation (scale) constraint, MFI operational (managerial) performance is fertile and can be harnessed for the growth of the industry.

CHAPTER SEVEN

CONCLUSION

7.0 Introduction

Among the several conjectures cited about microfinance operations and its capability to anchor the development path of developing economies, this thesis, empirically tests eight hypotheses using different microeconometric techniques. The hypotheses tested aim at contributing to the existing academic literature and policy direction on the following issues: (1) targeting of clients vis-à-vis financial sustainability; (2) loan size effect of interest rate and clients' well-being status; (3) economic governance and the dual objectives of microfinance institutions and (4) patterns, trends and drivers of microfinance efficiency. The thesis focuses on operational issues that affect institutional performance and outreach of microfinance institutions rather than the impact of microfinance on poverty reduction. In the next section, this chapter summarizes the results and provides policy implications for each of the four empirical chapters. Also in the penultimate section of this chapter, we outline some caveats related to the microeconometric techniques used and finally suggests areas for further considerations in the context of the thesis focus.

7.1 Summary of Results

The first empirical chapter questioned the sustainability of microfinance institutions in view of the heavy investment received from both development partners and government. This study tested the hypotheses: (i) formal MFIs that mobilized their own funds reach non-poor clients; and (ii) concentrating on the achievement of financial sustainability causes an institution to target non-poor clients. Using household level data from Ghana with a sample size of 1598, we revisited the microfinance argument of serving poorer clients on a commercial basis. Unlike financial self-sufficiency, operational self-sufficiency shows a positive effect in reaching poorer clients. The study upholds the sceptics' view of a trade-off between financial self-sufficiency and poverty reduction. Formal institutions dispensing their own funds target less poor clients. Using instrumental variable estimation, plausible problems of endogeneity emerging via measurement error were observed. We instrumented financial and operational self-sufficiency with density of microfinance institutions in a given location and group lending mechanism to resolve attenuation bias.

In the second empirical chapter, we integrated the well-being of a microfinance client into a loan size equation to examine the effect of interest rate. Using household level data from Ghana with a sample size of 1598, we tested the hypothesis of loan price inelasticity. Quantile and least squares regression were employed. The quantile regression showed pronounced variations in responsiveness of loan size to interest rate changes at different percentiles. In contrast to an inverse relationship depicted between the 20th and 40th quantiles, we observed respective positive and fairly flat curvatures at the extremes and around the median. We therefore interacted household poverty scores and lending rates to examine the effect of interest. The semi-elasticity of loan amount responsiveness to a unit change in interest rate was more than proportionate and significant for the poorest group. This suggests circumspection in designing loan price operational policies for the fifth poorest group of clients.

The third empirical chapter investigated a hypothesized relationship between economic governance and the dual objectives of microfinance institutions (MFIs). For economic governance, defined in the context of securing property rights, contract enforcement and collective action, we hypothesized a positive relationship between changes in these factors and the social objective of MFIs. We used an unbalanced panel data of 531 MFIs for the period 2005 to 2007. Comparing four panel estimates, the effect of economic governance on the social objective of MFIs was confirmed. Specifically, less time in securing property and the availability of credit information showed positive effects in targeting poorer clients. Potential biases due to slow changing and time invariant variables were resolved using the Hausman-Taylor (HT) and Fixed Effects Vector Decomposition (FEVD).

The fourth empirical chapter argued that patterns, trends and drivers of MFIs' efficiency depend on the scope of financial sustainability measures and MFIs' inclination to either of the dual objectives of financial systems and outreach. A balanced panel data of 164 MFIs for the period 2004-08 was extracted from the MIX website. Both parametric and non-parametric efficiency estimation techniques were used. We observed that both type (pure technical and scale) and scope (narrow and broad) of financial efficiency show varying trends. Although not-for-profit NGOs have been identified with better outreach, their social efficiency superiority relative

to other categories of MFIs was observed only in terms of overall scale efficiency. While consistent complementarity between operational self sufficiency and efficiency was observed across the methodology and microfinance objectives, the effect of outreach varies depending on institutional goal. Contrary to a trade-off between financial efficiency and outreach, the latter tends to have a positive link with social efficiency. Negative effects of bureaucracies in property registration and lack of credit information on social efficiency were also observed.

7.2 Policy Implications

From a policy perspective, four issues are prescribed either for microfinance practitioners or funders (government and development partners). Firstly, we recommend deliberate harmonization of microfinance programmes irrespective of the source of funds. Thus, microfinance investors should refrain from conditioning on-lending funds that constrains MFIs in pooling together funds. This will enable MFIs to disburse loans based on a broad institutional policy and minimize potential market fragmentation and distortion. On the part of MFI management, we recommend linkages between different categories of MFIs in view of the observed combined effect of source of funds and type of MFIs on targeting.

Secondly, in the context of loan pricing, management of MFIs are advised to segment the market based on poverty levels of clients. In addition to recent market segmentation advocacy, we propose the use of borrower's responsiveness to complement traditional client differentiation methods including type of economic activity and community level indicators. This will enhance the achievement of client specific needs to complement location specific and type of economic activity driven needs. This policy prescription will require simulation of different interest rates for various groups of clients based on country level poverty patterns.

Thirdly, creating an enabling atmosphere is recommended for achieving the poverty reduction goal of microfinance paradigm. We propose a re-channelling (in case extra funds cannot be accessed) of government and development partners financial resources from on-lending funds to the creation of an enabling external governance (business) environment that addresses issues such as bureaucracies in property registration and provides credit related information.

Finally, we recommend that MFIs should publish their efficiency levels (both financial and social) based on a multiple input-output framework. The rationale is to motivate inefficient institutions and inform microfinance funders on where to invest their funds, obviously depending on their motives. The latter is underpinned by the fact that the financial and social classification of MFIs' efficiency levels enables the identification of each MFI's comparative advantage.

7.3 Caveats

This section of the thesis attempts to acknowledge some limitations related to the methods of study used in each of the four empirical chapters. As microeconometric techniques are currently evolving at a very fast pace and data restrictions are quite often insurmountable within a given time period, some limitations of the thesis were inevitable.

The study relies on two types of quantitative datasets. Household cross section, and institutional and country panel datasets are respectively used for the first two and last two empirical chapters. In view of the rippling and complex interaction between household financial decision making and MFI service delivery, results emerging from the household cross section can be enhanced with qualitative information that tackles second and third tier probes.

In particular, the method of capturing household well-being status for purposes of comparison across different households and over time, and making inferences, has attracted wide pedagogic discourse. Although this thesis does not contribute directly to this debate, it is worthwhile acknowledging the limitations that accompany its application. To this end, in the context of the first two empirical chapters, three broad limitations have been identified. Firstly, measurement of household poverty attracts criticisms related to the use of a subjective measure and trade-offs that emerge in the use of a multi-dimensional poverty index. Secondly, the choice of cross sectional econometric techniques (least squares (ordinary and second stage regressions) and quantile regression) makes the results vulnerable to biases that otherwise would have been corrected with a panel dataset. For instance, although we attempt resolving the problem of endogeneity using instrumental variable estimation, the search of a good instrument within the limits of the dataset was extremely

daunting. Finally, since the data used for the first two empirical chapters was collected purposively to engage in a rapid household poverty comparison between MFI clients and non-clients, it was impossible to apply other cross sectional data analysis methods such as propensity score matching, treatment effects and non-parametric estimations.

The third and fourth empirical chapters' use of panel data commands a degree of reliability in view of its ability to control for unobserved MFI specific heterogeneity and allows for a host of approaches in minimizing the effect of endogeneity. Whilst estimation reliability has been carefully considered in this thesis, data generation and span (duration) of the MIX data set requires circumspection in interpreting the results and restricts the use of some of the very recent panel estimation techniques including dynamic panel approaches

In sum, given the complex relationship between microfinance operations, broad financial sector, economic growth/development and poverty reduction, it is imperative to combine qualitative and quantitative data sets and engage in different forms of analysis other than econometric techniques. In spite of these limitations, this thesis offers a platform for future empirical considerations. However the observed evidence of: a trade-off between financial sustainability and depth of outreach; client interest rate sensitivity; importance of external governance to the social objective of MFIs; and differences in MFI efficiency, cautions against over enthusiasm in extolling the virtues of the microfinance paradigm. The final sub-section of the concluding chapter identifies some of the empirical considerations that will add to and/or improve the approach used in this thesis.

7.4 Future Considerations

This thesis has benefitted from comments received during conference presentations and from reviewers in an attempt to get some of the empirical chapters published. However given time and other resource limitations, the author has not been able to incorporate all the comments received. In this section, we outline some of these comments that this thesis fails to deal with.

In the case of the first empirical chapter, that addresses trade-off/mutuality between outreach and financial self sufficiency, a couple of issues have been identified. Firstly, using the same dataset to examine the relationship between all different measures of outreach (worth, length, scope, breath, scale and depth) and financial self sufficiency will provide a better understanding on the win-win hypothesis. Secondly, the issue of endogeneity need to be addressed with more persuasive instrument to replace group mechanism and number of MFIs in a region as exclusion variables.

The second empirical chapter has the potential of unravelling more interdependence between interest rate and other covariates such as repayment schedule, loan duration, type of economic activity and poverty. In addition to exploring higher order interaction terms, the observed insensitivity and positive relationship between interest rate and loan size for the average poor and non-poor groups respectively, require further scrutiny as it contrasts economic theory of pricing. This suggests the exploration of other estimation techniques such as non-linear and non-parametric econometric techniques.

This chapter on economic governance will explore other datasets such as the Country Policy and Institutional Assessment (CPIA), UNECA African Governance Indicators (AGI) and the Ibrahim Index of African Governance (IIAG). This exploration will provide some benchmark assessment of the economic governance variables used this thesis. While focus will still be placed on economic governance issues such as property registration, contract enforcement and credit information, political and institutional governance indicators will provide some robustness check. More importantly, some of these variables can be used as external instruments instead of the current reliance on lags as internal instruments. This is important in view of the potential simultaneous effect of measurement error and slowing changing governance indicators that causes correlation between the explanatory variable and the idiosyncratic error term. This will lead to exploring use of traditional Instrumental Variable Estimation in the context of Panel. The case of using external Instrumental Variable Estimation is further justified due to two reasons. Firstly, potential sampling bias and reverse causality between outreach/profitability and the

microfinance financial performance indicators such as operating expense and yield on gross loan portfolio. Secondly, institutions reporting on the mixed market do so voluntarily and that might be correlated with some unobserved criteria.

The final empirical chapter will apply Malmquist efficiency index to identify institution specific changes in efficiency over time. This is essential in the context of DEA as efficiency over time is likely to be correlated. In the case of Translog cost function, symmetry and other restrictions will be further investigated as robustness check prior to its comparison with alternative measures such as DEA. Also, we will examine the potential dampening effect on the coefficients as a result of sampling bias and reverse causality between efficiency (social and financial) and microfinance characteristic such as MFI character type and source of funds. Finally, the potential policy implications of the final chapter would be better identified with country specific studies, hence it is imperative to investigate nation specific efficiency patterns, trends and drivers.

APPENDICES

APPENDIX I - Raymond W. Goldsmith's (1969, pp. 44-48): Stylized Facts on Financial Structure

1. In the course of economic development a country's financial super structure grows more rapidly than the infrastructure of national product and national wealth. Hence the financial interrelations ratio (the quotient of the aggregate market value of all the financial instruments in existence in a country at a given date to the value of its tangible net national wealth) has a tendency to increase.
2. This increase in a country's financial interrelations ratio, however, is not a process that continues without limit.
3. Economically less developed countries have much lower financial interrelations ratios than those which prevail in Europe or North-America.
4. The main determinant of the relative size of a country's financial superstructure is the separation of the functions of saving and investing among different economic units and groups of them.
5. In most countries the share of financial institutions in the issuance and the ownership of financial assets has considerably increased in the process of economic development.
6. This "institutionalization" of saving and of the ownership of financial assets has affected the main types of financial instruments differently.
7. Financial development in the modern sense has started everywhere with the banking system and has been dependent on the diffusion of scriptural money through the economy.
8. As economic development has progressed, the share of the banking system in the assets of all financial institutions has declined, though its share in the country's total financial assets has continued to increase for a while.
9. Foreign financing, as either a source of funds supplementing those domestically available or as an outlet for funds not easily utilizable within the country, has played a substantial role in some phase of the development of most countries.
10. Probably as important for the financial development of most countries as these flows of funds across international boundaries was the example provided by the more advanced countries. Transfers of technology and entrepreneurship have been easier to accomplish, and on the whole more successful, with respect to financial instruments and financial institutions than in many other fields.

11. The cost of financing, including interest rates and other charges, is directly lower in financially developed than in less developed countries, with occasional exceptions mainly reflecting the effects of inflation.
12. As real income and wealth increase, in the aggregate and per head per population, the size and complexity of the financial superstructure grows.

APPENDIX II - Poverty Conceptualization, Contextualization and Measurement

Introduction

Recent reworking of the international poverty line from $1/day to $1.25/day and counter responses on its reliability and validity demonstrates the dynamism, multidimensionality, location specificity and uncertainty characterizing the identification and measurement of poverty. Narayan et al. (2000) assert that poverty is location specific, gender biased, dynamic, institutionally embedded and complex. This appendix is structured to offer an insight into the complexity and evolving approaches in conceptualizing, contextualizing and measuring poverty. We will review recent literature on the nature, types, and tools and techniques of poverty measurement. This is followed by a description of the poverty situation in Ghana to provide readers with a broader perspective of the validation of the MPAT used in the third and fourth empirical chapters.

Nature of Poverty

The manifestation of poverty has yielded diverse terminologies describing three key issues of well-being: deprivation, functioning and capabilities (Sen, 1973; 1980; 1985). From the perspective of deprivation, lack of income was overly prominent in the definition of poverty. Its emergence and use dates back over a century, as it can be traced to Rowntree's study of poverty in the English City of York in 1899 (World Development Report, 2000). In contrast, Narayan and Petesch (2002) posit that the poor's experiential view transcends income, other materialistic and tangible objects, physiological and psychological defects and hinges on risks that are associated with both anticipated and unanticipated adverse effects, structure of the political economy and the role of institutions. This viewpoint demonstrates extensions both within and beyond deprivation.

The ideological change between Rowntree's study and Narayan and Petesch's (2002) observation did not begin until the 1970s, partly due to the dominance of classical economists' use of Gross Domestic Product (GDP) per capita. Agitations to test the veracity of GDP per capita as a measure of a society's well-being kickstarted after World War II and the real adverse effects of the Great Depression ensued. This prompted a number of academics and researchers (Townsend, 1970; Seers, 1972;

Sen, 1973) to question the use of GDP per capita as a yardstick for economic development and human welfare.

The compelling intervention by Townsend at the brink of the 1970s incited much detailed assessment of the philosophical and theoretical underpinnings of income as a measure of well-being. The concerns of Townsend and others were premised mainly on the mismatch between food nutritional intake, which was used as a benchmark for estimating a required minimum income level, and actual household income. Townsend (1970) alluded to some proximate variables that could possibly result in individual differential needs for food nutritional intake. Among the factors are body size, rate of metabolism, and energy demands of work and leisure. These factors certainly impede the designation of an income threshold that will be applicable to different individuals and households. In pursuance to the quest of identifying comparable criteria for well-being given individual differential needs, Townsend suggested five resources: (1) current cash income, (2) capital assets, (3) occupational fringe benefits, (4) social service benefits, and (5) private income in-kind, for determining poverty (Williamson & Hyer, 1975).

The obvious parallel between the criticisms and set of indicators offered to measure the diversity and complexity of well-being provoked philosophers, mainly John Rawls and Amartya Sen, to review the tenets of Utilitarianism, the scope of indicators, the measurability, equality and equity in relation to poverty. In spite of this and other pedagogic, compelling writings including Streeten (1981) and Sen (1973; 1980; 1985) on the shortcomings of income or consumption expenditures', they still dominate in the 21st century.

However, Townsend's intervention and later studies in the 1980s and early part of the 1990s provided significant contributions to the advancement of poverty studies. Most notable is the unifying consensus that has led to the transformation of a unidimensional conceptualization to a mutlidimensional perspective. Typical and recognizable developments attributable to the works of this period are the Human Development Indicators (Human Development Index, Human Poverty Index I & II and Gender Poverty Index), nutritional-based measures, wealth scores and ranking based on the basic needs and the asset framework. Variability in evidence based on

the different approaches in conceptualizing and measuring poverty has created a knowledge gap between measures and the identification of poverty. For instance, countries such as Cuba, Tajikistan and the Republic of Moldova evidence a gap of 43, 34 and 33 points between their rankings of GDP per capita and HDI rank (UNDP, 2006). These positive values indicate that, subtracting their HDI rank from GDP per capita rank, these countries seem to be relatively better-off measuring well-being from a broader perspective (using the HDI) than the GDP per capita. In contrast to this, some other countries observe a negative gap in their ranking of GDP per capita minus HDI. Examples include Equatorial Guinea (-90), Botswana (-73) and South Africa (-60) (UNDP, 2006). Thus these economies seem relatively worse-off measuring well-being from a broader perspective. These obvious gaps provide credibility for investigating issues on well-being beyond deprivation.

Sen's phenomenal contribution that extends poverty from deprivation to include functioning and capability unveiled the notion of time and frequency of poverty. As a result recent literature, in addition to multidimensionality and location specificity, has tackled issues such as extent (depth and severity), susceptibility (vulnerability) and spells of poverty. Lately, vulnerability and spells (expected and unexpected) poverty are emerging due to increasing respective incidence, and the effects of shocks and dynamics to well-being.

A third dimension – sustainable development and environment – has been added to the complexity surrounding the classical GDP and quality of life approaches to well-being. Stiglitz et al.(2009), in their report on "Measurement of Economic Performance and Social Progress" to the French President Nicholas Sarkozy, outlined inadequacies of GDP given the evolution of different comprehensive well-being measures but acknowledged the need for continuous discourse in view of the societal complexities.

Measures and Types of Poverty

Chambers (2006) inclines that the interests and backgrounds of policymakers, academics and researchers influence identification and measurement of poverty. This contributes to a divergence between a measure and identification of who is poor. This is rationalized by the differences in perceived knowledge of professionals in

contrast to ‘agent’ (individual and group) experiences. Chambers’ assertion has been exemplified by the host of typologies in trying to identify and measure poverty. The process of identifying and measuring poverty has also been influenced by the causes of poverty. Human rights parlance questions the role of structural inequalities and inequities that make some people poor. For the sake of brevity, this appendix skips the discussion on poverty variability emerging from differences in causes. Related work on physiological and sociological poverty is ignored as we limit our review to types based on the differences between professionals’ notion and that of the ‘agent’ (poor individual or household).

Objective and Subjective Poverty

Objective measures of poverty emanate strictly from the perspective of a professional (medical professionals, physiologists and philosophers). The professional predetermines a minimum living requirement to sustain different levels of survival or ‘normal way’ of life. It is an *a priori* setting of a threshold based on criteria such as daily calorie intake, concrete floor for dwelling, two persons per room, access to pipe borne water, basic level education, etc. The choice of indicator and weight is based on the professionals’ perceived knowledge and experience. This approach mostly leads to the identification of a threshold below which agents are classified as poor. To allow for comparability across agents of study an absolute threshold is identified irrespective of the peculiarities. This is termed as the absolute poverty line and a typical example is the World Bank’s threshold of US$1 and US$2 per day.

The World Banks’ approach is precedent on a designated minimum requirement for physical human survival. Households incapable of accessing this minimum requirement are classified as poor. The threshold is based on an equivalent cost of a basket of goods that satisfies essential food (nutritional) and non-food needs. This criterion underlies the computation of poverty from Living Standard Measurement Surveys (LSMS) in most developing countries including Ghana. This approach is arbitrary, as the decision on the criteria does not involve the agent.

In contrast, subjective measures of poverty elicit information from agents (individual, household, community, etc) based on their perception ofwell-being. This

approach is consistent with the theoretical underpinning of consumer choice since poverty is dependent on the intrinsic value that individuals, households, and community attach to goods and services. The value that is derived from the inherent level of satisfaction (utility) overrides any *a priori* criteria in defining poverty. The eminent problems that emerge are heterogeneity of preferences and the culminating task of aggregating across several different units of analysis and over time. This implies that from a practical perspective, reaching an absolute poverty threshold using a subjective conceptualization can be extremely prohibitive based on the diversity of, and non-cardinality that emerges from, individual preferences.

To overcome this, some studies (Diener, 1984; Ravalllion & Lockshin, 2000; 2001; Lawson et al., 2006) have employed the Participatory Poverty Assessment (PPA) methodologies, using ranks to measure and compare poverty. The approach prioritizes people's perceptions in the context of prevailing personal aspirations, and the social, cultural, economic and political setting at a given point in time.

In spite of the heavy laden constraint of incomparability, subjective poverty measures possess two distinct advantages. Firstly, they overcome the normative attribute of objective measures and enhance the measurement of poverty from a relative perspective. Secondly they inspire a continuous review of the multidimensional scope poverty measurement through the collation of well being perspectives. The latter has come about as a result of the participatory approach.

Both objective and subjective types of poverty lend their conceptualization to most classifications of poverty measurement and emerging extensions on well-being. Among these are: money-metric (monetary) or non-money metric (non-monetary); ordinal and cardinal; severity and depth and vulnerability and spells of poverty.

Measurement of Poverty in Ghana

Poverty measurement in Ghana is based on the phenomenal work of Foster, Greer and Throbecke (FGT) (1984) to measure incidence, depth and severity of poverty. The conceptualization is precedent on the objective presumption of a minimum calorific intake. The equivalent of a required basket of goods is estimated based on household expenditure of food and non-food items.

The FGT poverty measure in discrete terms is specified as Equation 2.II.1 below

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^{G} \left(\frac{(z - y_i)}{z} \right)^{\alpha} \qquad \textbf{--2.II-1}$$

where P_{α} represents the type of poverty measure depending on the value α. Alpha takes on values 0, 1 or 2 and the respective resultants gives the headcount (incidence), depth (poverty gap) and severity of poverty. N is the sample size; G is the number of poor people; y_i is household expenditure; and z is the absolute poverty line.

The headcount measure is the most commonly referenced measure of poverty as it is easily interpretable, especially to policymakers. It identifies the number of people below the poverty line. The measure is criticized for its inability to assess the extent of poverty by way of poverty gap. Representing alpha by 1 gives a measure of the extent of poverty and this is relevant for policy as it indicates the required resources to get people out of poverty. The third measure, squared poverty gap, places weight on the poverty gaps to assess the inequality among the poor. The FGT measures of poverty are complementary, as groups of people exhibit different characteristics of poverty. The FGT however is criticized on the arbitrariness of the alpha value and interpretation of further increases in the value.

Poverty Headcount in Ghana

The comparison of poverty head count across regions and overtime is cursorily assessed in this thesis. Coulombe and McKay (1995; 2000 and 2008), provide a detailed assessment of poverty trends in Ghana based on the Living Standard Measurement Surveys. In each of these papers, caveats such as effects of inflations and comparability of instruments are acknowledged.

Poverty incidence in Ghana over the period 1991-92 to 2005-06 has fallen by 23.2 percent for the poor and 18.3 percent for the extreme poor using the national poverty lines (Table II-1). In the case of extreme poverty, the 1991-92 poverty line of ¢700,000≈$77/annum is compared GHC 288.47 ≈ USD203/annum in 2005-06. In

July 2007 the Ghanaian currency was redenominated by literally slashing off four zeros, for instance the existing old currency of 10,000 Cedis is now traded at GHC1.

However, wide variations in terms of regional ranking are observed over the period. While the national administrative capital maintains its position as the least worse-off region, the incidence of poverty shows a U-shape as it increases between 1999-00 and 2005-06.

Table II-1 - Incidence of Poverty by Region in Ghana

	Extremely Poor			***Poor***		
REGIONS	*1991/92 %*	*1998/99 %*	*2005/06 %* ***(GHC 288.47)***	*1991/92 %*	*1998/99 %*	*2005/06 %* ***(GHC 370.89)***
Western	42.0	13.6	7.9	59.6	27.3	18.4
Central	24.1	31.5	9.7	44.3	48.4	19.9
Greater Accra	13.4	2.4	6.2	25.8	5.2	11.8
Volta	42.1	20.4	15.2	57.0	37.7	31.4
Eastern	34.8	30.4	6.6	48.0	43.7	15.1
Ashanti	25.5	16.4	11.2	41.2	27.7	20.3
Brong Ahafo	45.9	18.8	14.9	65.0	35.8	29.5
Northern	54.1	57.4	38.7	63.4	69.2	52.3
Upper East	53.5	79.6	60.1	66.9	88.2	70.4
Upper West	74.3	68.3	79.0	88.4	83.9	87.9
All	**36.5**	**26.8**	**18.2**	**51.7**	**39.5**	**28.5**

Source: Ghana Statistical Service 2007

Table II-2 - Regional Ranking of Incidence of Poverty (Upper Poverty Line) in Ghana

	Rounds of Living Standard Measurement Surveys		
REGIONS	**1991/92**	**1998/99**	**2005/06**
Western	5th	2nd	3rd
Central	2nd	7th	4th
Greater Accra	1st	1st	1st
Volta	6th	5th	7th
Eastern	4th	6th	2nd
Ashanti	3rd	3rd	5th
Brong-Ahafo	7th	4th	6th
Northern	9th	8th	8th
Upper East	8th	10th	9th
Upper West	10th	9th	10th

Source: Based on the table above

The Northern ecological zone of the country consistently remains as the poorest region; however evidence of intra-zonal competition in terms of poverty ranking is

observed. The ranking of central and the eastern regions showed marked variations. The inter-regional and intra-zonal variations over the three rounds of the LSMS provoke concern as to what is being measured and the potential impact of regional level policies over the period.

In conclusion, we surmise that conceptualizing poverty from an expenditure view point has inadvertently led to policy instruments related to the provision of financial resources and other income generating interventions. Widening the scope of conceptualization in view of the different types of poverty incidence (chronic, transient, and spells among others) justifies the call for both qualitative and quantitative approaches to the measure of poverty.

APPENDIX III - Estimating Poverty Index - Microfinance Poverty Assessment Tool

In the context of multidimensional approaches, MPAT possesses peculiar merits of assessing poverty relative to other methods such as Rapid Appraisals and Participatory Appraisals. Both approaches to the measure of poverty are dominantly subjective as they are mainly people-centric in nature. Though this allows for a holistic approach and reflects entirely the experiential levels of poverty, complications tend to emerge if opinions of the community leaders are at variance with that of households in the case of Rapid Appraisals and also when a researcher has to deal with large sample sizes for the Participatory approach. The MPAT operates midway and chooses a sample to estimate a poverty score, then applies an arbitrary cut-off poverty point to segment the sample into different categories. This invariably permits some degree of an objective approach, though the arbitrary choice of the cut-off, that is, either terciles or quintiles, is subject to some degree of criticism.

The approach collects household level data using a contextualized generic instrument that has six main subcomponents. The subcomponents of the instrument are:

- Demographic structure and economic activities
- Footwear and clothing expenditure
- Food security and vulnerability
- Housing indicators
- Land ownership
- Ownership of assets

Indicators for each of these components are structured to elicit both ordinal and ratio-scaled data. For instance, while specific questions on footwear and clothing expenditure elicit ratio-scaled data, food security obtains information on a ranked basis such as *'how many times was food served in the past two days?'* Questions of this nature transcend the narrow perspective of a money-metric perspective of poverty and provide further information on, for instance, food security, coping mechanisms, depth of poverty and vulnerability.

The estimation procedure is built on two descriptive statistical methods: Linear Correlation Coefficient (LCC) and the Principal Component Analysis (PCA). The MPAT approaches the computational measure with a bias for household per capita expenditure on footwear and clothing as this is chosen as the benchmark variable. The choice of this variable, though arbitrary, is consistent with the level of prominence accorded to this variable in the early work of Streeten et al. (1981) on basic needs. The LCC is the primary means of filtering poverty indicators to ascertain variables that best capture variations in relative household poverty (Henry et al., 2003). The initial step is to run a bivariate correlation test of all the other indicators against household per capita expenditure on footwear and clothing. The statistical criteria of $P<0.01$ and $P<0.05$ significance levels have been designated to identify variables that correlate very strongly and strongly respectively. A table ranking the variables based on the level of significance, value and sign of correlation matrix, and number of cases with missing values is generated to facilitate the implementation of the PCA.

The PCA enables the extraction of a poverty component that can be used to extract a household specific index of relative poverty. It is capable of achieving this objective as it initially filters variables that have a strong correlation with a poverty benchmark indicator. Each component extracted captures a unique attribute shared by survey households on the presumption of their relative poverty characteristics. This does not preclude the presence of other associated reasons such as geographical location, cultural practices and occupation. To minimize the extent to which other reasons might lead to the extraction of components other than the poverty component, further filtering at the initial stage is done to limit the indicators to variables that are very strongly correlated with household per capita expenditure on footwear and clothing. Some degree of intuition is applied to reduce the number of indicators; for instance, number of missing values for a particular indicator, a cluster of a number of indicators for one component, and spread of indicators, to capture other dimensions.

The PCA allows for the computation of a linear combination of indicator variables. The ‘component-loading’ that represents the amount of correlation between the component variable and the indicator variable is successively revised based on factor analysis to arrive at a household relative poverty score.

Appendix IV - Table IV- 1: Scope of MFIs Inputs/Outputs based on Sustainability and Outreach

Goals of Microfinance Institutions		Type of Efficiency	Input	Output
				Intermediation/Production Models
Sustainability	Financial	Technical/ Allocative Efficiency?	Operating expense	Financial revenue
			Personnel	Gross loan portfolio [I]
			Total Assets	
			Total Equity	
			Total expense	Financial revenue [I]
	Operational	Technical/ Allocative Efficiency?	Total Assets	Gross loan portfolio [I]
			Personnel	
			Total Equity	
Outreach[90]	Scale[91]	Technical/ Allocative Efficiency?	Operating/Financial expense	Number of Active Borrowers [P]
			Personnel	Number of Depositors [P]*
	Depth[92]	Technical/ Allocative Efficiency?	Total Assets	Average loan size/GNI per capita
	Breadth[93]	Technical/ Allocative Efficiency?	Total Equity	Total number of women borrowers [P]

APPENDIX V - Table V-1 Geographical Spread of Microfinance Institutions for Chapter Six

Regions	*Country- N (%)*	*MFIs- N (%)*
Africa (SSA)	**13 (21)**	**24 (15)**
East Asia and Pacific (EAP)	**4 (7)**	**12 (7)**
Eastern Europe and Central Asia (ECA)	**17 (28)**	**46 (28)**
Latin America and the Caribbean (LAC)	**15(25)**	**50 (30)**
Middle East and North Africa (MENA)	**7 (11)**	**17 (10)**
South Asia (SA)	**5 (8)**	**15 (9)**
Total	**61 (100)**	**164(100)**

[90] Other dimensions of outreach including length and scope have been excluded from this framework for purposes of brevity.
[91] Scale of outreach measures the magnitude of clients simply in terms of numbers.
[92] Depth of outreach captures the relativity or extent of poor clients reached by the MFI.
[93] Breadth of outreach is defined as the economic and demographic characteristics of clients.

APPENDIX VI – Ghana's Key Macroeconomic, Financial and Microfinance Indicators

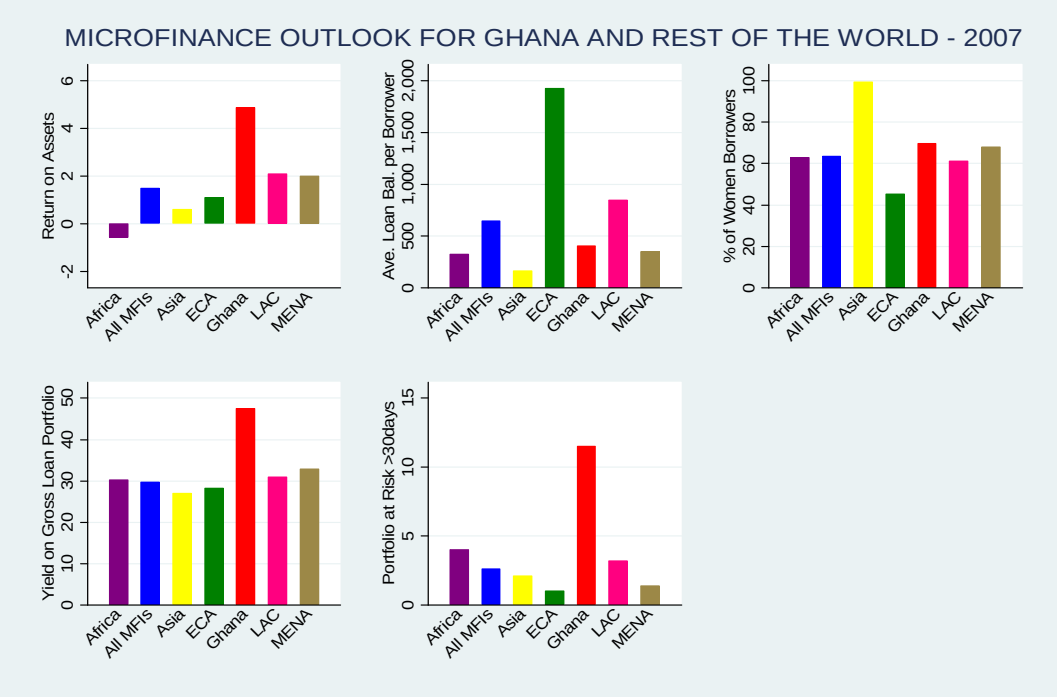
This appendix provides a snapshot overview of the Ghanaian economy in terms of overall macro economy, financial and microfinance performance. The selected indicators below coupled with a Gross National Income of just 14.7billion USD and a Gini index coefficient of 40.2 justifies the search for a development strategy that is capable of offering both development and poverty reduction strategies. With a relatively low access to financial service, Ghana has identified microfinance as a plausible development and poverty reduction strategy that can lift the economy out of the low income category.

- Gross Domestic Product growth rate – 4.5 percent: 2009 (World Development Indicators, 2009)
- Gross National Income per capita - 6300USD: 2008 Atlas method (World Development Indicators, 2009)
- Extreme Poverty Rate – 18.2 percent: 2005 (GSS, 2007)
- Driver of Economy – Agriculture
- Inflation (Consumer Price Index) – 13.3 percent: March 2010 (Bank of Ghana, 2010)
- Access to Finance – 16 percent (Honohan, 2007)
- Prime rate – 15.0 percent: April 2010 (Bank of Ghana, 2010)
- Average Lending Rates – April 2010 (Bank of Ghana, 2010)

Figure VI-1 provides a very loose [94] overview of key microfinance in Ghana compared to the averages for the various regions and all MFIs reporting on the MIX market. However, the high return on assets (profitability measure) alongside high portfolio risk (measure of potential default) yields a mixed perception about the efficiency of MFIs in Ghana. The low average loan size as proportion of GNIpc may signal the reach of poorer clients but the indicator requires caution with its interpretation.

[94] We hesitate in drawing inferences due to the use of simple averages.

Figure VI-1 Key Microfinance Indicators for Ghana compared to other Regions



Data Source – MIX Website

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