FACTORS THAT INFLUENCE CREDIT CONSTRAINTS IN FORMAL CREDIT MARKETS IN MALAWI: A HOUSEHOLD LEVEL ANALYSIS

Master of Arts (Economics) Thesis

By

BENJAMIN BISA BANDA
Bsoc. Sc. _University of Malawi

Submitted to the Faculty of Social Science in partial fulfilment of the requirements for the degree of Master of Arts in Economics

UNIVERSITY OF MALAWI
CHANCELLOR COLLEGE

APRIL, 2011

DECLARATION

I, the undersigned, hereby declare that this thesis is my original work and has not been submitted to any other institution for similar purposes. Where other studies have been used, acknowledgements have been made. I am solely responsible for all errors contained herein.

Benjamin Bisa Banda

_____

Signature

_____

Date

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

_____

Ronald Mangani, Ph.D

Supervisor

Date: _____

_____

Regson Chaweza, Ph.D

Head of Department

Date: _____

DEDICATION

To Mariangel, Patricia and Vinjeru, and the memory of my father, Robert.

ACKNOWLEDGEMENTS

First and foremost I would like to thank the Good Lord for the good health and the strength to go on during the entire study period. Completion of this study is one of His many blessings on me.

Special thanks are also due to my supervisor Dr R. Mangani for the invaluable comments and time. Without his unconditional support, patience and attention to detail, this research would not have been successfully completed. This also goes to Dr R. Mussa, the course coordinator, and all lecturers in the Department of Economics for their dedication.

I am indebted and very grateful to the management of National Statistical Office, for the generous financial assistance, without it, this study would not have come to its conclusion. I am very thankful to my family who gave me tremendous moral support and boosted my confidence to soldier on. MA classmates and all friends, you were great. I am also grateful to all individuals who I have not mentioned for supporting me all the way to accomplishing this degree.

ABSTRACT

The study examines the factors that influence a household's likelihood of facing credit constraints in formal credit markets in Malawi using cross section data from the 2008 Finscope Survey. Following a direct approach and employing logit model suggested by Jappelli (1990), the study has been able to investigate the factors that influence credit constraints in Malawi. The study finds that about 59 percent of the households were credit constrained, and that decrease in current income increases the probability of being credit constrained. It is found that wealthy households are less likely to face credit constraints than poor households. In addition, the employed are also less likely to be credit constrained and the probability of being constrained decreases by 6.7 percent for the employed. Furthermore, households in urban areas have a lower probability of being credit constrained, the probability of being constrained decreases by 8.8 percent if the household resides in the urban areas. Moreover, households located far away from the financial institutions were more likely to be credit constrained, probably due to high transaction costs.

It is therefore recommended that policies on the use of credit as development tool should aim at infrastructure development, and the provision of technology driven products so as to reduce transaction costs and enable credit access to across a broader client base. As suggested by Getter (2008), sometimes liquidity constraints may be an indication of household's incapacity to service the loan. Hence such households need to be targeted with other forms of safety-net programs.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

ATM	Automated Teller Machines
FIMA	Financial Inclusion in Malawi
FMB	First Merchant Bank
GDP	Gross Domestic Product
GoM	Government of Malawi
HDI	Human Development Index
IFPRI	International Food Policy Research Institute
MARDEF	Malawi Rural Development Fund
MFI	Microfinance Institution
MGDS	Malawi Growth and Development Strategy
MK	Malawi Kwacha
MRFC	Malawi Rural Finance Corporation
MSB	Malawi Savings Bank
MSE	Micro and Small Enterprises
MSMEs	Micro, Small and Medium Enterprises
MUSCCO	Malawi Union of Savings and Credit Cooperatives
NBM	National Bank of Malawi

NSO	National Statistical Office
OIBM	Opportunity International Bank of Malawi
OPM	Oxford Policy Management
PCA	Principal Component Analysis
POS	Point Of Sales
RBM	Reserve Bank of Malawi
ROSCAs	Rotating Savings and Credit Associations
SACCOs	Savings and Credit Cooperatives
SEDOM	Small Enterprise Development Organisation of Malawi
SME	Small and Medium Enterprises
SSA	Sub-Saharan Africa
UN	United Nations
UNDP	United Nations Development Programme
VSLA	Village Savings and Loans Associations
WB	World Bank

CHAPTER ONE

INTRODUCTION

1.1 Background and Motivation

Financial services are fundamental to economic growth and development. The provision of financial services such as credit, savings and insurance to low-income clients is a key element in pro-poor economic development (see Simtowe *et al.,* 2008). However, in developing countries, the lack of capital continues to be one of the important reasons behind inadequate economic development (see Manig, 1996). Furthermore, Gockel (2009) argues that the inadequate supply of credit is a serious constraint on economic development.

A number of studies have looked at the determinants and constraints affecting the supply of banking and financial intermediation services. However, empirical studies examining credit constraints in the developing world are uncommon. This study, therefore seeks to establish factors that affect households access to formal credit in Malawi. In particular, the characteristics of households likely to be credit constrained. The credit constrained consumers constitute those who had their request for credit rejected and the discouraged borrowers who perceive that their request for credit would be rejected if they applied for one (Jappelli, 1990). As demonstrated by Chen and Chivakul (2008), understanding credit constraints and their determinants has important policy implications at both the micro and macro levels.

At the micro level, the factors influencing credit constraint help shed light on the credit granting process of the lenders. While at macro level, credit constraints explain the observed correlation between current consumption and income growth, and the rejection of the permanent income hypothesis[1]. In other words, constrained consumers are not able to smooth their consumption effectively, leading to excess sensitivity of consumption to current income fluctuation. This implies that transitory, short-term changes in income have an effect on consumer spending behaviour. In addition, the presence of consumers with credit constraints has implications for the design of fiscal policy. A fiscal stimulus package that targets population groups that are more likely to face binding borrowing constraints is likely to be most effective.

It is essential that availability of banking and payment services to the adult population is the prime objective of public policy since lack of access to financial services is a key constraint to economic growth, private sector development and poverty reduction in many African countries. However, in many developing countries less than half the adult population has access to formal financial services, and in most of Africa less than one in five households do (World Bank, 2007). In Malawi, more than half of the adult population manage their lives without any kind of formal or informal financial product while only one in five are banked (GoM, 2008).

[1]The Permanent income hypothesis states that, in its simplest form, the choices made by consumers regarding their consumption patterns are determined not by current income but their longer-term income expectations.

Buckland and Simpson (2008) point out that these consumers would likely rely on informal financial service providers such as a small retailer, family member or friend where they would pay higher direct fees or interest rates.

In many African countries banks are inaccessible to most people due to stringent and often complex requirements to open accounts, high transaction costs, and their focus on a more upscale market of clients, corporate accounts and trade finance (World Bank, 2007). Schmidt and Kropp (1987) argue that the financial access problem, especially among formal financial institutions, is one created by the institutions through their lending policies. These include credit duration, terms of payment, required security and the provision of supplementary services that do not fit the needs of the target group. This implies that potential borrowers would not apply for credit even where it exists and when they do, they would be denied access. However, institutions providing microfinance[2] have helped to fill this gap by providing access to finance to low-income populations, including a broad range of microenterprises and those living outside large urban centres that had been traditionally underserved. Statistical evidence linked the provision of microfinance with improved household living standards, increased assets, better access to financial services by women, and a reduction in vulnerability and poverty (see among others Aghion and Murdoch, 2005).

[2] In Malawi, the Microfinance Act 2010 defines microcredit as the provision of small loans to small or micro-enterprises, low-income customers, or as determined by registrar, where such loans are granted to a person whose income depends on his own business or economic activity, whose security may include non-traditional instruments such as group guarantees or compulsory savings and the borrower may be required to make frequent repayment in small amounts.

The reasons advanced for microfinance being one of the most popular tools for poverty reduction include the potential to promote investment in assets by providing additional purchasing power, permitting individuals or households to exceed the limitation of their current economic situations (Shekh, 2006). Microfinance can also facilitate activities for earning and sustaining a livelihood and enables poor households to manage their economic activities more efficiently. In addition, microfinance helps to protect households against sudden falls in income and increase their crisis-coping capacity.

Furthermore, a group lending approach to microfinance can help the poor to build social capital and improve their quality of life as they often participate in solidarity groups (build netwoks) and establish a credit history and trust (see Aghion and Morduch, 2005). In particular, household members, especially women may experience a rise in self-esteem, dignity and a sense of empowerment through opportunities provided by access to financial services (see Hashemi, 1997).

Yehuala (2008) points out that the provision of credit has increasingly been regarded as an important tool for raising the incomes of rural populations, mainly by mobilizing resources to more productive uses. As development takes place, one question that arises is the extent to which credit can be offered to the rural poor to facilitate their taking advantage of the developing entrepreneurial activities. Hossain (1988) notes that the generation of self-employment in non-farm activities requires investment in working capital.

However, at low levels of income, the accumulation of such capital may be difficult. Hence, loans, by increasing household income, can help the poor to accumulate their own capital and invest in employment-generating activities.

Boucher *et al.,* (2006) note that *ex-ante* credit constraints prevent individuals from undertaking desired activities and from realizing profit maximizing investment levels in the activities they do engage in. The authors argue that entrepreneurially talented but poor individuals are prevented from starting businesses while liquidity strapped farmers are unable to purchase a critical pesticide to fend off a pest infestation. While *ex-post* credit constraints prevent individuals from borrowing after investment decisions have been made and production outcomes realized. The combination *of ex-ante* and *ex-post* credit constraints have huge implications for the likelihood that households fall into or climb out of poverty traps (see among others Carter and Barrett, 2006; Zimmerman and Carter, 2003).

Historically, a number of governments in less developed countries established credit programs aimed at improving rural household access to formal credit mostly in the area of agriculture production. These credit programs started as a result of lack no interest in lending to rural households by traditional commercial banks due to lack of viable collateral and high transaction costs associated with the small loans (Diagne, 1999). However, these credit programs failed to achieve their objectives both to serve the rural poor and be sustainable institutions (see among others Braverman and Guasch 1986; Adams and Vogel, 1986).

Hence this study's focus on the empirical analysis of households' credit constraints is instrumental to enhance the effectiveness of credit programmes and other policies.

1.2 Statement of the Problem

In 2005, the United Nations declared it a 'year of microcredit' in a campaign to raise awareness of the financial needs of the world's poor and low-income people. The initiative was raised out of the strong commitment from both the public and private sector to create financial services that meet the needs of poor people if countries are to reach the Millennium Development Goals (MDGs) to which Malawi is a signatory. The initiative recognises that microfinance is a powerful tool to meet the Millennium Development Goal of cutting in half, by 2015, the proportion of people living on less than a dollar a day. More recently, in 2009 the G-20 committed "to support the safe and sound spread of new modes of financial service delivery capable of reaching the poor and, building on the example of micro finance, will scale up the successful models of small and medium-sized enterprise (SME) financing." Despite these initiatives, financial markets in developing countries and particularly the Sub-Saharan African (SSA) region are largely underdeveloped, lacking in depth, highly inefficient, concentrated in the urban areas and dominated by a few (Mpuga, 2004).

The Malawi's national priorities are spelt out in the Malawi Growth and Development Strategy (MGDS) which was launched in 2007. The MGDS is the overarching development strategy for the country. Much as the MGDS recognises the problem of poor access to micro-credit and high default rates, for instance, under the fifth sub-

theme (sustainable economic growth), the analysis of the micro-finance sector and measures for its development are mostly absent (OPM, 2010). Furthermore, the few studies done in Malawi on formal credit constraints have concentrated in the rural areas. This situation motivates the current study to establish the factors that influence credit constraints in formal credit markets in Malawi with a rural and urban dimension.

1.3 Objectives of the Study

The main objective of the study is to ascertain factors that characterise credit constrained households in Malawi.

Specifically the study wants:

To investigate the impact of income on the probability of being credit constrained

To investigate the impact of place of residence on the probability of being credit constrained

To investigate the impact of education on the probability of being credit constrained

To investigate the impact of age on the probability of being credit constrained

To investigate the impact of wealth on the probability of being credit constrained

To investigate the impact of gender on the probability of being credit constrained

To investigate the impact of employment status on the probability of being credit constrained.

To investigate the impact of time taken to the financial institution on the probability of being credit constrained.

1.4 Study Hypothesis

The study tests the following hypotheses:

Income does not have an impact on the probability of being credit constrained

Place of residence does not have an impact on the probability of being credit constrained

Education does not have an impact on the probability of being credit constrained

Age does not have an impact on the probability of being credit constrained

Wealth does not have an impact on the probability of being credit constrained

Gender does not have an impact on the probability of being credit constrained

Employment status does not have an impact on the probability of being credit constrained

Time taken to the financial institution does not have an impact on the probability of being credit constrained

1.5 Justification of Study

There is increasing evidence that an efficient and broad based financial system provides a powerful thrust for economic growth. Sir John Hicks (1969) illustrated this by referring to the key role of the financial system in helping to mobilise huge volumes of capital for 'immense works' during Britain's industrial revolution. Prominent in this regard is the Schumpeterian view that finance leads to growth because it fuels 'creative destruction' by allocating resources to efficient newcomers. That is, through broader access to external funds, talented newcomers are empowered and freed from the disadvantages that would otherwise arise from their lack of inherited wealth and absence of connections to the network of well-off incumbents (see Rajan and Zingales, 2003). While Peachey and Roe (2004) argue that bigger and deeper banking systems go hand in hand with more advanced economic development and that a vibrant microfinance sector can augment this but not substitute for it. Furthermore, a good understanding of the determinants of households' access to credit is an integral part of poverty reduction efforts in poor countries (Amin *et al*., 2003).

Empirical work on the analysis of credit constrained consumers has been done in other countries and a few in Malawi. For instance, Jappelli (1990) carried out a study to estimate the credit constrained in the U.S economy; Buckland and Simpson (2008) conducted an analysis of credit constraint and financial exclusion with Canadian micro-data; Ibrahim *et al., (*2007) looked at household-level credit constraints in

urban Ethiopia. In Malawi, Simtowe *et al*., (2008) studied the impact of credit constraints on the adoption of hybrid maize among rural households in Malawi; Simtowe and Phiri (2007) looked at 'To what extent are credit constraints responsible for the non-separable behaviour at household level? Evidence from tobacco growing households in rural Malawi' and finally Simtowe *et al.* (2008) conducted an analysis on 'Who is credit constrained? evidence from rural Malawi. However, the studies done in Malawi are based on survey data from selected rural areas in Malawi hence did not capture rural versus urban dimensions among other important variables. It is the intention of this study to close this gap by making use of the recent nationally representative data set from the 2008 Finscope Survey.

1.6 Organization of the Study

The next chapter presents the background for Malawi's economy and the overview of credit market situation. Chapter Three presents a review of the theoretical and empirical literature under investigation. Chapter Four discusses the methodology to be used in the study. Chapters Five and Six provide empirical analysis and conclude the study, respectively.

CHAPTER TWO

ECONOMY AND MICRO-FINANCE SECTOR IN MALAWI

2.1 Introduction

This chapter provides an overview of the economy and micro-finance sector in Malawi. The chapter has three sections. Section 2.2 provides an overview of the Malawian economy with regard to macroeconomic variables, section 2.3 gives an account of the micro-finance and section 2.4 provides an overview of the insurance sector.

2.2 Overview of Malawian Economy

Malawi is a landlocked country with 118,484 square kilometres and a population of 13.1 million. The population is growing at about 2.8 percent per annum and the country has one of the highest population densities in Africa, 139 inhabitants per square kilometre of land surface.[3] Malawi's agricultural production is derived from two sub-sectors: the estate sector, which operates on freehold and leasehold land, and the smallholder sector, which operates under the customary land tenure system. The majority of the population are subsistence farmers, and an estimated 85 percent rely on agricultural output, either directly or indirectly, for their livelihood. Agricultural output generates over 90 percent of export earnings and 30-40 percent of Gross Domestic Product (GDP), most of which is produced by smallholder farmers (GoM,

[3] 2008 Population and Housing Census Main Report, National Statistical Office.

2007a). The country's staple crop is maize, while root crops, such as cassava and sweet potatoes, have become increasingly important, especially since the devastating drought of 1991/1992 growing season. Tobacco is by far Malawi's largest export, accounting for around 50 percent of merchandise export earnings. Other important export commodities are tea, coffee and sugar. The economy's continued reliance on agriculture has made it highly vulnerable to exogenous shocks caused by weather conditions and changes in international prices for its raw export commodities (GoM, 2007b).

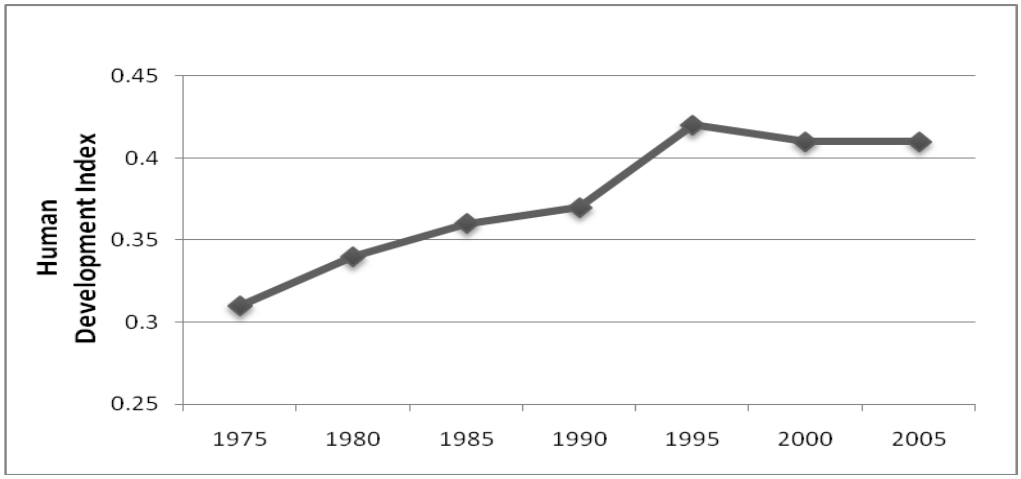
Malawi is one of the poorest countries in the world where 39 percent of the people live below the poverty line while about 15 percent are ultra poor (GoM, 2009). However, there has been steady GDP growth in real terms in recent years. The Gross Domestic Product in real terms grew by 6.7 percent in 2006, then 8.6 percent in 2007 up to 9.7 percent in 2008. This growth trend is likely to present opportunities for the financial sector to expand its client base even though it is vulnerable to weather because of the country's dependence on agriculture.

The Human Development Index (HDI) is a multi-dimensional summary indicator of development in three basic dimensions of decent standard of living, knowledge, and a long and healthy life. Malawi's HDI value increased between 1975 and 1995 but stagnated thereafter (see Figure 2.1).

The country has an underdeveloped finance sector in terms of serving the poor. It is estimated that only three percent of the economically active poor has access to

savings and only one percent has access to credit. Furthermore, the institutions and management skills in the sector are weak and almost all microfinance institutions (MFIs) operate with limited outreach and loan availability, particularly in the rural areas.

Figure 2.1 Malawi Human Development Index, 1975-2005



Source: UNDP .

2.3. Micro-finance Services

The last three decades have been the most dynamic period in the history of the microfinance sector, which has undergone huge changes. Micro-finance services begun with the government credit programs called 'agricultural development banks' which provided credit at subsidized interest rates to farmers. The assumption was that providing subsidized credit to the poor would increase their agricultural production, and thereby their income, and would thus reduce poverty. However, the programs failed to achieve their objective both to serve the rural poor and be sustainable credit institutions (Adams, *et al.* 1984).

Diagne (1999) notes that in response to these failures and in recognition of the critical role that credit plays in alleviating rural poverty in a sustainable way, innovative credit delivery systems are being promoted throughout the developing world with no or minimum government involvement. Hence microfinance providing small-scale savings and credit services has become one of the most popular interventions for poverty reduction and women's empowerment in recent times (Nuru, 2006).

Currently, the micro-financial services in Malawi are provided by a number of financial institutions ranging from banks, non-bank microfinance institutions, and financial cooperatives to informal service providers such as moneylenders. There are eleven licensed commercial banks in Malawi which provide financial services such as deposit products, credit facilities, foreign exchange services and payment facilities (see Table 2.1). The banks are regulated under the Banking Act (1989) and are supervised by the Reserve Bank of Malawi (RBM) which also oversees the operations of one leasing company and two discount houses. Much as bank branches are found across the country's various districts, their operations have mainly focussed in cities and towns.

Table 2. 1:General Profile of Commercial Banks in Malawi

Institution	Ownership	Total Assets (Malawi Kwacha)	Number of Clients	Coverage
Standard Bank	Privately owned	41,017,000,000	..	Operates in 12 districts with urban focus
First Merchant Bank	Privately owned	33,340,670,000	..	Operates in cities
Malawi Savings Bank	Government	26,297,700,000	..	..
NBS Bank	Privately owned	20,420,000,000	14488 (borrowers) 220 (clubs being serviced)	Urban based branches (trading centres)
INDEBANK	Privately owned	7,918,320,000		Operates in 6 districts with urban focus
National Bank of Malawi	Privately owned	7,211,500,000 (as of May 2009)	167,502 (as of May 2009)	Operates in 15 districts
NEDBANK		7,024,781,000	3,284	In Blantyre city and Lilongwe city
FDH Bank	Privately owned	6,253,300,000	..	Blantyre
Eco Bank	Privately owned	4,579,767,000	2,238	Operates in 5 districts, with an urban focus

Source: OPM and Kadale Consultants, 2010

.. denotes not available

OPM and Kadale (2010) note that even mobile banks are mostly restricted to trading centres, on tarmac roads and where there is a police station. However, due to competition in urban areas, a search for new markets has emerged in areas that were

previously considered to be of low potential through point of sale terminals and bank-on- wheels. It is important to note that through technology-driven products such as auto-teller machines (ATM), cell phone, internet banking, and point of sale devices (POS) there is huge expectation that transaction costs will go down and that there will also be improvement in accessibility of the financial services.

Furthermore, the financial services are also provided by non-bank microfinance institutions which provide various forms of credit (see Table 2.2). The 2010 Microfinance Act provides for the regulation and supervision of microfinance services. The providers in this group comprise of payroll moneylenders, trusts, companies limited by guarantee, and public entities that are government programmes, trust or companies that are owned by government. Within this group, the institutions cover the range of 'for-profit' and 'non-profit' entities and their products are more micro in size compared to banks.

The minimum loan size can start as low as Mk2, 000 (U$14) per individual while maximum can reach up to MK200, 000 (US$1,400) following multiple cycles of borrowing. However, like banks, many microfinance institutions avoid areas where roads are in a condition that would make it difficult to access (Kadale and OPM, 2010).

In addition, there are also publicly owned non-bank institutions that play a significant role in microfinance services. For instance, Malawi Rural Finance Company (MRFC) that mostly gives loans to agricultural producers. Recently, the Malawi Rural

Development Fund (MARDEF) was established to provide credit to groups in rural communities who are mostly doing agro-processing activities. However, MARDEF has faced challenges related to pricing of the loans since the interest rate charged does not allow the institution to fully recover its costs. In addition, another group of financial service providers are the savings and credit cooperatives (SACCOs). These provide savings and loan products depending on the loan purpose. Unlike banks, SACCOs accept alternative forms of collateral such as moveable property, stock of good and livestock.

Finally, in addition to banks, non-banks and SACCOs that operate in the credit market, the financial services are also provided by a number of informal operators These include moneylenders, friends, family members, village-based savings and loan associations (VSLAs) or the rotating savings and credit associations (ROSCAs) where small groups of individuals save small amounts periodically and each member receives a lump sum payment at some point during the cycle. Nearly 40 percent of the Malawians who borrow money, do so from friends or family at either no interest, 29 percent or with interest applied, 9 percent (GoM, 2008).

Table 2.2: General Profile of Nonbank Financial Institutions

Institution	Ownership	Financial Services offered	Total Assets	Number of clients	Coverage
MRFC	Government	Savings and Credit products	5,967,993,745	262,475	Operates in 16 Districts, peri-urban and rural areas
Greenwing	Privately owned	Salary based loans, business loans,	2,500,000,000	31,000	Urban and peri-urban locations
SACCOs	Membership-based	savings and credit	2,359,552,232	82,982	National
CUMO Microfinance	Privately owned	Microfinance loans	490,988,272	33,873	In 11 districts with rural focus
Microloan Foundation	Privately owned	Credit only	150,833,000	10,677	Peri-urban and rural
SEDOM	Government	Credit only	141,343,843	10,970	9 districts
MARDEF	Government	Credit only	86,732,000	154,000	National
Pelton Finance	Privately owned	Salary based loans	25,000,000	156	Lilongwe
DEMAT	Government	business and savings	9,387,855	1450	6 districts with rural focus
FINCA Malawi	Privately owned	Business loans	..	14,133	All regions

Source: OPM and Kadale Consultants,

.. denotes not available

2.4. Insurance services

Formal and informal insurance provide households with effective means of protection from shocks. The insurance sector in Malawi has eight non-life insurer, three life insurance providers and four brokers (OPM and Kadale, 2010). The provision of insurance is very much under-developed since the products tend to be very limited in range and target a limited segment of the population. It targets the needs of those who own large assets or salaried individuals who have high disposable income. Formal insurance is quite rare in Malawi with only 3 percent having some type of insurance product (GoM, 2008). Informal insurance entail belonging to rotating credit groups. However, informal insurance can also be much more nuanced and less clearly identified by researchers or even by the households themselves, such as the assistance that is provided by extended family to households, under the assumption that this aid would be reciprocated when needed (World Bank, 2007).

2.5 Conclusion

This chapter has provided a brief synopsis of Malawi's economy with regard to macroeconomic variables and an overview of micro-finance sector. It has been revealed that the lending institutions are biased towards the urban areas and salaried workers in a country where majority of the population lives in rural areas and are not in formal employment. Furthermore, even mobile banking is restricted to trading centres and on tarmac roads.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

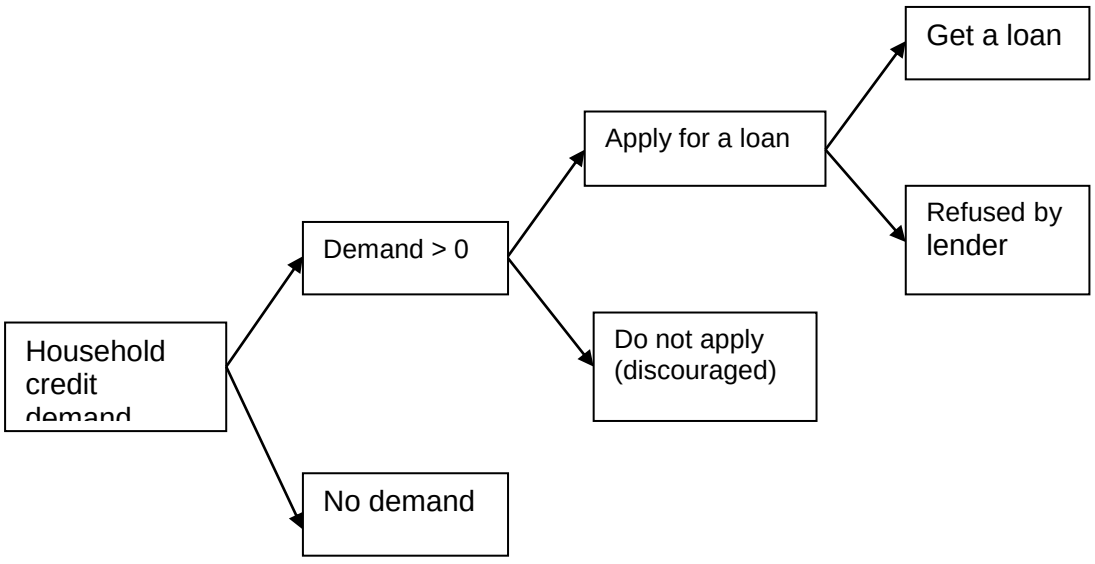
This chapter provides an overview of studies that have looked at credit constraints, measurement and identification of credit constraint status. The chapter contains two sections. Section 3.2 provides the theoretical framework on which the study is based. Section 3.3 gives the empirical evidence on which the study is based.

3.2 Theoretical Framework

Hussein and Ohlmer (2008) define credit constraints as the situation where a household cannot avail its self of the credit it desires at the prevailing relevant market conditions thus classify households into credit constrained and unconstrained households. However, Omonona *et al.* (2010) point out that a household has access to credit from a particular source if it is able and entitled to borrow from that source, whereas it participated in the credit market if it actually borrows from that source of credit. The consensus among development experts is that the provision of credit to low-income clients is a key element in pro-poor economic development and that through access to credit, households can diversity from low-risk or low return investments to higher risk investments offering greater returns (Simtowe, 2008; Diagne and Zeller, 2001) .

Diagne (2006) points out two channels through which access to credit affects household welfare outcomes. First, it alleviated the capital constraints on agricultural households since expenditure on inputs is incurred during planting and growth periods of crops, while returns are received only after the harvest. Hence the farm household must either dip into savings or obtain credit. Second, the knowledge that credit will be available to cushion consumption against income shortfall when a potentially profitable, but risky, investment turns out badly will induce the household to bear the additional risk. Furthermore, Chen and Chivakul (2008) demonstrate that the decision to enter the credit market depends on both credit demand and supply. Thus the observed debt levels can thus be considered the result of a multistate decision process, where demand is potentially rationed by supply (see figure 3.1).

Figure 3.1: Household Multistage Decision Process.



Source: Chen and Chivakul (2008)

A household may or may not have demand for credit. If it has demand for credit, it may or may not apply for a loan, as it may be discouraged by the prospect of possible of rejection or its inability to afford debt services in the future or high transaction costs. However, if the household is not discouraged, and applies for a loan, it may be rejected by the lender. Hence the decision process shows that there are many ways in which the observed debt holding may take a value of zero.

3.2.1 The Life-cycle or Permanent Income hypothesis

The classical life-cycle or permanent income hypothesis provides the best framework with which to start studying credit or borrowing constraints. The central idea of the permanent-income hypothesis is that it links an individual's consumption at any point in time to that individual's total income earned over their lifetime. The hypothesis is premised on that individuals wish to equate their expected marginal utility of consumption across time and that individuals are able to respond to income changes by saving and dis-saving (Aguiar and Hurst, 2007). The permanent income hypothesis provides a sharp contrast to Keynesian consumption rules which assume consumers make their consumption decisions based only on current income. The major insights of the permanent income hypothesis originated in Friedman 1957 and are closely related to the ideas expressed in Modigliani and Brumberg's (1954) life cycle hypothesis.

Considering the canonical model where an individual *lives T+1* periods and earns y_t in period $t = 0,...,T$. Assuming that the income stream is known at time zero. The

model assumes that the individual can borrow and lend freely at an interest rate *r*. The model also assumes that the future is discounted at the rate of $0 < \beta < 1$ and utility is additively separable across time and additively separable across consumption and leisure. For simplicity, leisure is treated as fixed and income as exogenous to the consumer. And Letting $u(c)$ represent the period utility enjoyed from consumption, where u′ > 0, u″ < 0. Then the consumer's problem becomes:

$$\max_{\{c_t\}_{t=0}^{T}} \sum_{t=0}^{T} \beta^t u(c_t) \tag{3.1}$$

subject to

$$\sum_{t=0}^{T} (1+r)^{-t} c_t \leq \sum_{t=0}^{T} (1+r)^{-t} y_t + \mathrm{A}_o \tag{3.2}$$

where A_0 represents initial assets.

A necessary condition for an interior optimal consumption plan is $u'(c_t) = \beta(1+r)u'(c_{t+1})$, for all $0 \leq t \leq T-1$. Hence, the relationship between consumption in two periods is independent of the relationship between income in those two periods. Letting $T \to \infty$ and $A \to \infty$ and $A_0 = 0$ (and impose the "no-Ponzi-game" condition $\lim_{t\to\infty} A_t/(1+r)^t \geq 0$. The budget constraint then implies that

consumption in each period equals the annuity value of the present discounted value of income, or "permanent income' such that:

$$c = r\sum_{t=0}^{\infty}(1+r)^{-1}y_t \qquad 3.3$$

Thus the consumption is a function only of permanent income, and not how that income is allocated across periods. The ability to borrow and lend is key to the permanent income hypothesis. This allows the individual to transfer income across periods at the rate $(1+r)$. In the above model, there was no uncertainty about the future income. Hence the model is extended to a case of uncertainty by letting y_t denote the random variable of income at time $t = 0,...,T$

Let E_t denote expectations conditional on information as of time t. At any point in time , t , the consumer's problem can be expressed as

$$\underset{\{c\tau\}_{\tau=t}^{T}}{max^{E_t}} \sum_{\tau=0}^{T}\beta^{\tau-1}u(c_\tau) \qquad (3.4)$$

subject to the period-by-period budget constraint: $A_{t+1} = (1+r)(A_t + y_t - c_t)$. Equation (3.4) differs from (3.1) in that individuals in (3.4) are maximizing expected utility. The first-order conditions imply the following "Euler equations":

$$\mu'(c_t) = \beta(1+r)E_t\mu'(c_{t+1}) \qquad (3.5)$$

The marginal utility of consumption varies in a predictable way due only to the interest rate and the subjective discount rate. Chen and Chivakul, (2008) notes that the Euler equation implies that households will try to maximize their utility by smoothing marginal utility over the life cycle. In a period of low income, households will borrow to finance current consumption; households will repay in a period of high income. In a world with perfect capital markets, households will be able to borrow the amount of money they desire to smooth their consumption. According to this basic model, current consumption should be independent of current income.

However, the inability to borrow implies that equation (3.5) may not hold because when constrained, a consumer may be forced to adjust consumption in response to a transitory or predictable shock to income. For instance, if a consumer experiences a temporary decrease in income, the inability to borrow against future income may necessitate that consumption moves with contemporaneous income. Zeldes (1989) argues that liquidity constraints do bind for a significant fraction of consumers. The inability to borrow presents consumers with the risk that a series of negative income shocks may force consumption down to extremely low levels.

3.3 Measurement and Identification of Credit Constraints

There are two methods used to identify credit constraints in literature, the direct and indirect methods. It is these two methods to which I now turn.

3.3.1 Direct Method

Direct method is based on direct elicitation in which respondents are asked qualitative questions about credit-constraint status using survey questions. Diagne *et al.* (2006) notes that in practice, households are classified as credit constrained, based on their responses to several qualitative questions on their loan application (or lack of) and rejections during a recall period. The classification is then used in reduced-form regression equations to analyze the determinants of the likelihood of a household being credit constrained and the effects of this likelihood on various household outcomes.

Following the papers by Jappelli (1990) and Feder *et al*. (1990), several authors have followed the direct approach that lies on more conventional survey-based research where constrained consumers are observable, albeit with a methodological twist. The 'twist' consists of adding a set of questions that permits the researcher to directly elicit the household's status as either credit constrained or unconstrained, then the researcher can directly evaluate the impacts of credit constraints on the efficiency of resource allocation. Jappelli (1990) classifies households in the U.S 1983 Survey of Consumer Finances as credit constrained if they had a loan application rejected by financial intermediaries or did not apply for a loan because they believed they faced a probability of rejection.

While Feder *et al*. (1990) classifies household in China as credit constrained if they stated their willingness to use more institutional credit at prevailing interest rates if it

were available. And the non-borrowing households were asked about the reason for not borrowing, and if it was not due to enough credit but rather inability to get credit, then this group were classified as constrained. The theoretical justification of the direct method is found in the extended version of the life-cycle or permanent income model that explicitly allows for the possibility of a credit constraint. Diagne *et al.* (2006) argues that the information on household credit-market experiences collected in the direct method is also an important contribution toward empirically identifying the respective effects of liquidity constraint and precautionary behaviour in life-cycle models (see Browning and Lusardi, 1976).

Based on the direct elicitation of credit constraints, Boucher *et al.*, (2006) identified three forms of credit constraints; quantity rationing, transaction cost rationing, and risk rationing. These three forms of non-price rationing arise due to information and enforcement problems associated with loan contracts and prevent households from realizing profitable projects. Quantity rationed households are denied access to loans; while transaction cost and risk rationed households voluntarily withdraw from the credit market because of non-price terms of available contracts. Thus quantity rationing occurs when a farmer has a profitable project, thus positive notional demand, but faces zero supply.

According to the studies by Mushinski (1999), Jappelli (1990) among others, a household may have both positive notional demand and faces positive supply, it may not have positive effective demand. This implies that a household who could obtain a loan to invest in a profitable activity may choose not to borrow due to transaction

costs that could reduce the expected income associated with the contract hence transaction cost rationed. Furthermore, the collateral requirement forces the borrower to bear a minimum amount of risk and thus may drive the borrower's expected utility below reservation utility, even though taking the credit contract would raise expected consumption. Thus the borrower is risk rationed because much as the borrower has access to an expected income but chooses to voluntarily withdraw from the credit market to instead undertake the lower return but certain reservation activity.

This demonstrate that it is important to account for credit constraints deriving from the latter two forms since types of policies that can alleviate them may be different from those designed to alleviate quantity rationing.

3.3.1.1 Challenges in Using Direct Method

Boucher *et al.,* (2006) identified important challenges which arise when using the direct elicitation method. They include; loan sectors, on use of respondents' perceptions lender supply rules and whether credit constraint classification should be defined at the household or individual level.

In practice, credit markets are composed of heterogeneous lenders from commercial banks, state banks, Non-Governmental Organisations's to a wide range of informal lenders. Hence a household may be unconstrained with respect to one type of lender but constrained with other lenders that offer more favourable contracts like those with longer maturity or lower cost. In the face of this, lenders should be classified into distinct sectors, or segments of the credit market. In addition, it would be important to

test sector specific hypotheses. For instance, Mushinski (1999) estimated the impact of market oriented reforms implemented by credit unions in Guatemala on the prevalence of rationing in the credit unions.

Another challenge is whether the credit constraint classification should be defined at the household or individual level. The approach at the household level is appropriate if household resource allocation is consistent with a 'unitary' household model in which endowments and income are pooled amongst household members. This means that the qualitative questions would then be addressed to the household head. In the case where resources are not pooled within the household or information is not shared, then individual characteristics may impact the household's resource allocation. The individual's constraint status needs to be elicited and thus the perception module is applied to each adult in the household. The individual approach is useful for testing hypotheses related to gender bias in credit access and intra-household resource allocation. For instance Diagne *et al.,* (2001) in access to credit and its impact on welfare in Malawi.

The third challenge is on use of respondents' perceptions lender supply rules. For instance, two individuals with positive effective demand that are identical except in their perceptions of the lender's supply rule. The first correctly believes he faces positive supply and thus ends up taking a loan and carrying out the investment project. The second incorrectly believes he faces zero supply. Hence, he does not apply. These two households would be classified as credit unconstrained and constrained, respectively. Thus as noted by Jappelli (1990) it may overstate the true

number of constrained households. This means that the difference in their resource allocations is determined by the difference in their perceived supply rule, which is captured by the direct approach, rather than the 'true' supply rule.

Yet another challenge comes in identification of maximum credit one could borrow. Barham *et al.*, (1996) uses the direct approach by asking households whether they applied for credit and if so, whether their application was rejected. And if it was approved, whether they obtained the full amount that they requested. Similarly, the direct approach that categorised households into discrete groups fails to capture the extent of the credit constraints (Diagne, 1999; Diagne *et al.*, (2000). They stress the value of data collection methodology that captures a credit limit variable in terms of the maximum that the lender is willing to lend. However, Boucher *et al.*, (2006) argue that it becomes difficult to identify the maximum since the borrower may know the lender's supply rule and might have only applied for the amount she or he qualified for, and again it requires a series of counter-factual questions to capture the credit limit variable.

3.3.2 Indirect Method

The indirect method infers the presence of credit constraints from violations of the assumptions of the life-cycle or permanent income hypothesis. Diagne *et al.,(*2000) note that empirical models testing for the presence of credit constraints based on the life-cycle or permanent income or 'consumption-smoothing" hypotheses use household consumption and income data to look for a significant dependence or

excess sensitivity of consumption on transitory income. Hence empirical evidence of significant dependence is taken as an indication of a borrowing or liquidity constraint.

However, the empirical evidence based on the permanent income hypothesis approach has been inconclusive (see Gersovitz, 1988; Deaton, 1992; Alderman and Paxson, 1992; Browning and Lusardi, 1996), among others. This is not necessarily due to the fact that empirical testing of the implications of the permanent income hypothesis requires repeated observations on the same household, whereas most of the studies are based on relatively short panels. Under conditions of uncertainty, violation of the implications of the life-cycle can result from prudent or precautionary behaviour even if the household is not credit constrained (Kimball 1990; Carroll 1991). Other authors have had the standard life-cycle model extended to explicitly incorporate both liquidity constraint and precautionary behaviour, and assess either through simulation or empirical testing the importance of each effect (Morduch, 1990; Deaton 1991; Paxson 1992).

3.3.2.1 Challenges in Using Indirect Method

Diagne *et al.*, (2000) note that due to identification problems, it is nearly impossible to disentangle the effects of credit constraint and precautionary behaviour from the type of income, consumption and asset data available for studies examining the presence of credit constraints. In addition, Carroll (1991) argues that if conditions of uncertainty are negatively correlated with wealth, then current income will be negatively correlated with consumption growth, even in the absence of borrowing

constraints. Furthermore, Deaton (1990) points out that the effect of negative income shocks on consumption also depends on the initial asset position of households. In conclusion, Diagne *et al.,* (2006) observe that the violation of an implication of the permanent income hypothesis is neither a sufficient nor a necessary condition for being credit constrained.

3.4 Empirical Literature

This section reviews findings of different researchers on the factors that influence credit constraints in formal credit markets. There is enormous empirical literature that exists on the factors that influence credit constraints. However, there are a limited number of studies that were specifically carried out in Malawi.

Using cross sectional data, Jappelli (1990) assesses the proportion of credit-constrained households and their characteristics in American economy. Employing a direct elicitation approach, the study found that the proportion of rejected applicants and discouraged borrowers was 20 percent. This is consistent with studies by Hall and Mishkin (1982), Mariger (1986), Hubbard and Judd (1986), Hayashi (1985), and Zeldes (1989) who also find around 20 percent of the American population behaving in a manner that is inconsistent with the pure life-cycle model.

The study further establishes that current income, wealth, and age were the most important determinants of the probability that a consumer is denied loan. The results support the evidence provided by Zeldes (1989) and Hayashi (1985) that credit constrained consumers are likely to be young, low-savers and have little wealth. The

author argues that the findings are consistent with the proposition that the consumption of the credit constrained consumers would exhibit excess sensitivity to current income fluctuations.

In addition, the study shows that the fraction 'of constrained consumers' depends on consumers' and lenders' behaviour, and that it is likely to vary in response to changes in current and future resources, demographic variables, and characteristics of financial intermediaries. Thus, it is incorrect to estimate Euler equations with exogenous and constant proxies for liquidity constraints as a result of assuming that the fraction of credit constrained consumers is exogenous and constant over time.

Credit is assuming increasing importance in response to the need of less privilege entrepreneurs who have limited capital and more importantly to low farm productivity for the farmers who are credit constrained. Conning and Udry (2005) noted that agriculture production has considerable time lags between the transformations of inputs into outputs thereby causing the rural household to balance its budget during the season when there are high expenditures for input purchases and consumption and few revenues. Hence with limited access to credit, the budget balance becomes a constraint to agriculture production within the growing season. For instance, Dong *et al.,* (2010) using cross sectional data from rural China looked into the effect of credit constraints on productivity and rural household income. Using the direct elicitation approach the study found that about 17 percent of the households were credit constrained in the sample. While applying the probit model and switching regression models, the study established that farm productivity would increase by 31.6 percent if

the household was not credit constrained. As regards household income, the predicted impact for household income showed that if the credit constraint was removed, household income could increase by 23.2 percent. Furthermore, higher education, more dependants, and younger farmers had higher productivity under credit unconstrained.

There has been conflicting results on the impact of education attainment of household head on the probability of being credit constrained. For example, Chen and Chavakul (2008) analyse the determinants of credit constraints in Bosnia and Herzegovina employing a household panel data of 2001 to 2004. They find high income, high wealth lower credit constraints while education variable were not significant. However, higher education reduced the probability of being credit constraint in Italy and Thailand, but had a positive impact on the probability in the United States (see Crook and Hochguertel, 2005). This suggests that the relationship between education and credit constraint status deserve further evidence to enable a reliable conclusion.

In a study on determinants of credit constraint conditions and production efficiency among farming households in South-western Nigeria, Omonona *et al.,* (2010) find that credit constrained farming households were found to be less efficient with mean efficiency of 0.721 than unconstrained farming households with 0.913. In addition, age, gender and dependency ratio of farmers were significant variables that influenced credit constraint conditions of farmers.

In a related study, Hussein and Ohlmer (2008) also provided evidence from Southern Ethiopia to show that credit constrained households used lower levels of capital intensive inputs and had lower mean productive efficiency.

Kedir *et al.,* (2009) examined the characteristics of households who are likely to be constrained and the extent of credit rationing in the formal sector in urban Ethiopia. They extend the approach of Jappelli (1990) to identify credit constrained households directly using the Fourth Round Ethiopian Urban Household Survey conducted in 2000. The study establishes that richer households have a lower probability of being rationed out of the credit market while expected future income, measured by the number of years of schooling had a negative but insignificant effect. The results seem to suggest that lenders use current income but not future expected income as a criterion for judging creditworthiness of a borrower. Furthermore, the constrained households are the poor, uneducated and households with children.

Simtowe *et al.,* (2008) examined the factors that influence a household's likelihood of facing credit constraints in rural Malawi. Using cross sectional data collected by the International Food Policy Research Institute (IFPRI) in 1996, the study employs a direct approach in the identification of credit constraints. The data were collected from members of credit programs as well as nonprogram members of four microcredit programs. The study establishes that households with more adult male members have a greater likelihood of facing credit constraints than those with smaller numbers of male members whereby adding one more adult, a household

increases the probability of facing credit constraints by 7.8 percent. The study considers loan applications for all adult members in the household, and if any single member of a household had his or her loan rejected or rationed, that household was considered to be credit constrained. Therefore, the probability of having at least one loan rejected is likely to be high among households with more adults than among those with fewer adults. In addition, the study finds that wealthier households are less likely to report credit constraints. The results are consistent with observations by Zeldes (1989), Hayashi (1985) and Jappelli (1990). Yet, households with larger land holdings had a higher probability of reporting credit constraints, apparently due to lack of secure land rights which could enable households to use land as collateral when borrowing. However the study was rural based and targeted microcredit program areas. This study attempts to fill this gap by looking at the rural-urban dimension using a nationally representative sample.

Other factors discussed in the literature include the impact of access to credit on adoption. Feder and Umali (1993) demonstrate that credit was as key determinant of adoption of most agricultural innovations. For instance, Simtowe *et al.* (2008) study the impact of credit constraints on the adoption of hybrid maize among rural households in Malawi using cross sectional data collected by International Food Policy Research Institute (IFPRI) in 1996. The study establishes that credit constraints have a negative and significant effect on the amount of land allocated to hybrid maize. The results further show that although older farmers are less likely to report credit constraints, they allocate less land to hybrid maize than younger farmers.

The authors argue that there is scope for increasing the cultivation of hybrid maize in Malawi if credit is targeted at younger farmers that are credit-constrained.

Using the same data, Simtowe and Phiri (2007) examine the extent to which credit constraints can be used to explain non-separable behaviour at household level among tobacco growing households in rural Malawi. The test for separation of consumption and production decisions was done using on-farm labour demand model. The study indicates that household demographic factors affect demand for labour among credit constrained households while they have no effect among the unconstrained households. The authors conclude that increased access to credit can be an important tool for arresting market failures faced by poor rural households to the extent that once liquidity constraints are relaxed households can hire extra labour to enhance their productivity.

3.5 Conclusion

Different methods were employed by different researchers in the empirical findings, almost all of the findings show that higher income and wealth have an impact on the probability of being credit constrained. However, education level of household head has shown mixed results. The present study follows the direct approach in identification of credit constraints due to the type data used in the analysis and more importantly, due to the fact that constrained consumers are observed. It is worth noting, as has been discussed earlier, the indirect method makes use of consumption

and income[4] data which is difficult to capture and not readily available in Malawi. In addition the inclusion of discouraged borrowers in the direct approach may overestimate the true number of constrained households due to the fact that it may include those who wrongly believe their application will be declined. It is also worth noting that not much has been done that directly test the presence of credit constraints for urban households in Malawi. This study therefore seeks to add up to the literature on the rural-urban dimension.

[4] Many people do not know their income or only know it in broad ranges. Many households have self-employed earners or home production hence costs of goods sold or produced are not recorded, no depreciation is calculated. Furthermore, most people try to hide their income from interviewers. Those hiding income include both poor people so as to appear poorer and therefore get assistance while the rich may be fearful of the possibility of taxation, political repercussions and robbery.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter presents the methodology employed by the study to assess factors that influence credit constraints in formal credit markets in Malawi. The chapter presents the econometric model, the variables of interest and the technique of estimation and analysis. The chapter ends by describing the type, source and limitations of the data used in the study.

4.2 Modeling Framework

Economists have not reached a consensus in the credit literature on the definition of 'who is credit constrained' (Simtowe *et al.,* 2008). Credit constrained consumers are, however, defined in this study as those who had their request for credit rejected by financial institutions and discouraged borrowers. The discouraged borrowers constitute consumers with high probability of loan denials since they perceive that even if they applied for a loan, they would be refused (Jappelli, 1990). Furthermore, this definition is preferred since it uses information directly from individual households on their participation and experiences in the credit market to determine their credit constraint status. While the definition falls short in the sense that it does not classify the households as constrained when they received a loan amount which is less than they applied for due to data limitation, however it remains a fact that

borrowers may know the suppliers credit limit and may have only applied for the amount that she or he qualified for.

Following Jappelli (1990) and Feder *et al.*, (1990) framework for the analysis of credit constraint and subsequently adapted by Zeller (1994), Schrieder and Heidhes (1995) and Boucher (1994), the model of consumption over the life cycle defines credit constraint as a situation or condition in which:

$$C_i^* - Y_i - A_i(1+r) - D_i > 0 \qquad (4.1)$$

where C_i^* is optimal consumption of household *i* along the life cycle path without credit constraint, Y_i is current household income, A_i is the current wealth yielding rate of return *r* and is assumed constant across individuals, while [5] D_i is the amount of debt that consumers are able to borrow or incur.

Furthermore, since the life-cycle model does not deliver a closed-form solution for C^* in the presence of borrowing constraints, the test strategy assumes that in a cross section the conditional expectation of desired consumption can be approximated by a quadratic function (Hayashi, 1985). Hence, two assumptions are made to make the model operational. First, in the cross sectional the reduced form for C^* can be expressed as:

[5] If $D_i = 0$, the expression $C_i^* - Y_i - A_i(1+r) - D_i < 0$ is equivalent to a cash-in-advance constraint preventing the individual from ever issuing liabilities. If instead $D_i = \infty$, the constraint is never binding.

$$C_i^* = X_i^{'}\alpha + \varepsilon_i \qquad (4.2)$$

where X is a matrix of observable cross-sectional variables such as current income, wealth, age, education and demographic characteristics. The vector α is common to all individuals, and the vector ε is an index specific to each household. C^* is further assumed to be increasing in both wealth and current income with propensities to consume out of income and wealth less than unity. The second assumption is that debt ceiling D is expressed as linear function of the same variables as desired consumption plus an error term, η, that captures unobservable variables:

$$D_i = X_i^{'}\sigma + \eta \qquad (4.3)$$

[6]Since collateral protect lenders from the risk of default and help them to discriminate against risky borrowers, it is assumed that D is also increasing in individual's wealth and current income.

Hence condition (4.1) can be rewritten as:

$$X_i^{'}\alpha - Y_i - A_i(1+r) - X_i^{'}\sigma + \varepsilon_i - \eta_i \equiv X_i^{'}\beta + \mu_i > 0 \qquad (4.4)$$

The condition forms the basis for a latent variable model in which:

$Z = 1$ if $X_i^{'}\beta + \mu_i \geq 0$ the consumer is credit constrained

$Z = 0$ if $X_i^{'}\beta + \mu_i < 0$ the consumer is not credit constrained (4.5)

[6] Since borrowers differ in collateral endowments, ability to repay, and observability by potential lenders, the debt ceiling is individual-specific and not constant across the population. The vectors of α and σ may contain several zeros.

where β is a linear combination of the parameters of equation (4.4) which measures the reduced form impact of the explanatory variables on the probability of being credit constrained, and $\mu = \varepsilon_i - \eta$. The probability that a consumer is liquidity constrained, conditional variables X in the cross section in $P = F\left(X_i^{'}\beta\right)$, where $F(.)$ is assumed to be logistic distribution and $X_i^{'}$ is the reduced form for the excess demand for loans.

4.3 Model specification

The logit probability model is used to estimate the probability of household being credit constrained due to binary nature of the dependent variable. The model that is used in the study is given as:

$$\Pr(y_t = 1/x_t = \frac{e^{\alpha+\beta x_i}}{1+e^{\alpha+\beta x_1}}$$

Where x_i is a vector of independent variables for household *i* which as follows;

Current Income of household head

Education of household head

Age of household head

Wealth of household head

Sex of household head

Employment status of household head

Place of residence

Time taken to go to the financial institutions

β is a vector of intercepts

∂ is a constant.

4.4 Description, Measurement and Justification of Variables

The following variables are employed for the econometric estimations in the study and Table 4.1 summaries the expected effects of the specific characteristics of the credit constraint status

Constraint status

The constraint status binary variable, which is the dependent variable, takes the value of 1 for the credit constrained households and 0 for the unconstrained.

Current income of household head

The lender considers current income, which is measured in Malawi Kwacha, as an indicator of creditworthiness of a client or potential client before signing a contract to grant the loan. The relationship between current income and debt is, however, not certain. Normally, the higher the current income, the smaller the amount of debt demanded. However, the amount of debt demanded may be larger as current income increases, especially if the increase is triggered by a permanent income shock (Chen and Chavakul, 2008). As such, the net impact on the household credit-constraint status is not predetermined.

Education level of household head

Education of a household head is captured by three dummy variables of no education, primary, and secondary and above. Education will have a positive effect on demand for credit if education leads households to acquire the necessary skills for managing larger investments that will require more credit. On the supply side, education may have a positive effect if it is used as an indicator of productivity, and thus lenders may be willing to lend more to educated people with the expectation that the risk of default is much lower and have lower income volatility. However, education might have a negative effect if credit programs are pro-poor in focus and target the poor and illiterate individuals. Hence the effect of education on the probability being credit constrained cannot be predetermined (Simtowe *et al.*, 2008).

Age of household head

Age of the household head, which is measured in years, is also believed to determine the credit constraint status of the household. Following the life-cycle hypothesis the young individuals with an ambition to earn higher incomes will tend to be active in terms of saving or dis-saving in order to accumulate wealth while the old are likely to rely more on their past savings and accumulated wealth. This means that the young will likely borrow more for investment while the old may be less inclined to borrow. Therefore the demand for credit is expected to vary positively with age. However, lenders are likely to favour older borrowers as their ability to pay is higher than young borrowers. In order to capture this nonlinear relationship, we use both linear and quadratic terms of age as independent variables (Mpuga, 2004).

Wealth

The wealth of the household is captured by five ranks (quartiles) of household wealth which is based on durable assets using the principal component analysis (sea Appendix C). Five dummy variables, from first to fifth quartiles, are constructed depicting lowest quartile to highest quartile. Wealth is a good measure of the borrower's repayment ability. The higher the wealth is, the higher the probability of obtaining a loan. On the demand side, however, given higher wealth, an individual can afford more desired consumption and may not need to borrow. It is expected that poor households will have less demand for credit, while their access to credit may be increased due to the poverty lending programs that target the poor. As such the net impact on the household credit constraint status is not predetermined

(Simtowe *et al.*, 2008)

Sex of household head

Sex of the household head is treated as a dummy variable that takes on the values of 1 if the household head is male and 0 if the household head is female. It is expected that male headed households will demand more credit because they have greater access to other production resources requiring credit supplementation compared to female headed households. However, on the supply side, female headed households will have more access to credit because microfinance institutions especially in the rural communities have a gender bias towards women. It will not be possible to predetermine the expected impact of gender on the probability of being credit constrained (Simtowe *et al.*, 2008).

Employment status

Employment status of the household head is also treated as a dummy variable that takes the value of 1, if the head is employed in salaried work and 0 if the head is unemployed. On the labour market status, the unemployed individuals may be more likely to demand credit because they have no current income, especially if the unemployment is temporary in nature. At the same time, they will be more likely to be rejected by the lenders. While the employed are seen as credit-worthy. Thus we hypothesise that the employed are likely to have a lower probability of being credit constrained.

Place of residence

Place of residence is also treated as a dummy that takes the value of 1, if the household resides in the rural areas and 0 if the household lives in urban areas. Since the poverty rate is higher in the rural areas than urban areas hence in these areas of greater economic risks, lenders may be less inclined to supply credits in rural areas than urban areas. Thus it is hypothesised that rural households have high probability of being credit constrained than urban households.

Time taken to go to the financial institution

Time taken to go to the financial institution is measured in minutes. This variable is used as a proxy measure for distance and access to financial institution. It is hypothesised that distance to the financial institutions will increase the probability of a household being credit constrained by raising transaction costs of obtaining loans (Simtowe, 2008).

Table 4.3: Expected Effects of Specific Characteristics on Credit Constraint Status

Variable	Demand for credit	Supply of credit or Access	Probability of being Credit Constrained
Current Income	+/-	+	+/-
Years of education of household head	+	+/-	+/-
Age of head	+	+	+/-
Value of Assets			
Quartile 1	-	-	+/-
Quartile 2	-	-	+/-
Quartile 3	+/-	+/-	+/-
Quartile 4	+	+	+/-
Quartile 5	+	+	+/-
Gender of household head	+/-	+/-	+/-
Employment status	+/-	+/-	+/-
Place of residence	+/-	+/-	+/-
Time taken to go to the financial institution	0	-	+

Source: Own computations

4.5 Data

The data used for this study are taken from the Malawi 2008 Finscope Survey conducted by the Malawi National Statistical Office and Kadale Consultants Limited with technical assistance from FinMark Trust. The 2008 Finscope Survey was a nation-wide survey which collected detailed information of topics including demographic characteristics of the population, education, housing conditions, income, access to finance infrastructure, financial knowledge, financial product usage, insurance, credit and money transfers. It provides insights into how people source their income and manage their financial lives. It looks into the use of, and demand for, financial products and services and how factors such as geographical access, the attitudes, behaviour, and quality-of-life of people impact on consumption patterns in various financial market segments.

The Survey uses sample enumeration areas (EAs) based and drawn systematically with probability to proportional size by National Statistical Office (NSO). The weighting of the data is conducted by Finmark Trust and approved by NSO using preliminary 2008 Population and Household Census data. It covers about 5 000 households in which and an adult member of the household (18 years and above) is selected for a face to face interview. For the purpose of this study, the sample is restricted to those who are household heads. And after excluding the missing values for the variables of interest a total of 1568 observations are left in the sample.

4.6 Diagnostic Tests and Analysis

Analysis of results is done by first presenting a descriptive statistics of all the variables used in the study and then finally the econometric results. All analyses are carried out in STATA 10.0 software while the Principal Component Analysis is done in SPSS software. Problems of multicollinearity, heteroskedasticity may arise due to the utilization of cross-sectional data (Gujarati, 2004). Multicollinearity is checked by using the correlation matrix and taken care of by the choice of explanatory variables while heretoskedasticity is corrected by use of standard robust errors.

4.7 Conclusion

The chapter has provided a detailed description of the methodology employed in the study. The model is specified based on the procedure proposed by Jappelli (1990). The marginal impact of the relationship is shown from the marginal effects estimated from the logit model. The chapter has also explained the variables and data used in the study.

CHAPTER FIVE

EMPIRICAL ANALYSIS

5.1 Introduction

The chapter presents and analyses estimation results. Section 5.2 provides the descriptive statistics of all the variables used in the study. Section 5.3 discusses the findings on the factors that influence credit constraints and finally Section 5.4 provides the conclusion.

5.2 Descriptive Statistics of the Variables

The section includes all variables used in the study and presents their mean, standard deviation, minimum and maximum values. Table 5.1 summarizes descriptive statistics.

The descriptive statistics show that, on average, 59 percent of the households are credit constrained. It also shows that households received a monthly income of about Mk14 153. The minimum and maximum values of this variable shows a range from zero income to as high as MK1 000 000 per month. Furthermore, the statistics show that the income variable followed by time taken to go to the financial institution and age have the highest standard deviation. This implies that, there is higher variability in these variables relative to the rest of the variables. In addition, age variable exhibits a mean of about 40.545. The minimum and maximum ages are 18 and 93, respectively.

Table 5.1: Summary of Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Constraint status	.591425	.4917255	0	1
Income of head	14153.53	55069.81	0	1000000
Place of residence	0.2554	0.4362	0	1
Employment status of head	0.1885	0.3913	0	1
First wealth quartile	0.1734	0.3787	0	1
Second wealth quartile	0.2232	0.2232	0	1
Third wealth quartile	0.1810	0.3851	0	1
Fourth wealth quartile	0.1923	0.3942	0	1
Fifth wealth quartile	0.2301	0.4211	0	1
Age of head	40.5454	14.5517	18	93
Sex of head	0.7799	0.4144	0	1
Time taken to go to the financial institution	75.24645	41.08174	5.5	180
No education	.1664565	.3726074	0	1
Primary education	.5523329	.4974106	0	1
Secondary education and above	.2812106	.4497318	0	1

Source: Own computations

Note: Mean, standard deviation, minimum and maximum values of income are in Malawi Kwacha

Another variable of interest is the place of residence dummy which also has an effect on probability of being credit constrained. The variable has a mean of about 0.2554 and a standard deviation of 0.4362. The table further shows that minimum and maximum time taken to visit the nearest financial institution is 5 minutes and 180 minutes, respectively. On average, households spend about 75 minutes to reach the nearest financial institution. This suggests that households have to travel a considerable distance to access credit thereby incurring transaction costs.

5.3 Econometric Results

As discussed earlier, the estimation of factors that influence credit constraints is based on the logit model. Multicollinearity was dealt with in the selection of variables and there was no major correlation amongst any of the variables whiles the use of robust standard errors in the command controlled for heretoskedasticity. The marginal effects of the probability that a household faces credit constraints are presented in Table 5.2. The marginal effects are reported since the estimated coefficients reflect the effect of independent variables on the odds of the probability rather than the probability itself (Simtowe *et al.*, 2008).

Table 4.2: Determinants of Credit Constraints

Variable	Marginal Effects (dy/dx)
Income of head	-0.00000676* (0.00000245)
Place of residence	-0.0883897** (0.04093)
Employment status of head	-0.067340*** (0.04044)
Primary education	0.0356613 (0.3745)
Secondary education	-0.0092838 (0.4749)
Second wealth quartile	0.0759035*** (0.04084)
Third wealth quartile	0.0785253*** (0.04273)
Fourth wealth quartile	-0.0198943 (0.04437)
Fifth wealth quartile	-0.906116*** (0.0533)
Time taken to go to financial institution	0.0009408** (0.00041)
Age of head	-0.0011782 (0.003865)
Sex of head	-0.1537264 (0.135324)
Number of observations	1586
LR chi2(12)	161.82
Prob > chi2	0.0000
Pseudo R2	0.0754

Source: Own computations. *denotes significant at 1%, **denotes significant at 5% *** denotes significant at 10%

The model χ^2 which measures the goodness of fit of the model is significant implying a good fit.

Relative to the base category, first quartile, the coefficient for the second and third quartiles of the value of household durable assets is positive and significant at 10% level while the fifth quartile is negative and significant at 10%.The finding suggest that households in the filth quartile are less likely to face credit constraints than the poor households in the first and second quartiles. This is consistent with prior expectations that rich households are more likely to have the ability to self-finance. The results are also consistent with observations of Jappelli (1990), Zeldes (1989), and Hayashi (1985) in the United States of America, and Simtowe *et al.,* (2008) in Rural Malawi. They find that wealthier households are less likely to report credit constraints. The marginal effect of -0.9061 suggest that the probability of credit constraints declines by approximately 90 percent in the fifth quartile.

The coefficient of the income variable is negative and significant at 1% level, suggesting that households with higher income are less likely to face credit constraints. The findings suggest that the higher the income the smaller the amount of debt demanded by the households as they will able to self-finance. Similar results are found by Chen and Chivakul (2008) in Bosnia and Herzegovina who used panel data set to show that households with more income are less likely to face credit constraint.

In comparison with the base category, rural based households, urban households are less likely to face credit constraints with a significant level of 5%. The probability of being credit constrained decreases by 8.8% if the household resides in the urban areas. This might be due to the higher poverty rates in the rural areas than urban areas hence in these areas of greater economic risks, lenders may be less inclined to supply credit.

With regard to household head employment, the results show that household heads who are employed are less likely to face credit constraints to heads without any employment. The relationship is significant at 10%. For the employed, the probability of being credit constrained declines by 6.7%. This negative relationship makes intuitive sense as the employed have stable income, and that job security is an important factor from the lenders' point of view.

One interesting finding of the study shows that the coefficient of the variable time taken to the reach the nearest financial institution is positive and significant at 5%, suggesting that households that are located far away from the financial institutions are more likely to be credit constrained. On one hand, this implies that access to credit is likely to favour households closer to the lending institutions as they will incur less transaction costs while on the other hand, it implies that lending institutions have limited outreach so as to meet the demand for credit.

5.4 Conclusion

The chapter presented the findings of the study. A summary of the descriptive statistics of all variables included in the model was given in section 5.2. From section 5.3, income, wealth quartile, place of residence, time taken to go to financial institution and employment status variables follow expected results. However, age, education, and sex were insignificant.

The study shows that supply of credit depends on location and the accessibility of the lending institutions as they are more focussed on urban areas with limited outreach to the rural areas.

CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

6.1 Introduction

This study set out to find the factors that affect credit constraints in formal credit markets in Malawi. The chapter contains two sections. Section 6.2 provides the summary of the study. Section 6.3 gives the implications for policy, and finally Section 6.4 provides the limitation of the study.

6.2 Summary of the Study

The main objective of this study was to ascertain factors that characterise credit constrained households in Malawi. While the specific objectives were to investigate the impact of income, wealth, place of residence, age, sex, employment status, education, and time taken to visit the financial institution on the probability of being credit constrained. The study used cross sectional data from the Finscope Survey in 2008 and employed a logit model for the analysis.

The study found a significant negative relationship between income and credit constraint which implies that as income declines, the probability of being credit constrained increases. A compliment of this finding was seen in the wealth quartiles variable which shows a significant negative relationship for the fifth quartile, relative to the base category, with the credit constraint status. This implies that, wealthy households are less likely to face credit constraints.

With respect to the second specific objective, place of residence variable had a negative and significant relationship with credit constraint status. This implies that relative to the base group, rural areas, households in the urban areas are less likely to be credit constrained. This might be due to higher poverty rates in the rural areas. Also the logit model suggests that there are significant marginal impacts of employment status on the probability of being constrained. The study also established that the employed were less likely to be credit constrained. This negative relationship makes intuitive sense as the employed have stable income, and there is job security for these salaried workers.

In addition, time taken to visit a financial institution had positive and significant impact on the probability of being credit constrained. This implies that households that are located far away from the financial institutions are more likely to be credit constrained. This suggests that access to credit is likely to favour households closer to the lending institutions as they incur less transaction costs and that lending institutions have limited outreach so as to meet the demand for credit.

6.3 Policy Implications

The results from this study suggest that there is much more room for improvement if credit constraints are to be reduced among the households in Malawi. With the limited availability of funds for credit, there is need to target credit for credit-constrained households so as to have access to productive opportunities. The study indicates that

wealth of a household reduces the probability of being credit constrained this means that any credit or safety-net program should aim at minimising liquidity constraints among the poor who have less assets.

As suggested by Getter (2008), sometimes liquidity constraints may be an indication of household's incapacity to service the loan. Hence such households need to be targeted with other forms of safety-net programs, such as the input-subsidy program currently being implemented by the government of Malawi. The objective is to provide subsidized agricultural inputs to the poorest households lacking the means for financing the purchase of agriculture inputs (Simtowe *et al.*, 2008).

Furthermore, it is found that the rural households are likely to be credit constrained, apparently due to poor road networks in the rural areas hence the lending institutions tend to concentrate in the cities and trading centres where there is security and good communication facilities hence the limited outreach to the rural areas. There is a clear need to spearhead the infrastructure development programmes as stipulated in the Malawi Growth and Development Strategy (MGDS).

6.4 Study Limitations and Areas for Further Research

Perhaps the major limitation of this study pertains to the data. It was not possible to capture the third category of credit-constrained households as those who had received less amount of loans than they applied for. Furthermore, the study could not capture the credit limit of how much they would have loved to borrow at the current interest

rates. This means the study underestimates the number of credit constrained households.

A possible extension of this study is to explore the repayment history and ability to service the debt among the rejected and discouraged borrowers. This would significantly improve on the classification of credit constraint status of households.

REFERENCES

Adams, D. and Vogel, R. (1985). Rural Financial Markets in Low-income Countries: Recent Controversies and Lessons. *World Development,* 14 (4), 477-487.

Adams, D. W., Graham, D.H., Pischke, J.D. (1984). Undermining Rural Development with Cheap Credit. *Westview Press*, Colorado, USA.

Aghion, B. and Murdoch, J. (2005). Economics of Microfinance. Cambridge, *MIT Press Books.*

Amin, S., Rai, A. S., and Topa, G. (2003). Does Microcredit Reach the Poor and Vulnerable? Evidence from Northern Bangladesh. *Journal of Development Economics*, 70 (1), 59-82.

Anderson, J. (1990). Does Regulation Improve Small Farmers' Access to Brazilian Rural Credit. *Journal of Development Economics*, 33 (2), 67-87.

Aryeetey, E. and Udry, C. (1997). The Characteristics of Informal Financial Markets in Sub Saharan Africa. *Journal of African Economics*, 6 (Sup), 161-203

Barham, B.P., Boucher, S. and Carter, M.R. (1996). Credit Constraints, Credit Unions, and Small-Scale Producers in Guatemala. *World Development*, 24 (5), 793-806.

Berger, A.N., Hasan, I. and Klapper, L.F. (2004). Further Evidence on the Link Between Finance and Growth: An International Analysis of Community Banking and Economic Performance. *Journal of Financial Services Research*, forthcoming.

Boucher, A., Guirkinger, C., and Trivelli, C. (2006). Direct Elicitation of Credit Constraints: Conceptual and Practical Issues with an Empirical Application to Peruvian agriculture. *Giannini Foundation of Agriculture Economics*, Working Paper No.07-004.

Braverman, A. and Guasch, J.L. (1986). Rural Credit Markets and Institutions in Developing Countries: Lessons for Policy Analysis from Practice and Modern Theory. *World Development* 14 (10/11), 1253-1267.

Buckland, J. and Simpson, W. M. (2008). Analysis of Credit Constraint and Financial Exclusion with Canadian Microdata. Menno Simons College, Winnipeg.

Carter, M.R. and Olinto P. (2003). Getting Institutions 'Right' for Whom? Credit Constraints and the Impact of Property Rights on the Quantity and Composition of Investment. *American Journal of Agricultural Economics*, 85 (10), 173-86.

Chen, K. and Chivakul, M. (2008). What Drives Household Borrowing and Credit Constraints? Evidence from Bosnia and Herzegovina. IMF working paper, WP/08/202, Washington.

Chipeta, C. and Mkandawire, M. (1992). The Financial Sector in Malawi. *Saving and Development,* 2 (Sup), African Review of Money, Finance, and Banking.

Chirwa, E. W. (1994). Smallholder Agricultural Repayment Crisis: Summary of Findings of the Repayment Study. University of Malawi, Centre for Social Research, Zomba.

Crook, J. and Hochguertel, S. (2005). Household Debt and Credit Constraints: Evidence from OECD Countries. Credit Research Center, University of Edinburgh Working Paper Series No. 05/02.

Diagne, A (1999). Determinants of Household Access to and Participation in Formal and Informal credit markets in Malawi. IFPRI, FCND DP No. 67, Washington.

Diagne, A., Zeller, M. and Mataya, C. (1996). Rural Financial Markets and Household Food Security: Impacts of Access to Credit on the Socio-economic Situation of Rural Households in Malawi. International Food Policy Research Institute and University of Malawi, Bunda College of Agriculture, Appendix 6.

Diagne, A., Zeller, M., and Mataya, C. (1995). Rural Financial Markets and Household Food Security: Impacts of Access to Credit on the Socio-economic Situation of Rural households in Malawi. Final report, Bunda College of Agriculture, University of Malawi, and International Food Policy Research Institute, Washington, D.C.

Diagne, A., Zeller, M., and Sharma, M. (2001). Access to Credit and its Impact on Welfare in Malawi. Research Report 116, IFPRI, Washington.

Diagne, A., Zeller, M. and Sharma, M. (2000). Empirical measurements of Households' Access to Credit and Credit Constraints in Developing Countries: Methodological Issues and Evidence. IFPRI, FCND Discussion Paper No. 90, Washington D.C., USA.

Eswaran, M. and Kotwal, A. (1990). Implications of Credit Constraints for Risk Behaviour in Less Developed economies. Oxford Economic Papers, 42:473-482.

Evans, J. (1993). Malawi Mudzi Fund Sub-project Appraisal: Assessment of Existing Rural Credit Groups and Related Institutions. Lilongwe.

Feder, G., Lawrence, J., Justin, Y., and Xiaopeng, L. (1990). The Relationship Between Credit and Productivity in Chinese Agriculture: A Microeconomic Model of Disequilibrium. *American Journal of Agriculture Economics*, 5(1990), 1151-1157.

Dong, F. (2006). Effects of Credit Constraints on Productivity and Rural Household Income in China. *Forum for Development Studies No.2-2006*, Volume 33, Norwegian Institute of International Affairs.

Galor, O. and Zeira, J., (1993). Income Distribution and Macroeconomics. *Review of Economic Studies 60:35-52.*

Gilligan, D., Harrower, S. and Quisumbing, A. (2005). How Accurate Are Reports of Credit Constraints? Reconciling Theory with Respondents' Claims in Bukidnon. Philippines-IFPRI, Washington DC.

Government of Malawi, (2009). Welfare Monitoring Survey 2009. Zomba: National Statistics Office.

Government of Malawi, (2008), Finscope Survey 2008. Zomba: National Statistics Office.

Government of Malawi, (2007a). National Census of Agriculture and Livestock. Zomba: National Statistics Office.

Government of Malawi, (2007b). Malawi Poverty and Vulnerability Assessment, Investing in Our Future. Lilongwe: Ministry of Development Planning and Cooperation.

Hall, R. E., and F.S. Mishkin, (1982). The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households. *Econometrica*,50(2), 461-481.

Hayashi, A. (1987). Tests for Liquidity Constraints: A Critical Survey in Bewley. *Fifth World Congress*, Vol.2, Cambridge University Press.

Hayashi, F. (1985). The Effect of Liquidity Constraints on Consumption: A Cross-Sectional Analysis. *Quarterly Journal of Economics,* C (1985), 183-206.

Hicks, J. R., (1969). The Theory of Economic History. Oxford, Clarendon Press.

Hossain, M. (1988). Credit for the Alleviation of Rural Poverty: The Grameen Bank in Bangladesh. IFPRI Research Report, 65.

Howell, N. and Wilson, T. (2005). Access to Consumer credit: The problem of Financial Exclusion in Australia and the Current regulatory framework. *Macqurie Law Journal*, 5 (7),1-18.

Hubbard, R. G., and K.L. Judd, (1986). Liquidity Constraints, Fiscal Policy, and Consumption. *Brookings Papers on Economic Activity*, 1 (1986), 1-50.

Hulme, D. (1999). Client Drop-outs from East African Micro-finance Institutions Microsave-Africa. Kampala.

Hussein, A., and Ohlmer, A. (2008). The Influence of Credit Constraint on Production Efficiency of Farming Households in Southern Ethiopia. *The Social Sciences,* 5 (4), 262-321

Jappelli, T. (1990). Who is Credit Constrained in the U.S. Economy? *The Quarterly Journal of Economics,* 105(1), 219-234. MIT Press.

Manig, W. (1996). The Importance of the Informal Financial Market for Rural Development Financing in Developing Countries: The Example of Pakistan. *The Pakistan Development Review*, 35 (3): 229-239.

Mariger, R.P. (1986). Consumption Behaviour and the Effects of Fiscal Policies. Cambridge, Harvard University Press.

Mpuga, P. (2004). Demand for Credit in Rural Uganda: Who Cares for the Peasants? A Paper Presented at the Conference on Growth, Poverty Reduction and Human Development in Africa Centre for the Study of African Economies. Accessed on December 3, 2010, from: www.csae.ox.ac.uk

Nankumba, J. S. (1980). An Evaluation of Supervised and 'Unsupervised' Agricultural Credit Systems in the Lilongwe District of Malawi. Final Report, University of Malawi, Bunda College of Agriculture, Rural Development Department.

Oketch, H., Abaga, A. and Kulundu, D. (1995). The Demand and Supply of Micro and Small Enterprise Finance in Kenya. KREP, Nairobi.

Omonona, B.T., Lawal, J.O. and Oyinlana, A.O. (2010). Determinants of Credit Constraint Conditions and Productivity Efficiency Among Farming Households in Southwestern Nigeria. *The Social Sciences*, 5 (4), 326-331.

Peachey, S., and Roe A. (2004). Access to Finance' A Study for the World Savings Banks Institute. Oxford Policy Management.

Petrick, M. (2004). A Microeconometric Analysis of Credit Rationing in the Polish Farm Sector. *Economic Development and Cultural Change*, 46 (3), 599–620.

Rajan, R., and Zingales, L. (2003). Savings Capitalism from the Capitalists, Crown Business. New York.

Rosenzweig, M. R., and Wolpin, K.I. (1993). Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-Income Countries: Investments in Bullocks in India," *Journal of Political Economy,* 101 (2), 223-224.

Schmidt, R.H. and Kropp, E. (1987). Rural Finance Guiding Principles. GTZ, Eschborn.

Shekh, N. (2006). Microfinance and Poverty Reduction: Is there a Trade-off? A Case Study from Rural Bangladesh. *Forum for Development Studies 2(33).*

Simtowe, F. and Phiri, A. (2007). To What Extent are Credit Constraints Responsible for the Non-separable Behavior at Household Level? Evidence from Tobacco Growing Household in Rural Malawi. *Journal of Applied Sciences,* 7 (13): 1741-1747.

Simtowe, F., Diagne, A. and Manfred , M. (2008). The Impact of Credit Constraints on the Adoption of Hybrid Maize in Malawi," *Review of Agricultural and Environmental Studies*, 90 (1), 5-22.

Simtowe, F., Diagne, A., and Manfred , M. (2008). Who is Credit Constrained? Evidence from Rural Malawi", *Agricultural Finance Review*, 68 (2), 255 – 272.

Stiglitz J. and Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. *American Economic Review*, 71 (3), 393–410.

Vakis, R., E. Sadoulet, E. and Catero, C. (2004). Testing for Separability in Household Models with Heterogenenous Behaviour: A Mixture Model Approach. Berkeley: Department of Agriculture and Resource Economics, University of California.

World Bank, (2006), Making Finance Work in Africa. Washington: World Bank.

World Bank, (2007). Finance for All. Washington: World Bank.

Zeldes, S. (1989). Consumption and Liquidity Constraints: An Empirical Investigation," *Journal of Political Economy,* 97 (1989), 305-346

Zeller, M. (1994). Determinants of Credit Rationing: A Study of Informal lenders and Formal. Research Report, IFPRI, Washington, USA.

Zimmerman, F. and Cater, M. (2003). Asset Smoothing, Consumption Smoothing and the `Reproduction of Inequality Under Risk and Subsistence Constraints. *Journal of Development Economics*, 71: 233-260.

APPENDICES

Appendix A : Categorisation of Discouraged Borrowers and Constraint Status

Reasons for not borrowing in the past 12 months	Constraint Status
Fear of debts	constrained
You do not know where to borrow money	constrained
You do not know how to apply	constrained
I do not have assets to give as security or collateral	constrained
You do not have a credit record	constrained
You do not have an ID document or salary slip	constrained
You do not trust banks or other lenders	constrained
You tried, but have been refused	constrained
Had no one to borrow from	constrained
You can pay your living expenses with what you have	unconstrained
You are worried that you would not be able to pay back the money	unconstrained
Interest charged on borrowed money is too high	unconstrained
You do not want to become a defaulter or be known as a defaulter	unconstrained
You do not believe in borrowing money	unconstrained
Borrowing money is shameful or embarrassing to you	unconstrained
You are not allowed to borrow money by spouse, family, other	unconstrained

Appendix B: Logit Model

Let P_i represent the probability of being credit constrained then 1- P_i is the probability of not being constrained. Let Y_i=1 for credit constrained households and Y_i =0 otherwise. Hence

$$\Pr(Y_i = 1) = P_i \quad \ldots\ldots(A1)$$

$$\Pr(Y_i = 0) = 1 - P_i \quad \ldots\ldots(A2)$$

The probability of being constrained is given as:

$$P_i = E(Y = 1 \mid X) = \frac{1}{1 + e^{-(\beta_0 + \beta' X)}} \quad \ldots\ldots(A3)$$

Where, X is a vector of independent variables and β is a vector of their respective coefficients. While the probability of not being constrained is given as:

$$(1 - P_i) = E(Y = 0 \mid X) = \frac{1}{1 + e^{(\beta_0 + \beta' X)}} \quad \ldots\ldots(A4)$$

This can be presented in odds ration of the probability of being constrained relative to not being as follows:

$$\left(\frac{P_i}{1 - P_i}\right) = \frac{1 + e^{(\beta_0 + \beta' X)}}{1 + e^{-(\beta_0 + \beta' X)}} \quad \ldots\ldots(A5)$$

This is simplified as;

$$\left(\frac{P_i}{1-P_i}\right)=e^{(\beta_0+\beta' X)} \qquad \text{..} (A6)$$

To ensure linearity not only in the Odds ratio but also in the explanatory X variables, the natural log of equation 7 is used.

$$\ln\left(\frac{p_i}{1-P_i}\right)=L_i=\beta_0+\beta' X \qquad \text{..} (A7)$$

Appendix C: Household Wealth Index

Wealth is a measure of economic status and that it represents a more permanent status than does either income or consumption and again it is easily measured than either consumption expenditure or income.

In the calculation of wealth index, the variables included almost all households' assets and utility services since a broad criterion rather than selected items. The broader criterion has a greater number of indicator variables which gives a better distribution of households with fewer households concentrated on certain index scores. In general, any item that reflects economic status was used.

To determine the weights and apply them to form the index, the variables are categorised in sets of dichotomous variables. Then using Principal Component Analysis (PCA) to assign indicator weights. The Principal Component Analysis involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called the principal components. The first principal component accounts for as much of the remaining variability as possible, and each succeeding component accounts as much of the remaining variability as possible. The procedure (the SPSS factor analysis procedure) standardizes the indicator variables (calculating the z-scores), then the factor coefficient scores (factor loadings) are calculated, and finally, for each household, the indicator values are multiplied by the loadings and summed to produce the household's index value. In this process, only the first of the factors produced is used to represent the wealth index. The resulting sum is itself a standardized score with a mean of zero and a standard deviation of one. It should be noted that the first principle

is able to capture more than one third of the variability in explaining wealth. An increase from 0 to 1 in a dummy variable raises the wealth index in an amount equal to scoring factor.

The quartiles are then used instead of other percentiles as a compromise between limiting the number of categories to be tabulated and adequately representing the relationship between wealth and the credit constraint status. This implies that other percentiles can be just as easily determined as quartiles.

Appendix D: Assets and Services Used for the Construction of Wealth Index

Variable	Observations	Mean	Std. Dev.	Min	Max
Roofing Materials	1586	0.3732661	0.4838245	0	1
Materials for the wall	1586	0.5037831	0.5001434	0	1
Floor Materials	1586	0.278058	0.4481834	0	1
Source of drinking water	1586	0.1191677	0.3240879	0	1
Type of Toilet facility used	1586	0.0851198	0.2791479	0	1
Energy for lighting	1586	0.1128625	0.3165245	0	1
Energy for cooking	1586	0.1210593	0.326299	0	1
Owning a water heater	1586	0.0384615	0.1923683	0	1
Owning a cooker	1586	0.054855	0.2277688	0	1
Owning a refrigerator	1586	0.0554855	0.2289976	0	1
Owning a television set	1586	0.1298865	0.3362846	0	1
Owning a radio	1586	0.6494325	0.4772982	0	1
Has a ground phone	1586	0.0315259	0.1747891	0	1
Has a cellphone	1586	0.2957125	0.4565063	0	1
Has more than one cellphone	1586	0.0970996	0.2961868	0	1
Has a torch	1586	0.315889	0.4650156	0	1
Has a bicycle	1586	0.4136192	0.4926372	0	1
Has a car	1586	0.0277427	0.1642867	0	1
Has a sofa set	1586	0.1878941	0.3907508	0	1
Has a plough	1586	0.0189155	0.1362697	0	1
Has a motorcycle	1586	0.0100883	0.099964	0	1

Appendix E: Checking for Multicollinearity

The estimates for a regression model cannot be uniquely computed when there is a perfect linear relationship among the predictors. If the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficient can get inflated. The correlation matrix is used to test the problem of multicollinearity where the rule of thump is that if correlation coefficient between two regressors exceeds 0.8 then multicollineariy is a serious problem. The test confirms that multicollinearity is not a problem.

Correlation Matrix

	Income	Employed	Age	Sex	Place	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Time to institution	noeduc	Primary	Secondaryplus
Income	1.000													
Employed	0.151	1.000												
Age	0.002	-0.048	1.000											
Sex	0.071	0.104	-0.079	1.000										
Place	0.157	0.416	-0.074	0.021	1.000									
Quintile 1	-0.070	-0.178	0.054	-0.207	-0.203	1.000								
Quintile 2	-0.081	-0.193	-0.033	0.047	-0.213	-0.246	1.000							
Quintile 3	-0.067	-0.168	-0.005	0.056	-0.155	-0.215	-0.252	1.000						
Quintile 4	-0.011	-0.018	-0.003	0.035	0.011	-0.224	-0.262	-0.229	1.000					
Quintile 5	0.214	0.522	-0.009	0.055	0.525	-0.250	-0.293	-0.257	-0.267	1.000				
Access	-0.113	-0.328	0.065	0.013	-0.611	0.178	0.170	0.092	0.006	-0.418	1.000			
Noeduc	-0.090	-0.155	0.205	-0.147	-0.169	0.180	0.094	-0.003	-0.046	-0.208	0.130	1.000		
Primary	-0.112	-0.247	0.010	0.027	-0.191	0.051	0.120	0.100	0.037	-0.291	0.164	-0.496	1.000	
Secondaryplus	0.198	0.401	-0.181	0.092	0.351	-0.205	-0.211	-0.108	-0.003	0.494	-0.289	-0.280	-0.695	1.000