UNIVERSITY OF CAPE COAST

EXAMINING OUTREACH AND SUSTAINABILITY AS PERFORMANCE

MEASURES OF MICROFINANCE INSTITUTIONS IN GHANA

By

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this University or any educational institution elsewhere.

Student's Name: Jacob Tetteh Ahuno   Date....................................

Signature………………….................

Supervisors' Declaration

We hereby declare that the preparation and presentation of this thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Name: Prof. Patrick Agbesinyale   Date..........................

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Signature…………………................

ABSTRACT

The microfinance movement has received enthusiasm as a poverty alleviation tool that has the potential to become a self-sustaining industry. However, in the 1990s, a debate emerged regarding the possibilities of achieving this promise. While some argue that microfinance institutions (MFIs) should reduce their dependency on donors by becoming self-sustaining to serve large numbers of poor people, others fear that a profit-seeking approach will result in poor clients being discarded. The debate still remains unsettled, and the aim of this thesis is to shed light on this on-going debate by studying whether outreach and sustainability, as measures of performance in MFIs in Ghana.

An unbalanced annual panel data of 57 microfinance institutions in Ghana was analysed over a period of 2006-2012, using the generalised least squares technique to estimate random effect regression model for the sustainability model (OSS) and then an ordered logistic regression for the outreach model. The panel data for the study collected from the Microfinance Information Exchange (MIX) database being housed by the World Bank.

The results from the first model indicate that all the variables except cost on loan disbursed were significant in affecting sustainability. Like expected, all the variables followed the expected signs. For the second model except NPM, WP and AGE (Young) all the other variables were significant. The study recommends that MFIs should keep their debt-equity ratio and cost on loans disbursed as low as possible to generate enough revenue to ensure sustainability without resorting to subsidies from parent organizations or donors.

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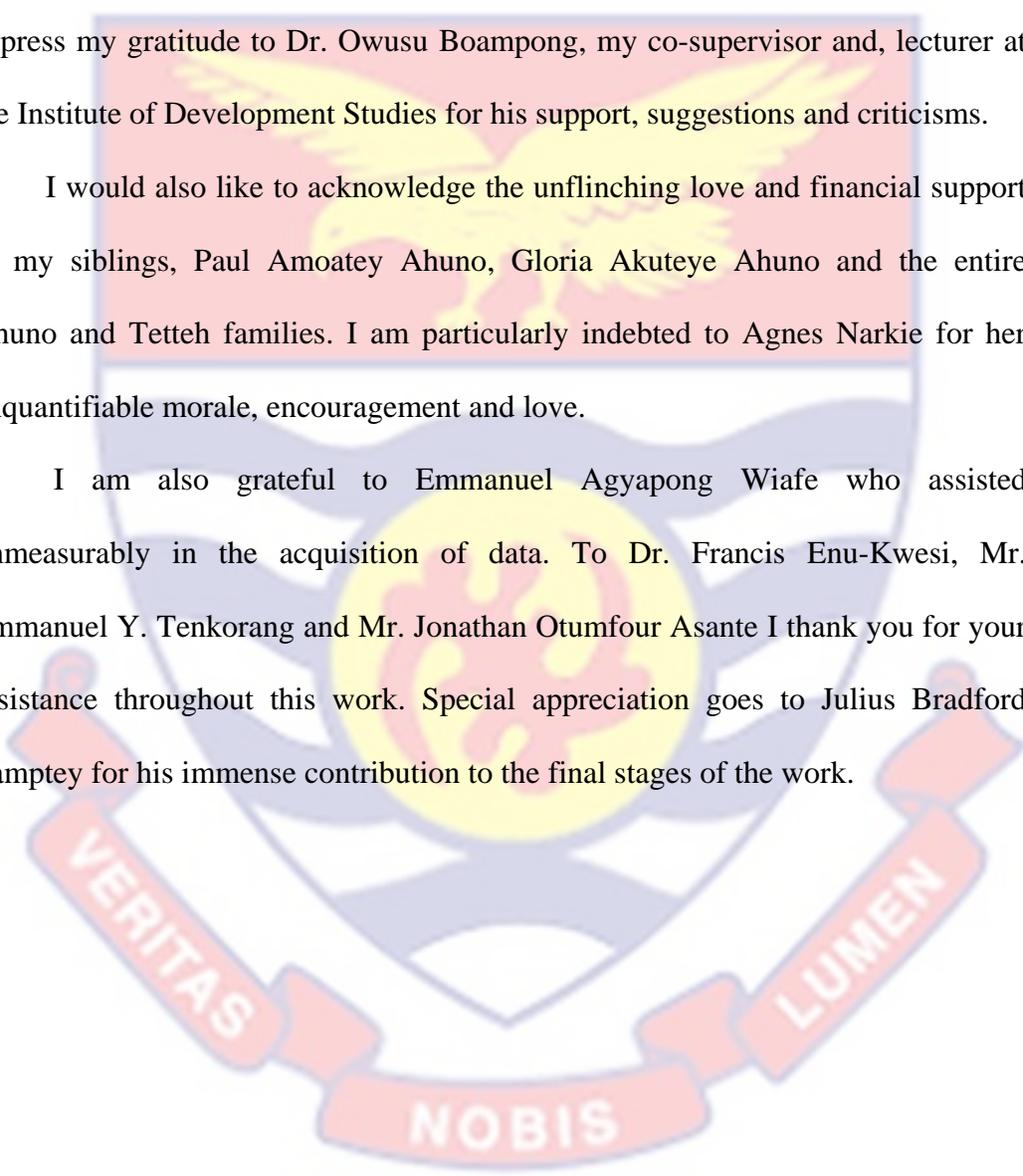
DEDICATION

This work is dedicated to my parents, Emmanuel Teye Ahuno and Elizabeth Mensah.
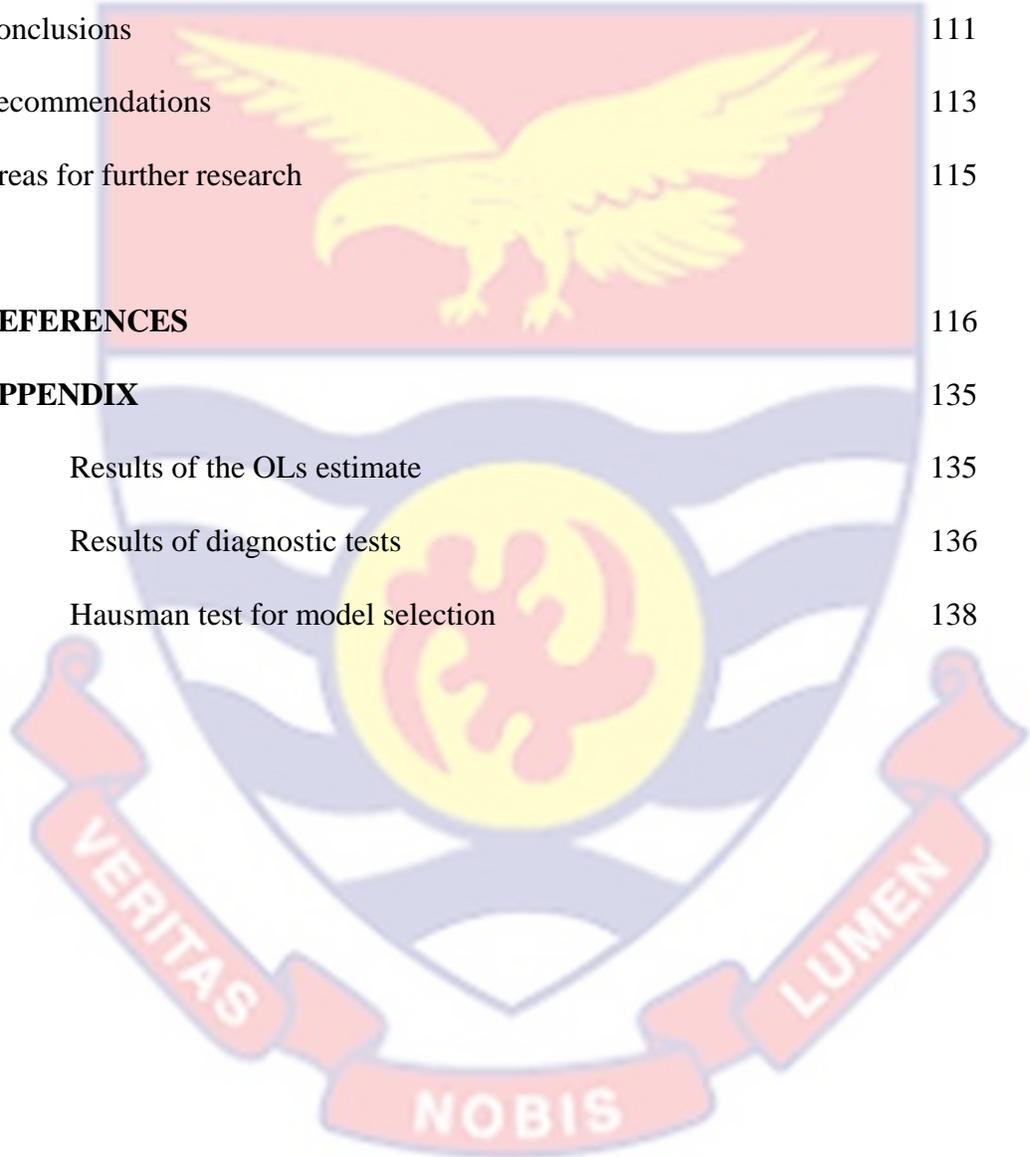
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AvLz	:	Average Loan Size
BOSS	:	Basic Operational Self-Sufficiency
CLD	:	Unit Cost of Loans Disbursed
DER	:	Debt-Equity Ratio
FINCO	:	Financial Costs
FSS	:	Financial Self-Sufficiency
GHAMFIN	:	Ghana Microfinance
GoG	:	Government of Ghana
GOLP	:	Gross Outstanding Loan Portfolio
LLP	:	Loan Loss Provisions
LS	:	Legal Status
MFI	:	Microfinance Institution
MFO	:	Microfinance Organisations
MIX	:	Microfinance Information Exchange
NBFI	:	Non-Banking Financial Institution
NBO	:	Number of Borrowers Only
NGO	:	Non-Governmental Organisation
NSB	:	Number of both Savers and Borrowers
NSO	:	Number of Savers Only
OPCO	:	Operating Costs
OSS	:	Operational Self-Sufficiency
OUTR	:	Outreach

RELRD	:	Real Effective Lending Interest Rates
SP	:	Savings Product
UN	:	United Nations
WL	:	Average salary/wages and benefits divided by the national per capita income

CHAPTER ONE

INTRODUCTION

Background to the study

Few ideas have generated as much hope for alleviating poverty in low-income countries and at the same time developing the institutional capacity of financial systems to lend cost-effective loans to poor people as microfinance (Morduch, 2000). Microfinance has therefore grown over the years to become one of the most effective tools used for fighting poverty. Its establishment was justified on the grounds that it is a first-best policy strategy to capture the existing gap between the poor and the financial market.

Due to the emergence of microfinance, the last three decades have seen a rise of decentralised financing mechanisms enabling clients to have access to different financial services (Hudon, 2007). But the ideas and aspirations behind microfinance are not new (Rossel-Cambier, 2008). Small, informal savings and credit groups have operated for centuries across the world, from Ghana to Mexico to India and beyond. In Europe, as early as the 15th century, the Catholic Church founded pawnshops as an alternative to usurious moneylenders (Helms, 2006). Today, microfinance is a field that has received an increased academic interest, policy attention and donor interest. Examples are the 2006 Nobel Prize for peace in favour of the Grameen Bank founder Yunus as well as the G8 2005 support declaration for micro-finance (CGAP, 2005).

Formal microfinance can be traced back to the pioneer work of Grameen Bank in Bangladesh and Accion International in Latin America in the late 1970s

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(Accion International, 2006 and 2007; Chu, 2006; Ledgerwood, 1999; Christen, 1997). The major thrust of Grameen Bank was to promote access to financial services for the poor to enhance their participation in productive activities. For Accion International, the primary objective was to promote access to financial services for those unable to access them from the traditional formal financial sector. The two roles ascribed to microfinance have become key driving forces for promoting access to formal financial services for low-income earners and reducing poverty (Morduch, 1999; Schreiner, 1999; Mathie, 2002; Littlefield, Morduch & Hashemi, 2003; Fernando, 2004; Kalpana, 2005).

Over the years, microfinance has not only acquired an additional dimension as a tool for financial systems development (Otero & Rhyne, 1994), it has also recorded impressive growth (Ledgerwood, 1999; Woller & Schreiner, 2006). In Asia and the Pacific, UNESCAP (2006) reported that microfinance was the fastest growing segment of rural financial intermediation. The range of products currently provided by the microfinance industry has widened, the repayment rates have been maintained at close to 100 percent, the number of loans per borrower has increased significantly, and several Microfinance Institutions (MFIs) (CGAP, 2010) are reportedly financially sustainable and profitable (Morduch, 1999; Kalpana, 2005; Cull et al., 2006; Rhyne & Otero, 2006;AccionInternational, 2007). The number of MFIs regulated under the banking laws has also increased since 1992, when the first specialised MFI, BancoSol in Bolivia, transformed into a regulated commercial MFI (Ledgerwood & White, 2006; Chu, 2006).

In terms of scale of outreach, the number of savers and borrowers, and the value of loan portfolios have increased exponentially. Citing a publication by Microfinance Barometer (2012), MIX Market Inc. database shows that in 2010 MFIs served a total of 105 million borrowers, up from 35 million in 2005, with outstanding loans of EUR 54 billion and around 80% are women. However, with half of the global adult population still unbanked, the financial access challenge remains. According to Microfinance Barometer (2012), the 2010 fiscal year was a particularly strong year for microfinance with both portfolio and number of borrowers growing by 24% and 12%, respectively. The East Asia and Pacific region is the largest region in terms of size of loan portfolio, representing 34% of the global portfolio. Africa forms at present only 7% of the 2010 global microfinance gross loan portfolio (MIX Market Inc., 2010).What these mean is that poor people in Sub Saharan Africa still lack access to formal financial services and the problem is especially serious in rural areas (Zeller & Myer, 2002).

But the professed goal of public support for microfinance is to improve the welfare of poor households, through better access to small loans (Navajas, et al., 2000) and in most instances, public funds for microfinance institutions carry a mandate to serve the poorest (Microcredit Summit, 2003). For instance, the Microcredit Summit in 1997 rallied on support to seek more than US$20 billion to provide microfinance products and service to 100 million of the poorest households (Navajas et al., 2000; Daley-Harris, 2007). Governments, non-governmental organisations (NGOs) and development partners, including the

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World Bank, United Nations Development Programme (UNDP), the United States Agency for International Development (USAID), and the International Fund for Agricultural Development Fund (IFAD) also provide funding to microfinance institutions (MFIs) to support their operations.

According to the Ghana Microfinance Network (GHAMFIN) (2011), the organization which coordinates the activities of MFIs, there are over 500 regulated and non-regulated MFIs as at 2011. Some are banking institutions, NGOs, Christian Organizations and Non-banking Financial Institutions which together served over 900,000 clients. These statistics shows that Ghana has one of the largest groups of MFIs in Africa. While it is evident that microfinance institutions have become central players in Ghana's socio-economic development, there are some indications that MFIs are not operating at full scale capacity or impact. For instance, only 10% of the potential demand for credit by the poor in the financial market is reached by MFIs in Ghana, (UNCDF, 2008). This can either be the result of a poor portfolio quality to meet the excess demand or the quest to succeed financially regardless of who they are serving.

As the microfinance industry has evolved and rapidly expanded both globally and in Ghana, questions regarding sustainability and outreach have come to the fore. For example, Morduch (1999), Cull et al. (2006), Okumu (2007), Mersland and Strom (2009) were puzzled whether microfinance could meet the full promise of reducing poverty without on-going subsidies. They also observed that high repayment rates recorded by MFIs cannot be translated easily into profitability. Buckley (1997) questions whether MFIs are any different from past

smallholder rural and co-operative finance of the 1960s and 1970s, suggesting that they may not be sustainable without either substantial donor subsidies or a shift toward less poor clients. Ledgerwood and White (2006) and Hatarska, (2009) observe that the microfinance industry has seen impressive growth for longer than two decades, yet still a large percentage of its potential market worldwide have not been reached.

The microfinance literature is filled with theoretical arguments on the issue of sustainability and outreach of MFIs. While Rhyne and Otero (1992) and Otero and Rhyne (1994) have argued that to achieve significant outreach, sustainability of MFIs is a prerequisite. And this argument has since been elevated to include the commercialisation and transformation of microfinance, which have strong links to regulation (Christen & Drake, 2002; Ledgerwood & White, 2006; Okumu, 2007; Hatarska, 2009). Others also posit the possibility of a trade-off between the financial and social performance (Christen, 2001; Olivares-Polanco, 2005; Hishigsuren, 2007; Gosh & Van Tassel, 2008; Cull et al, 2009; Mersland & Strom, 2009).

Statement of the problem

Banking with the unbankable as Grammen experimented became a global phenomenon of providing credit to the poorest of the poor. Microfinance has grown enormously over the last 20 years and is now firmly established as a major supplier of a wide range of financial services to millions of people (CSFI, 2011). About one thousand MFIs that report to the MIX have 105 million borrowers and

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86 million savers, and the numbers are growing by about 24 percent a year, even more in some countries. However in the last few years, microfinance has found its enviable reputation under attack for a number of perceived reasons: its growing commercialism, as evidenced by an increasing focus on size and profitability, a decline in standards, particularly in the area of lending, and a sense that the industry may be drifting away from its original "double bottom line" purpose. All have combined to cast microfinance in a new and unflattering light, and have raised doubts about the continued willingness of donors and investors to provide the support it crucially need (CSFI, 2011).

The donors of MFIs make decision in abating their funding of MFIs as soon as the MFIs is able to be self-sustaining with little/no dependence on donors for further financing. The donors' decision discontinue support, is usually based on performance measurement of the MFIs. This performance is measured in terms of outreach and sustainability (Christen et al, 1995). Since the 1990s, the concept of performance in MFIs has been subjected to intense debate. Despite diverging perspectives, industry players have gradually reached consensus on the definition of standard indicators for its evaluation. The Consultative Group to Assist the Poor (CGAP), a consortium of donor organizations that currently has 33 members, translated this consensus into a set of guidelines (CGAP, 2003) that have been widely disseminated. While the emphasis on financial performance has boosted the sector's level of professionalism, the focus on profitability has at times led institutions to lose sight of their social mission (Christen, 2001).

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Empirical research on sustainability and outreach, using a single country, has rarely been undertaken. While most previous studies on microfinance have conducted research on the impact that microfinance has on poverty reduction (Hulme & Mosley, 1996; Murdoch, 1999; Copestake, et al, 2005; Yeboah, 2010), others evaluated the effects of regulation on MFI performance, the effect of regulation on outreach and sustainability (Campion & White, 1999, Christen & Rosenberg, 2000; Arun, 2005; Okumu, 2007; Hatarska & Nadolnyak, 2007; Hatarska, 2009). Even though there have been studies conducted on the trade-off between sustainability and outreach, they are mainly focused on samples from all over the world or on regional levels (Korse, 2011; Balkenhol, 2007; Cull et al, 2007; Murdoch, 2000; Rhyne, 1998; Pischke, 1996; Hulme & Mosley, 1996; Christen, 1995; Krahnen & Schmidt, 1994; Otero & Rhyne, 1994).

Regardless of the growing research in the area of investigating the sustainability and outreach as performance measurement of microfinance institutions worldwide including Africa; due to the strong nexus between microfinance and poverty reduction (Morduch & Haley, 2002). The study on the sustainability and outreach determinants on performance of MFIs is rarely investigated in Ghanaian context. This study would investigate the outreach and sustainability determinants on performance of MFIs to contribute fresh evidence on these indicators for further policy considerations and efficiency in MFIs operation in Ghana.

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Objective of the study

The general objective of this research sought to examine outreach and sustainability determinants on performance of microfinance institutions in Ghana. The specific objectives were to:

1. Analyse the effects of the determinants of sustainability on the performance of MFIs in Ghana;

2. Analyse the effects of the determinants of outreach on the performance of MFIs in Ghana;

3. Determine the most significant variable that determines performance of MFIs in Ghana

4. Make recommendations based on the findings.

Alternative Research/Hypotheses:

1. H_A: there is a significant relationship between the determinants of sustainability on the performance of MFIs in Ghana;

2. H_A: there is a significant relationship between the determinants of outreach on the performance of MFIs in Ghana;

3. H_A: there is more significant effect of sustainability determinants on performance than any other variable;

4. H_A: there is more significant effect of outreach determinants on performance than any other variables.

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Scope of the study

This study is concerned with examining outreach and sustainability determinants on performance of microfinance institutions. However the study has been restricted to the Ghana and data for the period between 2006 and 2012 were covered. Ghana has been selected for the simple reason that even though MFIs have been operating in this country, poverty still remains a dominant syndrome. Again the researcher selected Ghana because:

- First, research in this area outreach and sustainability measures on MFIs performance is rarely investigated.

- Second, the growing significance of MFI's services to the "unbankable" population in the country.

This study has two parts, namely sustainability and outreach. The work principally is about modelling the determinants of sustainability and outreach, using regression method and panel data collected on 57 MFIs for seven years (annual) from 2006 to 2012.

Significance of the study

The studies that have been undertaken in the microfinance industry in Ghana have not explored sustainability and outreach determinants on performance; neither has it been comprehensive in terms of the institutions covered or the depth of analysis, especially with respect to the application of quantitative methods. This study has, therefore, been justified in that it:

- Identifies the determinants of sustainability and outreach covering several MFIs. It also investigates the relationship between sustainability and outreach using the correlation and regression method; and

- The results of the study are useful for various actors in the microfinance industry, including the potential/current regulators and supervisors of MFIs, to get a broader understanding of the determinants of sustainability, which is a major institution building policy issue, the determinants of outreach, which is a major public policy issue, and the relationship between the two.

Organization of the study

This work is organized into five chapters. The introduction of the work which consists of the background of the study, statement of problem, objectives of the study, scope of the study, significance of the study and the organization of the study.

Chapter two covers the literature review. The relevant literature to the study is thoroughly reviewed and the areas considered include theoretical and empirical issues on microfinance.

In chapter three, the methodology used for the study is considered. This embraces the choice of the study area, population and sampling, data collection procedures, research instruments, research design and data analysis.

The discussion and presentation of result is captured in chapter four and Chapter five consists of the summary of findings, conclusions, recommendations and the direction for future research.

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CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

This chapter is in three broad parts. The first part gave a general definition and scope of microfinance. This was followed with a background review of the microfinance sector in Ghana. The second part brings out some of the conceptual issues pertaining to the determinants of Microfinance. A particular attention was paid to performance measures of MFIs and some of the limitations of the selected measures of outreach and sustainability. This was then be followed by an appraisal of some empirical studies on the relationship between sustainability and outreach as performance measures of Microfinance institutions.

Microfinance – Definition and Scope

Microfinance is the provision of a broad range of financial services such as credit, savings, insurance and money transfer for low-income individuals or households (Asian Development Bank, 2000). Armendariz de Aghion and Morduch (2005) defined microfinance as "a collection of banking practices built around providing small loans (typically without collateral) and accepting tiny savings deposits." According to the United Nations the microfinance model encompasses the provision of financial services and the management of small amounts of money through a range of products and a system of intermediary functions that are targeted at low income clients (UN, 2005).

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From the above definitions, it is clear that microfinance is a multi-dimensional development approach that is targeted at the poor as a means of providing demand driven, well-structured financial services meant to improve their living standards.

Microfinance institutions (MFIs), which cover a wide range of providers that vary in legal structure, mission, and methodology, offer these financial services to clients who do not have access to mainstream banks or other formal financial service providers (Brown et al., 2005). The nature of microfinance institutions is dissimilar to the traditional banks; even though, they are all involved in financial intermediation. MFIs are relatively small in size, limit their services to poor households and often provide small collateral free group loans. Gropper et al. (2006) also distinguish MFIs from the other financial institutions by indicating that many aspects of the operations of microfinance units are characterized by subsidies and in-kind transfers from international donors, governments and international networks.

MFIs pursue a double bottom line objective of outreach and sustainability. On one hand, MFIs fulfil an outreach mission by providing financial services to the poor who are often not reached by the traditional banking institutions. On the other hand, they working sedulously to sustain and expand their operations – sustainability, (Gropper et al., 2006).

Although microfinance units are on the whole contributing to the goal of alleviating poverty across the globe, the movement on this expansion path is very marginal. According to Brown et al. (2005), globally some 30 million families

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had access to microfinance services by end of December 2000. Of these, around 19 million were classified as amongst the poorest families around the globe. This represents barely 8% of the total of 235 million poorest families in the world. Although, Asia alone, accounts for three-quarters of the poorest families covered by micro-financial services, only 9.3% of the poorest families were reached. In Latin America and Africa 7% of the poorest families have access to microfinance, whereas in India, which alone accounts for around a quarter of the world's poorest families, even on the most optimistic assumptions barely 5% of the population had access to microfinance (MIX Market Inc., 2010). Also, only 10% of a potential active and bankable poor are believed to be reached by MFIs in Ghana; whilst an estimated 50% of excess financial demand for service is projected to exist within the microfinance sector in Ghana, (UNCDF, 2008).

Concepts and measures of sustainability and outreach

The terms sustainability and outreach are extensively used in the field of microfinance without, in many instances, providing clear definition (Ledgerwood, 1999; Hulme & Mosley, 1996). For the purpose of this study it is important that these terms are defined for two main reasons. First, they are used in different contexts and their meaning thus depends on the specific context in which they are used. Second, two of the focal areas of this study are to establish the determinants of sustainability and outreach. This section investigates and discusses the definitions of these concepts and their measures.

The concept of sustainability

The term sustainability is used interchangeably with other concepts such as profitability, self-sufficiency, financial self-sufficiency, self-sustainability, financial sustainability, financial efficiency, institutional sustainability, viability and financial viability (SEEP Network & Calmeadow, 2000; Ledgerwood, 1999; Paxton & Fruman, 1998; Christen, 1997; Buckley, 1997; Johnson & Rogley, 1997; Hulme & Mosley, 1996). These can be confusing, especially to new readers in microfinance.

Woller and Schreiner (2006) define sustainability as the non-profit equivalent of profitability, while UNESCAP (2006) defines sustainability as the ability of the organisation to meet the cost of operations and build enough reserves for capitalisation. Navajas et al. (2000) define sustainability as "…permanence…Sustainability is not an end in itself but rather a means to the end of improved social welfare" (Rhyne, 1998, p.7). Strauss Commission (1996, p.21) defines self-sustainability as "…the degree of subsidy independence attained by a DFI…"

From a project point of view, sustainability is about the life of a project beyond a period during which its finances come from external sources, such as donors. Therefore, sustainability is a question of self-reliance in the medium to long term (Mog, 2004). However, in development circles the conventional meaning of a sustainable institution refers to an organisation consciously designed to do one or more of the following: (i) survive over time as an identified unit, (b)

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recover some or all of its costs, and (c) supply a continuing stream of benefits using its own resources (Brinkerhoff & Goldsmith, 1992).

Relating to profitability, sustainability is an adjusted measure of profitability in an accounting sense, generally defined as the difference between total revenue (TR) generated by an organisation from its operations and the total associated costs (TC). While profitability is generally used to assess the financial performance of organisations that do not depend on external subsidies, sustainability is considered more appropriate to assess the financial performance of subsidy-dependent organisations (Hulme & Mosley, 1996).

In a nutshell, the concept is used in the microfinance literature to describe the performance of institutions or programmes that at one point or another rely on external support in the form of grants, concessionary loans or implicit subsidies. It is a concept developed to answer the question of whether it is possible for an institution to exist for a long time providing valuable services without subsidies. In this study, the sustainability of a microfinance institution means its ability to exist over a reasonable number of years providing microfinance services without subsidies.

Sustainability measures

The development of self-sufficiency measures started with Yaron (1992) (Ledgerwood, 1999). In the literature reviewed, different levels of measures of self-sufficiency have been suggested. Rhyne and Otero (1992) identify four levels, as summarised in Table 1.

Table 1: Levels of Sustainability

Level	Activity
One	Grants and/or soft loans to cater for total operating costs and revolving loan fund. The MFI is presumed to be earning no income from operations. The MFI is kept in existence by grants and/or soft loans.
Two	The MFI raises funds by borrowing short-term loans at concessionary interest rates, but the amount is still insufficient. Grants are therefore needed to cover parts of the operating and implicit costs.
Three	Operating income increases but still not sufficient to cover all the costs including cost of inflation and concessionary loans.
Four	The MFI is fully self-financing. At this level income generated from the provision of financial services fully accounts for all the costs and the growth of the MFI.

Source: Constructed following Rhyne and Otero (1992)

While exploring the three profitability models, namely the cost recovery model, the return on equity model, and the modified subsidy-adjusted return on assets model for evaluating financial sustainability, Christen (1997) points out that originally most practitioners understood that a credit programme or an MFI was financially viable as long as the income received covered its operating expenses. This perception meant that even institutions or programmes that completely depended on donations were viewed as viable (sustainable). However, Christen (1997) notes that this perception changed and sustainability was redefined to mean meeting operating expenses entirely from income generated from services offered to clients. Following this redefinition of sustainability, three

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levels of self-sufficiency were suggested: i) the basic operational self-sufficiency, ii) a more complete operational self-sufficiency, and iii) financial self-sufficiency (Christen, 1997). Table 2 captures information used to derive these levels of sustainability, obtained by dividing the total of all considered incomes (Y) by the total of all considered expenses (TE). For example, if we let BOSS stand for the basic operational self-sufficiency, then, BOSS = Y/TE is a level of the sustainability attained by an MFI.

Table 2: Levels of sustainability and information used to derive them

Information from income statement & other sources	Basic level of financial viability	More complete operational self-sufficiency	Financial self-sufficiency
Total Operating Income (Y)	-	Considered	Considered
Total Income Received (Y)	Considered	-	-
Total Cash Expenses (E)	Considered	Considered	Considered
Total Non-cash Expenses (E)	-	Considered	Considered
Cost of Inflation (E)	-	-	Considered
Cost of Capital (E)	-	-	Considered

Source: Constructed following Christen (1997)

Further developments of self-sufficiency measures have reduced the levels at which they are measured to two: operational self-sufficiency (OSS) and

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financial self-sufficiency (FSS) (see SEEP Network & Calmeadow, 1995; and Ledgerwood, 1999). Sources of information used to generate OSS and FSS are summarised in Table 3.

Table 3: Sources of information used to generate OSS and FSS

Information from income statement and other sources	Operational self-sufficiency (OSS)	Financial self-sufficiency (FSS)
Total operating income	Considered	Considered
Revaluation/inflation adjusted fixed assets value	Not Considered	Considered
Financing costs	Considered	Considered
Total cash expenses on operations	Considered	Considered
Total non-cash expenses on operations e.g. depreciation and loan loss provision and write-off	Considered	Considered
Total in-kind expenses on operations	Not Considered	Considered
Cost of capital or funds	Not Considered	Considered
Cost of concessionary loans and other subsidised injections such as grants	Not Considered	Considered

Source: Constructed following various reviewed microfinance literature (SEEP Network & Calmeadow, 1995; Ledgerwood, 1999)

Self-sufficiency measures are generated by dividing the total of all considered incomes by the total of all considered expenses (SEEP Network and Calmeadow, 1995). Because of the apparent consensus in the literature that OSS

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and FSS are the preferred measures of self-sufficiency (Barres, 2006), further discussions are limited to these two measures.

Operational self-sufficiency (OSS)

To explain OSS, let total operating financial income for an MFI be designated by LY and let the expenses be defined and denoted as follows (SEEP Network & Calmeadow, 1995): i) Financial costs are costs to the MFI of borrowing from other institutions (FINCO); ii) Direct and indirect operating costs incurred by the MFI in the process of lending and related activities (OPCO). Depreciation costs are included in OPCO (CGAP, 1996); iii) Loan loss provisions (LLP). These cater for possible loan defaults and write-offs.

$$OSS = \frac{LY}{FINCO + OPCO + LLP} \quad -------------------1$$

OSS is a continuous variable fully defined when (FINCO+OPCO+LLP) $\neq$ 0. This means that at least one of the variables in the denominator, that is, FINCO, OPCO or LLP $\neq$ 0. The index is unbounded when the numerator of the function generating it tends to $+\infty$ and the denominator is comparatively very small or zero.

In practice, though, it is unlikely that OSS can be undefined and unbounded, because no MFI can operate without incurring any cost. As Samuelson and Nordhraus (1996) argue, there is a fixed cost that an organisation must incur whether it is producing outputs or not. Similarly, it is unlikely that LY can increase to $+\infty$ while the value of the denominator remains comparatively small or zero, since to generate LY, expenses are incurred. Furthermore, the main

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component of LY is the product of loan portfolio (LP) and interest rate (i) charged on loans. To grant more LP, more factor inputs are required, but the law of diminishing returns to scale postulates that LP cannot increase infinitely. Following Stiglitz and Weiss (1981), it is also unlikely that i can be increased infinitely, because at $i = +\infty$, the demand for loans = 0, and secondly, it is not practical to charge infinite i.

OSS <0 implies that either LY or total expenses are negative. This is unlikely to occur, because a negative income is not feasible and costs can be zero or positive. OSS $= 1$ means that the MFI is at break-even point, while OSS >1 implies that the MFI fully covers cash and non-cash costs and OSS <1 but positive means total expenses are more than LY, and therefore the MFI is making losses.

Financial self-sufficiency (FSS)

Following the derivation of OSS, to explain FSS, let total operating financial income for an MFI be denoted by FY and let the expenses be defined and denoted as (SEEP Network & Calmeadow, 1995): i) Financial costs which are costs to the MFI of borrowing from other institutions (FINCO); ii) Direct and indirect operating costs incurred by the MFI in the process of lending and related activities (OPCO). Depreciation costs are included in OPCO (CGAP, 1996); iii) Loan loss provisions (LLP). These are made to cater for possible loan defaults and write-offs; iv) In kind expenses that would be incurred for technical assistance received but not paid for by the MFI (INDCO); and v) The cost of maintaining the

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value of equity relative to inflation and the surplus revenue resulting from subsidised loans (ICS).

FSS can be expressed as:

$$FSS = \frac{FY}{FINCO + OPCO + LLP + INDCO + ICS} - - - - - - - - - - 2$$

Like OSS, FSS is also a continuous variable fully defined when (FINCO+OPCO+LLP+INDCO+ICS) ≠ 0. This implies that at least one of the variables in the denominator, that is, FINCO, OPCO, LLP, INDCO or ICS, ≠0. The index is, however, unbounded when the numerator of the function generating it tends to $+ \infty$ and the denominator is comparatively very small. In practice, though, it is unlikely that FSS can be undefined and unbounded, because no MFI can operate without incurring any cost for reasons already advanced. For this reason, as long as an MFI is in operation, it must incur positive costs. Similarly, it is unlikely that FY can increase to $+\infty$while the value of the denominator remains comparatively small, since to generate FY, expenses are incurred, and the law of diminishing returns to scale applies on the loan portfolio components of FY.

FSS< 0 implies that either FY or total expenses are negative. This is unlikely to occur, because a negative income is not feasible and costs cannot be negative for reasons already advanced. FSS = 1 means that the MFI is at break-even point, while FSS>1 implies that the MFI fully covers all costs and FSS<1 but positive means total expenses are more than FY, and therefore the MFI is making losses or depending on subsidies.

Adopted measure of sustainability

As shown earlier, two measures have been suggested for measuring sustainability of MFIs. This underlines an indication of the greater emphasis that has been placed on the sustainability of microfinance institutions in the recent past, and the need to find appropriate measures that can be widely accepted as standard measures of sustainability.

In this study OSS has been preferred for the following reasons:

1. Like FSS, it can easily be related to the standard profitability definition of revenue minus associated expenses, which makes it easy to understand the linkage between profitability and sustainability;

2. It explicitly relates income to expenses, which are the two main components that are critical in determining whether or not an institution is able to cover all its costs of doing business;

3. While FSS is a more appropriate measure of sustainability (Barres, 2006), the data required to derive it are enormous and often not available in most MFIs, more specifically those in Ghana;

While OSS as a measure of sustainability has some advantages discussed above, it also has some limitations:

1. Unlike FSS that uses the inflation rate to adjust for the cost of equity, in OSS the cost of equity as well as other implicit subsidies is not adjust for. In OSS, in-kind support that the MFI may receive is not adjusted for. FSS controls for in-kind subsidies as well.

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2. OSS, like other measures of sustainability, does not measure the benefits of microfinance, and the measurement of costs in the framework ignores the costs borne by clients as well as social costs (Yaron et al., 1997 cited in Ledgerwood, 1999). Thus the measure does not lead to a cost-benefit analysis, perhaps the most natural and defensible method of evaluation (Schreiner, 1999).

3. OSS, like other measures of sustainability, is a point estimate as it establishes the level of operational self-sustainability at a point in time, but it doesn't project what may happen in the future (Schreiner, 1999).

The concept of outreach

The contexts where the concept of outreach has been or is mostly used are religion, community activities, targeted credit programmes and microfinance, or more generally, development programmes or activities. For the purpose of this study, outreach is examined within the context of microfinance.

Conning (1999, p.52) defines outreach as the term "...typically used to refer to effort by microfinance organisations (MFOs) to extend loans and financial services to an ever-wider audience (breadth of outreach) and especially toward the poorest of the poor (depth of outreach)." In this definition, outreach is reflected as an effort made to provide loans and financial services to the poorest of the poor. Similarly, Navajas, et al. (2000, p.335) define outreach as "…the social value of the output of a microfinance organisation in terms of depth, worth to users, cost to users, breadth, length, and scope." In this definition outreach is seen in the value

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of output of an MFO. In other words, an MFO must first produce an output, which the authors do not indicate, and the value of the output is what is considered outreach.

Some authors such as Schadwinkel (2000) have argued that the concept of outreach is vague as it has proven to be difficult to assess, because it includes quantitative as well as qualitative aspects. In addition, the clients that are the subject of assessment are difficult to identify and to obtain their status. While the definitions of outreach by Navajas, et al. (2000) is more elaborate, it is not clear and therefore not very helpful in understanding outreach precisely in the context of microfinance. Conning's (1999) definition of outreach is more appropriate, but it is not the definition adopted in this study. The researcher adopts a less restrictive definition of outreach, defined as the extent to which microfinance services are accessible to the low-income earners, measured by the scale of outreach as argued in the next sub-section.

Measures of outreach

When micro-credit and later formal microfinance gained currency in the 1990s with different approaches to the delivery of financial services to the poor, the concept of outreach begun to be widely used in microfinance and other measures developed. It was during this time that Yaron (1992) also argued that the traditional quantifiable measures of institutional success based on accounting profit is often meaningless information with respect to financial self-sustainability (Gurgand et al., 1994). For this reason Yaron (1992) suggested that seven

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different measures could be used to measure the outreach: (i) the value of outstanding loan portfolio and the average value of loans extended, (ii) the amount of savings and average value of savings accounts, (iii) the variety of financial services offered, (iv) the number of branches and village posts/units, (v) percentage of the total rural population served, (vi) the annual growth of MFI assets over recent years in real terms, and (vii) women's participation.

Over the years, the measures of outreach first proposed by Yaron (1992) have either been broadened, refined or categorised. The CGAP (1997) and Yaron et al. (1997) as cited in Ledgerwood (1999) broadened outreach measures and classified them under three groups: (i) clients and staff outreach, (ii) loans outreach, and (iii) savings outreach. Further refinement of measures of outreach has re-classified them into two categories: scale (or breadth) of outreach and depth of outreach, although Microbanking Bulletin (2006) has maintained a long list of outreach indicators, and MIX Market (2006) uses the Number of Active Borrowers as a measure of outreach due to the fact that it is the most commonly available proxy to measure the breadth of outreach. By the scale of outreach is meant the number of clients served in a defined period, and by the depth of outreach is meant the level of poverty of the clients served (Ledgerwood, 1999).

Ledgerwood (1999) further argues that the scale of outreach is a straightforward measure but less nebulous than the depth of outreach, because it captures the total number of clients served by an MFI without taking into account their poverty status. It is argued here that there are millions of non-poor people who are also denied access to financial services in the formal sector. Moreover,

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the delivery technology employed by MFIs tends automatically to close out those who can access financial services from the formal sector, leaving out mainly those who are unable and have to turn to MFIs for financial services (Johnson & Rogaly, 1997; Ledgerwood, 1999; Jain, 1996).

Adopted measure of outreach

From the above proposed measures of outreach, the scale of outreach is straightforward and easy to establish. The depth of outreach has been proposed as a better measure of outreach from the poverty perspective. For the purpose of this study the scale of outreach is considered an adequate measure of outreach for the following reasons:

First, it is a reasonable measure of people excluded from accessing financial services from the traditional formal financial sector. It is a quantifiable proxy of the extent to which the MFI has reached its outreach objective (Yaron et al. cited in Ledgerwood, 1999). Indeed, one of the basic reasons for the evolution of microfinance is to provide access to financial services for those who have been consistently left out or underserved by the traditional formal financial sector (Ledgerwood, 1999; Schadwinkel, 2000). Ledgerwood (1999) argues that indicators of outreach are relatively simple to collect and provide a good measure of scale of outreach and good proxies for depth of outreach.

The second reason for preferring scale outreach is that it is cheaper to construct. Outreach measures that take into account the characteristics of the poor

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usually require regular collection of detailed information about the MFI clients to determine their level of poverty.

The scale of outreach measure has some limitations:

1. Like the sustainability measures, scale of outreach lacks a need to measure the benefits of microfinance. Thus the measure does not lead to a cost-benefit analysis (Schreiner, 1999).

2. Finally, from the perspective of the six aspects of outreach originally proposed by Schreiner (1999) and later expounded by Navajas, et al. (2000), scale of outreach only gives a picture of the number of clients served (breadth). It does not, for example, give a full account of outreach in terms of the value to clients, cost to clients, depth, length and scope.

Having examined the concepts of sustainability and outreach and how they are measured, the adopted measure of outreach in this study is the number of clients an MFI has served with financial services in a defined period and the adopted measure of sustainability is operational self-sufficiency (OSS).

Some determinants of sustainability and outreach and analysis of their relationship

The researcher now examines the determinants of sustainability and outreach that have been identified through a review of the literature on the rapidly expanding field of microfinance. For a systematic analysis and presentation, each widely acknowledged determinant identified in the literature has been tackled

separately so that the relationship between the dependent variable and the explanatory variable is fully investigated. The analysis also investigates the relationship between sustainability and outreach.

Sources and uses of funds

Based on sources of equity, an organisation can be private, public or state. Private and public organisations are initially funded by equity from individuals or private entities while state organisations are funded by equity from the state or government. Based on legal status, an organisation can be incorporated or unincorporated, and it can be private, public, state or non-governmental. In Ghana some organisations incorporated as limited by guarantee also take the form of non-governmental organisations (NGOs). The bulk of funding for NGOs tends to come from donors in the form of grants or proceeds from concessionary loans (Chu & Otero, 2002).

Beyond the initial funding for establishing an organisation, additional funds can be in the form of retained earnings or surpluses, grants, loans (concessionary or commercial) or intermediated savings (Table 1). Retained earnings or surpluses and grants are part of the equity, while the rest are liabilities. Therefore, sources of funds can be categorised into net worth/equity and liabilities. Van Greuning et al. (1999) on the other hand identify three broad types of MFIs according to their main sources of funds for operations and loans: (i) those using other people's money in the form of grants and donations, limited deposits, and concessionary and commercial borrowing; (ii) those using members' money in the form of

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contributions and savings deposits; and (iii) those using the public's money in the form of retail deposits, savings deposits, wholesale funds and commercial borrowing.

Sources of funds and the implications for outreach and sustainability

A significant amount of literature on microfinance has placed much emphasis on the sources of funds as a major determinant of sustainability and outreach (Rhyne & Otero, 1992; Otero & Rhyne, 1994; Rhyne, 1994; Christen, 1997; Buckley, 1997; Robinson, 2001a; Christen & Drake, 2002; Fernando, 2004; Chu, 2006; Ledgerwood & White, 2006). Buckley (1997), for example, argues that extensive outreach reportedly achieved by MFIs is due to donor funding, while Rhyne and Otero (1992) argue that extensive outreach by the MFIs can be achieved and sustained through savings mobilisation and access to commercial loans.

While it is not easy to see a direct relationship between the various sources of funds, on the one hand, and sustainability and outreach, on the other hand, given the accounting principle that the value of net worth plus liabilities (sources of funds) is equal to the value of assets, an increase in the sources of funds should lead to an increase in the uses of funds. Thus, if a sustained amount of savings and commercial loans can be mobilised, it is possible that sustainability and expanded outreach can be achieved. It can also be seen that additional equity arising from retained earnings or donor funding or both leads to an increase in the uses of funds.

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However, if the savings mobilised and/or commercial loans obtained are used to increase GOLP, if the average loan size (AvLz) increases at a rate higher than the rate at which GOLP increases, an increase in GOLP may not be translated into an increase in outreach although sustainability could improve. Thirdly, an increase in GOLP may not be translated into an increase in outreach, if the number of repeat borrowers increases. Therefore, access to more savings and/or commercial loans may not necessarily lead to an increase in outreach and/or improved sustainability, as has been argued in the literature (for example, Rhyne & Otero, 1992; Otero & Rhyne, 1994; Rhyne, 1994; Christen, 1997).

In this study it is implicitly hypothesised that sources of funds measured by DER positively affect sustainability and outreach, because it is widely expected that an increase in the resource inflow to a microfinance institution should lead to an increase in loanable funds and the number of clients accessing the loans.

Uses of funds and the implications for sustainability and outreach

Operating revenue (OR) is directly generated from two main uses of funds: investments and disbursed loans proxied by the gross outstanding loan portfolio (GOLP).The direct way to increase investments and GOLP, given fixed sources of funds, is to re-allocate funds within the uses side, a fairly logical argument that has received less emphasis in microfinance empirical studies. If investments generate more revenue compared to other forms of uses of funds, re-allocating resources to other forms of uses of funds (ceteris paribus) results in increased OR and, therefore, sustainability.

Similarly, assuming all other factors remain constant, an increase in GOLP results in higher OR and improves sustainability. Thus, an increase in investments and GOLP, ceteris paribus (lending interest rates, costs and repayment rates), translates directly into improved sustainability. The loan size does not have any effect, except where it leads to increased cost of loan administration. On the other hand, an increase in GOLP could also lead to a decrease in OR, because as more loans are disbursed and left uncollected, less revenue is generated. Thus, an increase in GOLP could be negatively associated with sustainability, but positively with outreach as hypothesised in this study.

Unlike sustainability, where more revenue can be generated from investments and GOLP to improve sustainability as argued above, outreach is only influenced through GOLP (assuming loans are the only products offered). Denoting the number of loans by NL and average loan size by AvLz, GOLP = AvLz*NL. Assuming there are no repeat borrowers (NRB), then NL is the same as outreach. This means that for NL to increase when GOLP increases, AvLz and NRB have to be constant. If these variables increase, an increase in GOLP may not be translated into an increase in outreach.

Concepts of savings and intermediation

The term 'saving' is widely used to mean income not spent on current consumption but put aside for future spending (Bannock et al., 1998). It is often assumed that savings arise from the surplus income available for current consumption. However, in most developing economies savings may not occur in

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the form of income not spent on current consumption, but on non-financial assets. Moreover, the savings may not necessarily be the result of surplus income, but a genuine sacrifice of current consumption for either investment to produce goods and services for future consumption or for an unforeseen eventuality (Robinson, 2001). If saving has occurred and is placed in a financial institution, it becomes a financial product offered by that financial institution. Intermediation of savings means lending the money out at the risk of the lender (GOU, 2003).

The role of savings mobilisation

There is a large amount of literature on savings, however, much of the literature focused on the role of savings in growth and development, determinants of savings, reasons for savings, and savings behaviour mainly at household and national levels. For example, in a review of alternative theories of savings, Jensen (2003) states that whenever a growth model is formulated, a theory of savings is adopted. This implies that savings were viewed as an important source of funds for investment to generate economic growth rather than as a product offered by financial institutions. In financial development theories the focus on savings has been from the point of view of ensuring its safety in the financial system, how to attract it, and the role it plays in granting loans (Okumu, 2007).

The implications of savings products for sustainability and outreach

Savings affect sustainability and outreach of MFIs through two main channels. In Ghana, for example, and as also argued in the Strauss Report (1996),

savings are a source of relatively cheap loan funds compared to funds from commercial sources, because it (savings) usually attracts low interest rates (MOFPED, 2006). Cheap loan funds can be lent at relatively low lending interest rates, which in turn may attract more clients and, hence, increased outreach and revenue depending on the elasticity of demand for credit. More revenue may lead to increased profitability. There is, therefore, a positive relationship between savings and both sustainability and outreach.

The second way through which savings affect outreach is as a financial service. Assume that an MFI provides only two products: loans and savings which can be accessed by savers only, borrowers only or by both savers and borrowers. Hence the outreach of this MFI denoted by OUTR is a summation of the number of savers only (NSO), the number of borrowers only (NBO), and the number of both borrowers and savers (NSOBO). By providing savings services to the low-income earners, a significant level of outreach can be attained and sustainability improved (Morduch, 1999; CGAP, 2004; Lafourcade et al. 2005).

Average loan size and the implications for sustainability and outreach

To illustrate how absolute loan size affects outreach, assume a given loan fund of, say, US$15,000. Assume further that three different loan sizes are extended to clients: US$50, US$75 and US$100. This illustration assumes constant costs of delivering the loans, constant number of repeat loans and unlimited demand for loans. From the illustration, the smaller the loan size, the greater the number of clients served and the greater the outreach. This means that

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MFIs that deliver small loan sizes, if not constrained by the amount of funds available for lending, can reach more clients and therefore achieve a greater outreach compared to those with relatively larger loan sizes. SEEP Network and Calmeadow (1995) identified average loan size as one of the three key factors that influence the level of activities and hence operational costs. Small loans tend to be very expensive to administer. Due to the high cost of giving small loans and reaching low-income clients, it has been argued that institutions that target low-income clients cannot break even.

Age of the MFI and implications for sustainability and outreach

Categorising 72 programmes studied by age, lending method, target group and level of sustainability, Morduch (1999) finds that financial progress improves with the age of the institution, which means that the older the institution, the higher the level of sustainability. The age of the organisation also affects sustainability and outreach through accumulated experience from learning by doing, the development of operating systems, experience and training of staff, and the level of scale attained (SEEP Network & Calmeadow, 1995). Hulme and Mosley (1996) argued that, when the number of borrowers or the loan portfolio increases, the costs of operations are lowered due to economies of scale, and this number increases with time. But as already argue in this dissertation, scaling up also leads to higher costs. Therefore, the final effect on sustainability and outreach depends on the net effect between the revenue generated from increased scale of

operations and the costs. Based on empirical findings reported above, it is hypothesised in this study that age correlates positively with OSS and outreach.

Lending interest rates and its implications for sustainability and outreach

Although contested in the literature (Jackson, 2003; Smithin, 2005), it is generally accepted that the rate of interest is the price of borrowed money. To a financial institution this rate is that charged to the institution when borrowing money or the rate the institution charges when lending money to its clients. Three different types of lending interest rates can be distinguished: nominal, effective and real. The nominal lending interest rate is usually explicitly quoted by a financial institution, while an effective lending rate includes the nominal interest rate plus other charges that are directly associated with the loan granted (Ledgerwood, 1999; CGAP, 1996). The real lending interest rates and the real effective lending interest rates take into account the rate of inflation. This research will adopt the nominal interest rate (i); however, each of these lending interest rates has different implications for sustainability and outreach of an MFI.

In the liquidity preference theory Keynes argues that the interest rate is a reward for parting with liquidity. In this model the rate of interest is inversely related to liquidity preference. By implication, therefore, to counter liquidity preference, the interest rate should be raised. However, this has been shown to be a fallacy, as interest rates are not the only factors that affect liquidity preference.

From the perspective of the banking sector, Stiglitz and Weiss (1981) argued that banks making loans are concerned about the interest rate they receive

on the loan, and the riskiness of the loan although the interest rate a bank charges may itself affect the riskiness of the pool of funds by either: i) sorting potential borrowers or ii) affecting the actions of borrowers. Both effects derive directly from the residual imperfect information which is present in loan markets after banks have evaluated loan applications. When the price (interest rate) affects the nature of transactions, it may not also clear the market, which could lead to a lower outreach.

The above arguments indicate that the relationship between lending rates and sustainability and outreach is an empirical question. For the purpose of this study, holding other factors constant, it is hypothesised that lending rates are positively related to sustainability and outreach, because the higher the lending rate, the more the loan income that can be generated and loaned out to reach more clients.

Costs and the implications for sustainability and outreach

Literature identifies information asymmetry as one major source of costs to the institution providing financial services. For example, Steel et al. (1997) argue that problems of imperfect information characterize low-income economies where economy-wide information flows are limited and financial information is lacking or costly to obtain. There are various definitions of cost. Nicholson (1995) distinguishes at least three different notions of cost: opportunity cost, accounting cost and economic cost. While these are common notions of cost in standard microeconomics text books, the literature on microfinance has focused more on

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transaction cost (Johnson & Rogaly, 1997). For this reason the rest of this sub-section focuses more on transaction cost. Von Pischke (1991) defines transaction costs as the costs of establishing and conducting financial relationships and they include costs incurred in marketing and client mobilisation, credit appraisal, security arrangements to protect cash, documents and other data, recording systems for transaction processing and decision making.

In the context of this study costs can broadly be defined as the expenditure incurred for the attainment of a goal which are FINCO, OPCO and LLP. These costs affect OSS both directly and indirectly. For instance, an increase in costs leads to a decrease in OSS and by extension it leads to a decrease in outreach, and vice versa. This is a direct effect of cost on OSS and indirect effect on outreach. Costs can also affect sustainability and outreach through their effects on the demand for loans, if cost is high demand will fall. This is an indirect effect of cost on OSS and outreach. It is hypothesised in this study that costs negatively relate to OSS and outreach.

The concept and theory of the firm, sustainability and outreach

The theory central to the analysis in this dissertation is the theory of the firm. In particular, this study has adopted the production function as it helps in a systematic identification of the factors of production and how they are related to therespective outputs, which have been identified in this study as sustainability and outreach. Previous studies in microfinance have not used this approach to identify the determinants of sustainability and outreach apart from Okumu (2007).

The concept and the theory of the firm

The concept of the firm

Kasper and Streit (1998) argued that a firm is an economic organisation, with more or less durable planned arrangements set up to pool productive resources in order to pursue one or several shared material purposes. These resources are coordinated within some kind of hierarchical order by a mix of institutions and commands, with the aid of human resource input. Institutions and commands are defined here as man-made rules which constrain possible arbitrary and opportunistic behaviour in human interaction (Kasper & Streit, 1998). The physical resources of an industrial firm consist of tangible things such as plant, equipment, land, natural resources, raw materials, semi-finished goods, waste and by-products, and even unsold stock of finished goods (Penrose, 1995).

Penrose (1995:9) further argued that "A 'firm' is by no means an unambiguous clear-cut entity; it is not an observable object physically separable from other objects, and it is difficult to define except with reference to what it does or what is done within it." The author suggests three ways in which a firm can be defined: (1) a basic unit for the organisation of production, more especially in market economies; (2) an administrative organisation; and (3) a collection of productive resources.

Mas-Colell et al. (1995) described a firm as a productive unit that must also represent the productive possibilities of individuals and households, while Joskow (2006) noted that firms were conceptualised as production sets that defined the

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technologically most efficient opportunities to transform inputs into outputs. The

above discussion of what a firm is can be seen in summary form in Figure 1

| Block I: External factor-inputs | → | Block II: Firm characterised by an organisational structure, goals, policies, systems and procedures | → | Block III: Products (Outputs) | → | Block IV: Market for firm's products |
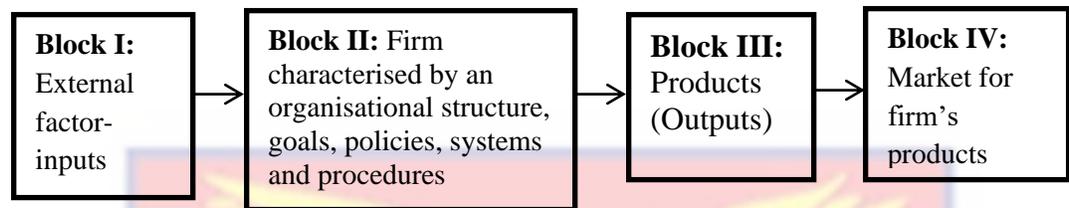
Figure 1: An illustration of an industrial firm and its boundary

The theory of the firm

The definition of the theory of the firm

The theory of the firm has been defined in different ways. Foss (1996), for

example, defined the theory of the firm as a theory that addresses the issues of the

existence, the boundaries and the internal organisation of the multi-person (the

firm). Mas-Colell et al. (1995) argued that the theory of the firm deals with

questions such as: Who owns the firm? Who manages it? How is it managed?

How is it organised? What can it do? Similarly, Bannock et al. (1998) defined the

theory of the firm as the study of the behaviour of firms in respect of: (a) the

inputs they buy; (b) the production techniques they adopt; (c) the quantity they

produce; and (d) the price at which they sell their output. Understood in this

manner, knowledge of the way firms behave is essential in determining such

major variables as investment, employment of factor inputs, wages, and output

levels and prices (Hawkins, 1979).

Generally, two basic approaches to the theory of the firm can be identified:

(a) theneoclassical approach which assumes that firms aim to maximise profits,

whether they aremonopolists or perfect competitors (Mas-Colell et al., 1995); and

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(b) the modern theories that attempt to capture the actual characteristics of modern firms (Bannock et al., 1998; Baumol, 1965). In the former case, Romer (2006) argued that a central assumption of most economic models is that agents maximise simple objective functions: consumers maximise expected utilities, and firms maximise expected profits. In the latter case, Baumol (1965) argued that there is no reason to believe that all firms must maximise profit all the time.

Despite the disillusionment with the neoclassical theory of the firm, it continues to hold sway over modern approaches because of lack of a generally acceptable alternative theory of the firm that gives precise and definite results about the firm's behaviour as does the neoclassical theory of the firm (Hawkins, 1979; Penrose, 1995; Nicholson, 1995). Consistent with this assertion, Romer (2006) argued that the assumption of maximising expected profits is not that it leads to perfect descriptions of the behaviour of firms, but that it leads to reasonably good approximations in most cases. Mas-Colell et al. (1995) show that, under reasonable assumptions, the goal of profit maximisation is the goal that all owners of the firm would agree on, while Pindyck and Rubinfeld (1998) argued that the assumption of profit maximisation is frequently used in microeconomics because it predicts business behaviour reasonably accurately and avoids unnecessary analytical complications.

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The neoclassical theory of the firm

The basic assumptions

From the neoclassical definition of the firm, Douma and Schreuder (1998) and Nelson and Winter (1982) discern the following basic assumptions that constitute the neoclassical theory of the firm:

- The entrepreneur of the firm is also its owner;

- Firms choose to maximise profits or present value of their output in the long run, given the external conditions they face. However, this goal has to be attained both in the short and long run by equating marginal cost (MC) to marginal revenue (MR);

- The firm has full knowledge about its past performance, the present conditions and future developments (global rationality). It is also assumed that the firm learns from past mistakes and uses the acquired knowledge to appraise the present and the future;

- The entry into the market is governed by the respective market conditions; and all relevant markets are in equilibrium;

- The firm acts with a certain time horizon that is influenced by such factors as the rate of technological progress, the nature and gestation period of the product, capital intensity of the methods of production and so on; and

- No firm can improve its position given what others are doing, except if the supply of factor inputs expand and production sets are augmented.

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The Limitations of the neoclassical theory of the firm

Over the years there have been sustained criticisms of the traditional neoclassical theory of the firm on a number of grounds (Nicholson, 1995; Nelson & Winter, 1982; Koutsoyannis, 1979; Baumol 1965). The first set of criticisms was based on the core model of the theory of the firm, the perfectly competitive market model. To address these criticisms the theory was further developed in the 1930s with the publication of two books on imperfect markets and monopolistic competition by Robinson (1933) and Chamberlin (1933) respectively to include oligopoly models and monopolistic competition (cited in Koutsoyannis, 1979). However, this revision has been found unsatisfactory and the criticisms of the theory have continued, mainly on two counts.

The first is with regard to the main assumptions that constitute the neoclassical theory of the firm, maximising the expected profits. The second concerns the reasons why the firm exists, which is widely premised on Coase's (1937) seminal paper. Coase's paper points out that economics had no positive theory to determine the bounds of the firm. The author characterises the bounds of the firm as that range of exchange over which the market system was suppressed and instead the authority allocated the resources both in the firm and in the market (Jensen & Meckling, 1976). Williamson (1967) extended Coase's view of why firms exist to include asset specificity and opportunism. These criticisms are further discussed below under three main themes: criticisms of the goal of profit maximisation; criticisms of equating MC to MR; and criticisms of the facilitating assumptions.

Criticisms of the goal of profit maximisation

The criticisms of the goal of profit maximisation are two pronged. First, it is argued that firms cannot attain the goal of profit maximisation, because they do not have the necessary knowledge, information and/or ability. The firms do not know with certainty their demand and cost curves as assumed in neoclassical theory and therefore they cannot apply the principle of MC=MR. Secondly, it is argued that even if the firm wanted to pursue profit maximisation, it could not do so because there are many other goals to pursue. For example, Williamson (1963) and Baumol (1965) argue that managers have discretion to pursue policies that maximise their own utility rather than that of the shareholders, measured by profits. The managerial utility includes such variables as salary, security, power, status, prestige and professional excellence (Penrose, 1995). In this respect, profit acts as a constraint to the managerial behaviour in that the financial market and the shareholders require a minimum profit to be paid out in the form of dividends, failure of which puts the job security of the managers in danger.

Transaction cost theory and other views of the firm

Major attempts have been made to substitute the neoclassical theory of the firm with other models, with each attempt motivated by the conviction that the former is inadequate in two major respects (Joskow, 2006; Nicholson, 1995; Penrose, 1995; Fama, 1980; Jensen & Meckling, 1976; Leibenstein, 1966; Hawkins, 1979). The first has already been covered above (assumptions). The

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second is generally associated with Coase's (1937) article. Foss (2003; 1996) argues that as the story is normally told, "The theory of the firm traces its existence back to Coase's landmark 1937 article, 'The Nature of the Firm.'" Holmstrom and Tirole (1989) also observe that, while substantial progress has been made on the description and analysis of market performance, firm behaviour and organisation have remained poorly understood.

Coase (1937) and the proponents of his view for example (Foss, 2003; Cella, 2003; Martimort & Verdier, 2002) argued that, while it is theoretically conceivable that a producer may each day buy all the inputs he or she needs for production from the market place, such a way of mobilising factors of production would not only involve extremely high transaction costs in, for instance, discovering the relevant information on prices, negotiating the prices, drafting and monitoring the execution of contracts, and where necessary, enforcing the contracts, but some factors may not be marketed. Thus, relying exclusively on one-off contracts would result in enormous costs. This is why, according to Coase and the proponents of his view, repetitive production is normally coordinated within organisations called firms to reduce such costs (Kasper & Streit, 1998; Douma & Schreuder, 1998; Joskow, 2006). Thus, a firm exists to reduce transaction costs.

As argued above, the main bone of contention between the neoclassical economists and the transaction cost theorists is how and where the factor inputs are acquired and their implications for the rest of the other variables for production and exchange. In the neoclassical theory factors of production are

acquired from the market via the price system and the firm plays no central role in the process. In the transaction cost theory factor inputs are acquired from within the firm and are heavily influenced by the firm's structure, rules and procedures, and the incentive system occasioned by the agency theory. In the latter case the existence of the firm has significant implications for its performance, while in the former, to put it in the words of Mas-Colell et al. (1995), "The firm is viewed merely as a 'black-box', able to transform inputs into outputs" with no other central role to play. The essential difference between economic activity inside the firm and economic activity in the market is that the former is carried on within an organisation coordinated by policies, systems, procedures and guidelines, while the latter is not (Penrose, 1995).

Areas of consensus on the theory of the firm

The goal of profit maximisation

In all the criticisms of the goal of profit maximisation, the interesting question is whether it is possible for the firm to exist in the long-run if it significantly deviates from the goal of profit maximisation. The consensus, however, is that earning a profit in the long-run is not only an essential element for all business firms, but under reasonable assumptions profit maximisation is the goal all firm owners would agree upon (Romer, 2006; Pindyck et al., 1998; Intrilligator et al., 1996; Penrose, 1995; Mas-Colell et al., 1995).

Penrose (1995, p.30) argues, "Firms will never invest in expansion for the sake of growth if the return on the investment is negative, for that would be self-

defeating." Romer (2006, p.341) argues "A firm that fails to maximise profits is likely to be out competed by more efficient rivals or purchased by individuals who can obtain greater value from it. And managers who fail to maximise profits for owners of their firms are likely to be fired and replaced by ones who do." Similarly, Williamson (1981) argues that transaction cost theory is not inconsistent with profit maximising behaviour, a point Jensen and Meckling (1976) agree with when they retain the notion of maximising behaviour on the part of individuals in the analysis of the theory of the firm. Therefore, while firms may be motivated by other objectives, pursuit of profit is a necessary constraint in their production function.

The objectives of the neoclassical theory of the firm

Some authors believe that some of the attacks on the neoclassical theory are misdirected and/or do not recognise its objective, which is principally to explain the process of resource allocation and price determination in a market economy. For instance, Demsetz (1997) noted that the neoclassical theory of the firm serves an important objective of conceptualising an economy in which there is interdependence between the households and firms, whether a firm is a multi-person or not. He further observes that the firm in the neoclassical model is quite different from the firm in Coase's 1937 classic paper on the nature of the firm in which managed coordination, presumably involving more than one person, defines the firm. The prime objective of Coase's article was to explain the existence of firms and their importance relative to price mechanism, but markets

cannot substitute production. They only provide the framework for exchange. There must be a producer before an exchange can take place. Firms produce and then exchange takes place.

Case and Fair (2002) and Pindyck and Rubinfeld (1998) argued that production is not limited to business firms, private, public or corporation. Households also engage in transforming factors of production into useful things (outputs). Similarly, the government also combines factors of production to produce public services for which demand exists.

In the same vein Penrose (1995, p.11) notes "The 'theory of the firm' – as it is called in the literature – was constructed for the purpose of assisting in the theoretical investigation of one of the central problems of economic analysis – the way in which prices and allocation of resources among different uses are determined." The author concludes that only those aspects of the behaviour of the firms that are relevant to the problems that the wider theory is designed to solve should be considered.

Thus, many of the attacks on the neoclassical theory of the firm are not so much proper critiques of the received theory of the firm, but more or less arguments for the development of a theory appropriate to answer the different questions or interests at hand (Penrose, 1995).

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The production function

Analysis of the production function

The production function is one of the pillars of the theory of the firm. In its general form it is a purely technical relationship between quantities of inputs and quantities of output (Pindyck & Rubinfeld, 1998; Mas-Colell et al., 1995; Varian, 1992; Koutsoyannis, 1979). However, Koutsoyannis (1979) argued that in practice the measurement of output has been done in value added terms, which destroys the purely technical nature of the production function. Hence, the relationship between factor inputs and the corresponding output can be described as both technical and economic (Varian, 1990).

The technical part of the relationship is called the technological production function and can be used to identify the levels of inputs used to produce corresponding level(s) of output(s). Wallis (1979) recounted that the technical production function summarises the efficient production possibilities open to a firm, a technical maximisation problem having been solved. The economic part of the relationship may be described as the economic production function, used to identify the least-cost combination of inputs in a feasible production set.

In Figure 1 the firm is illustrated to constitute external and internal factor inputs combined to produce output, which is exchanged. For a systematic exposition of the production function and its development, the researcher began with the neoclassical model that has only two factor inputs: labour and capital, denoted by L and K respectively (Wallis, 1979; Zellner, Kmenta, & Dreze, 1966). Land is considered constant for the economy as a whole, although it may not be

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constant for individual sectors or firms, and for this reason it is conventional to lump it together with capital. Expressed in a general mathematical form, this is represented as:

$$Q = f(L, K) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

where Q is output, L is labour input, and K is capital input. All variables in equation 3 are flows, that is, they are measured per unit of time, and $L \geq 0$ and $K \geq 0$ and the function is a single-valued, continuous, and at least twice differentiable (Mas-Colell et al., 1995; Varian, 1992; Varian, 1990; Wallis, 1979).

Equation 3 shows that Q is affected by L, and K but it does not tell us the direction of the relationship. Moreover, the variation of the explanatory variables is tied to the time period over which each can be varied. Economists have categorised the period over which factor inputs can be varied into two major runs: the short run and the long run (Lipsey, 1993; Pindyck & Rubinfeld, 1995; Samuelson & Nordhaus, 1996). The short run is a period in which firms can adjust production by changing variable factors such as raw materials and some labour, but cannot change fixed factors such as capital and land that can only be changed in the long run. In the very long run technology can also be changed through research and development that results in innovation of, say, new products, new techniques of production or new inputs.

Introduction of costs into the production function

Up to this point the discussion of the production process has focused on the relationship between the physical units of output and inputs. But the decision to

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produce and the combination of inputs to use is often an economic one. Production technology and factor prices determine the cost of production (Pindyck & Rubinfeld, 1998). Thus, the main purpose of a production function is to provide the technical relationship between the inputs and the outputs necessary for attaching cost to the different input combinations to aid in making economic decisions. Further examination of the production function and its relationship with the cost of the factor inputs is provided below.

Equation 4 is derived from a general form of a production function (equation 3):

$$Q = f(L, K) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

As was argued earlier in this chapter, to produce Q a firm must combine the relevant factors of production postulated on the right-hand side of equation 4. These factors are acquired at a cost (price). When the price of each factor is known, then the total quantity of each factor is multiplied by the relevant price, after which a sum is obtained to arrive at the cost of all the factors of production. To illustrate this, let us designate total cost of inputs by TC, and the prices of L and K by w and r respectively such that:

$$TC = wL + rK \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (5)$$

Assuming TC captures all the relevant costs, equation 5 tells us that to produce Q units of output, the firm must spend wL + rK outlay of resources to acquire L and K volume of factors of production. Rational firms normally choose a combination of factor inputs that maximises output given the cost of inputs or vice versa.

From equations 4 and 5, the Lagrangean function can be written as:

$$Q^* = wL + rK + \lambda\{Q - f(L,K)\} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

The first order conditions are:

$$\partial Q^*/_{\partial L} = w + \lambda fL = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

$$\partial Q^*/_{\partial K} = r + \lambda fL = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (8)$$

so that

fL/w = fK/r---9 and

$$\partial Q^*/_{\partial \lambda} = -Q + f(L,K) = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (10)$$

such that the firm remains on its production function. Thus, the optimal solution occurs when the ratios of each factor to its price are equal for all the factors of production. Solutions to equations 7, 8, 9 and 10 give the cost of minimising input levels in terms of prices and the fixed output level. These would be the input levels that a firm conscious of minimising its costs of inputs used in production would choose.

It must be noted that, while the exposition of the production function has been done under the assumption of perfect competition, the extension of the theory of the firm to cover imperfect markets has generally retained the same basic framework and decision-making processes postulated in the perfect competition model (Cyert & March, 1963; Bannock et al., 1993).

Profit function

The profit function defines the relationship between the revenue earned by a firm and the associated costs. Mas-Colell et al.(1995) define profit as revenue

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minus cost, while Nicholson (1995) distinguish between the term profit and economic profit, but define economic profit essentially in the same way as the other authors define profit. For a systematic exposition of the profit derivation, the following symbols and letters are defined:

Π= profit of the firm

P = average price of the output of the firm

Q = average quantity of the output of the firm

X = average quantity of a vector of the inputs of the firm (measured in the same units)

c = average price of the inputs of the firm.

Π= TR–TC ---11

Where TR = P*Q, TC = X*c. Q, in this case, is obtained from the production function. It is assumed that all that is sold is produced by the firm. In the neoclassical formulation Q is the maximum output attainable from alternative combinations of conceivable factor inputs (Pindyck & Rubinfeld, 1998; Varian, 1992). Where neoclassical conditions are violated, as may happen in the real world, the output is sub-optimal (Pindyck & Rubinfeld, 1998). That is, production does not take place at the frontier.

Equation 11 shows that profit is a function of prices of factor inputs, quantities of factor inputs, quantity of output and output price. The function is continuous, homogeneous of degree one, convex, decreasing in prices of inputs and increasing in the price of output.

Maximising profit by choice of TR in equations 9 calls for choosing Q such that,

$$\left(\frac{\partial \pi}{\partial Q}\right)(Q) = P - \left(\frac{\partial TC}{\partial Q}\right)(Q) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (12)$$

Thus, the first-order condition for profit maximisation is

$$P = \left(\frac{\partial TC}{\partial Q}\right)(Q) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (13)$$

The second-order condition is

$$\left(\frac{\partial^2 \pi}{\partial Q^2}\right) = \frac{\partial^2 TC}{\partial Q^2} \leq 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (14)$$

Equation 14 shows that the firm is maximising profit at Q and at this level of output, price = marginal cost. Q is at maximum, while the cost of combinations of inputs (TC) is at minimum and therefore profit (Π) is at maximum.

The microfinance institution and the firm

The theory of the firm in general and of production function in particular, is widely understood to be more applicable to industrial firms producing tangible goods. Its application particularly to microfinance institutions that provide a kind of a different service to its customers, rather than a physical product raises the question of whether or not it is appropriate. For example, a deposit-taking financial institution accepts deposits and gives out loans. In this intermediation process loan appraisal and granting are not done the same way as when offering other services. The process involves a customer applying for a loan and the MFI appraising the application, normally by visiting the client's project or household to assess the viability of the project. In this way the process of providing a

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financial service is different from that of providing other services, let alone the production of tangible goods. In short, providing a financial service such as extending a loan tends to be prolonged.

The traditional neoclassical theory of the firm treats the firm as a black box. That is, what takes place within the firm and how that affects its performance is not explained. However, treating the firm in this way does not make it different from an MFI, since both mobilise external factor inputs to produce outputs. Secondly, the process of transforming the inputs into outputs is similar and can be understood in terms of the production function presented. The economic decision taken in the process of choosing the least-cost combination of inputs is similar in the two institutions. Besides, the sustainability model can be explained in terms of the profit function.

Turning to the institutional arrangements, both the firm in the theory of the firm and a financial institution make decisions within an administrative system designed on similar principles. Both institutions have goals, policies, procedures and systems. Depending on their level of development and legal status, both categories of firms have organisational structures to guide their operations. Other similarities and differences between a microfinance institution and a non-financial firm can be captured with the aid of typical items that appear in the balance sheets of both types of the institutions/organisations. The balance sheet items can provide indications as to whether a firm is a financial institution or not.

Table 4 is a summary of a list of typical items that would appear in the balance sheet of a microfinance institution and that of an industrial firm. From Table4 the major similarities and differences listed below can be identified.

Table 4: Comparative analysis of balance sheet contents of a typical MFI and a non-financial firm

Assets	MFI	Non-financial firm
Current Assets		
Cash and bank balances	Yes	Yes
Balances with the central bank	Not major now	No
Loans outstanding (net)	Yes	No
Investments	Yes	Yes
Work in progress/raw materials	No	Yes
Debtors (receivables)	No	Yes
Closing stock/inventory	No	Yes
Fixed Assets		
Plant and machinery No Yes	No	Yes
Office equipment and automobiles	Yes	Yes
Property (land and buildings)	Not major	Yes
(Accumulated depreciation)	Yes	Yes
Liabilities		
Borrowings	Yes	Yes
Client deposits	Yes	No
Creditors (payables)	Not major	Yes
Deferred revenue	Yes	No

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Net worth/Equity		
Equity	Yes	Yes
Retained earnings	Yes	Yes

Source: Adapted from SEEP Network (1995); Maurere et al. (1995)

Application of the production function to the outreach model

The section argues that the production function describes the relationship between inputs and outputs in a firm. In the traditional neoclassical production function with capital and labour as inputs, for example, the output can be the number of bushels of wheat or tons of maize. In the case of a depository financial institution, Rose and Fraser (1988) argue that it exhibits a two-stage production process whereby in the first stage it employs original factors of production, namely land, labour, capital and managements skills to mobilise savings which, after putting aside a portion to meet short-term demands for cash, the remaining portion goes to stage two of the institution's production process. At stage two the financial institution continues to utilise the original factors of production, which are then augmented by the remaining portion of savings generated in the first stage.

Using the factors of production described above, a depository financial institution can provide a range of services depending on its legal status. For example, a commercial bank in Ghana accepts, provides loans, overdrafts, foreign exchange, participates in inter-bank clearing systems, and provides and assumes guarantees, bonds, and other warranties on behalf of others, a Non-Banking

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Financial Institution (NBFI) accepts deposits (mainly savings) and extends loans (Banking Act, 2004).

Traditionally, outputs of financial institutions such as commercial banks and NBFIs are measured in terms of values of services provided. However, based on the principle on which national income and product accounts are compiled, it is argued in this study that the output of these institutions can also be measured, for example, in terms of the number of depositors and borrowers, since deposits and loans are deposited and received by depositors and borrowers respectively, often referred to as clients. Denoting the number of clients served by an MFI in a defined period by OUTR, land by LAND, labour by L, capital by K, and additional loan funds from savings by D, the production function of a deposit-taking microfinance institution can be represented as

$$OUTR = f(LAND, L, K, D) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (15)$$

Equation 15 is comparable to equation 3, implying that the determinants of outreach can be analysed within the framework of a production function.

For a non-depository MFI, D = 0. LAND and K are normally combined, which reduces equation 15 to equation 16.

$$OUTR = f(L, AK) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (16)$$

where AK is K+D + LAND.

The effect of offering savings product for outreach is captured in equation 17 by the variable, SP,

$$OUTR = f(L, AK, SP) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (17)$$

In addition to the determinants of OUTR specified in equation 17, other determinants of outreach in literature and applicable to this study are as follows: yield on gross loan portfolio (YGLP), net profit margin (NPM), size of the MFI in terms of the clients they deal with (SIZE), the unit cost of loans disbursed or the cost per borrower (CPB), debt-equity ratio (DER), the target market or the kind of services offered (SEV), the percentage of female/women participation (WP) and the age of the institution (AGE), all captured in equation 18. Note that all these variables are described in Chapter Three.

$$OUTR = f[NPM, YGLP, CPB, SIZ, NB, AGE, SEV, WP] \dots \dots \dots \dots \dots (15)$$

All the variables in equation 18 are defined to be greater than zero and are single-valued, continuous and at least twice differentiable. Factor inputs L and part of AK can be viewed as traditional factors of production according to the neoclassical production theory (equation 3) and are captured by WL and YGLP respectively.

In the traditional production function L and AK are considered homogenous factor inputs measured in terms of services provided per unit of time. Where data on input per unit of time are not available, the inputs are typically measured by the amount utilised or available in the production process. Labour is typically measured as man-hours employed, sometimes as the number of employees or labour costs per period (Varian, 1992; Inrtilligator et al., 1996). In this study labour has been measured in terms of salary/wage bill, because it was difficult to capture data in terms of man-hours. Capital input is typically measured by net capital stock (net of appreciation) or sometimes by the gross capital stock and

certain direct measures, such as the number of tractors in use in agriculture. To avoid the complexities involved in the measurement of capital, in this study YGLP has been used as a proxy for capital or AK (Intrilligator et al., 1996).

Application of the profit function to the sustainability model

This section concentrates on identifying the determinants of sustainability within the framework of a profit function discussed earlier in this chapter, and also taking into account the relationship between profitability and sustainability. To do this, we start with equation 19 below:

$$\Pi = P*Q - TC \text{--} 19$$

where Π, P, Q and TC are as defined before. In the traditional profit model (equation 2.19), the factors that affect the profit levels are average price (P), output (Q), average price of inputs (c), and quantity of inputs (X) – See equation 11. In the sustainability model measured by OSS, the determinants of sustainability are shown in equation 20.

$$OSS = [[((NSB+NRB*ANT)*AvLz*i)][1-\gamma]+Z]/[FINCO+OPCO+LLP] \text{--------} 20$$

The variables are as defined before.

Comparing the variables in equations 19 and 20, as argued in Chapter Three, P can be equated to appropriately combined i and Z;(NSB+(NRB*ANT)*AvLzcan be equated to Q; and FINCO+OPCO+LLP can be equated to TC. This leaves out the rate of default (γ) discussed in Chapter Four under repayment rate and the implications for sustainability and outreach. Γ is treated as a cost in the sustainability and outreach models.

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In addition to the real effective lending interest rates (RELRD), average loan size relative to the national per capita income (AvLz), and the unit cost of loans disbursed (CLD). It is worth mentioning that the determinant of OSS are not static their form changes, they can be proxied and proxy for other variables. Thus the determinants of sustainability identified per the dataset and other literature (Ledgerwood, 1999) include; yield on gross loan portfolio (YGLP), net profit margin (NPM), operating expense (OPE), cost on loans or cost per borrower (CPB), debt equity ratio (DER), capital adequacy (CAR), and non-performing loans (NPL). Thus, together with L, AK and SP, the determinants of sustainability can be specified as

$$OSS = f[L, AK, SP, NPM, YGLP, CPB, OPE, DER, CAR, NPL] \ldots \ldots \ldots (21)$$

All the variables in equation 21 are defined to be greater zero and are a single-valued, continuous and at least twice differentiable. Note that in this Chapter L is denoted by WL and AK is denoted by YPLP. Again per the mandate of instituting MFI, some variables are assumed hence it would be dropped, for example, savings product and legal status. This is because, for one to operate a financial institution to be listed with the database, it must be registered. As if that is all, if a client wishes to take a loan, the client has to save with the institution for some time before the clients qualifies to be given the loan.

Empirical Evidence

The relationship between outreach and sustainability is still not clearly determined yet (Balkenhol, 2007). It seems possible to earn a profit and serve the

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poor at the same time, but there emerges a trade off when it comes to earning a profit and serving the poorest (Cull et al, 2007; Hulme & Mosley, 1996). Until 1995 several researchers have evaluated outreach and sustainability among some well-performing institutions (Krahnen & Schmidt, 1994; Otero & Rhyne 1994), and others evaluated single MFIs and demonstrated that these institutions reached both outreach and sustainability (Patten & Rosengard, 1991). Christen (1995) was the first to investigate this "double performance" among 11 institutions in different countries, in a variety of settings. The focus was on loan size, number of clients, and the percentage of female clients as the most important outreach indicators. Regressions were run to study the statistical relation between these and other indicators for outreach and financial performance. The authors found that well-performing institutions show no correlation between the poverty level of their clients and the financial sustainability of the institution. The authors recognize that serving poorer clients or serving clients in rural areas is more challenging for MFIs. However, they also find that these institutions are very well able to provide tailor made services in an efficient way. Because of this efficiency the institutions have lower expenses, enabling the clients to be able to pay the interest on the loans. This enables the institution to become financially self-sustainable. However, these results were not significant (Christen, 1995).

In 2007, Hatarska and Nadolnyak investigate whether regulated institutions reach better sustainability and outreach. They provide cross country evidence from 114 MFIs from 62 countries. In assessing sustainability Hatarska and Nadolnyak consider OSS rather than other measures such as ROA. The authors

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argue that the institutions may not apply the necessary adjustments to the accounting data, so that the data are considered to be inappropriate for research. After performing two regressions (using GLS), one with an outreach measure as the dependent variable and one with a sustainability measure, the authors find that regulatory status neither affect the financial nor the social mission of MFIs. According to Hatarska and Nadolnyak both missions can thus be reached simultaneously.

In 2009, Cull and colleagues describe the trade-offs occurring in microfinance. They study 346 MFIs of 67 countries with data collected from the Mix. The authors find that raising interest rates only increases profitability up to a certain point, and that some "not for-profit" institutions in fact do earn a modest profit. Another finding by Cull et al, contradicting to earlier findings by Olivares-Polanco (2005), Navajas et al (2003), and McIntosh et al. (2005), is that competition from formal institutions (e.g. banks) seems to drive MFIs to serving poorer clients. The authors do not find that sustainability and outreach are per definition substitutes. Although the data used in this research are found to be of high quality, they are not representative of the full MFI population: "the data over-represent institutions that both have a commitment to financial sustainability and that are willing to comply with the MIX's relatively rigorous reporting standards. Because of this, the institutions are more likely to be industry leaders in terms of financial performance, and the data should be seen as giving a sense of best -case financial possibilities" (Cull et al., 2009, p.6).

Cull et al. (2007) examined why the promise of microfinance – to reduce poverty by using profit generating banking activities – stays unmet. By examining 124 MFIs in 49 countries, and performing separate OLS regressions for the outreach and sustainability indicators, the authors seek to answer the question whether a trade-off exists between depth of outreach and profitability. The cross-country data used show enough variety in contractual types, prices, target markets and institutional size to allow for an analysis of the nature- and trade-offs of lending relationships (Cull et al., 2007). The MFIs considered in this research were selected based on their data availability, which causes the sample to be unrepresentative of all MFIs. Nonetheless, the authors find that it is possible for MFIs to increase outreach and at the same time make a profit, but a trade-off arises between making a profit and serving the poorest.

It can be concluded that previous research on the existence of a trade-off between the financial and social performance objectives in microfinance is subject to several limitations: data were incomplete or unavailable, outcomes turned out to be insignificant, the sample was unrepresentative or biased, or not all commonly used outreach and sustainability indicators were included. This study tends to overcome some of these limitations by using probability sampling techniques to, providing a representative sample of Ghana MFIs, and including the two commonly used measures for outreach and sustainability, number of clients and OSS respective.

Conceptual Framework
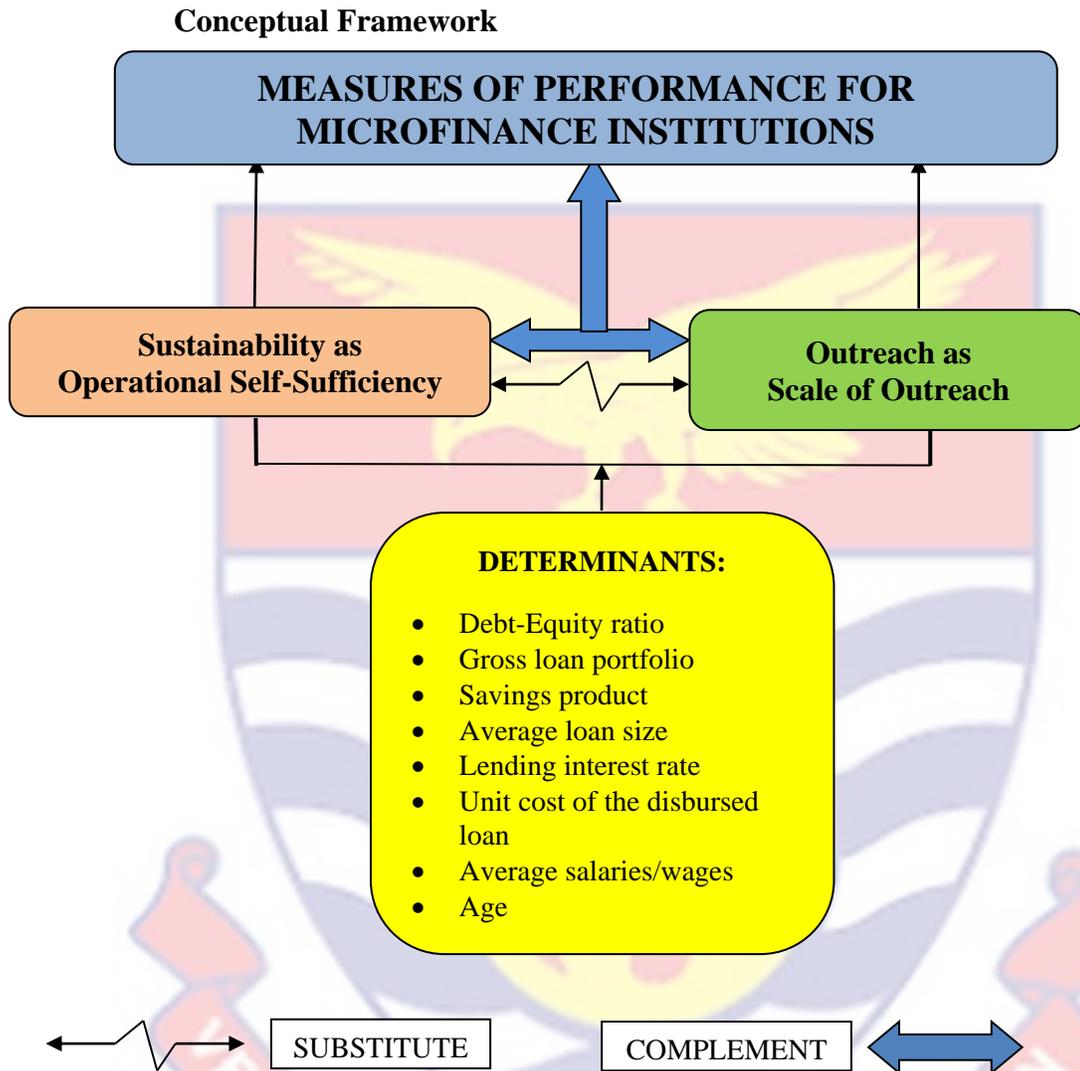
Figure 2: The relationship between Outreach and Sustainability of MFIs

Source: Adapted from Yaron, et al (1997)

Outreach and sustainability are the twin objectives of MFIs. Outreach is expanding the number of clients of the MFI. Building of lasting, permanent financial institutions requires that they become financially sustainable through value maximization beyond covering costs. The third policy objective relates to the impact of financial systems development, particularly on poverty reduction,

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which is outside the scope of this study. The framework shows that if the relationship between outreach and sustainability is complementary then MFIs in Ghana can achieve and must be measured by the two performance measures of outreach and sustainability. Complementary relationship here implies a positive direct relationship between the performance measures. However, if the relationship between the two measures is that of substitution then only one measure can and should be used to assess the performance of MFIs in Ghana. A substitute relationship implies an inverse relationship between outreach and sustainability.

According to the application of the production function to the outreach model discussed earlier, outputs of financial institutions such as rural banks and NBFIs are measured in terms of values of services provided. However, based on the principle on which national income and product accounts are compiled, it is argued in this study that the output of these institutions can also be measured, for example, in terms of the number of depositors and borrowers, since deposits and loans are deposited and received by depositors and borrowers respectively, often referred to as clients. This implied that the determinants of outreach can be analysed within the framework of a production function. Similarly, the application of the profitability function to the sustainability model makes it possible to equate profit to operational self-sustainability and its determinants can also be analysed within that framework. Both sustainability and outreach are affected by some determinants which in this study includes debt-equity ratio (DER), ratio of gross loan portfolio to total assets (GOLP), providing savings product (SP), average

loan size divided by the national per capita income (Avlz), real effective lending interest rate (RELRD), unit cost of disbursed loan value (CLD), average salary/wages and benefits divided by the national per capita income (WL), legal status (LS) and age (AGE).

Conclusion

This chapter has discussed microfinance and its scope, the concept, measures and the determinants of sustainability and outreach and the concept and theory of the firm and their application to MFIs. The chapter has argued and illustrated that the firm in the theory of the firm is similar to an MFI, because they both mobilise external and internal resources to produce outputs, which are eventually sold in the market. Secondly, the decision variables in both the firm and an MFI are essentially the same. Therefore, sustainability can be understood within the framework of the profit function while outreach can be understood within the framework of the production function.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter presented the methodology behind the study. This provided information on how and why the researcher has made certain decisions. The chapter is organised into following: research design, population, sampling technique and data collection. The chapter also presented the model specification both the outreach model and the sustainability models and the final part covered the data processing and analysis.

Research design

The study made use of quantitative research. The quantitative method is structured and formal, and the distance to the source of information is often greater than in the qualitative method. Statistical methods are used to analyse the gathered data (Holme & Solvang, 1997). The studied employed quantitative method because it is most suitable for the research issue and the way information is gathered and analysed.

The study design took the form of a Panel study. A panel design involves the repeated collection of data from the same unit(s), allowing for the tracking of changes at both the aggregate level and the individual level (de Vaus, 2001). As a descriptive tool the value of a panel design resides in the fact that it enables us to examine change or stability. Causal analysis is used to establish temporal order of events and this is necessary because the basic tenet of causal reasoning is that a

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cause must precede its effect in time. In cross-sectional research where all data are collected at one point in time it can be difficult to establish the order in which events occur, however, panel designs enable tracking the order in which events take place (de Vaus, 2001).Since the study seeks to test hypothesis of units which keeps changing with time it become obvious that the choice of panel study is the appropriate study design.

Study population

The study population is Microfinance Institutions in Ghana. There are about 500 microfinance institutions in Ghana currently. The target population is microfinance institutions in Ghana which published their performance on Microfinance Information Exchange (MIX). As at 2012, over 70 microfinance institutions in Ghana report their performance data to the MIX.

Sample and Sampling technique

The panel data were drawn from the Microfinance Information Exchange (MIX) dataset housed by the World Bank, some variables were also based on author calculations. Since the year 2000 to date most MFIs in Ghana have been reporting to MIX. Data span from the period between 2006 – 2012. Using the criteria, 70 MFIs were listed and this became the sampling frame. According to Microbanking Bulletin (2006) any microfinance that may be qualified to be list on the MIX dataset must meet certain standards – audited accounts, and the account must be published, have financial statements, and other criteria that merit listing

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on the exchange market. For the purposes of this study all the 70 MFIs were considered, however, some MFIs were dropped. The choice of this number was highly motivated by data availability as far as the MIX dataset was concerned. This is a clear indication that purposive non-probability sampling was used in the sampling of the data.

Data collection

The panel data for this research was based on secondary data, which was collected from the Microfinance Information Exchange (MIX). The MIX database provides the only publicly available source for detailed information on MFI performance. It lists the social and financial performance of over 1800 MFIs worldwide.

Bauchet and Morduch (2010) analyze the differences between the MIX and the larger database of the Microcredit Summit Campaign (MSC), an organization that promotes microfinance and social change. The authors conclude that the MIX data are more skewed towards financially sustainable institutions, while the institutions included in the MSC have stronger social objectives. Further, at the MIX MFIs have choices whether to list themselves in the database or not. This choice can be influenced by the need of funds; the possibility exists that institutions list themselves, hoping that potential investors review their profile. There could thus be a bias towards MFIs seeking funds. Despite these potential biases, the MIX provides the only publicly available data. These data present

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considerable variance in institutional sizes and locations, types of contracts, and target markets, making it a random sample of relatively transparent MFIs.

Theoretical model specification

The theoretical model for the study adopted the endogenous growth theory. According to Jones (1995); and Lucas (1988) endogenous growth theory means economic growth from within a system. Endogenous growth theory stresses the fact that if productivity is to increase, the labour force must continuously be provided with more resources. Resources in this case include physical capital, human capital and knowledge capital (technology). However, Romer (1990) had previously stressed that endogenous growth does not just happen and as such identified four basic pre – conditions for growth: Capital – measured in units of consumption goods; Labour – skills available from a healthy human body; Human capital – activities such as formal education and on the job training which is person specific; An index of the level of technology.

Liu (2007) in his liken growth of an institution or a state to its performance. Liu stressed that if an institution performs above par, it may growth of that institution. Stated differently, if an institution is seen to have growth, then it presupposes that that institution has performed. Though Liu (2007) added that it may not always be the case that performance indicates growth. However, Liu mentioned that if the argument is anything to go by then the normal growth model ought to be modified. The normal methodology of these growth studies is to begin with the neoclassical production function of the form;

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$$Y(t) = A(t)f[K(t), L(t)] \tag{22}$$

Where;

Y(t) = Output; A(t) = Technological change; K(t) = Capital stock; and L(t) = Labour force.

The study then complements the neoclassical endogenous growth model with Greuning and Bratanovic (2009) performance model in the panel data framework. Thus, equation (1) is transformed to the form in equation (2) below as have used in studies such as Buscemi and Yallwe (2012); Ampah (2010).

$$X_{it} = F(Y_{it}, Z_{it}) + U_{it} \tag{23}$$

X_{it} represent performance of an MFI (i) at time (t);

Y_{it} and Z_{it} also represent MFI characteristics and performance indicators; and

U_{it} is the stochastic error term

Empirical model specification

Following the Greuning and Bratanovic (2009) in equation (2) the reduced form however is modelled as follows and as used by studies like; Mesah (2015); Buscemi and Yallwe (2012); Ampah (2010); Focardi (2009).

$$OSS_{it} = \beta_0 + \beta_1 NPM_{it} + \beta_2 YGLP_{it} + \beta_3 CPB_{it} + \beta_4 OPE_{it} + \beta_5 DER_{it}$$
$$+ \beta_6 CAR_{it} + \beta_7 NPL_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots (24)$$

$$OUT_{it} = \alpha_0 + \alpha_1 NPM_{it} + \alpha_2 YGLP_{it} + \alpha_3 CPB_{it} + \alpha_4 SIZ_{it} + \alpha_5 NB_{it} + \alpha_6 AGE_{it}$$
$$+ \alpha_7 SEV_{it} + \alpha_8 WP_{it} + \mu_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots (25)$$

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Where:

OSS represents operational self-sufficiency; OUT represent outreach; NPM is net profit margin; YGLP is yield on gross loan portfolio; CPB is cost on loans; DER debt equity ratio; CAR is capital adequacy ratio; NPL is non-performing loans; SIZ is the size of the MFI; NB is the number of active borrowers; AGE represent the age; SEV is the services offered; and WP represent women participation. Moreover, β_0 and α_0 are the constant terms in equations (3) and (4) respectively, β_i and α_i: i = 1,2, 3.... are the coefficients of the variables to be estimated, while ε_{it} and μ_{it} respectively represent the error terms in both equations.

Justification of the variable and expected signs

Operational Self-Sufficiency (OSS) and outreach (OUT)

Both operational self-sufficiency and outreach in the model represent the performance of an MFI (dependent variable). According to Navajas, et al. (2000) outreach refers to the social value of the output of a microfinance organisation in terms of depth, worth to users, cost to users, breadth, length, and scope. Operational self-sufficiency has to do with how MFIs are able to sustain themselves or their operation over time given the credit risk and cost of production (Samuelson & Nordhrau, 1996).

Net profit margin (NPM)

Profitability is measured by the incomes and the expenses. Income is the money generated from the activities of the business for example, the interest

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incomes on the loan obligations and other activities. Expenses are the costs of the resources used up to consume by the business. These costs include the opportunity cost for debts, cost of bad debts and cost of debt recovery (Leong, 2009). Thus net profit margin is the amount left after all costs together with depreciations have been deducted from income/revenue. It is expected that NPM positively affect the performance of an MFI.

Yield on gross loan portfolio (YGLP)

Generally, portfolio yield is the initial indicator of an institution's ability to generate revenue with which to cover its financial and operating expenses (Christen, 1997). Thus it fair to say that yield of gross loan portfolio is the revenue that accrues to the amount of money used for giving out loans. Hence if that amount does not increase or grow then the performance or sustenance of that institution is suspect. For the purposes of the data and the study, yield on gross loan portfolio (nominal) would be used. This is the adjusted financial revenue from loan portfolio/adjusted average gross loan portfolio. It is hypothesised that OSS and YGLP are positively related.

Cost per borrower (CPB)

This is also the cost a borrower brings any time he/she is offered the loan. In some jurisdiction, cost on loans is used to proxy for it. The more people borrowers borrow money and are not able to redeem, it add extra cost to the institution. The opportunity cost of not giving the money to other people, time

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wasted and the physical money lost. It is calculated as the adjusted operating expense/adjusted average number of active borrowers. It is hypothesised that OSS and CPB are negatively related.

Debt- equity ratio (DER)

Generally for microfinance institution to be self sustaining the amount of debt to equity ratio must rather be on the lower side. The DER is measured as the adjusted total liabilities/adjusted total equity, thus the higher the DER the lesser the profitability of the MFI and that is a threat to sustenance. It is hypothesised that OSS and DER are negatively related.

Capital adequacy (CAR)

The ratio of equity to total asset is employed as a measure for bank capital adequacy. This measures the percentage of the total asset that is financed with equity capital. Capital adequacy therefore describes the sufficiency of the amount of equity that can absorb shocks that banks may experience. According to Afriyie and Akotey (2013), banks with good capital adequacy ratio have good profitability and again a strong capital adequacy is able to absorb possible loan losses and thus avoids bank 'run', insolvency and failure. It is expected that the higher the equity to asset ratio, the lower the need for external funding and therefore the higher the profitability of the bank. In addition, well-capitalised banks face a lower cost of going bankrupt which reduces their cost of funding

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(Kosmidou, 2008). Hence, the study expects CAR to be positively related to performance (OSS) of MFI.

Non-performing loans (NPL)

Non-performing loans are the total loan losses of financial institution/bank at time. It also measures how banks manage their credit risk because it defines the proportion of loan losses amount in relation to total loan amount (Hosna, Bakaeva & Juanjuan, 2009) and how strong and viable a bank is in terms of its ability to extend loans. Here the ability of MFI's loan recovery policy is very much critical. The essence of the inclusion of this variable is that as Afriyie and Akotey (2013) recounted a higher NPL means a lower profit margin for the MFI. Boahene, Dasah & Agyei (2012) had also explained that non-performing loans are actually the bad loans out of the total loans advanced to clients. Since MFIs make interest on loans, any losses would adversely affect the profitability and to some extent the sustainability/performance of the MFI (Tefera, 2011). The study however expects a negative relationship between performance and NPL.

Operating expense (OPE)

The operating expense is measured as adjusted operating expense/adjusted average total asset. The major elements of operating cost are staff salaries, recurrent expenditure, maintenance/depreciation cost and administrative cost. It is used to measure the impact of efficiency on financial institution's performance. It is also used to provide information on the variation of bank cost over the banking

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system. A negative correlation is expected between the operating cost and performance implying that higher operating cost means lower profit and vice-versa.

Age (AGE)

The age of a particular bank is also expected to affect it performance positively. Logically as MFIs/banks growth in age it expects to devise a number of workable strategies to redeem its loans. The bank also gets to know credit worthiness of a borrower and as time progress defaulters are denied loans. Thus the higher the age the better it is to improve profitability of the bank. Thus the age in the model captures the growth of the MFI. Kosmidou (2008) revealed that characteristics of a bank such as age size may be statistically significant in imparting on the performance of a bank. In the study age is measured as: 1= new; 2=young; and 3=mature. Age is expected to positive.

Size (SIZ)

The size in the model is used to proxy for the total coverage of the MFI in terms of the number of branches and the total number of offices. The assets here could be physical or monetary. Kutsienyo (2011) mentioned that coverage and number of offices including head office denotes the number of clients the MFI serves. This variable is normally used to measure for outreach of the institution. That is as MFIs grow laterally and get many branches and get concentrated on the type of products it helps them to be efficient and productive. Thus study expects a positive relationship.

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Number of active borrowers (NB)

The number of active borrowers has to do with the number of borrowers with loans outstanding, adjusted for standardized write-off. Thus, though the number of active borrowers measure the level of outreach, the higher the number the lower the performance and vice versa. Hence the study expects negative relationship.

Services offered (SEV)

Here the target market is used to proxy for the services offered by and MFI. It is measured by the kind of business or activity to particular group of clients. It is captured in the dataset as: 1=low end; 2=small business; 3=high end; and 4=broad. The low end has to do with the individual poor but product people, who may need assistance or start-ups. The small business on the other hand may be group of people or individuals with small business who require the service of loans. These are normally artisans and the retailers. For the high end, it involves people with bigger businesses e.g. wholesalers, cash crop farmers with bigger farms etc. The broad end encompasses all the other services and many other activities. The study hypothesis a positive relationship with performance of an MFI.

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Women participation (WP)

Women participation is measured as the number or the percentage of female borrower and the percentage of female. It is also measured in other way as the number of active women borrowers/adjusted number of active borrowers. The study expects it to have a positive with outreach a microfinance institution.

Data processing and analysis

The data for estimating sustainability and outreach models were captured in Microsoft Excel and transferred to Statistical Package and Service Solutions (SPSS) version 18 for quantitative analysis (Hamilton, 2004). The analyses have been undertaken at the following levels.

Univariate and bivariate analysis

This level of analysis focuses on the descriptive statistics of the standard variables in the sustainability and outreach models, i.e. non-dummy variables. Specific descriptive statistics extracted are the means, medians, quartiles, standard deviations, minimum and maximum values of the observations, and the numbers of observations. The association between OSS and OUTR has been investigated based on the correlation coefficient. Correlation was also used to evaluate the relationships between the explanatory variables. The sign and magnitude of the correlation coefficient indicate the direction and the strength of the relationship between two or more variables. A correlation coefficient of 1 or –1 implies perfect or exact relationship between the two correlated variables. In the case of

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more than two variables, this is called perfect multicollinearity or exact relationship among the variables (Gujarati, 1993).

Multivariate analysis

The hypotheses as stated in Chapter One were tested using two estimation techniques, the random effect estimation and an ordered logistic estimation. For the OSS model, random effect model is used. To examine the relationship between the determinants of sustainability on the performance of MFIs, an unbalanced panel approach was employed. In a classical panel analysis, it is assumed that estimates are efficient and somehow consistent because coefficients are constant over time. According to Greene (2002), if coefficients contain an observed term for all individuals, then the entire model can be treated as an ordinary linear model and fit by least squares (OLS). Thus, the coefficients of the panel model were estimated by the ordinary least squares (OLS), this is because the OLS estimator is assumed to the best linear unbiased estimator and provides efficient results.

However, if there are unobserved term(s) then the estimation/technique would proceed to adopt either the fixed effect or the random effect model. If the model fails relevant post-estimation test then the generalised least squares are used (Tabachnick & Fidell, 2007; Wooldridge, 2004). The outreach model used the ordered logit model. The motive for the choice of the model stem from the fact that outreach is captured as: 1=small; 2=medium and 3=large. According to Torres-Reyna (2014) when a dependent variable has more than two categories and

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the values of each category have a meaningful sequential order where a value is indeed 'higher' than the previous one, then you can use ordinal logit. In the nutshell two separate regressions were performed. However it is worth noting that some diagnostic and post-estimation tests were done to check for the consistency and robustness or otherwise of the models.

Summary of the chapter

This chapter presented the methodology for the study. This included the study design or the research design, population for the study, the sample and sampling technique, justifications of the variables in the study and the data analysis. The study made use of a secondary data source – the Microfinance Information Exchange (MIX) database. The MIX data is housed by the World Bank and it has data on over 1000 MFIs. For Ghana just 70 MFIs reports the MIX database. It was revealed that all MFIs were considered for the study, however, the choice of the variables in the model were informed by the theory and data availability as far as the MIX data was concerned. Two separate regression models were performed; the random effect model and the ordered logistic regression. Both techniques were motivated by the type of data and the literature.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

The present chapter is devoted to the analysis and discussions of the empirical findings arising from the estimated models. The chapter consists of two broad areas. The first deals with a brief examination of the descriptive statistics and the structure of the data. The second part deals with the correlation results, the econometric results of sustainability and outreach models and finally, summary of the chapter.

Descriptive Statistics

Table 5 presents descriptive statistics of the dependent variables and the standard explanatory variables identified in the literature. As shown in Table 5, five categories of statistics are reported for each of the variables: the mean, the standard deviation, the minimum and the maximum values of the observations, and the number of observations for each standard explanatory variable. From the reported statistics, the mean and standard deviation of outreach, for example, is 118.805 and 10.6334 clients per MFI, and the minimum and maximum values of the observations are 30.0517 clients and 2581.85 clients respectively. The minimal deviations of the variables from their means with the exception of number of active borrowers (NB) and cost per borrower (CPB) as shown by the standard deviations give an indication of slow rate of fluctuation of these variables over the period. However, based on standard deviations of OSS, YGLP,

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NPL and WP it is an indication that MFIs do not exhibit substantial variations. Moreover, all the variables have positive mean values; this is an implication that these variables are normally distributed. Again comparing the mean and median values of the results except OUTR and NB all the value were close, indicating an even distribution of the variable.

Table 5: Descriptive statistics of the standard variables in the sustainability and outreach models

Variables	N	Minimum	Maximum	Mean	Median	Std. Deviation
OSS	270	0.08490	3.59313	1.09785	1.17200	0.29105
OUTR	318	30.0517	2581.85	118.805	3.54801	10.6334
DER	271	-3.5428	558.620	6.50405	2.44710	6.20042
NPM	264	-10.7777	1.55222	0.04852	0.397200	0.79214
YGLP	169	0.04810	1.51970	0.48889	0.25863	0.21000
NPL	206	0.88141	20.1002	0.00384	0.13240	0.09672
OPE	186	0.04740	3.74570	0.49833	1.83061	0.39049
CPB	149	0.0000	1293.00	15.3080	30.0401	19.4481
SIZ	242	1.0000	131.000	10.4132	3.06152	13.7050
NB	291	20.000	14802.0	120.553	19.7477	208.539
AGE	312	1.0000	3.00000	2.36859	2.03816	0.81901
SEV	285	1.0000	4.0010	2.41052	1.98017	1.44252
WP	222	0.5780	4.11003	0.70985	2.01701	0.31926

Source: Mixmarket data, 2013

Table 6: Structure of data used in the study

Number of Levels	Subject Effect	Name	57
	Within-Subject Effect	Years	7
Number of Subjects			57
Number of Measurements per	Minimum		2
Subject	Maximum		7
Correlation Matrix Dimension			7

Source: Mixmarket.org, 2013

Table 6 shows the repeated design and here 7 years of data for 57 microfinance institutions are sampled as explained in the methodology. As some microfinance institutions lack information for some of the years, the minimum (2) and maximum (7) numbers of measures per MFI are unequal, making the design unbalanced. This is one reason why the researcher chose to use the unbalanced panel as it accommodates this dynamics.

Table 7 displays the frequencies of the categorical data. From the table, it is observed that as of year 2012 majority of the MFIs (58.7%) had come of age to be categorised as mature. Though in terms of outreach or clients based about 63% were considered to be small. It was also realised that about half of the entire MFIs were offering variety of services.

Table 7: Categorical Variable Information

Factor		N	Percent
Outreach	Small	200	62.9%
	Medium	81	25.5%
	Large	37	11.6%
	Total	318	100.0%
Age	New	68	21.8%
	Young	61	19.5%
	Mature	183	58.7%
	Total	312	100.0%
Services offered	Low end	130	45.6%
	Small business	12	4.2%
	High end	23	8.1%
	Broad	120	42.1%

Source: Mixmarket.org, 2013
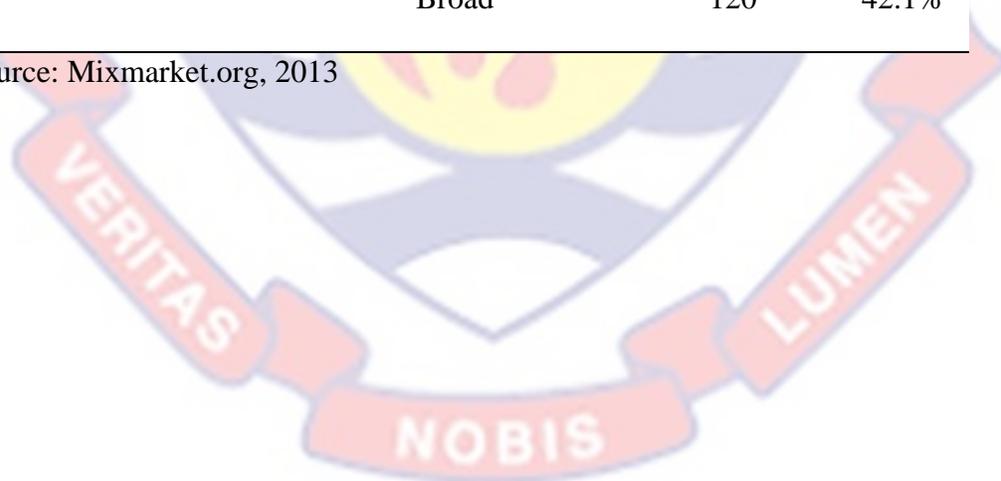
The relationship between the determinants and OSS and OUTR

Table 8: Pairwise correlation coefficients and their significance levels

	OSS	OUTR	DER	NPM	YGLP	NPL	OPE	CPB	SIZ	NB	AGE	SEV	WP
OSS	1.00												
OUTR	.61	1.00											
DER	-.02	.03*	1.00										
NPM	.62**	.08***	.14	1.00									
YGLP	.03**	.23**	.03	.09*	1.00								
NPL	-.30*	.12*	0.00	0.00	0.07	1.00							
OPE	-.47*	.07*	-.05	.62	.50	.13*	1.00						
CPB	-.05**	.02**	.12**	-.02	-.21	.21*	.11	1.00					
SIZ	.01	.42***	.02	.64	.33	.13	.08	.17	1.00				
NB	-.03	.77**	.12*	.11**	-.27*	.10	.11	.06	.57	1.00			
AGE	.16**	.16**	.17	.21	.27	.10	.31	.14	.01	.14	1.00		
SEV	.30	.05**	.04	.08	.11	.21	.04	.42	.04	.11	.00	1.00	
WP	.29**	.32**	.04	.31	.09	.02	.18	.34	.05	.12	.13	.09	1.00

NB: OSS and OUTR are dependent variables, while the rest are explanatory variables. * means significant at 10%; **means significant at 5%; and ***means significant at 1%.

Table 8 presents the pair wise correlational matrix between the variables, though the correlation showed the relationship between all the other variables, the

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area of interest is rather the relationship between each independent variable and the dependent variable either outreach (OUTR) or operational self-sufficiency. The essence of these results was to test the direction of relationship between the dependent variable and the independent variables. Moreover it was to test the presence of collinearity in the model. From table 8 it was realised that, with the exception of operational expenses, debt-equity ratio, non-performing loans, number of active, borrowers, and cost per borrower that had negative relationship, all the variables showed a positive relationship. The implication for the negative relationship is that as the variable increase, performance decreases. The opposite is true for the positive relationships. The size of the coefficients indicates that there is minimal level of correlation or weak correlation between the dependent and the independent variables. In addition, except size of MFI and outreach that showed 1% significance level, the rest were at 5% significance level. Just operating expense and non-performing loans were significant at 10% significant level.

Diagnostic tests

Diagnostic tests are very crucial in social research since it has the tendency to give robust and efficient results. For panel studies since it combines both cross sectional part and time series part, it may suffer from heteroskedasticity, multicollinearity, omitted variable bias and so on. First, the heteroskedasticity is the situation where the variance between the explanatory variables and the error term is not constant. That is to say, as the coefficients of

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the independent variables change, the error term also changes as well but not in a constant figure. According to Woodridge (2004), the presence of heteroskedasticity is not a problem in crosssectional panel studies, because the presence of heteroskedasticity does not cause any biases and inconsistency to the estimates however advised that the model passes the test. In the statistical package, the test for heteroskedasticity '*hettest*' uses the Breusch-Pagan and Cook-Weisberg test for heteroskedasticity and the null hypothesis (H_0) is, there is constant variance or homoskcedastic (Greene, 2008). From the test, the p-value was 0.4043 which indicates that, the study fails to reject the H_0 of constant variance and thus accept the alternative hypothesis of the presence of heteroskedasticity. Multicollinearity is another problem that affects the estimates of OLS regression.

By definition it is the correlation between two or more of the independent variables in a model or regression. According to Kohler and Kreuter (2009), there is a command which is often used to detect the collinearity of the regressors with the constant term. The used the variance inflation factor (VIF) command. As rule of thumb a tolerance (1/VIF) of 0.1 or less (equivalently VIF of 10 or greater) is a cause for concern, indicating the presence of muticollinearity (Kutner, 2004). The test results of the VIF showed that there is no multicollinearity or the presence of multicollinearity is minimal. The mean VIF was 1.69 which is far below the rule of thumb of 10. Again, there was also test for omitted variable test. According to Torres-Reyna (2014), omitted variable test is misspecification test actually showing whether a model is correctly specified. The null hypothesis as given by

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the test is that model has no omitted variables. The test is also Ramsey RESET test using powers of the fitted values of the dependent variable. The p-value was 0.0000 implying that the study reject the null hypothesis and accept the alternative hypothesis that the model was not correctly specified. It is actually on the backdrop of these tests that study did not use the OLS model (Appendix A) and went further to estimated both the fixed effect and the random effect.

The study also tested for cross-sectional dependence/contemporaneous correlation in the model using Breusch-Pagan LM test of independence. Though, Baltagi (2008) stated that cross-sectional dependence is a problem in macro panels with long time series (over 20-30 years). This is not much of a problem in micro panels (few years and large number of cases). However, the study went further to test it. The null hypothesis in the BP/LM test of independence is that residuals across entities are not correlated. According to the test in Appendix B, p-value of 0.116 indicated that the study fails to reject the null hypothesis that there residuals across entities are not correlated. This therefore implies that there is no cross-sectional dependence. The final test was the serial correlation test using the Wooldridge test for autocorrelation in panel data. Though it is also not a problem in micro panels the study did it because serial correlation causes the standard errors of the coefficients to be smaller than they actually are and higher R-squared. The test in Appendix B (p-value of 0.6603) showed that there is no serial correlation in the model.

Effects of the determinants sustainability OSS

(i) H_A: there is a significant effect of each determinant of sustainability on sustainability as a performance measure on MFI's in Ghana

Table 9: Panel regression results (Dependent Variable: OSS)

Independent variables	Fixed effect estimates				Random effect estimates			
	Coeff.	Std. Err	t	P>|t|	Coeff.	Std. Err	z	P>|t|
NPM	0.72792	0.04994	14.57	0.000***	0.69842	0.04301	16.23	0.000***
YGLP	0.00124	0.08353	0.01	0.988	0.07566	0.03233	2.53	0.017**
CPB	-0.00011	0.00071	-1.65	0.103	-0.00126	0.00069	-1.81	0.071*
OPE	0.44587	0.08838	3.52	0.011**	-0.00533	0.08180	-0.07	0.948
DER	-0.03176	0.01337	-2.89	0.019**	-0.02935	0.01225	-2.40	0.017**
CAR	0.06390	0.02931	2.79	0.080*	0.05461	0.05383	1.01	0.310
NPL	-0.17341	0.33315	0.521	0.698	-0.10364	0.09120	-1.14	0.256
CONS	1.10089	0.04202	26.20	0.000	1.11386	0.04013	27.76	0.000
	R^2 = 0.8243				R^2 = 0.8523			
	F (7, 100) = 60.47				Wald chi 2 (7) = 514.94			
	Prob. > 0.0000				Prob. > chi2 = 0.000			

NB: *** means significant at 1%; **means significant at 5% and * means significant at 10%; and N = 57

This hypothesis was posed to examine whether there is a significant effect of each determinant of sustainability on sustainability in Ghana. The null hypothesis states that there is no significant effect of each determinant of

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sustainability on sustainability in Ghana. Random effect model within the generalised least squared framework was used to find out the effect, if any, between each determinant of sustainability on sustainability model. The use of this test is based on the assumption that data collected are continuous, unbalanced in nature and unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model.

To estimate the panel regression models in equation (24), and to select which model (either the fixed or the random), the Hausman test was performed to determine the appropriateness of the model to be adopted. The intuition behind the test is that according to Green (2008), it basically tests whether the unique errors (εi) are correlated with the independent variables. In the Hausman test, the null hypothesis is that the preferred model is random effects and the alternative states that the fixed effect model is preferred. That is to say, H_0 is that difference in coefficients is not systematic. As indicated by the Hausman test in appendix B ($H=$ 3.39 with a p-value = 0.6407), meaning the difference in coefficients between fixed effect and random effect is systematic, providing evidence in favour of the random effect model. Thus the study used the random effect model as the preferred model for the analysis.

However, according to Torres-Reyna (2014); and Brandom (2008) because the random effect model assume that the entity's (individual MFI's) error term is not correlated with the predictors which allows for time-invariant variables to play a role as explanatory variables; it is possible for the presence of

time –invariant heterogeneity and thus leading to omitted variable bias in the model. Therefore Torres-Reyna (2014) recommend that the after the random effect model be subjected to the robust test and omitted variable test before the estimates are analysed and other post-estimations done.

Table 10: Random effect estimates (Dependent Variable: OSS)

Variables	Coef.	Robust Std. Err	Z	P>|t|	[95% Conf. Interval]	
NPM	0.69842	0.06398	10.92	0.000***	0.573023	0.823828
YGLP	0.07473	0.03233	2.31	0.020**	0.114134	0.178802
CPB	-0.00126	0.00548	0.230	-0.865	-0.00023	-0.00001
OPE	-0.10048	0.00538	-18.68	0.000***	-0.191617	0.202284
DER	-0.03013	0.01090	-2.76	0.011**	-0.000884	0.000297
CAR	0.08677	0.05461	2.79	0.010**	-0.224684	0.115452
NPL	-0.10364	0.04796	-2.16	0.031**	-19.76627	0.962684
CONS	1.11386	0.04665	23.88	0.000	1.022431	1.205301

R^2 = 0.8243   Corr (u_i, X) = 0 (assumed)

Wald chi 2 (7) = 1543.60   N = 57

Prob. > chi2 = 0.000

NB: *** means significant at 1%; and **means significant at 5%

From the results on Table 10, all the variables except cost on loans or cost per borrower (CPB) were statistically significant in affecting the performance of a microfinance institution in Ghana. According the results, all other things remaining constant, at 1% level of significance, performance of an MFI increases

by 0.69842 if the net profit margin of that particular MFI increases by 1 unit. Yield on gross loan portfolio was significant and positively related to performance on an MFI, it also had expected sign. This implies that the higher the yield on loans advanced by an MFI across time the better or higher it performance. At 5% level of significance, an increase in YGLP, increase the performance by 0.07473 across time (year) and between MFIs.

Operating expense (OPE) was also significant and negatively related to the performance of MFIs. That is as the operating expenses of MFIs reduce or fall the better it is for them. From the table, 1% significance level, a unit increase in the OPE would reduce the performance of MFIs by 0.10048 over the time period. Moreover, capital adequacy (CAR) was statistically significant in influencing the performance/sustenance of MFIs in Ghana. The results showed a positive relationship as expected by the study. Meaning, the more MFIs create buffer against credit risks by increasing the capital adequacy, the better for them in their sustainability in business.

In addition to the above, both debt equity ratio and non-performing loans were at 5% significant level statistically significant in affecting the performance or operational self-sustenance of MFI over time. For instance, an increase in debt equity ratio (DER) of an MFI reduces the operational self-sustenance or performance by 0.03013 and a unit increase in non-performing loan reduces the operating self-sustainability or performance by 0.10364 over time and between MFIs in Ghana. Finally, from the equation (26) it implies that when all the

independent variables are equal to zero, OSS will be equal to 1.1139; approximately 1% of MFI's activities would be self-sustainable.

$$OSS = 1.1139 + 0.698NPM + 0.075YGLP - 0.001CPB - 0.100OPE$$
$$- 0.030DER + 0.087CAR - 0.104NPL \ldots\ldots\ldots\ldots\ldots (26)$$

Post-estimation test of the model

These tests help in testing the goodness of fit of the model or otherwise of the technique used. According to Torres-Reyna (2014), post-estimation tests are crucially important in quantitative research since it tell how well how well a model is explained by the technique used and whether the model is well specified or has no omitted variables. It again, highlights the explanatory power of the model.

First from the table is the R^2, it shows the explanatory power of the model. The R^2 was 0.8243 which means about 82 percent of the variations in the dependent variable (OSS) of the model is explained by the independent variables. The Wald test in the table also tests the joint significance of a subset of coefficients of the model and if the test (p-value) is significant then the model is good. According to Woodridge (2004); Kohler and Kreuter (2009) the Wald test is an F-test to see whether all the coefficients in the model are different than zero. From table 10, the Wald test was 0.000 implying that the coefficients in the model were statistically different from zero and thus the model was good.

An omitted variable test was conducted using the "*ovtest*" in the model. The null hypothesis (H_0) is that the model has no omitted variables. The test

(0.9189) indicates that the model fails to reject the H_0 that the model has no omitted variable. The essence of this test was to determine whether the model was well specified (Baltagi, 2008). In essence it shows that the random effect model in the generalized least square form was correctly specified. A failure of this test would mean that the coefficients of the model would be biased. Robust estimation of the random effect model to a large extent was meticulously considered to take care of the heteroskedasticity. The last test was the Breusch and Pagan Lagrangian Multiplier (LM) test for random effects. This LM test helps to decide between a random effects regression and a simple OLS regression.

Normally, in econometrics, an OLS regression is considered to the best linear unbiased estimator (BLUE) hence it is preferred over any technique if possible. A failure of this test indicates that the OLS estimate must be chosen over the random effect model. The null hypothesis in the LM test is that variance across entities is zero. This is, there is no significant difference across units (i.e. no panel effect). From the test in Appendix C, the p-value is 0.000, hence the study reject the null hypothesis conclude that random effects is appropriate. There is enough support to the fact that there are significant differences across MFIs over time.

(ii) H_A: there is a significant effect of each determinant of outreach on outreach as a performance measure on MFI's in Ghana

Table 11: Ordered regression estimates (Dependent Variable: OUTR)

Variables	Odds Ratio	Std. Err	z	P>|t|	[95% Conf. Interval]	
NPM	0.09017	0.11535	0.78	0.434	-3.16269	1.35910
YGLP	1.24729	0.11092	2.22	0.024**	-6.18364	1.23767
CPB	3.03866	1.01899	4.30	0.000***	-0.00766	0.00748
SIZ	1.69454	0.02448	3.39	0.002**	-0.01381	15.2723
NB	1. 71001	0.00034	4.97	0.000***	0.00023	13.0103
WP	1.04844	1.81412	0.03	0.979	-3.50717	3.60407
Age=2	1.85918	1.13586	1.64	0.102	-4.08543	0.36705
Age=3	1.93705	0.11230	8.34	0.000***	0.13820	11.2640
Sev=2	1.50681	0.81250	1.85	0.057*	-2608.86	2639.00
Sev=3	1.63443	0.15996	3.69	0.001**	-3.71633	2.44746
Sev=4	1.84053	0.27800	1.92	0.047**	-1.08747	12.1565

Pseudo R^2 = 0.5314

LR chi2(11) = 105.07   Prob > chi2 = 0.0000

N = 57

This hypothesis was posed to examine whether there is a significant effect of each determinant of outreach on outreach in Ghana. The null hypothesis states that there is no significant effect of each determinant of outreach on outreach in

Ghana. The ordered logistic regression model was used to find out the effect, if any, between each determinant of sustainability on the outreach model. The use of this technique is such that the dependent variable has inherently ordered categories. According to Williams (2005) though the distance between adjacent categories is unknown, the ordinal scale is treated as though it represents a latent interval/ratio scale. For this technique and multinomial logits there must be a reference or base group. Hence, the study used the small as the base (reference) group.

From the results on Table 11, all the variables were positive and statistically significant in explaining changes in the dependent variable, except net profit margin (NPM), women participation (WP) and age (Young ie age=2). Though the apriori expectation was to have cost on loan disbursed/cost per borrower to be negative effect. Logit coefficients are in log-odds units or odds ratio and as such cannot be read as regular OLS coefficients. The technique estimates the cumulative probability of being in one category versus all lower or higher categories (Torres-Reyna, 2014; Long & Freese, 2006). From Table 11, the odds of a lager MFI with yields on gross loan portfolio to perform are 1.27 times greater than medium and small MFIs in terms of clients (outreach). Again, each additional year is associated with 20.3% increase in cost on loans to small MFIs compared to MFIs with medium and large outreach.

Moreover, it was seen that size of an MFI was significant at 5% significant level in explaining outreach (performance) of an MFI. Thus the bigger the size of an MFI the bigger it is for outreach and vice versa compared to medium and small

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MFIs. Size was explained in terms of numbers of offices and branches a particular MFI has. Therefore, it logical to assume that, the higher the size, the higher the clients base of that particular MFI. In addition to the above, number of active borrowers (NB) was at 1% significance level statistically significant in influence outreach of MFIs. In other words, the odds for MFIs with higher active borrowers to have higher outreach is 1.71 times bigger than MFIs with medium and small active borrower if all other things are held constant.

Finally age and services MFIs offer were significant in explaining outreach (performance) of MFIs. For age, the results indicated that every additional year is associated with 93.7% increase in clients or outreach (performance) for lager MFIs more than MFIs with Medium and smaller clients. Stated differently, the odds for a large MFI which is mature in terms of age to increase outreach is 1.94 bigger than young and new MFIs compared with the other categories of outreach. However for services offered, it was revealed that MFIs that provide more services stand the chance of having higher outreach compared with MFIs the offer fewer services.

Post-estimation for the ordered logit model

Like the R^2 and adjusted R^2 in other models that shows the explanatory power of the model, Pseudo R^2 does similar function. The Pseudo R^2 was 0.5314; meaning about 53 percent of the variations in the dependent variable (OUTR) of the model is explained by the independent variables. The LR chi2 like the Wald test, test the joint significance of a subset of coefficients of the model and if the

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test (p-value) is significant then the model is good. From table, the p-value was 0.000 implying that the coefficients in the model were statistically different from zero and thus the model was good. Furthermore the study performed the proportionality test using the brant test. Normally, ordered logit and multinomial logit regressions are tested whether the distance between the categories in the dependent model are proportional. According to Long and Freese (2006) this is rather more serious with multinomial logit regressions because since the ordered logit defines the dependents variable as ordinal, the model assumes that the distance between each category of the outcome is proportional. However, Long and Freese (2006) added that in practice, violating this assumption may or may not alter the substantive conclusions but cautions that it must be tested. With the p-value of 0.000 it means that there is enough evidence that the parallel regression assumption has been violated. The passing of post-estimation test by both models proves that both models were good measures of performance and thus one could be used in the absence of the other. Both measures could also be used as the same time so that one reinforces the other.

Discussion of the determinants of OSS and OUTR results

Debt-Equity Ratio

It is hypothesised in this study that debt-equity ratio (DER) is negatively related to operational self-sustainability of an MFI. Empirical evidence from this study also proved that DER is negatively related to the operational self-sustainability of an MFI. This suggests that microfinance's ability to provide its

services without subsidies as well as the extent to which its services are accessible to low-income earners is negatively associated to its DER. The implication is that a high DER indicates that a microfinance industry may not be able to generate enough cash to satisfy its debt obligations, and will thus lower sustainability (may require subsidies for its provision of services or have a short operational life span). Hence, MFIs may not able to achieve their aim of reducing poverty. These findings are however inconsistent with the hypothesis that has been advanced in this study.

Nevertheless, the findings is consistent with authors like Rhyne (1994); and Christen, (1997) who argue that even if sources of funds (DER) is use to increase gross loan portfolio at a rate higher than the rate at which it increases, an increase in gross loan portfolio may not be translated into an increase in outreach. Again an increase in gross loan portfolio may not be translated into an increase in outreach, if the number of repeat borrowers increases. Therefore, DER may not necessarily lead to an increase in outreach and/or improved sustainability.

Yield on gross loan portfolio as a proportion of total assets

The study expected YGLP to be positively related to performance of MFIs (sustainability and outreach), indeed results of this current study showed that yield on gross loan portfolio was positive. This has to do with the fact that the more the amount of loans advanced and repaid (which means less amount of outstanding loans) the more is the revenue generated for the MFI. YGLP is positively related to outreach because the less the uncollected loans (less outstanding loans) the less

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the number of clients. This result is consistent with the study of Yaron (1992) on performance of microfinance institutions. Furthermore, as yield on gross loan portfolio of an MFI grows, it is an indication that the MFI is better off or is improving and performing thus it profitable to reach other people who are unbanked. According to Christen (1997), generally, portfolio yield is the initial indicator of an institution's ability to generate revenue with which to cover its financial and operating expenses. Thus it fair to say that yield of gross loan portfolio is the revenue that accrues to the amount of money used for giving out loans. Hence if that amount does not increase or grow then the performance or sustenance of that institution is suspect.

The positive relationship between YGLP and OSS means that if investments generate more revenue compared to other forms of uses of funds, re-allocating resources to other forms of uses of funds (ceteris paribus) results in increased operating revenue and, therefore, improves microfinance's ability to provide its services without subsidies. Similarly, assuming all other factors remain constant, an increase in YGLP results in higher operating revenue and improves sustainability. Thus, an increase in investments and YGOLP, ceteris paribus (lending interest rates, costs and repayment rates), translates directly into improvement in microfinance's ability to provide its services. This has implication for development. If government can provide the enabling environment for the microfinance institutions to secure more loans from the commercial markets and encourages them through moral suasion to give out loans to more

clients, then the livelihood of individuals can be improved since the uses of funds does not really affect the survival of microfinance institutions in Ghana.

Cost on loan or cost per borrower

Cost per borrower was negative and significant in only the outreach model indicating that the more cost on loans falls, the more revenue and hence the higher motivation to bring other clients onto the financial system. Cost on loans disbursed is the cost a borrower brings any time he/she is offered the loan. The more people borrowers borrow money and are not able to redeem, it add extra cost to the institution. The opportunity cost of not giving the money to other people, time wasted and the physical money lost. This rather becomes cost to sustainability and outreach. This results support the claim of Von Pischke (1991) who defined cost on loans to include; opportunity cost, accounting cost and economic cost.

According to Johnson and Rogaly (1997) an increase in costs leads to a decrease in operational sustenance and by extension it leads to a decrease in outreach, and vice versa. Costs can also affect sustainability and outreach through their effects on the demand for loans, if cost is high demand will fall. The basic business equation relating sustainability and costs is $\pi = TR-TC$, where π is a proxy measure for sustainability, TR is total operating revenue generated by the firm, and TC is total costs incurred in generating TR. From this equation, ceteris paribus, TC is negatively related with sustainability as higher TC is related to lower π. Empirical findings of this study revealed a non-effect of unit cost of

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loans on sustainability albeit significant in explaining outreach. These findings call for efficient operations by MFIs to minimise costs with respect to outreach.

Age of the institution providing the financial services

Another factor found to be a statistically significant explanatory variable to the outreach model was Age (Mature). This result was consistent with the expectation of the study. As Kosmidou (2008) mentioned that rationally as MFIs or banks grow in age it expects to devise a number of workable strategies to redeem its loans. MFIs also get to know credit worthiness of a borrower and as time progress defaulters are denied loans. Kosmidou (2008) revealed that characteristics of a bank such as age size may be statistically significant in imparting on the performance of a bank. The result was also in line with the assertion of Morduch (1999); and Pindyck and Rubinfeld (1998). Morduch (1999) said that financial progress improves with the age of the institution, which means that the older the institution, the higher the level of sustainability. The age of an organisation positively affects its sustainability and outreach through accumulated experience gained from learning by doing, the development of operating systems, experience and training of staff, and economies of scale (Pindyck & Rubinfeld, 1998).

Capital adequacy

Capital adequacy was positive and significant in explaining sustainability of MFIs in Ghana and was also consistent with the expected. This stems from the

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fact that capital adequacy describes the sufficiency of the amount of equity that can absorb shocks that financial institutions may experience. As stated by Afriyie and Akotey (2013), financial institutions with good capital adequacy ratio have good profitability and again a strong capital adequacy is able to absorb possible loan losses and thus avoids bank 'run', insolvency and failure. Kosmidou (2008) also stated in previous studies that well-capitalised banks face a lower cost of going bankrupt which reduces their cost of funding.

Non-performing loans

At 5% significant level, non-performing loans were significant in effecting the sustainability of MFIs. According to Hosna et al. (2009) it also measures how banks manage their credit risk because it defines the proportion of loan losses amount in relation to total loan amount and how strong and viable a financial institution or bank is in terms of its ability to extend loans. Here the ability of MFI's loan recovery policy is very much critical. Non-performing loans are actually the bad loans out of the total loans advanced to clients (Boahene et al. 2012). Since MFIs make interest on loans, any losses would adversely affect the profitability and to some extent the sustainability/performance of the MFI (Tefera, 2011).

Operating expense

Operating expense was at 1% significance level significant in explain sustainability of MFIs. Actually the study measures operating expense to include

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staff salaries, recurrent expenditure, maintenance/depreciation cost and administrative cost. Thus the more financial institution accrues operating expense, the more unprofitable the institution becomes and that has a toll on the sustainability of some workers to say the least (Joskow, 2006). Moreover, operating expense is used to measure the impact of efficiency on financial institution's performance. It is also used to provide information on the variation of bank cost over the banking system. A negative correlation means that higher operating cost, the lower the profit and vice-versa.

Size of financial institutions

The size in the model is used to proxy for the total coverage of the MFI in terms of the number of branches and the total number of offices. Kutsienyo (2011) mentioned that coverage and number of offices including head office denotes the number of clients the MFI serves. And that is exactly how the study captures outreach – the number of clients MFI serves at a time. Thus, this variable is normally used to measure for outreach of the institution. That is as MFIs grow laterally and get many branches and get concentrated on the type of products in other areas it helps them to be efficient and productive. This could be tied to the number of active borrowers, in that the more an MFI has more active borrower it presupposes that the total coverage in terms of its clients are high. Though not all active borrowers are able to pay back loans, however, the fact remains that the fact the clients is an active borrower means the clients pays it loan obligations.

Services offered by MFIs

The study revealed that services offered by MFIs were significant in explaining the changes in outreach of MFIs. Services offered were measured by the kind of business or activity to particular group of clients. It is captured in the dataset as: 1=low end; 2=small business; 3=high end; and 4=broad. It was observed that the more MFIs offer more services to cover different group of clients, the more the number of clients they have and that explains bigger outreach. It is thus logical to assume that MFIs that provide more services stand the chance of having higher outreach compared with MFIs the offer fewer services.

Net profit margin of financial institutions

Net profit margin was positive and at 1% significance level significant in influencing operating self-sustainability of MFIs in Ghana. Though the expected it to be positively significant in influencing both models, however it turned out to be significant in only the OSS model. Normally profits are measured by the incomes and the expenses, i.e. π = TR-TC, where π is profit (a proxy for sustainability), TR is total operating revenue generated by the firm, and TC is total costs incurred in generating TR. From this equation, ceteris paribus, a higher π means lower TC and higher TR and that has implication for sustenance of an institution. According to Romer (2006) the consensus in business is that earning a profit in the long-run is not only an essential element for all business firms, but it

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serves as the reasonable assumptions for sustenance and thereby profit maximisation in future.

Generally, income is the money generated from the activities of the business for example, the interest incomes on the loan obligations and other activities. Expenses are the costs of the resources used up to consume by the business. These costs include the opportunity cost for debts, cost of bad debts and cost of debt recovery (Leong, 2009). Thus net profit margin is the amount left after all costs together with depreciations have been deducted from income/revenue. Therefore a higher net profit margin is good morale for sustainability.

Chapter summary

This presented the results and discussion on the study. The chapter began by looking at description of the data. It was realised that the data was normally and evenly distributed except NB, CPB and OUTR. The data structure also showed that there were 57 MFIs with 7 within-subject effects. The study also presented correlation between the variables using the Pearson correlation r coefficients. The study moreover performed some diagnostics test as it were to determine the choice of variables and also provide support to the choice of model. The test included: heteroskedasticity test, multicollinearity test, serial correlation test, the test for cross-sectional dependence test and the test for the presence of panel effect in the data.

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The study used the random effect to estimate the OSS model and the decision was motivated by the Hausman test. According to the results, all the variables except CPB were statistically significant in affecting the performance of MFIs in Ghana. Ordered logistic regression was also used to estimate the OUTR model. The motivation for this type of technique stem from the fact that OUTR is an ordered or categorical variable. The study continued to perform post-estimation tests that are crucial to determine the stability or otherwise of the models. The post-estimation tests included: omitted variable test, Wald test, heteroskedasticity test, and the proportionality test using the brant test. Again, the various test indicated that both models were good measures of performance and that one could be used in place of the other or one could be used to reinforce (complement) the other.

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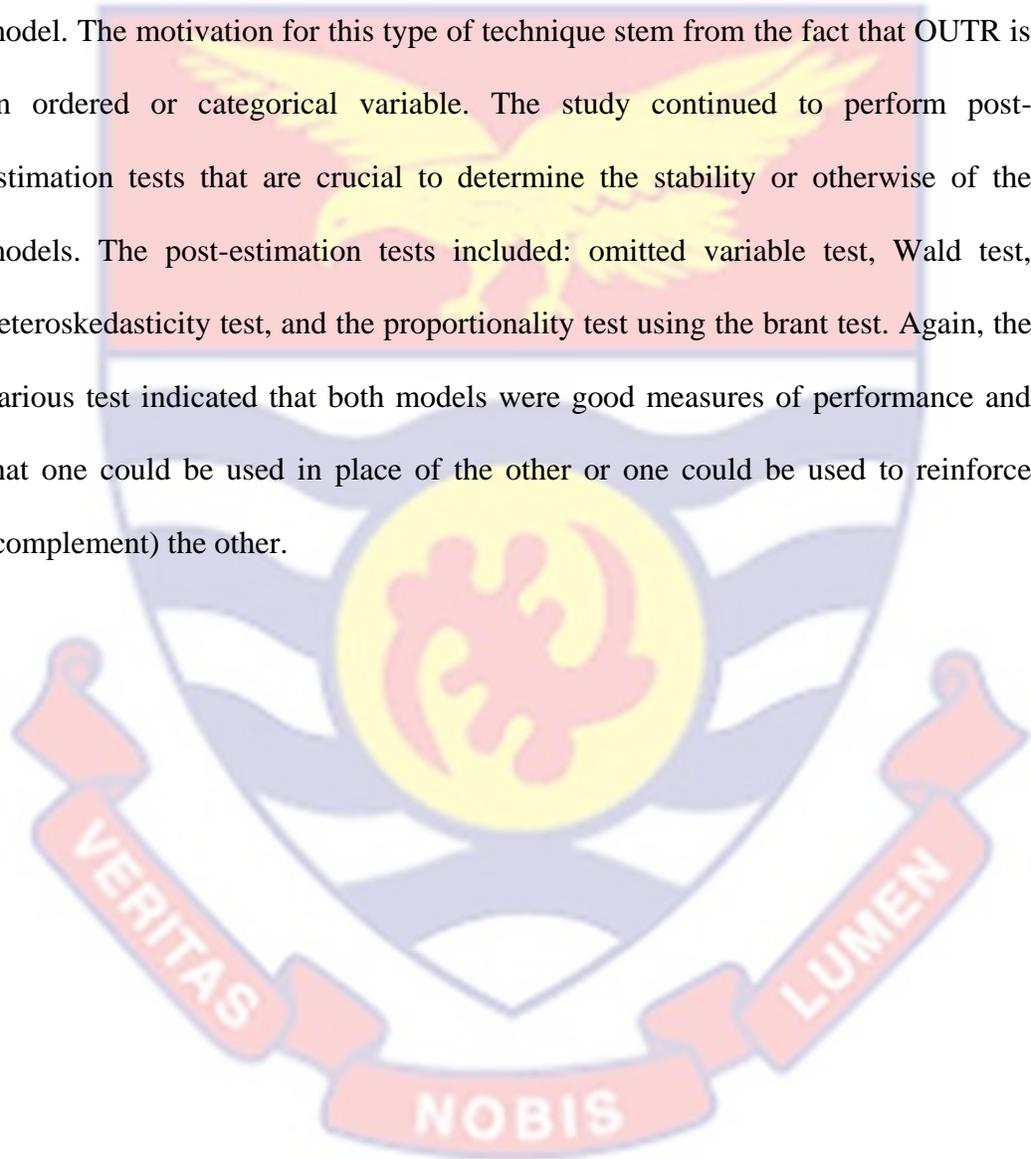
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the key findings of the study, the relevant conclusions from the findings and the recommendations derived from the conclusion of the study.

Summary

The study investigated the outreach and sustainability as performance indicators of MFIs in Ghana. The study conducted a survey of literature in three main areas: i) the definitions and measures of sustainability and outreach; ii) the determinants of sustainability and outreach; iii) a well-grounded theoretical basis for estimating sustainability and outreach models. Following Brinkerhoff and Goldsmith (1992); and Mog (2004), sustainability is a question of self-reliance in the medium to long term without subsidies, and the measure of sustainability preferred in the study is operational self-sufficiency. The less restrictive definition of outreach adopted in this study is the extent to which formal financial services are accessible to the low-income earners and the preferred measure of outreach is the scale. Two generalised estimating equation regression models were estimated using data collected on 57 MFIs in Ghana: sustainability and outreach.

Key findings of the study

Effects of the determinants sustainability OSS

All the OSS variables except cost on loans or cost per borrower (CPB) were significant in affecting the performance of MFIs.

Yield on gross loan portfolio was significant and positively related to performance on an MFI, it also had expected sign. An increase in YGLP increased the performance of MFIs by 0.07473 across time (year) and between MFIs.

Operating expense (OPE) was also significant and negatively related to the performance of MFIs. That is as the operating expenses of MFIs reduce or fall the better it is for them. A unit increase in the OPE would reduce the performance of MFIs by 0.10048 over the time period.

Moreover, capital adequacy (CAR) was statistically significant in influencing the performance/sustenance of MFIs. The results showed a positive relationship as expected by the study.

In addition to the above, both debt equity ratio and non-performing loans were significant in affecting the performance or operational self-sustenance of MFI over time. An increase in debt equity ratio (DER) of an MFI reduced the operational self-sustenance or performance by 0.03013 and a unit increase in non-performing loan reduces the operating self-sustainability or performance by 0.10364 over time and between MFIs.

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Finally, if all the independent variables of OSS are held constant certeris paribus MFIs in Ghana can only contribute approximately 1% to help the course of operational sustainability.

Effects of determinants of outreach on outreach on performance

All the OUTR variables were positive significant in explaining changes in the dependent variable, except net profit margin (NPM), women participation (WP) and age of MFIs.

The odds of a lager MFI with yields on gross loan portfolio to perform are 1.27 times greater than medium and small MFIs in terms of clients (outreach). Again, each additional year is associated with 20.3% increase in cost on loans to small MFIs compared to MFIs with medium and large outreach.

In addition to the above, number of active borrowers (NB) was significant on influence outreach of MFIs. The odds ratio for MFIs with higher active borrowers to have higher outreach is 1.71 times bigger than MFIs with medium and small active borrower.

Finally the results indicated that every additional year is associated with 93.7% increase in clients or outreach (performance) for lager MFIs more than MFIs with Medium and smaller clients. Stated differently, the odds for a large MFI which is mature in terms of age to increase outreach is 1.94 bigger than young and new MFIs compared with the other categories of outreach.

However for services offered, it was revealed that MFIs that provided more services stand the chance of having higher outreach compared with MFIs the offer fewer services.

Conclusions

The debt-equity ratio (DER) was negatively related to operational self-sustainability of an MFI. The implication was that a high DER indicates that a microfinance industry may not be able to generate enough cash to satisfy its debt obligations, and will thus lower sustainability. Hence, MFIs may not able to achieve their aim of reducing poverty.

The study showed that yield on gross loan portfolio was positive (YGLP). This has to do with the fact that the more the amount of loans advanced and repaid the more was the revenue generated for the MFI. The positive relationship between YGLP and OSS means that if investments generate more revenue compared to other forms of uses of funds, re-allocating resources to other forms of uses of funds (ceteris paribus) results in increased operating revenue and, therefore, improves microfinance's ability to provide its services without subsidies. Thus, an increase in investments and YGLP translates directly into improvement in microfinance's ability to provide its services.

Cost per borrower was negative and significant in only the outreach model indicating that the more cost on loans falls, the more revenue and hence the higher motivation to bring other clients onto the financial system. The more people borrowers borrow money and are not able to redeem, it add extra cost to the

institution. The opportunity cost of not giving the money to other people, time wasted and the physical money lost. This rather becomes cost to sustainability and outreach.

Capital adequacy was positive and significant in explaining sustainability of MFIs in Ghana. This stems from the fact that capital adequacy describes the sufficiency of the amount of equity that can absorb shocks that financial institutions may experience.

Non-performing loans were significant in effecting the sustainability of MFIs. Here the ability of MFI's loan recovery policy is very much critical. Non-performing loans are actually the bad loans out of the total loans advanced to clients since MFIs make interest on loans, any losses would adversely affect the profitability and to some extent the sustainability/performance of the MFI. Operating expense was significant in explain sustainability of MFIs. Thus the more financial institution accrues operating expense, the more unprofitable the institution becomes and that has a toll on the sustainability of some workers to say the least.

The size in the model is used to proxy for the total coverage of the MFI in terms of the number of branches and the total number of offices. That is as MFIs grow laterally and get many branches and get concentrated on the type of products in other areas it helps them to be efficient and productive. This could be tied to the number of active borrowers, in that the more an MFI has more active borrower it presupposes that the total coverage in terms of its clients are high. Though not all active borrowers are able to pay back loans, however, the fact

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remains that the fact the clients is an active borrower means the clients pays it loan obligations.

The study revealed that services offered by MFIs were significant in explaining the changes in outreach of MFIs. Thus the more MFIs offer more services to cover different group of clients, the more the number of clients they have and that explains bigger outreach. Net profit margin was positive in influencing operating self-sustainability of MFIs in Ghana. Thus net profit margin is the amount left after all costs together with depreciations have been deducted from income/revenue. Therefore a higher net profit margin is good morale for sustainability.

Recommendations

Based on the key findings and the conclusions of the study, the following recommendations were made:

1. MFIs should keep their debt-equity ratio as low as possible to generate enough revenue to ensure sustainability without resorting to subsidies from parent organizations or donors. Since a high debt-equity indicates that an MFI is not able to generate enough cash to satisfy its debt obligations lowering their sustainability. Hence, MFIs may not able to achieve their aim of reducing poverty.

2. MFIs should extend more loans to women groups since their yield on gross loan portfolios was better. The group loan format is good for facilitating more loan repayment on the part of individuals of the group

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and apart from this they usually save with the MFIs which help in recovering part of loans in events of default. This strategy is also appropriate for reducing the cost per borrower.

3. MFIs should focus on reducing their debt-equity this will affect their capital adequacy significant on sustainability thus the sufficiency of the amount of equity that can absorb shocks that they may experience in case of non-performing loans.

4. For the MFIs increase their main asset base which is loan performance the incremental-loan-based strategy should be used on the part of the groups that contract loans from them. This will increase the MFIs loan recovery rate since after repayment of loans by the groups; they will be rewarded with expanded loan facilities.

5. MFIs should consider organizing part of their services over-the-phone and loan collection be organized with the group loan format. This will reduce the relevance of opening several offices that come with its attendant operating costs. This will contribute hugely to their net profit margin since few employees and physical facilities will be needed for the delivery of services to clients.

6. MFIs should simplify the number of products/services they deliver to their clients, and as much as possible customize based on their clients emerging needs so not end up providing so many services that are not even accessed by their clients.

Areas for further Research

Drawing from some of the limitations of this study and the assumptions made the following are recommended areas for further research.

1. A similar study using FSS instead of OSS as the dependent variable in the sustainability model and the depth of outreach as the dependent variable in the outreach model.

2. A similar study with a much larger sample of MFIs and a longer time period to see if the findings are different from those of the current study.

3. A study that explicitly factors in the demand factors as determinants of sustainability and outreach.

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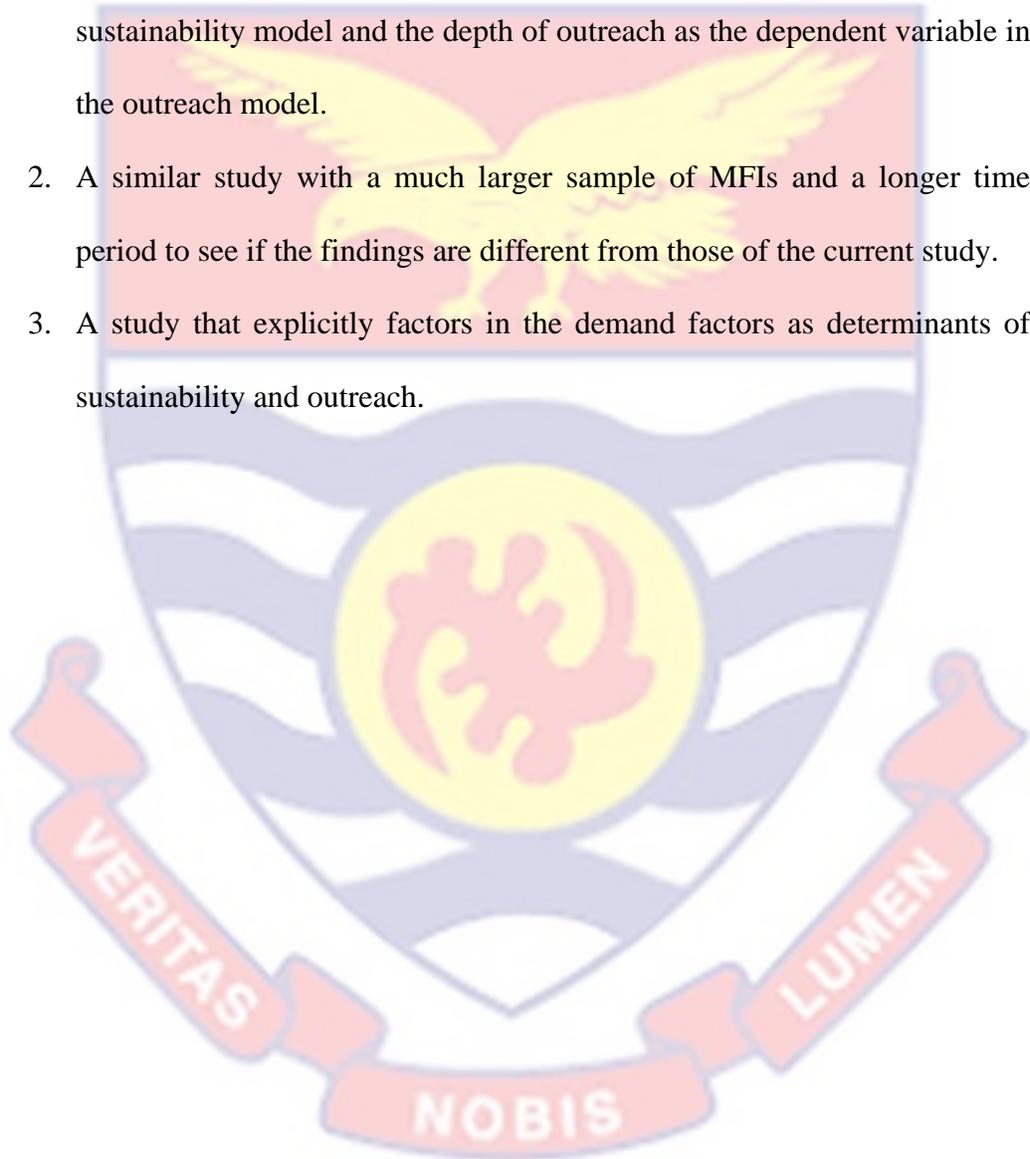
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APPENDIX A

Results of the OLs estimate

Variables	Coef.	Std. Err	t	P>|t|	[95% Conf. Interval]	
NPM	.6984258	.0430199	16.23	0.000	.6131617	.7836899
YGLP	.0323339	.0756465	0.43	0.670	-.117594	.1822628
CPB	-.000126	.000069	-1.81	0.074	-.0002643	.0000123
OPE	.0053336	.081804	0.07	0.948	-.1567995	.1674668
DER	-.0002935	.000122	-2.40	0.018	-.0005363	-.000507
CAR	-.054616	.0538325	-1.01	0.313	-.1613103	.0520782
NPL	-.103644	.0912091	-1.14	0.258	-28.44183	7.712869
_cons	1.113866	.0401311	27.76	0.000	1.034328	1.193404
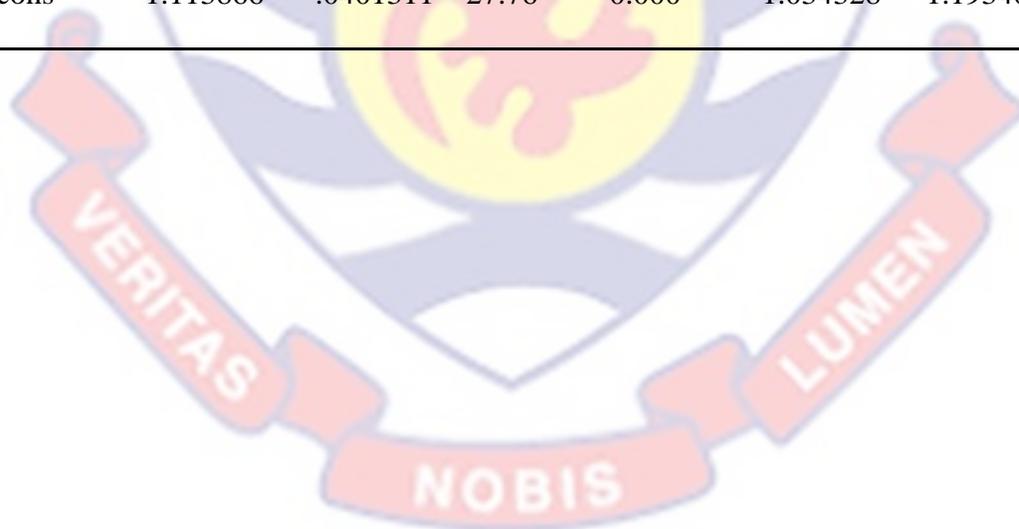
APPENDIX B

Results of diagnostic tests

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of oss

chi2(1)   =   0.70

Prob > chi2 =   0.4043

Variable	VIF	1/VIF
ope	3.20	0.312443
npm	2.00	0.501220
yglp	1.79	0.557754
car	1.36	0.735261
cpb	1.36	0.736573
npl1	1.06	0.943292
der	1.03	0.967676
Mean VIF	1.69	

Ramsey RESET test using powers of the fitted values of oss

Ho: model has no omitted variables

F(3, 106) = 2280.51

Prob > F =   0.0000

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Breusch-Pagan LM test of independence: chi2 (21) = 28.914, Pr = 0.1161.
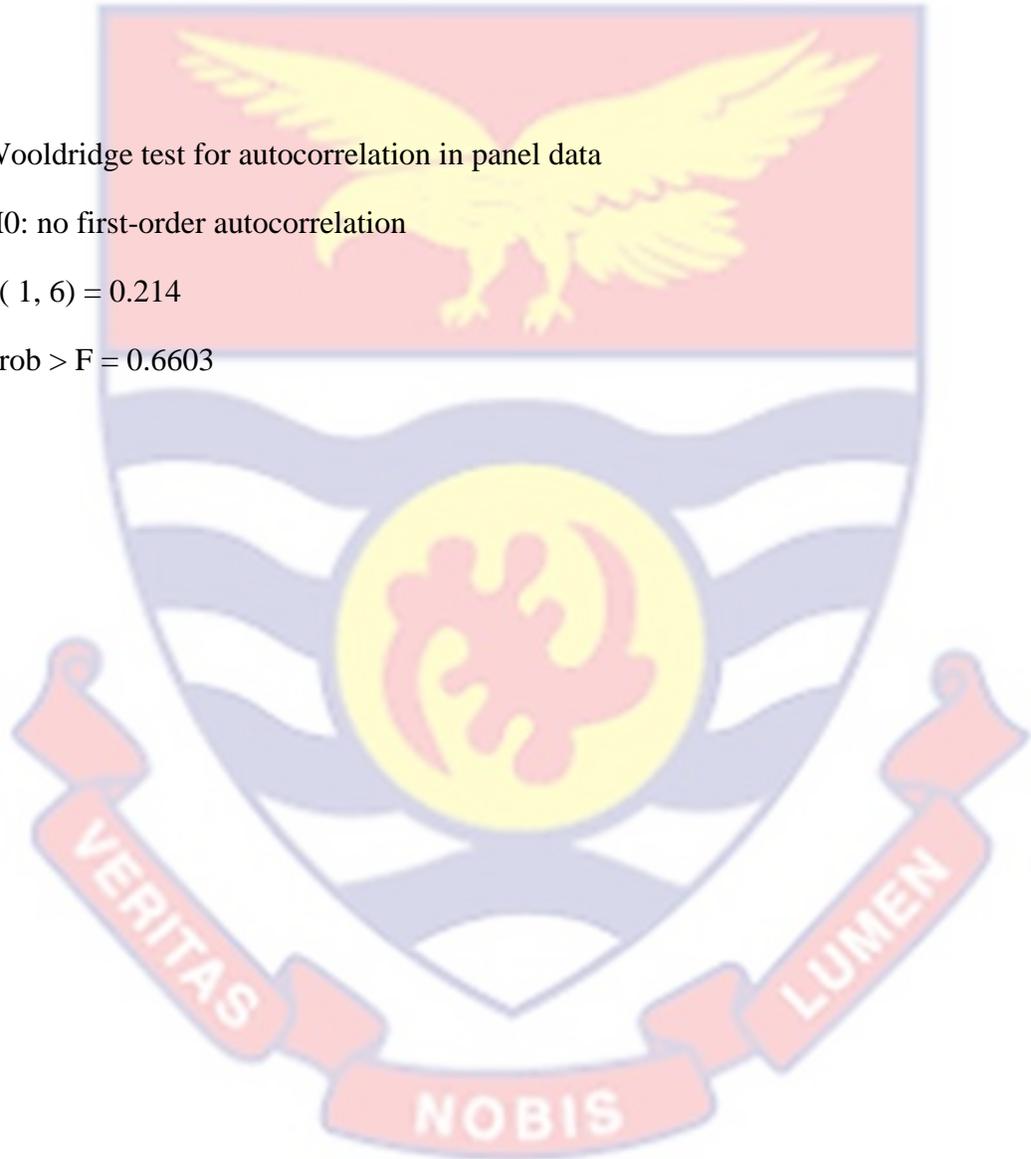
Based on 7 complete observations over panel units

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

$F(1, 6) = 0.214$

$Prob > F = 0.6603$

Appendix C

Hausman test for model selection

Variables	Coefficients			
	(b) Fixed	(B) Random	(b-B) Difference	Sqrt(diag(V_b-V_B))
NPM	.7279201	.6984258	.0294943	.0253709
YGLP	-.0012354	.0323339	-.0335694	.0354301
CPB	-.0001185	-.000126	7.53e-06	.0000174
OPE	.0458771	.0053336	.0405435	.0334586
DER	-.0003176	-.0002935	-.0000241	.0000536
CAR	-.0293124	-.054616	.0253037	.0273696
NPL	-5.953905	-10.36448	4.410573	3.513866

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)

=   3.39

Prob>chi2 =   0.6407

Breusch and Pagan Lagrangian multiplier test for random effects

y[OSS,t] = Xb + u[OSS] + e[OSS,t]

Estimated results:

Test: Var(u) = 0

chi2(1) = 45.67   Prob > chi2 = 0.000

Ramsey RESET test using powers of the fitted values of oss

   Ho: model has no omitted variables

     F(3, 106) =   2.51

     Prob > F =   0.9189