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DETERMINANTS OF PARTICIPATION IN VILLAGE BANKS AND EFFECTS ON THE WELFARE OF SMALLHOLDER FARMERS IN NGAKA MODIRI MOLEMA DISTRICT, NORTH WEST PROVINCE, SOUTH AFRICA

By

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DECLARATION

I, Djamfa Mbiakop William, declare that the dissertation entitled "Determinants of participation in village banks and effects on the welfare of smallholder farmers in Ngaka Modiri Molema District, North West Province, South Africa" is my work in design and execution and has not been submitted for any degree purposes at this or any other university. I declare that all materials and sources used or quoted in this work have been duly acknowledged by means of complete references.

Signature: ..... Date: ……

DEDICATION

This study is dedicated to my parents, Mr Michel Mbiakop and Mrs Fride Tchatchua for their care and love, my Aunt E. Njiane, my brothers J. Hyonkeu, H. Mbiakop and E. Ouane, my sisters L.Djapa and A.Njiane and most especially to the Noutchie and Ateba families in Mafikeng, South Africa. “TO GOD BE THE GLORY”,

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ABSTRACT

Smallholder farmers are recognised worldwide, for the key role they play in ensuring food security. However, their viability is constrained by many challenges with access to micro-finance as one of such challenges. These barriers have contributed to the exclusion of smallholder farmers from formal credit markets. Thus, the project of village banks has been initiated in order to improve savings habits and increase the chances of access to credit by farmers. However, the objective of village banks has been deviated and has now become business-oriented. This study analyses the impact of participation in village banks on the welfare of smallholder farmers in Ngaka Modiri Molema District Municipality, North West Province, South Africa.

A multi-stage sampling procedure was used to select both the participating and non-participanting farmers in village banking. The first stage involved the purpose selection of 3 banks out of the five available using the vertical and horizontal analysis. The second stage entail the random selection of 100 farmers from the list of farmers who participate in village banking with the three selected banks, while a similar approach was used in selecting 100 farmers who did not participate in the district where each of the three banks located to serve as control group. Primary data on socio-economic and demographic variables were collected using a household questionnaire. A simultaneous equation model (SEM) and propensity score matching technique (PSM) were used for data analysis.

It was found that variables such as gender, level of education, farming experience, size of the land, per capita income and distance from office of a village bank were associated and significant for decision by smallholder farmers to join a village bank.

The findings from the Simultaneous equation model (SEM) and propensity score matching (PSM) are consistent across the two methods. The results reveal that the effect of village banks on smallholder farmer's per capita expenditure is strong. The results also indicate that participation increased per capita expenditure by 83.85% and variables such as marital status, dependency ratio, main occupation and distance are negatively significant for per capita expenditure while only income per capita and technology applied positively influence per

capita expenditure. The PSM results showed that the Average treatment of treated (ATT) with kernel matching, nearest neighbor matching and radius matching was 0.58, which is an indication that if a smallholder farmer participates in a village bank, his annual per capita expenditure will increase by 58%.

In conclusion, non-members of village banks had better socio-economic characteristics which could assist in enhancing their welfare better than those who belong to village banks. The null hypothesis that socio-economic and demographic factors do not influence a smallholder farmer's decision to join a village bank was partially rejected and participation in a village bank positively affects the annual per capita expenditure of smallholder farmers. However, more needs to be done in terms of providing expertise training, improving saving behaviour, developing a specific curriculum on micro-finance, empowerment on land, promoting the participation of more women, creation of more community-based initiatives in terms of village banks in order to meet the expectations and initiatives of village banks in South Africa.

Key words: Smallholder farmers, village bank, propensity score matching, simultaneous equation model, welfare, North West Province

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LIST OF ABBREVIATIONS AND ACRONYMS

ATE:	Average Treatment Effect
ACCOSCA:	African Confederation of Savings and Credit Cooperatives
ATT:	Average Treatment of Treated
AFRACA:	African Rural and Agricultural Credit association
CASP:	Comprehensive Agriculture Support Programme
CFI:	Cooperative Financial Institution
CBO:	Community-Based Organisation
CBDA:	Cooperative Bank Development Agency
DAFF:	Department of Agriculture, Fisheries and Forestry
DFID:	Department for International Development
DTI:	Department of Trade and Industry
EU:	European Union
FAO:	Food and Agriculture Organisation
FRSSA:	Fellow of the Royal Society of South Africa
FSC:	Finance Service Cooperative
FSA:	Financial Service Association
FINASOL:	Financial Solution
GDP:	Gross Domestic Product
HDI:	Human Development Index
IFAD:	International Fund for Agriculture Development

MAFISA: Micro-Finance Institution of South Africa

ML: Maximum Likelihood

MPC: Marginal Propensity to Consume

MFI: Micro Finance Intermediaries

NGOs: Non-Governmental Organisation

NMMDM: Ngaka Modiri Molema District Municipality

NWP: North West Province

PSM: Propensity Score Matching

ROSCAs: Rotating Savings and Credit Association

SHF: Smallholder farmers

SACCO: South African Savings and Credit Cooperative

SAMAF: South African Microfinance Apex Fund

SACCOL: Saving and Credit Cooperative League of South Africa

SARB: South African Reserve Bank

SEM: Simultaneous Equation Model

SCGs: Savings Credit Group

2SLS: Two Stage Least Square

VSLAs: Village Savings and Loans Associations

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Historically, smallholder farmers have been neglected in South Africa compared to commercial farmers who were supported by legislation, subsidised and given preferential treatment. Smallholder farmers were thus faced with many challenges. As a result, a dualistic agricultural sector emerged with smallholder farmers operating on small land sizes, with insufficient investment and institutional support (Sikwela, 2013). However, smallholder farmers in many sub-Saharan African countries are the drivers of many economies, although their contributions are often not well-acknowledged (Van Rooyen *et al.*, 2012; Coetze and Cross, 2002; Adafu *et al.*, 2010).

Smallholder farmers vary depending on the context, country and ecological zone. According to the Food and Agriculture Organisation (FAO, 2015), the term smallholder farmer (SHF) is interchangeably used with terms such as 'small-scale', 'resource poor' and sometimes, 'peasant farmers'. It is defined as those marginal and sub-marginal farm households that own or/and cultivate low hectares of land. It means cultivation of small land. In addition, smallholder farmers have limited resources relative to other farmers in the agricultural sector to meet their agricultural practices (FAO, 2015).

In South Africa, smallholder farmers (SHF) are also defined as farmers owning small plots of land estimated between 1 and 5 hectares on which they grow subsistence crops and one or more cash crops and relying almost exclusively on family labour (DAFF, 2012). At the provincial, level in South Africa, most small holder farmers are predominantly in rural areas, where poverty levels are still high. In this study, the term SHF and small-scale farmers are used interchangeably to refer to the same concept.

According to Statistic South Africa (2011), the Human Development Index (HDI) is an index that measures the human development of a community based on measure of life expectancy, literacy and income. The North West province has the third lowest HDI (0.545 %) in South Africa. This is followed by Limpopo (0.48%) and the Eastern Cape (0.51%). Furthermore, Ngaka Modiri Molema District Municipality (NMMDM) is one of the districts with the

lowest HDI in South Africa. Mahlo (2011) maintains that these factors affect the well-being of smallholder farmers, especially those residing in rural communities.

Nonetheless, smallholding farming plays an important role in wealth creation among rural poor in terms of producing food for home consumption and informal markets. Despite the many challenges that inhibit their growth and ability to effectively contribute towards food security. Smallholder farmers still facing some challenges related to accessibility to land, inputs, market services, high costs of transactions, reliable markets and lack capital due to lack of collaterals(Girabi and Mwakaje, 2013).

Over the years, the South African government has formulated policies aimed at improving access to financial services by smallholder farmers, especially in rural areas. However, these policies do not adequately differentiate target groups, hence inadequate implementation. The concept of a broad range of institutional structures to improve access to finance by smallholder farmers is more realistic with the launching of programmes such as the Comprehensive Agriculture Support Programme (CASP), and the Micro-Finance Institution of South Africa (MAFISA), just to mention a few. The idea is to have a wide range of programmes to co-ordinate efforts aimed at increasing access to financial services by rural people. Among the sources of capital available for farming are as savings, credits, inheritance, grants and gifts, pooling of capital, leasing and contract farming, which many still remain inaccessible to smallholding farmers. The Strauss Commission (1996) proposed a process for transforming the rural financial services sector at national level in order to strengthen existing local institutions in the private and public sectors (DAFF, 2009). At the retail level, the Commission did not provide details of how to achieve increased access to rural financial services. There is, therefore, a need to broaden participation of rural financial markets by proposing diverse financing mechanisms to ensure access to financial services with emphasis on the mobilisation of savings through self-help group or cooperatives.

Yaron *et al.,* (1998) argues that traditional subsidised programmes used by government as a finance mechanism to promote agricultural growth and development in rural areas of South Africa failed in its objective. The failure is also evident in the North West Province (NWP), with most government programmes not yielding the desired outcomes (Cloete, 2010).

According to Brouder(2009), a co-operative is an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs, through aspirations of a jointly-owned and democratically controlled enterprise. In South Africa, Savings and Credit

Co-operatives (SACCO) and the Finance Service Cooperation (FSC) are the most dynamic and successful co-operatives that help SHF to empower themselves. In Kenya, its representative body, the Kenya Union of Savings and Credit Co-operative Ltd (KUSCCO), is very well run and carries out its responsibilities of promoting co-operation very seriously by helping SHF and has launched a village bank to mobilise lower levels of saving (Cheruiyot *et al.*, 2012). On the other hand, informal financial intermediation in the mobilisation of savings, such as the Rotating Savings and Credit Association's (ROSCAs) mobile saving collectors, and mutual assistance groups, are easily identifiable in Nigeria because of the contiguity of shared forms and characteristics. There is, however, no identifiable characteristic between informal financial institutions operating in urban and those in rural areas (Adafu *et al.*, 2010). Since savings is a major characteristic associated with the "Modern Man", many of those deprived of such services are usually forced to develop unconventional savings facilities such as ROSCAs, savings group (*Njangis*), family meetings, church associations and old age meetings (Bime and Mbanazor, 2011). In South Africa, the village bank project was initiated at the beginning of 1994 in the North West Province with the assistance of the International Fund for Agricultural Development, the Provincial and National Department of Agriculture, Agribank, some commercial banks and a number of Non-governmental Organisations (NGOs) (Chisasa, 2014).

The importance of village banks lies in their understanding of the fact that participation means savings, and their potential to transform the credit market as well as and dealing with risks associated with lending and borrowing contracts, removing the need for collateral and reducing high transaction costs. Poor communities regard village banks as being responsive to their financial needs, hence, providing smallholder farmers with access to extension, technology, quality seeds, inputs such as fertilizer, labour and, therefore, improving productivity (Mashigo, 2007). The concept of 'village bank' was aimed at encouraging poor people to save, either individually, or as a *stokvel*, with the branch depositing funds in a 'link bank' to guard against theft and provide an audit path. When further funding for the Financial Service Association (FSA) was denied, it led to its collapse in 2004. Government decided to pay out over R5 million to individuals, keeping in mind the end goal to shut down unviable Finance Service Cooperatio(FSCs), which turned out to be more business-arranged. This situation led to the loss in their fundamental centre whose intention was to assist rustic groups and smallholder farmer to access essential financial services such as savings and loans. Village banking was proposed as a possible solution to financial difficulty for rural farmers and to link borrowers, social groups and micro-finance providers in a manner that will reduce

transaction costs and the risks of providing external finance to rural people. Village banks were, thus, left to operate independently under the supervision of the South African Microfinance Apex Fund (SAMAF) in the Department of Trade and Industry (DTI) (which assumed regulatory responsibility for FSCs).

Although several studies discuss the broad range of possible institutional forms in rural areas of South Africa, the role of decentralised financial systems has been the focal point of many studies. However, it has been argued that despite the restructuring of village banks, access to basic financial services remains poor in the North West Province at local level (Mahlo, 2011). Therefore, based on this background, it is imperative to explore the participation in village banks and its relationship to SHF in Ngaka Modiri Molema District Municipality (NMMDM) of the North West Province, South Africa.

1.2. Problem statement

Considering the requirements of finance in the agricultural sector, very few farmers own capital to invest in small-scale agriculture. Most of them are not performing at the maximum; thus, a need to provide credit to all potential farmers who require such assistance. Additionally, in terms of household expenditure, most SHF hardly have any savings to support their activities. It is, therefore, imperative to study the means used by village banks to enable farmers to advantageously use seeds, fertilizers, irrigation and machinery to increase their agricultural livelihood (Antwi, 2013).

In view of this development, the government of South Africa supported the idea of cooperative financial institutions (CFI) as a means of improving access to finance for the poor and a means of improving their livelihood. Despite the support of government and many policiy recommendations over the years, the poverty rate (the percentage or proportion of people living in households with an income less than the poverty line) of Ngaka Modiri Molema District Municipality (NMMDM) is still as low as 29% due to lack of financial opportunities to empower themselves. Therefore, a study on village banks is necessary in order to examine the conditions of smallholder farmers in rural communities and to propose ways of improving their standards of living (Karlan *et al.*, 2014). Since the objective of village banks is not very clear, farmers fail to participate in such banks. However, those who participate in such banks fail to sustain their investment, thus raising the question of whether village banks really have impacted on the welfare of smallholder farmers or not. In addition,

a study on village banks is important in order to understand why the conditions of smallholder farmers (targeted by these banks) have not improved, especially in rural areas.

1.3. Research questions

The following research questions were asked in the study:

(i) What is the current welfare status of the smallholder farmers?
(ii) What are the socio-economic/demographic factors influencing the participation of smallholder farmers in village banks?
(iii) Does participation in village banks improve the welfare of smallholder farmers?

1.4. Aim and objectives of the study

The main aim of this study was to investigate the effects of village banks savings on the welfare of smallholder farmers.

The specific objectives were to:

(i) Describe the current welfare status of smallholder farmers;
(ii) Analyze socio-economic/demographic factors influencing the participation of smallholder farmers in village banks; and
(iii) Determine the effects of participation in village banks on the welfare of smallholder farmers.

1.5. Hypotheses

The following null hypotheses were tested in the study:

(i) Socio-economic and demographic factors do not influence the participation of smallholder farmers in village banks significantly.
(ii) Membership of village banks does not lead to a significant increase in per capita expenditure and improvement in the welfare of smallholder farmers.

1.6. Significance of the study

This study will inform policy and decision-makers on how best to develop microfinance institutions (such as village banks) in order to enhance the agricultural productivity of smallholder farmers in a sustainable manner. This study will assist smallholder farmers on

some of the challenges faced by village banks in fulfilling their mandate towards smallholder farmers. It will also inform microfinance service providers on how smallholder farmers could easily access microfinance institutions in a sustainable manner. Furthermore, it will inform credit recipients on how to easily access microfinance credits and the positive impact in agricultural productivity and poverty alleviation. The findings will also assist communities in the study area to understand their position in terms of the extent to which micro credit schemes operating in their area contribute towards the promotion of the culture of savings among communities through real investments after the acquisition of credit. The findings will also contribute to the literature by determining factors that influence SHF to join village banks and its effect on the welfare of SHF. Finally, the study will provide solutions to challenges faced by both village banks and smallholder farmers with regard to finance. Such solutions could be adapted in others provinces of South Africa according to their environmental and economic characteristics.

1.7. Limitations of the study

A few challenges were encountered during the data collection process. Firstly, the study was not conducted across South Africa due to limited finances; focus was on Ngaka Modiri Molema District Municipality (NMMDM). Secondly, there are few smallholder farmers involved in village banks in the study area. It would have been better if more farmers were involved and monitored during the entire period of survey. Thirdly, few farmers were involved in the study due to the fact that smallholder farmers in the area are not educated and do not keep record of their activities. Fourthly, lack of sampling in method.

1.8. Delimitations of the study

The aim of this study was to determine the effect of participation in village banks on the welfare of smallholder farmers and precisely the relationship between savings, credit and livelihood of smallholder farmers. However, due to the broad scope of the concept of welfare, this study focused specifically on the economic welfare of smallholder farmers and precisely on the expenditure of smallholder farmers (which was more relevant in terms of measuring welfare). All these aspects were examined within Ngaka Modiri Molema District Municipality (NMMDM), North West Province, South Africa.

1.9. Organisation of the study

This study is organised as follows: Chapter 1 is the introduction and general orientation of the study. It also presents the problem statement, aim and objectives of the study, the research questions, significance of the study, limitations and delimitations of the study. Chapter 2 is the review of relevant literature and the theoretical framework that informed the study. Chapter 3 focuses on the research methodology, including the description of the study area. Chapter 4 presents the results and discussion of findings of the study. Chapter 5 presents the conclusions, policy implications and recommendations based on the major findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

This chapter reviews literature on challenges faced by smallholder farmers regarding their participation beyond associated credit accessibility in general and village banks in South Africa in particular. The literature review sets out with a discussion on access to agricultural credit and rural finance in the world, sub-Saharan Africa in general and South Africa in particular. Determinants of micro-finance are discussed followed by an analysis of the key components of welfare. The study does not only discuss the general structure and core activities of village banks but also reviews socio-economic and demographic factors influencing farmers' participation in village banks in general.

2.1. Agricultural credit and rural finance

2.1.1. Agricultural credit and rural finance in the world

The late 1970s witnessed a growth in financial services targeted towards the poor, through initiatives spearheaded by Non-Government Organisations (NGOs) such as Grameen Bank, Bangladesh (United Nations, 2006). According to the United Nations Report (2006), agricultural production, processing and trade practices are generally perceived to provided relatively low margins and in some cases, perceived by financiers as very risky operations. For instance, among the risks, include natural hazards which affect agricultural production that provides high levels of uncertainty for farmers to use land as physical collateral. Previous study argued the need to find new approaches to improve agricultural credit is paramount, if agricultural production is to be profitable to farmers (Amin, 2013). Furthermore, the liberalisation of financial markets, innovations in the management of agricultural risks and reduction in transaction costs associated with farming have had a significant and positive impact on agricultural production and financing around the world (Amin, 2013). In Vietnam, SMP (2010) pointed out that numerous factors and predictors contribute to the success of financing initiatives among farmers in rural areas, a development which affects the nature of operations of financing organisations in rural areas. For instance, the study further indicates a strong correlation between borrower outreach and mobilisation of savings in rural Vietnam

(SMP 2010). On the same note, in Columbia, the history of rural finance has been characterised by a system which channels benefits to a limited number of beneficiaries, at the expense of the economy as a whole (Goldman, 2006). The study further reiterates that access to financial services in rural Columbia was limited and segmented due to inadequate services and lack of innovation in financial intermediation in rural areas. However, in sub-Saharan Africa, much of the financial credit meant to support farmers' initiatives is on the increase, little has been done to investigate determinants of participation of village banks and their effects on the welfare of small holder farmers.

2.1.2. Agricultural credit and rural finance in sub-Saharan Africa

Sub-Saharan Africa (SSA) is part of the developing world, where the rate of poverty is very high, especially among people living in rural areas and who rely on agriculture as a major source of income (FAO, 2015). As such, the need to support farmers through micro financing initiatives cannot be over emphasised in order to eliminate inequalities affecting economic development using farming as a medium (Gobezie, 2008). The diversity of demand for rural finance requires a broad range of strong financial intermediation institutions, which can expand outreach to households in different layers of poverty and in resource-poor urban and rural areas (Coetzee and Cross, 2002).

Despite the implementation of various agricultural policies in SSA aimed at increasing agricultural investment through investing at most 10% of the annual national budget in agriculture (United Nations, 2006), the dwindling fortunes of African Countries in terms of agricultural production, prevent them to be food secure (FAO, 2015). In SSA, credit can be obtained for agricultural purposes from formal and informal sources. The informal type of agricultural credit refered to credit from money lenders, friends and groups savings. In the formal setting, credit is not accessible to most small farmers in most SSA countries, including Nigeria and Ghana, where commercial banks and other specialised agencies are charged with the responsibility of providing credit to farmers. In Kenya and Mali, which benefited substantially from lending from commercial banks up to the late 1990 (Salamine and Arawomo, 2013), it is, however, discouraging that a downward trend was recorded in the allocation of credit by commercial banks to agriculture in these countries. The regulation and supervision of Micro-Finance Institutions (MFIs) should be an integral part of the strategy to develop a market-based financial system. Micro-finance is not limited to borrowing, but also

includes other financial services such as savings and insurance. In SSA, savings facilities are a particularly important question when considering prudential regulation of MFIs because the prospective micro-finance target group is usually many times larger in deposit business than in lending (Segun *et al*., 2015). A study by Salami *et al.,* (2010) revealed that in Africa, aside the problem of poor access to modern technology by peasant farmers, the major bane of agricultural development is low investment or finance.

2.1.3. Agricultural credit and rural finance in South Africa

2.1.3.1. South Africa's saving policy

Generally, the scope of financial institutions is very broad and the experiences of countries differ from one country to another. Institutions, policies and practices that work well in one country may not work at all in another. Strategies for building inclusive financial sectors have to be creative, flexible, and appropriate to the national situation and nationally owned. While necessarily designed at the national level, such strategies should, nevertheless, build on the lessons learned in other countries and the resulting considerations of good practices (United Nations, 2006).

A major initiative to encourage savings is the Financial Sector Charter, which is a wide ranging government-led initiative to partner with the financial services industry. The aim of the Financial Sector Charter is to encourage a transformed, vibrant and globally competitive financial sector that reflects the demographics of South Africa. Roth *et al.,* (2007) argues that although in theory saving policy is a voluntary arrangement, there is a degree of moral pressure to comply, as well as the threat that if the financial institution does not meet the agreed targets, the South African government will not conduct business with it.

2.1.3.2. Rural finance in South Africa

In South Africa, where most people still live in rural areas, and agriculture is the mainstay of rural economy, access to financial services by the poor could be a necessary tool to alleviate poverty among rural people (Cloete, 2010).

Post-apartheid, many changes have been done to improve the conditions of black farmers by establishing many financial institutions to promote smallholder agricultural development (Table 2.1). The government of South Africa established the Land Bank and the Agricultural Credit Board to assist commercial and emerging farmers served by parastatals in former homelands. The collapse of parastatals left emerging farmers without access to credit. The main mission of the Land Bank was to provide financial services to farmers excluded from the banking system by the former regime (Aliber *et al*., 2006). However, the Bank has continued to concentrate on commercial farmers, leaving surviving emerging farmers only with credit provided by land reform through the land reform grant.

Besides efforts by the Government, access to credit by emerging farmers remains insufficient. However, the government decided to introduce the Macro Agricultural Finance of South Africa (MAFISA), with the main mission of finding out the credit needs of emerging farmers while the focus of the Land Bank is on commercial farmers. MAFISA also failed due to lack of capacity, delayed establishment of credit committees, prolonged process of application and reliance on over-worked extension office (Sebopetji and Belete, 2009).

According to De Klerk *et al*., (2013), agricultural and rural finance in South Africa is constituted by demand side made up mainly of subsistence farmers, emerging farmers and small-scale commercial farmers. The supply side is presented at the macro level (Government and International agencies), the meso level (industry) and the micro level (firm or individual). At the micro level, where formal and informal sources play an important role in agricultural credit, informal sources are more dominant in rural areas where some *stokvels* extend credit to members; some invest in assets that could generate income for members; while some are used only to save funds towards a particular event such as Christmas or the beginning of the school year. The Village Savings and Loans Associations (VSLAs) also play an important role in the informal sector. The Savings and Credit Groups (SCGs) promoted by the Save Act in KwaZulu-Natal, are good examples. In terms of these, a self-selected community group saves money together (similar to shares), thereby creating a loan fund. Members can borrow from the fund (a limited number of times a year) and pay interest to the group on loans. Loans can be used for a range of purposes, including enterprise, housing and education. Typically, about two thirds of savings are mobilised into loans at any given time. These groups are an important source of capital for emerging farmers.

Table 2.1: Sources of agricultural credit and rural finance in South Africa

NAMES	EXAMPLES
Commercials banks	-ABSA Bank -First National Bank
Cooperative financial institutions (CFI)	-Cooperative banks (Ditsobatla Co-operative Bank) -Financial service cooperatives (village banks)
Government DFIs	-Land Bank -MAFISA
Insurance companies	-SATAN -Zurich
Developmental microfinance institutions	-Marang -Women development business
Off takers/ buyers	-Pick' N Pay
Registered credit providers	
Agricultural cooperatives	-AFGRI -SENWES
Commodity associations	-Cotton South Africa -NERPO -Potatoes
Informal services	-*Stockvels*/ROSCAs/ASCAs -Family and friends -Burial societies -*Mashonisas* / loan sharks

Source: FinMark Trust 2013

2.2. Socio economics factors influencing farmers' participation in village banks

According to Giroh *et al.,* (2012), farmers make decisions about which savings mobilisation group to join, and the decision is based upon a range of economic factors such as human development, institutional and technology factors. These factors can provide immense potential for agricultural growth and development, which could facilitate the empowerment of smallholder farmers. However, before agriculture can be promoted to a point where this potential can be successfully tapped, factors inhibiting the growth and development of agriculture through village banks must first be addressed.

2.2.1. Economics factors

The theoretical work on savings has consistently outlined the major potential economic determinant of savings. These determinants can be grouped loosely under the following headings: financial variables; income and growth variables; and uncertainty measures.

2.2.1.1. Access to credit

Adequate access to financial resources is a key principle of successful rural development strategies (Boucher *et al.*, 2008). This is because farmers are unable to access loans; they can lose some of the few assets they have if they face negative shocks such as droughts or a significant drop in the prices they receive (Jones and Dallimore, 2009). Thus, farmers are discouraged to participate in any savings group. According to another school of thought, farmers who have access to well-designed credit facilities and savings, can avail themselves of capital to finance inputs, labour and equipment needed to generate income, and therefore, are more excited to participate in savings groups (World Bank, 2015).

In North Africa, making access to credit easy for women has changed gender relations at the household level and is strengthening women's economic empowerment. The project has improved women participation in savings groups and has seen them improving their farming and entrepreneurial skills (Byron *et al*., 2010). In Kenya, Apind *et al.,* (2015) found that access to credit significantly influenced the extent of rice marketing among farmers since this extent indicated the level of commercialisation of the rural production.
Furthermore, a study conducted by Hlongwane *et al.,* (2014) in South Africa, revealed that access to credit was positively significant to market participation, since participation in market requires production, which can easily be reached by access to inputs through better a credit system. Therefore, based on this argument, access to credit has a significant effect towards participation in agricultural production through group savings. Thus, it is imperative to explore the effect of access to credit towards participation in farming.

2.2.1.1.1. Role of credit in farming

According to DAFF (2012), farming, as other businesses, requires loans for production and sustainability of the business. The need for agriculture credit becomes more important when

its moves from traditional to commercial agriculture. Thus, credit plays a crucial role as follows:

- Purchase of new inputs: Farmers need finance for the purchase of new inputs such as seeds, fertilizers, pesticides and irrigation water. If the seed of high yielding varieties and other modern inputs are made available to farmers, they can increase productivity not only of land but also labour;
- Purchase of implements: Credit is required by farmers for the purchase of tractors, threshers, harvesters and water pumping sets. The use of appropriate machinery in land will increase production by growing more than one crop on the same piece of land at the same time;
- Better management of risk: Credit enables farmers to better manage risks of uncertainties of price and weather. Farmers can borrow money during raining days and pay back during peak years of crops;
- Permanent improvement in land: Credit also helps farmers to make permanent improvements on the land such as sinking of wells, land reclamation, horticulture and rotation of crops;
- Better marketing of crops: If timely credit is available to farmers, they will not sell produce immediately after the harvest is over (when prices of agricultural goods are low in the market). Credit enables farmers to withhold agricultural surpluses for sale when prices are high;
- Face crises: Credit is required by farmers to face crisis. A crisis could be caused by failure of a crop, drought or flood; and
- Ensure that time is saved during operations: If timely credit is available to farmers, they will be able to produce on time in order to meet the needs of the market and avoid waste.

2.2.1.1.2. Classification of credit

According to Antwi (2013), the purpose of credit is broadly classified based on various criteria such as time/duration or purpose. In terms of purpose, the following types of loans are required in the agricultural sector:

- Production loans: This refers to credit given to farmers for crop production. Such loans are intended to increase the production of crops. These are also called seasonal

agricultural operation loans, short-term loans or crop loans. Such loans are repayable within a period of time (ranging from 6 to 18 months in lump sum);

- Investment loans: Refers to loans given for equipment whose productivity is distributed over more than one year. Loans given for tractors, pump sets, tubes well, work stock are the examples of investment credit. (Medium term loans).
- Marketing loans: Meant to assist farmers overcome distress sales and market the produce in better manner. Regulated markets as well as commercial banks, on the warehouse receipt, are extending financial assistance to farmers in this regard, by advancing 75% of the value of the produce. This enables farmers to clear off their loans and dispose the produce at remunerative prices; and
- Consumption loans: Refers to any loan advanced for some purpose other than production, broadly categorised as consumption loan. It appears to be an unproductive loan but, in fact, directly assists in more productive use of crop and investment loans, averting to a greater extent of diversion of loans for others purposes.

2.2.1.2. Household income

Household income has been acknowledged to have affected participation in agriculture among rural people. Morokolo (2001) concurs with this argument and maintains income is a major determinant of saving mobilisation, which leads to an increase in the negotiating power of smallholder farmers. Furthermore, John Keynes, in his theory of consumption, argues that household consumption depends on the availability of disposal income. This is an indication that income and consumption expenditure are positively related. Wvan and Khosa (2007) found that income is the most important determinant of household food security in South Africa. Thus, without farming, the food security of households would be reduced, especially among the ultra-poor. Food obtained from various types of agriculture land significantly contributes to household nutrition. In Cameroon, Bime and Mbanasor (2011) found that household income is a significant determinant of informal savings among vegetable farmers. Savings made by farmers assist them in terms of improving their supply of inputs and tough times in the agricultural sector caused natural hazards (Carletto *et al*., 2012). Therefore, it is important to know the sources of income adopted by rural households in order to better understand the relationship between the various economic activities taking place in rural areas and their implications for economic growth and poverty reduction.

2.2.1.3. Saving and investment

The part of income not spent in the expendable circuit, leaks out of the system and negatively affects the initial income of the country (Brune *et al.*, 2011). It is, however, important to pool funds together for others to borrow and invest. This is an attempt to lead the economy to higher levels of production and income.

Whereas, it is true that at a global level, saving must equal investment, the fact that saving and investment end up in a balance does not mean that many households spontaneously desire to save and invest in equal measures (Dupas and Robinson, 2013). In economic language, savings and investment are an ex-post; hence, actual saving and investment must be equal. However, desired saving and investment may not be. Yields are raised when farmers can afford to invest capital to create more profit, which can be used for future investments. The money that a farmer has to invest in the farm can be used to increase inputs such as fences, seeds, machinery, fertilizers and renew buildings.

2.2.1.4. Saving and interest rate

According to Gutierrez and Solimano (2007), the association between interest rates and savings is ambiguous theoretically (the effects of income and substitution may work in opposite directions). The effect of income produced by higher interest rates may be positive or negative depending on whether the saver is a net wealth holder or a net debtor. The positive income effect of an increase in interest rates for a net wealth holder may run in an opposite direction than a substitution effect that induces a cut in current consumption (substituting for future consumption).

2.2.2. Human development factors

Human development factors entail factors affecting physical and psychological aspects of humans to operate effectively in the production environment (Sewell, 2015). Furthermore, fellow of the Royal Society of South Africa (FRSSA) (2005) states that human development is measured by the Human Development Index (HDI), which shows that the living standard of South Africans is still slipping. On the same note, a poor HDI is considered to relate to poverty, more especially among poor and underserved communities in Africa. Many people

in rural areas, still live below the poverty line and battle to meet their needs to survive and cannot be expected to save. Savings and debt levels have tended to have an inverse relationship with correlation coefficients in South Africa Saving Institute (SASI) over the years (Reinhart et al.,, 2015).

The deteriorating socio-political situation, increased violence and crime levels have caused high levels of illiteracy (which impact negatively on growth hence, employment potential of the economy to deteriorate. Nga (2007) (of the South African Communist Party) (SACP), confirms that the question of saving is very central to economic development and transformation in the country. It is imperative to look at HDI from a socio-economic dimension and its role in initiatives for participation in village banks.

2.2.3. Environmental factors

Macroeconomic policy has to be prudent by creating an environment conductive to saving. For example, inflation targeting, protects the purchasing power of savers. This implies that saving is able to attract competitive real rates of interest. However, it should be noted that low inflation itself may be a disincentive to save since households may be less inclined to hedge against future inflation by saving more. Policy makers, should therefore, create an enabling environment for higher investment, economic growth and job creation since there are factors that improve the ability of individuals to save. According to Masilela and Kaniki (2009), creating an enabling environment also requires addressing barriers to saving, particularly those that are obligatory for poorer people. This argument is supported by Nene (2009), who emphasises that creating an enabling environment requires addressing barriers to saving. The first of such barriers is affordable access to savings and transaction services. An environment of price and financial stability is probably the best contribution that monetary policy can make towards saving, investment and the good health of the economy in general.

2.2.4. Technological factors

Ismail and Mawar (2009) argue that saving contributes to economic development in locations where companies lack access to the necessary technological advances (in countries far away from the “technological frontier”). Thus, with access to technology, the company will improve its productivity and farmers will feel their savings secure to invest, thus contributing to growth in developing countries (Darley, 2011).

According to DAFF (2009), irrigation and machines are two examples of expensive technology which increase yields. Also, genetic engineering allows new plants to be grown, reduces diseases and droughts and promotes better yields. On the other hand, computer-controlled technology in greenhouses provides suitable conditions for good quality crops (where the computer controls moisture level, the temperature and the amount of food needed).

2.2.5. Institutional factors

Institutional factors could be better understood with focus on fiscal policy and savings. According to Ndikumana (2008), fiscal policy may affect private investment through the following five channels: First, if investment is dependent on savings, fiscal policy affects private investment by disturbing the volume of savings; Second, from a view of investment behaviour, fiscal policy can promote investment by improving investor confidence; Third, suppose that investment is demand constrained, fiscal policy influences investment by affecting domestic demand; Fourth, fiscal policy affects investment directly through the cost of capital as influenced by tax policy; and Finally, fiscal policy affects investment through public infrastructure investment, which reduces private costs of production, thereby raising profitability.

2.3. Components of economic welfare

Economic welfare is known as the level of prosperity and standard of living of either an individual or a group of persons. In the field of economics, it specifically refers to utility gained through the achievement of income inequality, employment and education (Just et al., 2008). Welfare is a statutory procedure or social effort designed to promote the basic physical and material well-being of people in need. As a broad concept, welfare can be subdivided into social and economic welfare. According to Just et al (2008), the well-being of the entire society is not only the same as the standard of living but is also more concerned with the quality of life that includes factors such as the quality of the environment, level of crime, extent of drug abuse, availability of essential social services as well as religion and spiritual aspects of life (Miller et al., 2015).

Jacobs and Slaus (2010) conducted a study on the power of measurement, human and economic welfare in order to understand the level of flourishing and nature of expectations for everyday comforts in an economy. The study also examined how economic aspects could be measured through a variety of factors (such as Gross Domestic Product (GDP) and other indicators) reflecting the welfare of the population such as literacy, number of doctors and levels of pollution, among others. Economic welfare is a general concept which does not lend to an easy definition. According to World Development Indicator (World Bank, 2015), economic welfare is usually measured in terms of real income (purchasing power parity) and real GDP. An increase in real output normally leads to increase expenditure, this suggests that people are better off and therefore there is an increase in economic welfare. Therefore, understanding economic welfare from the perspective of farmers is significant among farmers in order to understand opportunity costs realized from the farming practice.

2.4. Structure of village banks in South Africa and core activities compared to the main stream

Compared to classic commercial banks (which have their own constitution), village banks are classified under cooperatives and have a particular structure due to the role of agriculture in the economy.

2.4.1. Cooperatives and cooperative financial institutions (CFIs)

Cooperatives are found throughout the world and have played a significant role in the socio-economic transformation of communities around the world, in general and in South Africa, in particular (Abebaw and Haile, 2013). There are different types of cooperatives in South Africa, amongst them, are agricultural cooperatives (the most dominant form of cooperative), which assist farmers in sourcing inputs needed to grow crops, keep livestock, market and process produce. The principles of agricultural cooperatives are as follows: democratic member control; voluntary and open membership; autonomy and independence; educational training and information; cooperation among cooperatives; concern for the community; and economic participation of members. CFIs include co-operative banks, financial services co-operatives (FSCs) and savings and credit cooperatives (SACCOs) or credit unions.

According to Towungana (2015), in recent years, four programmes have contributed to the development of the CFI sector in South Africa. These include:

- ❖ The Financial Services Association (FSA) and Financial Solutions (FINASOL) both promoted Financial Services Cooperatives (FSCs), also known as 'village banks'. They worked in the sector from 1996 to 2002;
- ❖ The Savings and Credit Co-operative League of South Africa (SACCOL) promoted the formation and establishment of SACCOs and Credit Unions. SACCOL was active from 1981 until 2011;
- ❖ The South African Microfinance Apex Fund (SAMAF) was established as a wholesale funding institution and has worked in the sector since 2006; and
- ❖ The Co-operative Banks Development Agency (CBDA) regulates and develops co-operative banks. It was established in 2009.

2.4.2. South African Micro-Finance Apex Fund (SAMAF)

The mission of SAMAF is to provide competitive and customised micro-finance services by going deeper and broader in the target market (Figure 2.1). Also, SAMAF seeks to be a leader in the field of development of micro-finance and to provide best practice models in South Africa through:

- Development of sustainable financial intermediaries that reach the enterprising poor;
- Facilitation of training and capacity building for micro-entrepreneurs and financial intermediaries; and
- Ensuring effective financial intermediation and working markets for the working and enterprising poor.

According to Rogerson (2013), the Department of Trade and Industry (DTI) Report revealed that, SAMAF provides financial services to small-scale entrepreneurs living in rural areas through financial intermediaries known as financial service cooperatives (FSCs), cooperative banks and micro-finance intermediaries (MFIs).

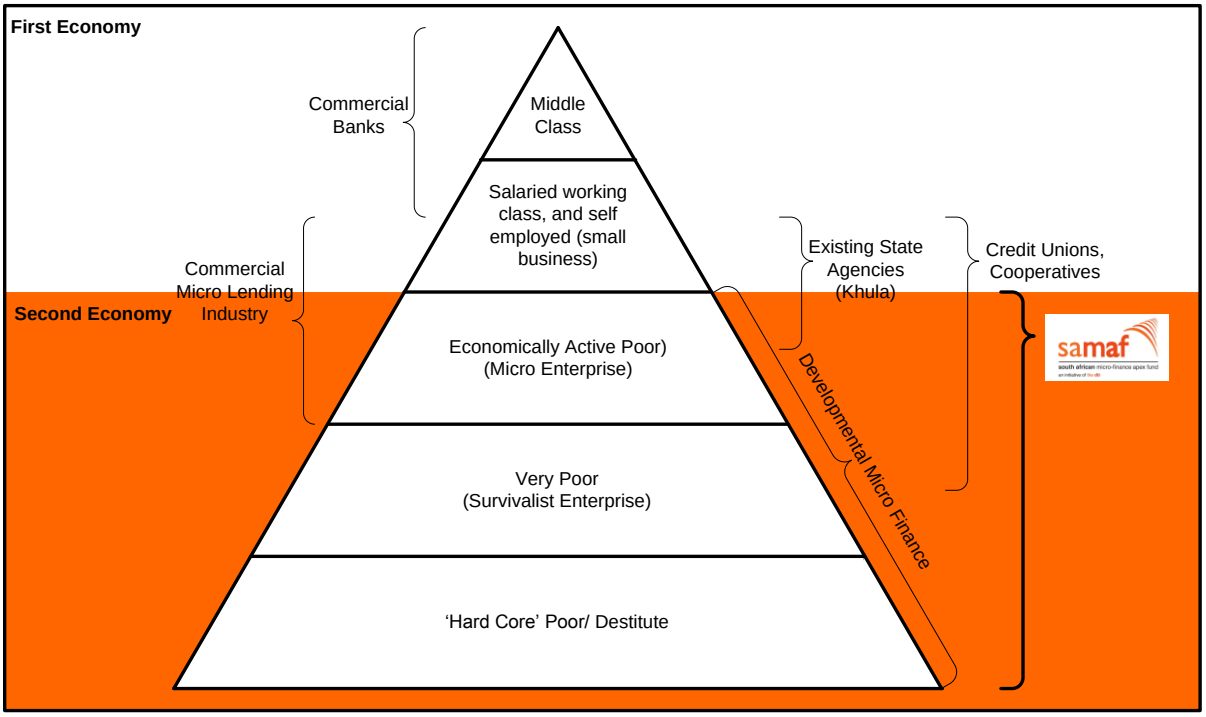

Figure 2.1: Structure of financial markets in South Africa

Source: Adapted from Olawale et al (2010)

2.4.3. Concept of financial service cooperatives (FSCs)

The third-tier of banking in South Africa is made up of member-based financial institutions; across a spectrum that includes *stokvels*, burial societies, savings and credit unions, village banks and mutual banks. While not all of these would consider themselves as cooperatives, many in fact, meet the essential criterion – of member ownership and control (Philip, 2003).

In 1996, South Africa became the 28th African country to become a member of the African Confederation of Savings and Credit Cooperatives (ACCOSCA). Both the Savings and Credit Cooperatives (SACCOs) and Village Financial Services Cooperatives operate through exemptions from the Banks Act of 1990. According to Republic of South Africa(1996) (1994), the South African Reserve Bank recognises the Financial Service Association (FSA) as the representative of the financial Service Cooperative (FSC) on the condition that they abide by the Constitution of FSA and FINASOL as well as the statutes of FSA. After 1998, the village FSC also has to fulfil two other requirements in order to come into existence. That is, registration of village banks with the registrar of cooperatives, in the Department of Agriculture, and affiliation with the Financial Services Association (FSA), the umbrella association of co-operative village banks, which provide the necessary monitoring and supervisory functions. According to DAFF (2012), the concept of 'village banks' is aimed at

encouraging poor people to save, either individually or as a *stokvel*, with the branch depositing funds in a 'link bank' to ensure against theft and provide an audit trail. When further funding for FSA was denied, prompting the association to collapse in 2004, village banks were left to operate independently under the supervision of SAMAF.

2.4.4. Village banks project in South Africa

The village bank project in South Africa was initiated at the beginning of 1994 in the North West province by the entry of the International Fund for Agricultural Development (IFAD) in the country after the Agricultural Bank in Bophuthatswana (now North West province), applied for membership of the African Rural and Agricultural Credit Association (AFRACA). The initial phase of the project to establish village banks in South Africa and Uganda was financed by IFAD. Subsequent phases were funded from different sources such as provincial and national Departments of Agriculture, Agribank, some commercial banks and a number of Non-Governmental Organisations (NGOs). During the pilot phase of the project, three village banks were established in Kraaipan, Lotlhakane and Moshedi. On conclusion of the pilot phase, the concept was evaluated and submitted to the registrar of banks, who issued a special exemption for these institutions, through which their deposit taking functions are legalised (Bodie, 2015).

The main purpose of the village bank project was to develop sustainable rural financial service institutions linked to formal commercial banking networks through which provision could be made for the financial services needs of rural communities in South Africa. The village bank concept of ownership depends on a member-driven shares and savings base and has been developed specifically to cater for rural communities where the main activity is agriculture. Village banks are not for profit organisations, they are generally controlled and operated by members, and redistribute any earnings in excess of operational costs to members in the form of dividends on share capital, increased interest on savings, or decreased rates on loans. Around 20 million people are said to be poor in South Africa, with the overwhelming majority residing in rural areas. They are mostly engaged in agriculture and do not have access to primary financial services such as savings and credits. The value of all loans is, therefore, based on the sum of pledged deposits plus a proportionate value of internal and external risk capital, hence the need for savings mobilisation strategy (DAFF, 2009).

The idea of village banks/FSC was conceived to create a financial institution that would decrease transaction costs of savings mobilisation, reduce information costs, provide loans and thus reinvest funds in areas in which they were mobilised. A village bank/FSC was seen as a community vehicle with which the community would be able to access a comprehensive range of financial services and could interact with the broader financial sector at lower transaction costs through interlinking with commercial banks.

2.4.5. Purpose of village banks loans

According to DAFF (2012), the village banks loan programme was intended to encourage savings, provide members of village banks with cost effective loans within the operational structure and capacity of individual FSCs. The loan programme was based on a set of basic principles that could be summarised as follows:

- The village bank concept of ownership depends on member-driven shares and savings base;
- No pooling of saving (open account and/or fixed deposits) is allowed because of the limited capital adequacy ratio;
- All borrowing is done against the following risk coverage:
    - Own deposits (open account and/or fixed deposits) pledged as security;
    - Deposits (open account and/or fixed deposits) of a co-depositor pledged as security;
    - Share capital allocated as risk capital;
    - Reserves allocated as risk capital;
    - External funds mobilised as risk capital;
- The order of risk coverage is always in accordance with the following priority rating:
    - Own and pledged deposits;
    - Reserved allocated as risk capital;
    - Shares allocated as risk capital;
    - External risk capital;
- The value of all loans is, therefore, based on the sum of pledged deposits plus a proportionate value of internal and external risk capital;
- All risk is managed by the institutional structure of FSC and the system of risk management must, therefore, fall within the institutional capacity of FSC; and

- ❖ Ownership and control of all aspects of FSC must, at all times, remain with shareholders.

2.4.6. Membership and management of village banks

2.4.6.1. Membership

According to DAFF (2012), participation in village banks is a free decision from each community member. However, to become a member of a village bank, a person has to pay a joining fee and, thereafter, a share, priced normally at R100-00, has to be purchased. The purchase of shares cannot exceed 20% of all shares held by total membership. The other rights and obligations of a member are governed by the statutes of the village bank but the main membership entitles a person to vote in a village bank and also use the services of the village bank.

2.4.6.2. Management and administrative structures

In principle, the governance of village banks was to be democratic and participatory, with branches owned and managed by members, who would be shareholders (DAFF, 2012). Every shareholder and member of a village bank, has a vote to decide on the Board. The Board, comprised of 7-11 members, normally has seven portfolios comprising of an executive of three (sometimes a chairperson, a secretary and a treasurer), a marketing portfolio, an auditing and investment portfolio as well as a loans and security portfolio. In general, and as derived from the statutes, the Board sets policy for the co-operative. It also ensures regular audits to maintain proper financial management and control, processes applications for loans through a loans committee and employs an administrator. The administrator acts as an operational manager and can employ other administrators.

The Supervisory Committee also appoints an auditor, who ensures the funds of the village bank are managed properly. Each village bank also has statutes which confers certain powers on the Board and enables them to make policy and decide on the implementation thereof, through the various committees.

The services of a village bank (to its members) differ from person to person, and could be summarised as follows:

- Savings;
- Credits;
- Shares;
- Invest money on which interest can be earned; and
- Group accounts for saving and /or burial group.

2.5. Theories on savings behaviour

There is extensive literature on the determinants of savings. Traditional Keynesian models imply that consumption and savings depend on the level of current income. Subsequent theoretical contributions placed individual consumption and savings behaviour in an inter-temporal optimisation perspective as follows: The Keynesian consumption function; the Keynesian savings function; and the permanent income hypothesis.

2.5.1. The Keynesian consumption function

As far as income is concerned, the Keynesian consumption function expresses the level of consumer spending depending on three factors (Huang *et al*., 2016). The consumption function, in economics, is a single mathematical function used to express consumer spending. The standard Keynesian consumption function is expressed as follows:

$$C = a + c\,Y_d$$

Where

C = consumer expenditure,

a= autonomous consumption. This is the level of consumption that would take place even if the income was zero. If an individual's income fell to zero, some of his existing spending could be sustained by using savings. This is known as dis-savings.

c= marginal propensity to consume (mpc). This is the change in consumption divided by the change in income. Simply, it is the percentage of each additional pound earned that will be spent. Disposable income is represented as Y_d. There is a positive relationship between disposable income (Y_d) and consumer spending C. As income rises, so does total consumer demand (Mankiw, 2014). This theory was used by Khan *et al*., (2015) in Bangladesh, India, Nepal, Pakistan and Sri Lanka in order to estimate consumption functions of SAARC countries. As applied in this study, it is expected that the independent variables (disposal income, autonomous consumption and marginal propensity to consume) would influence the

dependent variable (consumer expenditure) and if disposal income is totally consumed, there is no possibility of saving, since it is understood that participation in village bank depends on household capacity to save.

2.5.2. The Keynesian savings function

The Keynesian savings function predicts that the income earned by consumers but not spent on consumption, will be saved in some form.

$Y = C + S$

Where Y is income, C is consumption and S is savings.

If the consumption function is $C = a + bY_d$,

Then the savings function is given by

$S = -a + (1 - b)Y_d$.

With zero income, consumers still spend the amount "a", this means they dis-save "a". Out of each R1 consumers spend "b", this means they save (1-b). This theory was used by Ali and Rahman (2015) to develop a modified short run consumption function with some special assumptions. As applied in this study, the savings function shows that savings and consumption are related. In this study, participation in village banks depends on the capacity of households to save; therefore, there is a necessity to revise household behaviour in term of savings.

2.5.3. Permanent income hypothesis

Permanent income hypothesis (PIH), a theory of consumption developed by the American economist Milton Friedman, states that the choices made by consumers regarding their consumption patterns are, determined not by current income but by their long-term income expectations. The key conclusion of this theory is that transitory, short-term changes in income have little effect on consumer spending behaviour (Parker, 2010). This theory was used by Epaphra (2015) to understand the nature of national savings behaviour in designing policies to promote savings and investment, which in turn, enhance economic growth through capital formation. Permanent income hypothesis is based on utility. In the context of this study, participation in village banks depends on the capacity of households to save, thus to improve livelihood and face some future situation, households need to control expenditure in

order to smooth out total wealth. This is an indication that consumption must be a function of disposal income.

Based on these theories, savings behaviour could have a significant effect towards participation in village banks. Therefore, it is imperative to explore the impact of these theories among smallholder farmers in the North West province and their influence towards participation in village banks.

Based on this background literature and theories on micro-finance around the world in general and South Africa in particular, the conceptual framework in the section below was derived.

2.6. Conceptual framework

Figure 2.2 shows the conceptual framework of beneficiaries of village banks and their welfare. Given the limitations of credit facilities in rural areas, it is expected that some participants will access credit from village banks while others will not. It is expected that those who access credit from village banks should be able to improve farming technologies and increase the use of inputs. Inputs considered in this study include agrochemicals (fertilizers and pesticides) and improved seeds. Credit beneficiary farmers are also expected to be able to apply improved farming technology such as tractors, power tillers or ox-plough. Consequently, farm productivity is expected to be higher in farms operated by credit beneficiaries compared to farms operated by non-credit beneficiaries. According to Abate *et al*., (2013), a change in productivity over time depends on changes in the type, quantities of inputs and technology used. It is also expected that farmers who participate in village banks should have greater opportunities to access credit markets compared to those with no credit.

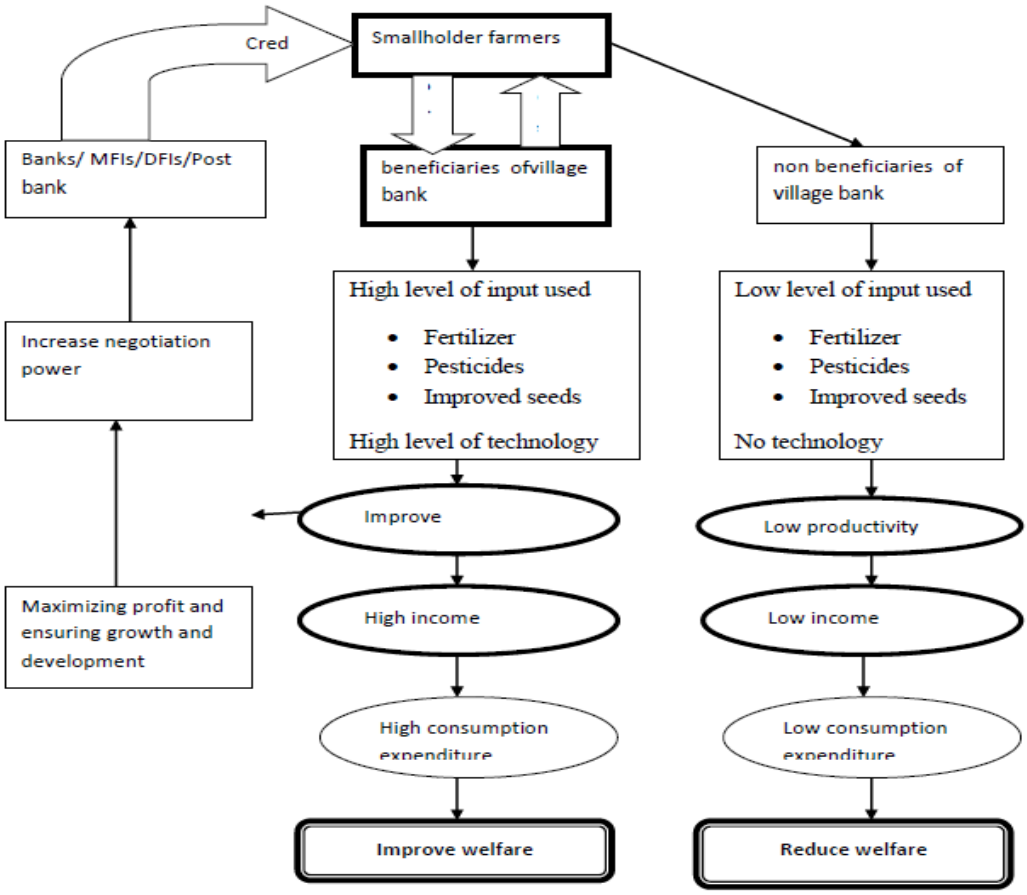

Figure 2.2: Conceptual framework of participants of village banks on welfare

Source: Adapted from Girabi and Mwakaje (2013)

2.7. Empirical studies

The main problem for village banks is how to guarantee payment and reliable management to assist members achieve better productivity. Member of village banks need to be united and keep to their rules in terms of payments, especially the purpose of the loan (Chisasa, 2014).

Studies have shown that determinants of savings are influenced by the decision of households to participate in village banks and how membership to these groups/cooperatives impact on their per capita expenditure through access to credit and their welfare.Several empirical studies have examined the determinants of savings (Giroh *et al.*, 2012; Bime and Mbanasor, 2011; Fasoranti, 2013). Antwi (2013) reported that income level, inflation, transaction costs, levies/taxation policy, returns from savings, interest rates, security, farm

sizes, household sizes and dependency ratios, levels of farmers' education, proximity and availability of banking facilities, membership of farmer organisations are the determinants of savings in rural farming areas, even though they are ineffective without a savings culture. Cultural factors are routinely mentioned in the literature as constraints on usage of financial services. Some serve as barriers to access and others discourage potential customers from seeking access. This is confirmed by Darley (2011) in a study to measure improved household savings in South Africa. The author found that household behaviour is insufficient in terms of expenditure and that there is a lack of a savings culture to encourage positive savings. It was suggested that savings culture, financial literacy and consumerism are also determinants of savings in South Africa.

Dlomo (2012) analysed households in South Africa focusing on low income categories and prospects of formalising informal savings. He found that households with higher levels of education, save more, and that males save more than females. Limited financial literacy is often cited as a significant constraint on demand for credit. People with limited literacy skills are often unaware of their right and can be taken advantage of (United Nations, 2006). Giroh *et al.,* (2012) reported in their survey on financial inclusion that education, experience and membership of savings association have significant and positive effects on savings behaviour while household size has a significant but inverse relationship. In a study on financial literacy, financial education and economic outcomes, Hastings *et al*., (2012) found that the causal link between low knowledge and under saving looks increasingly weak. While Cole *et al.*, (2012) studied "the effect of education on financial behaviour", it was found that although an extra year of schooling leads to a 7-8 percentage point increase in the likelihood of financial participation, however, the content is of critical importance. This is due to enhanced cognitive ability rather than any specific financial literacy education.

A study conducted in Cameroon by Bime and Mbanazor (2011) on the determinants of informal savings among vegetable farmers showed that interest paid, farm size, income, education and distance were positively significant. Using time series analysis, Ogbuabor *et al.,* (2013) found that informality hinders the growth of domestic savings and the growth rate of real per capita income impacts positively on domestic savings in Nigeria. In South Africa, Harjes and Ricci (2005) examined the drivers of savings and found that for the past 20 years, commodity prices, fiscal policy and financial liberation have been the main determinants of private savings.

Others empirical studies have focused on cooperatives, group savings, group lending and community savings. In Nigeria, Adufu *et al*., (2010) investigated informal savings mobilisation and investment in ROSCA and found lack of trust/fear of default, method of savings, leadership structure, death of member and lack of participation in decision-making as the main constraints faced by members. In South Africa, DAFF (2012) designed framework for the development of smallholder farmers through cooperative and found high transaction cost, lack of human capital as some of the challenges faced by cooperatives. Also, Coetze and Cross (2002) investigated the role of community banks in South Africa and found that community banks exist and are active on a continuum from informal to formal institution. It was thus concluded that there is still a need for a formal system.

According to Mashigo (2007), transforming South Africa's credit market through a group lending mechanism is possible on the condition that the effectiveness and efficiency of these mechanisms receive government intervention through judicial policies as well as the creation of an enabling policy environment. This is supported by Jones and Dallimon (2009) who found that at one level, transparency structures within MFIs, in general, and village banks, in particular, should make little difference to the delivery of financial services. Seeking the opinion of members at every stage would impose transaction and opportunity costs which will be most keenly felt by the poorest. However, from the records of MFIs, it was proved that there is a significant failing in participation and quality. This failure can be explained by the challenge faced by village banks in terms of power relations determined the tribal authority.

The following studies show how the factors influence the decision of households to join groups or cooperatives and how membership to such groups/cooperatives impact on income and welfare.

Van Rooyen *et al*., (2012) found that microfinance is both beneficial and harmful to the livelihood of the poor, improves savings and household income. This is because people, who are not economically active, express limited demand for financial services. However, Karlan *et al*., (2014) found that transaction cost, lack of trust and regulatory barriers, information and knowledge gaps, social constraints and behaviour biases are constraints to adoption and effective usage of savings.

Banerjee's (2013) study shows a large positive impact on various outcomes from improvements in access to and usage of formal savings. The study also hints at more transformative impacts than what currently obtains in similar evaluations in micro credit.

Girabi and Mwakaje (2013) studied the impact of microfinance on smallholder farm productivity in Tanzania, using multi regression analysis and t-test. The findings revealed that credit beneficiaries realised high agricultural productivity compared to non-credit beneficiaries. This is partly because credit beneficiaries are relatively better in accessing markets for agricultural commodities, use of inputs and adoption of improved farming technologies. The major factors hindering access to credit by smallholder farmers were reported to be lack of information, inadequate credit supply, high interest rates and defaulting.

Fasoranti (2013) investigated mobilisation of rural savings among women, using binary logistic regression and found that most respondents invested in non-agricultural businesses. Despite the low propensity to save, rural saving still has a positive effect on poverty indices. Mwalughali (2013) studied the impact of community saving and investment promotion programmes in Malawi, using IV, randomisation and matching technique. The findings revealed that the effect of community savings on household income and credit is very strong.

Brune *et al*., (2011) conducted a study on "the Commitments to Save'' and found evidence of very large impact of access to a specialised savings product on downstream income, expenditure and wealth. Ashraf *et al*., (2010) found that the evidence on the impact of expanding access to savings is promising and spans a range of development goals, from impacting empowerment.

Dupas and Robinson (2013) conducted a study entitled "Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya", and found that the impact of expanding access to saving is promising to promoting entrepreneurial investment and activity and increasing agricultural investment and production. This explains why most households join groups in order to access credit, invest and save money to improve their livelihood. This is supported by Ellis *et al*., (2010) who investigated the impact of access to financial services on household investment and found that access to financial services enables households to invest in activities that are likely to contribute to higher future income and, therefore, to growth. Also, there is a clear demand for financial services across the

population, though semi-formal and informal financial services and mechanisms are more commonly used than formal financial services.

In Malawi, Mwalughali (2013) reported that the effect of community savings groups on household income and credit is very strong in the sense that communities could save and/or invest their resources into income-generating initiatives and provide credit. Weiss and Montgomery (2005) conducted a study in Latin America and found that village banks have a stronger poverty focus. He concluded that introducing, strengthening or expanding the concept of village banks may help alleviate social problems at the same time that it extends the reach of the rural finance system.

Talukder (2014) conducted a study in Bangaladesh and found that household size was the non-economic factor that determines household income. Furthermore, the findings also revealed that experience in business and household land had a strong impact in income as well as occupation even though negative. Shi *et al*. (2010) found that educational level of members of the household, high number of non-agricultural employed household members as well as change in average year of education of members are important factors that account for income mobility. Other studies have revealed that farming experience of head of the household, farm size and household size strongly influence the poverty level of households (Okpala, 2012).

2.8. Summary of chapter

This chapter focused on the review of literature on agricultural credit and rural finance, as well as determinants of participation in micro-finance institutions. The literature review revealed that economic welfare is measurable and that there are key components which help in the estimation of individual welfare. In terms of the structure and core activities of village banks compared to main stream banks, which are guided by the South African Reserve Bank (SARB), village banks are structured differently due to their crucial role (inclusion banking) in rural areas and indirect participation in food security in the economy. The link between cooperatives and cooperative financial institutions was examined, the role of the South Africa Micro Finance Apex Fund (SAMAF) was discussed with emphasis on the proper functioning of village banks and the concept of financial cooperatives was described.

Furthermore, theories on savings behaviour were discussed with economic theory in mind. A conceptual framework was designed for a better understanding of village banks savings and credit. A selective theoretical and empirical literature review was conducted as this section of the study forms the basis for the development of the model in chapter 3. Even though the review is not exhaustive, it nonetheless, summarises some of the major findings in the field.

CHAPTER THREE

METHODOLOGY

3.0. Introduction

This chapter provides an overview of the geographic, demographic and socioeconomics characteristics of the study area. A brief summary of the location, size and population of Ngaka Modiri Molema District Municipality (NMMDM) is given in terms of natural and agricultural environments. A description of the research design, sampling procedures, methods of data collection and statistical techniques used for data analysis are given. Definitions and justification of variables used to measure the participation of farmers in village banks are also provided. A detailed description of the statistical framework used in the study, the type of data used, an assessment of the suitability of the data and statistical framework used in testing the hypotheses formulated in chapter one are also provided in this chapter.

3.1. Description of the study area

3.1. 1. Location of the study area

According to figure 3.1, Ngaka Modiri Molema District Municipality (NMMDM) is one of the four district municipalities of the North West Province, South Africa. The other three are: Bojanala-Platinum, Dr Ruth Segomotsi Mompati and Dr Kenneth Kuanda. The District covers a surface area of 31039 square kilometres and shares borders with the Republic of Botswana. The region is officially divided into five districts as follows: Mafikeng; Ratlou; Ramotshere Moiloa; Distsobotla; and Tswaing. The aggregate population of the area is about 842 699 people, with 93.9% African, 1.6% hued, 0.6% Indian/Asian and 3.7% white. The average age of the population is under 25 years (Bogopane, 2012).

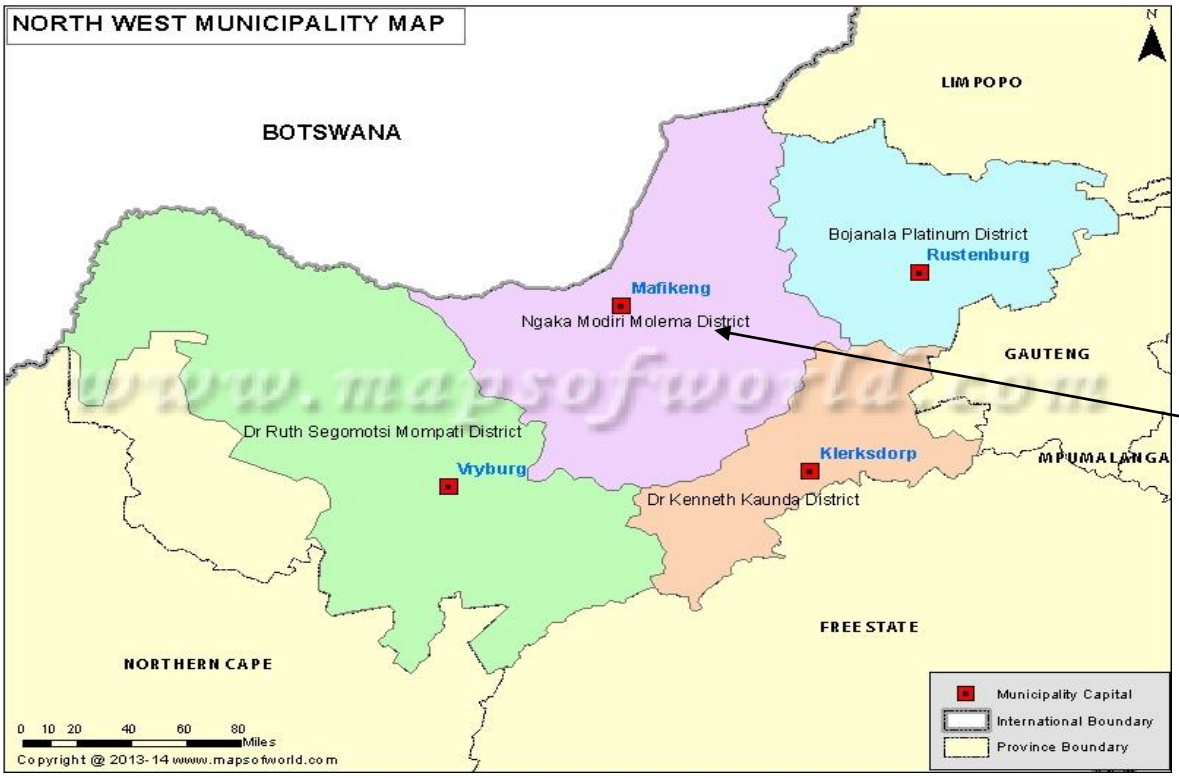

Figure 3.1: Map of the North West province, South Africa

Source: Municipality,NMMD(2014)

3.1.2. Income and poverty situation

As indicated by NMMD (2014) report, roughly 75% of all family units in Ngaka Modiri Molema District (NMMD) procure under R1 500 every month. The spatial example of wage circulation amongst family units in the area demonstrates a low level of pay and reasonableness in terms of provincial range, particularly in the northern and south-western parts of the area. This pattern is common when contrasting wage figures among different Local Municipalities in the area. The figures show that Ratlou Local Municipality has roughly 88% of family units that procure under R1500 every month, trailed by Tswaing and Ramotshere Moiloa Local Municipalities with 82.4% and 78% of families. Ditsobotla (70.8%) and Mafikeng Local Municipality (66.2%), are somewhat, better compared to the other neighbouring districts (Table 3.1) . The low salary levels in Ratlou and Tswaing Local Municipalities are further intensified by the fact that exclusive family units (4.6% and 8.8%) individually acquire more than R3 500 per month.

Furthermore, functional literacy (the proportion of residents over 20 years of age who have primary education or higher) is 35% in these local municipalities compared to the District's total of 2%. Hence, majority of people who are economically active in this District are either employed in poorly paid jobs in rural areas or unemployed.

NMMDM has an aggregate family unit wage of about four trillion of Rand, which is about 17% of the aggregate family unit pay in the North West. The most minimal extent of this wage is in families in Ratlou, a nearby district and Ramotshere Moiloa region, making the two regions, the most underprivileged (Local Government, 2015).

The present unemployment rate in the area stands at 2.2%, compared to the aggregate number of 23% of unemployed individuals in the North West. In any case, this rate is not steady with subsistence agriculture where there is a drop in the number of jobs with the movement of young people to urban areas for better life (Local Government, 2015).

Presently, under 2.5% of the aggregate population in NMMDM do not have any form of tertiary education. The area has a Gross Value Added (GVA) of 10.673,146, compared to 13% of the aggregate GVA in the North West Province. Ratlou and Ramotshere Moiloa contribute 9 %and 11% to the local economy of the region. They have the most reduced Gross Value Added (GVA) in horticulture and mining as the essential segment (Local Government, 2015).

3.1.3. Natural environment

3.1.3.1. Soil type

Data on soil types in NMMDM region shows that primary soil types comprise of Eutrophic soils, Dystrophic to Mesotrophic soils, Mesotrophic to Eutrophic soils and Non-Calcareous soils. These soil types are straightforwardly identified with spatial appropriation of horticultural exercises in the District (Local Government, 2015).

3.1.3.2. Vegetation

The vegetation of NMMDM can be described as follows:

(i) The central and southern parts mainly comprise of sour mixed bushvelds and dry Cymbopogon - Themeda veld;

(ii) The drier western parts are mainly characterised by Kalahari thronged and shrub bushel;

(iii) The eastern parts are mainly covered by Banked veld and Cymbopogon;

(iv) Themeda veld (sandy); and

(v) The extreme northern part is characterised by turf thornveld and mixed bushveld areas (Local Government, 2015).

3.1.3.3. Topography

The geography of NMMDM is delegated "level" (68%), with 15% of the aggregate zone portrayed as "mountainous" and 17% as "rolling". The territory (referred to as sloping), is primarily situated in the northern parts of NMMDM (Ramotshere Moiloa Local Municipality). Within this region, 47% of the range can be portrayed as rugged. The focal and south-western parts of NMMDM (Mafikeng, Ditsobotla, Ratlou and Tswaing Local Municipalities) are transcendently level with some secluded rugged regions in the northern parts of Mafikeng and Distsobotla regions. Whatever remains of NMMDM is "flat" (68%) (Local Government, 2015).

3.1.3.4. Water and climate

The State of the Environment Report for the North West Province (2015) provides detailed data and information on water and spatial distribution of climatic elements. The total number of water consumer units residing in areas classified as rural farmland is 17 438 persons. Majority of these units are located in Ditsobotla and Ramotshere Moiloa Local Municipalities. Approximately 70% of households on farmland have access to some form of water reticulation system (house connection, yard connection or communal standpipe). The vast majority of these consumer units utilise boreholes as their main source of water supply. Rainfall in the District varies from 400 to 600 mm per annum. A small part of the area, adjacent to the eastern boundary, has rainfall slightly higher than the District's average (800 to 1 000 mm per year). Average rainfall per annum stands at 600 mm. Thunderstorms and hails do occur but are lower compared to figures obtained for the Highveld region. NMMDM is distinct from the Highveld region based on differences in climatic statistics (Local Government, 2015).

Table 3.1: Statistics of Ngaka Modiri Molema District and Local Municipalities

Municipalities within the District	Area (km2)	Population	Number of households	Poverty rate
Ngaka Modiri Molema District Municipality	31039	842,699	185,269	59.47%
Ditsobotla Local Municipality	6,464.87	202,187	39,001	55.32%
Mafikeng Local Municipality	3,698.44	293,180	69,397	37.74%
Ramotshere Moiloa Local Municipality	7,192.86	150,713	30,610	64.69%
Ratlou Local Municipality	4,883.65	107,339	23,831	75.43%
Tswaing Local Municipality	5,966.25	81,829	22,429	64.18%

Source: Local Government (2015)

3.1.3.5. Agricultural environment

The district is a predominantly rural with agriculture and mining constituting the economic backbone. The level of education and skills development relevant for these sectors are very low. It is, therefore, not surprising that a large proportion of economically active people (unskilled) work in relatively poorly paid elementary occupations as well as many who remain unemployed. Unemployment rate (42.3%) is higher than the national average of approximately 25 percent. Furthermore, within the district, there is disequilibrium in the distribution of basic services between urban and rural parts of the District (Local Government, 2015).

The District is of strategic importance to the food reserves of the North West Province due its rural nature and the existence of both commercial and subsistence farming activities. Farming activities focus on cattle, game farming around Zeerust and maize production as well as wheat, fruit and vegetable cultivation. The District's maize output contributes immensely to the total output of the Province and positions it as a major producer of white maize in the country. Hence, the Province is ranked second after the Free State in terms of agricultural productivity in South Africa (DAFF, 2012). A study by DAFF (2012) revealed that the

District has engaged in multiple measures to improve farming practices in tribal areas, moving from subsistence to commercial practices.

3.1.4. Financial services and village banks in the District

The financial and business services sector's contribution to the total GDP of the North West Province has a noteworthy 13.6 %, which is equal to R 13 million. This reflects a 1.8 % increase in the sector's contribution towards the provincial GDP since 2004. In addition, the sector's contribution towards the Gross Value Added (GVA) of the Province grew by 4.4 %, reaching a 7 % contribution towards the economy of the North West Province. However, despite the sector making a noteworthy contribution towards the GDP of the Province, it only accounted for 4.5 % of total provincial employment (Cloete, 2010).

In the course of the study, fives village banks were identified in NMMDM (Motswedi village bank located in Ramotshere Moiloa Municipality; Kraaipan village bank in Ratlou Municipality; Lehurutshe village bank in Ramotshere Moiloa Municipality; Lethekane village bank in Ramotshere Moiloa Municipality; and Dithobotla village bank in Dithobotla local Municipality).

3.2. Research design

The study adopted a cross-sectional research design in which data was collected once from sampled respondents in Ngaka Modiri Molema District Municipality. Data was analysed qualitatively and quantitatively. Hypothesis testing was performed in order to test the effect of village banks on the welfare of smallholder farmers.

3.3. Population of study

The target population of this study consisted of all members and non-members of village banks in Ngaka Modiri Molema District Municipality (smallholder farmers).

3.4. Sampling procedure and sample size

From the five village banks identified in the District, three were purposively selected using a vertical and horizontal analysis to ensure that all the banks had the same level. The vertical analysis consisted of examining the organogram, the structure and operation of all the banks, which were at the same level. The horizontal analysis focused on the number of smallholder farmers in the banks, the volume of deposit, capital and the size of the bank. To avoid

choosing successful banks over unsuccessful ones, the most successful, less successful and average banks were chosen in order to avoid bias. From the three selected banks, a simple sampling technique called multi-stage sampling procedure was used to select members from each of the selected banks using registers of village banks obtained from management of each village bank. A total of 100 participants were selected for the study.

Since the focus of the study was on the effects of participation in village banks on welfare, non-members of village banks were used as a control group. Therefore, 100 non-members were selected for purposes of comparison with the treated group from the register of the Department of Agriculture with similar socio-economic characteristics as the treatment group. The inclusion of non-members assisted in terms of comparing the outcomes of treated smallholder farmers with those of the untreated group. A total sample of 200 participants was selected for study as shown in Table 3.2.

Table 3.2: Sample procedure and sample size

Municipalities	Villages	Village banks	Volume of deposit	Members of village banks who are smallholder farmers		Non-members of village banks who are smallholder farmers
				Members	Sample	Sample
Ratlou Local Municipality	Kraaipan	Kraaipan	R 365392	500	30	30
Ramotshere Moiloa Local Municipality	Motswedi	Motswedi	R 962228	700	50	50
Ramotshere Moiloa Local Municipality	Dinokana	Lehurutshe	R 295400	300	20	20
	Total			1500	**100**	**100**

3.5. Data collection

A survey was conducted for members and non-member of village banks using a structured questionnaire. A structured questionnaire was used to collect information from selected

individuals (members and non-members of village banks). Before administering the questionnaire, it was pre-tested in order to eliminate ambiguity. A total of two hundred (200) questionnaires were administered to household heads in their local language and in English in order to gather as much information as possible for the study. The questionnaire was subdivided into four sections as follows: characteristics of households; Agricultural characteristics; indicators for mobilisation of savings; credit indicators; membership of village banks; and welfare status.

Data from the questionnaire was quantified by the researcher using STATA 12.0. The result of the pre-test assisted the researcher in restructuring the final questionnaire through paraphrasing or rephrasing questions that were unclear or ambiguous to respondents and the administrator. Hence, new variables were incorporated and missing ones considered relevant to the study included in the questionnaire. The questionnaire was self-administered with the assistance of extension officers and personnel hired for the purpose of the study.

Face-to-face interviews were conducted with managers and staff of village banks on their membership, categorisation, number of smallholder farmers, operations of the village banks and other challenges faced by village banks. Secondary data and other relevant information were collected from bulletins, books, journals, publications from the North West University library, the library of the Agricultural Centre, and records from village banks (such as history of the village bank, level of agricultural cooperative, village bank project and its management for purposes of the literature review).

3.6. Data analysis

Data collected was coded using Microsoft Excel packages and processed through STATA 12.0. Univariate (frequency, mean and standard deviation) and multivariate (Logistic regression, simultaneous equation model and propensity score matching) were used to analyse the data.

3.6.1. Univariate analysis (objective 1)

The objective of determining the current welfare status of smallholder farmers was done using univariate analysis (tables, frequency, mean and standard deviation and poverty analysis).

3.6.2. Multivariate analysis (objectives 2 and 3)

In this study, multivariate analysis was used to test the hypothesis (objective two), which was to determine socio-economic factors influencing the participation of smallholder farmers in village banks and objective three, which was to analyse the effect of participation in village banks on the welfare of smallholder farmers (per capita expenditure). This was done by examining the relationship between the dependent variable (Y) and the independent variable (Xs) using multivariate analysis such as simultaneous equations model and propensity score matching (PSM). The simultaneous equation model looked at the relationship between participation in village banks and income per capita of a smallholder farmer while the PSM measured the actual impact of participation in village banks on per capita expenditure of smallholder farmers.

3.6.2.1. Logistic regression

Identification of socioeconomic/demographic factors influencing decision to participate in village banks was analysed using bivariate analysis such as logistic model. Logistic regression, also referred to as the Logit model, is used to model dichotomous outcome variables.

In the Logit model, the log odd of the outcome is modelled as a linear combination of the predictor variables. Models which include a “yes” or “no” types of dependent variables are called dichotomous (binary). Such models approximate the mathematical relationship between explanatory variables and the dependent variable (that is always assigned a qualitative response).

Logistic model is based on cumulative logistic probability function. Its advantage is that it can predict the probability of smallholder farmers’ participation in village banks. It is based

on the assumption that the value of a random variable falls within a specific range (Weisers, 2011).

The cumulative probabilities of a random variable are less than or equal to a specific value as:

$$P = \frac{e^{l_i}}{1+e^{l_i}} \quad (1)$$

Conceptually, the behavioural model used to examine participating factors is given by:

$$Y_i = g(l_i) \quad (2)$$

$$l_i = b_0 + b_j X_{ji} \quad (3) \quad \text{where}$$

Y_i = observed response for the i^{th} observation (i.e. binary variable $Y_i = 1$ for participation in village bank, $Y_i = 0$ for non- participation in village bank);

l_i underlying stimulus index for the i^{th} observation;

g = functional relationship between the field observation (Y_i) and the stimulus index (l_i) which determine the probability of participating in village banks;

i = 1, 2, ..., n are observed on variables for the participation model; m is the sample size; X_j is the j^{th} explanatory variable for the i^{th} observation and j = 1,2,3,...,n . b_j is an unknown parameter, j= 0,1,2,.....,n, where n is the total number of explanatory variables.

The Logit model assumes that the underlying stimulus (l_i) is a random variable which predicts the probability of participation in village banks.

$$P = \frac{e^{l_i}}{1+e^{l_i}} \quad (4)$$

Therefore, for the i^{th} observed (an individual farmer);

$$l_i = \ln \frac{p_i}{1-p_i} = b_0 + \sum b_j X_{ji} \quad (5)$$

The relative effect of each explanatory variable (X_{ji}) on the probability of participation in village banks is measured by differentiating with respect to $X_{ji,}$ that is,

$\frac{\delta p_i}{\delta X_{ji}}$, using the quotient rule

$$\frac{dp_i}{dX_{ji}} = (\frac{e^{l_i}}{1+e^{l_i}})(\frac{I_i}{X_{ji}}) \quad (6)$$

The logit t model will guarantee that the estimated probabilities will lie between logical limit 0 and 1. Due to this and other facilities, the logit model is similar and the most frequently used models when the dependent variable happens to be dichotomous (Gujarati, 2004).

The logit model enables the researcher to calculate the odds ratio. When redefining the dependent variable (which is dichotomous), it is advisable to return to the problem of transforming Y from {0 or 1} to the real line. An alternative approach is considered based on the odds ratio because all farmers do not have the same probability to join the village bank and the sum of all their probability will give 1. If an event occurs with probability p, then the odds of it happening are $0(P) = P/(1-P)$. Logit function is similar to Probit function, but has thinner tails than the normal distribution.

3.6.2.1.1. Model specification

The dependent variable (Y) was measured by the dichotomous variable: farmers who participated in village banks were identified as 1, while those not using village banks were identified as 0 as shown below:

$I_i^* = \beta X_i + \mu_{1i}$

Where,

I = 1 if I_i^*>1, participated in village banks,

I= 0 if I_i^*<= 0, otherwise,

X_i is exogenous (independent) variables where i= 1, 2, 3…….. n,

B = is a vector of parameter to be estimated,

μ_{1i} = is the disturbance term,

X1 = gender of respondent (1 = male; 0 = otherwise),

X2 = age of respondent (years),

X3 = educational status of respondent (1 = educated, 0 = not educated),

X4 = dependency ratio (consumer/worker ratio),

X5 = land size (hectare),

X6 = log income per capita (Rand),

X7 = Diversification of enterprise (1 = diversified; 0 = otherwise),

X8 = distance from the offices of village banks to the household (kilometres),

X9 = hired labour (1 = yes; 0 = otherwise),

X10 = marital status (1 = married; 0 = otherwise),

X11 = primary occupation (1 = full time farmers; 0 = otherwise),

X12 = technology applied in farming (1 = yes; 0 = otherwise),
X13 = farming experience (in years).

3.6.2.1.2. Multicollinearity and heterokedasticity tests

In STATA 12.0, before running the logit regression, it is crucial to carry out the OLS regression to check how the independent variables fit the model. In our model, since the dependent variable was dichotomous, the linear probability model was rather considered. From the results, the variable inflator factors test was used to check for multicollinearity. The results in Appendix 2 show that variables (age and farmers' experience) have high VIF (2.23 and 2.06 respectively) and less than 10, indicating the presence of multicollinearity. This also implies that they have the same effect on the model explanation. Therefore, the removal of one of these variables from the model was appropriate.

Furthermore, the model was correlated and the results revealed that age and farmers' experience were highly correlated (0.68), justifying the removal of one of these variables (see appendix 2).

In our model, farmers' experience explained their participation (y) in village banks compared to age; hence, age was removed from the model. A linear probability model was run again, and the results of the variance inflator factor showed that the mean of variance inflation factors (VIFs) of 1.22 was less than 10 (the tolerance level for multicollinearity). Appendix 3 shows that the values of VIF for all variables were less than 10, indicating the absence of multicollinearity between the independent variables (Xs). It should be recalled that variable log AC = ln (annual income per capita with off income).

Appendix 3 also shows the test for heteroskedasticity, using the Breusch-pagan/cook-weisberg test in STATA 12.0. The null hypothesis Ho states that there is a constant variable, meaning that:

Ho: there is no presence of heteroskedasticity data.

To check the P value from the results, if p-value <0.05, the null hypothesis is rejected and it is concluded that there is the presence of heteroskedasticity. If p-value > 0.05, one cannot reject the null hypothesis, thus there is no presence of heteroskedasticity data. In our case, p-

value = 0.3686, which is greater than 0.05, therefore, it could be concluded that in the current model, there is no presence of heteroskedasticity data.

3.6.2.2. Simultaneous equation model (SEM)

An obvious reason for endogeneity of explanatory variables in a regression model is simultaneity (that is, if one or more of the explanatory variables are jointly determined by the dependent variable). Models of this sort are known as simultaneous equations models (SEMs). This technique separately estimates the measurement model and structural model of the structural equation model. This study used one of the SEMs called two stages least square equations (Instrumental variables). The advantages of using TSLS over the more conventional maximum likelihood (ML) method for SEM include the following:

(i) It does not require any distributional assumption for right-hand side (RHS) independent variables. They can be non-normal or binary;

(ii) It is computationally simple and does not require the use of numerical optimisation algorithms; and

(iii) It permits the routine use of often ignored diagnostic testing procedures for problems such as heteroscedasticity and specification error (Pesaran and Taylor, 1999).

However, TSLS has some disadvantages in their use compared to ML. The ML estimator is more efficient than TSLS, given its simultaneous estimation of all relationships. Hence, ML will always dominate TSLS in sufficiently large samples if all assumptions are valid and the model specification is correct. ML is less affected to weak instruments than TSLS. The coefficients from the second stage regression are the TSLS estimators, but *SE*s are wrong .To get correct SEs, estimate the model in a single step using the package as STATA 12.0.

The TSLS model is used with one endogenous regressor according to Oczkowski and Farrel (1998).

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 W_{1i} + \ldots\ldots\ldots\ldots + \beta_{1+r} W_{ri} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

(i) Instruments $Z_{1i}, \ldots\ldots\ldots\ldots Z_m$ where,

Z must be uncorrelated with ε_i

Z must be correlated with X

(ii) First stage

- ✓ Regress X_1 on all the exogenous regressors: regress

X_1 on W_1, ……., W_r, Z_1, ……, Z_m by OLS (Ordinary Least Square)

- ✓ Compute predicted values $\ddot{X}_{1i}$, i=1 , …, m

(iii) Second stage

- ✓ Regress Y on $\ddot{X}_1$, W_1, ……, W_r by OLS
- ✓ The coefficients from this second stage of regression are the TSLS estimators, but the standard errors (SEs) were wrong.

Per capita expenditure $Y_{1i} = \beta_0 + \beta_1 participation$ .....(2)

Participation $Y_{2i} = \beta_0 + \beta_1 X_1 + ... + \beta_n X_n + \varepsilon$ .....(3)

(iv) Endogenous variables: participation,

(v) Instruments variables: loan amount satisfaction, auto-consumption and number of time eating per day, total assets,

(vi) Independent variables (excluding endogenous variables): the same used in the Logit model.

3.6.2.2.1. Check for endogeneity

Endogeneity is when one or more explanatory variables are correlated with the error term, meaning cov(x,μ)≠0. To see whether participation is an endogenous variable, while performing the test of endogeneity on STATA 12 from the post estimation test of instrument variables 2SLS in annual income per capita (Appendix 4), one looks at the p-value of Durbin Score and Wu Hausman. The null hypothesis Ho states that variable are exogenous:

- If their p-value is very small (significant), then the null hypothesis should be rejected and concluded that the variables are endogenous; and
- If their p-value is large (insignificant), then the null hypothesis should be accepted and concluded that the variables are exogenous.

In this study, Durbin Score and Wu-Hausman had a p-value of 0.000 and 0.000 respectively, which were significant and, therefore, the null hypothesis could be rejected and concluded that participation is an endogenous variable.

3.6.2.2.2. Validity of instruments

The validity of an instrument is justified by post-estimation tests of instrumental variables in per capita expenditure equation on second stage summaries in appendix 4. It is necessary to identify predictors that are variable to be measured, that probably do not correlate normally with any of the unmeasured variables. These predictors are referred to as instrumental variables.

From the first stage report in appendix 4, one is searching for good instruments variables which must correlate with the endogenous variable but not correlate with the error term.

At first, the four instrumental variables (loan amount satisfaction, auto-consumption, number of time eating per day and total assets) are used; the test of endogeneity above showed that participation was endogenous. When the test for weak instrument at the first stage was conducted, it was discovered that the partial R square was high (0.3717) and the F-statistic (27.069) was slightly higher than all variables of 2sls and LIML between 10% and 25%. These results proved that instruments are strong.

3.6.2.3. Propensity score matching

3.6.2.3.1. The problem of the control group

Microeconomic analysis of the impact of participation in village banks on welfare is hampered by the fact that the before and after activities of a farm are rarely observed. Therefore, researchers are usually left to compare participants and non-participants. Thus, self-selection into village banks as an intervention for improvement of a farmer's welfare has to be considered since it is a source of endogeneity, and failure to consider it will overstate the true impact of village banks ((Abate *et al.,* 2013).

According to Gayatri *et al.,* (2010), ex-post evaluation measures the actual impact accrued by beneficiaries who are attributable to programme intervention. Ex-post evaluation has immediate benefits and reflects reality. Ex-post evaluation can also be much more costly than ex-ante evaluation since they require collecting data on actual outcome (expenditure) for participants and non-participants of a group.

In order to determine what would have happened to smallholder farmers if village banks were not in existence is the main challenge of impact evaluation. The implication is that the per

capita expenditure of participants has to be determined in the absence of village banks. A beneficiary's outcome in the absence of village banks would be its counterfactual (control group).

With Ex-post evaluation, one observes that outcomes such as income of intervention of village banks on intended participants could raise questions on changes in the well-being of intended participants. Does this change relate directly to the intervention? Has this intervention caused income to grow? Not necessarily! In fact, with only a point of observation after treatment, it is impossible to reach a conclusion whether the result after the intervention can be attributed to the village bank itself.

Ideally, one would like to compare how the same smallholder farmer would have fared with and without intervention (before and after). But one cannot do so because at any given point in time, a smallholder farmer cannot have two simultaneous existences (Gayatri *et al.*, 2010). Also, since smallholder farmers do not keep records due to their poor management, there is no baseline information regarding their existence.

In this study, judging village banks by comparing the per capita expenditure of participants with that of non-participants was not enough. The challenge was to identify a suitable comparison group of non-participants, whose outcomes on average provided an unbiased estimate of the outcomes that smallholder farmers would have had in the absence of participating in village banks. Thus, it is necessary to compare what would have happened to the per capita expenditure of participating smallholder farmers had village banks not existed and how their per capita expenditure would have changed by being members of village banks. Therefore, a comparison group (that is a close counterfactual of participants of village banks) is needed.

In trying to understand the effects of participation in village banks on the welfare of farmers, the per capita expenditure of participants and non-participants in village banks and their contribution to the welfare of smallholder farmer were compared in this study. Per capita expenditure of farmers was observed with the aim of understanding how village banks may assist in terms of improving welfare. Impact evaluations have used a range of methods and some have relied on several approaches which can provide a useful check on the toughness of assumptions underlying different estimates. In each case, the choice of evaluation methods reflects available data, time and resources as well as the particular focus of the different evaluations.

In this study, welfare, as a broad concept, was broken down into social welfare (which is more qualitative) and economics welfare (which is more quantitative). The focus of the study was on economics welfare, especially on the effect of participating in village banks. Nevertheless, due to time constraints and complexity, other components of economics welfare (employment, education and environment) were not considered in this study. In most empirical studies, consumption expenditure is the most common and preferred welfare indicator used for household welfare and resources (Jacob and Slaus, 2012; Wagle, 2007; and Bjorklund*et al.,* 2012). The assumption in economic terms is that, the more income increases, the more welfare will depend on the use of income, but with expenditure, welfare is visible. Thus, the focus of this study was on per capita expenditure, where the margin error is low for impact comparison.

Propensity Score Matching (PSM) was used to test the effect of participation in village banks on the per capita expenditure of farmers. The model was used to address issues of self-selection and the estimation of treatment effects when there is non-random allocation of subjects to treatment and control groups (as is generally the case with observational data).

3.6.2.3.2. Propensity Score Matching (PSM) and average treatment effect (ATE)

Propensity Score Matching (PSM) has been used by many researchers on impact evaluation (Sikwela, 2013; Abate *et al*., 2013; and Mwalughali, 2013) to construct a statistical comparison group based on a model of the probability of participating in treatment, using observed characteristics. Participants are then matched on the basis of this probability, or propensity score, to non-participants. According to these authors, a way of obtaining strong impact assessments is to compute the Average Treatment Effect on the Treated (ATT), which in this case, refers to the average effect of smallholder farmers who obtained loans from village banks. The average treatment effect of the programme is then calculated as the mean difference in outcomes across these two groups. The validity of PSM depends on two conditions: (a) conditional independence (namely, that unobserved factors do not affect participation); and (b) sizable common support or overlap in propensity scores across the participant and non-participant samples (Gayatri *et al.,* 2010).

Propensity Score Matching (PSM) was used to analyse the inclusiveness and effectiveness of cooperative banks. This method allows one to analyse the likelihood of cooperative membership, the impact of cooperative membership on per capita expenditure of farmers, and

the heterogeneity in impact across farmers in a comprehensive manner. First, an estimate of the propensity score (PS) is made as the probability of the sampled farmers to be a member of an agricultural cooperative bank (D). A Probit model is used, including a large set of conditioning factors (X) that can explain a possible non-random distribution of cooperative membership in the population:

$PS = P(D=1|X)$ (1)

The variables included in the vector X relate to household demographic characteristics.

The estimated PS can be interpreted as the probability of being a member of a village bank and the estimated marginal effects as the impact of variables in X on this probability. The Probit estimation will result in insight on whether membership of village bank is biased towards certain types of households and hence, on the inclusiveness of village banks.

Secondly, an estimate is made of the Average Treatment Effects (ATE) of membership of a cooperative bank on farm expenditure and the likelihood of being poor. An estimated PS is used to match treated observations or households of members of a cooperative with untreated observations or non-member households. An estimated average treatment effects is the average difference in farm expenditure and poverty incidence between treated Y (1) and matched controls Y (0). (Verhofstadt and Maertens, 2014).

$ATE = E[Y(1) - Y(0)] = E[Y(1)] - E[Y(0)]$ ..... (2)

With this method, a comparison is made of the per capita expenditure of members of a cooperative or treated households with non-members or control households that are similar in terms of observable characteristics, and partial control for non-random selection of cooperative members (Sikwela, 2013; Abate *et al.*, 2013; Verhofstadt and Maertens, 2014). The estimated ATE can be interpreted as the impact of membership of a village bank on per capita expenditure of farmers, and hence, the effectiveness of cooperative banks.

Third, an analysis is made of how different membership in village banks affects per capita expenditure. The methods proposed by Abebaw and Haile (2013), and Mutuc *et al.*, (2013) were applied. The average treatment effect on the treated (ATT) is calculated, which measures the impact of membership of a cooperative bank on farm income and poverty for actual village banks members only:

$$ATT = E\left[Y(1) - Y(0) / D = 1\right] = E\left[Y(1) / D = 1\right] - E\left[Y(0) / D = 1\right] \quad \text{..... (3)}$$

The estimated ATT was used, generated using the kernel matching method, nearest neighbour matching and radius matching.

According to Caliendo and Kopeing(2008), Nearest Neighbour Matching is the most straightforward matching estimator is nearest neighbor (NN) matching. The individual from the comparison group is chosen as a matching partner for a treated individual that is closest in terms of propensity score. Whereas with Radius Matching, NN matching faces the risk of bad matches, if the closest neighbour is far away. This can be avoided by imposing a tolerance level on the maximum propensity score distance (caliper). Imposing a caliper works in the same direction as allowing for replacement. With Kernel and Local Linear Matching, the matching algorithms discussed so far have in common that only a few observations from the comparison group are used to construct the counterfactual outcome of a treated individual. Kernel matching (KM) and local linear matching (LLM) are non-parametric matching estimators that use weighted averages of all individuals in the control group to construct the counterfactual outcome.(Caliendo and Kopeinig, 2008). In this study, because of the same size of members and non-members of villages' bank, Nearest Neighbour Matching is the best technique matching used.

Impact heterogeneity is visually inspected by plotting ATT over the PS distribution and over the distribution in the characteristics of farm and smallholder farmers, and to derive a smoothed curve. The characteristics of farm and smallholder farmers such as , gender, size of the land, level of education, and marital status were used to analyse which of the characteristics of farm and smallholder farmers had the largest impact per capita expenditure and poverty, and thus, whether village banks are most effective for those most likely to join or not.

Using STATA 12.0 to estimate the effect of village banks on the per capita expenditure of smallholder farmers, there is a need to describe and summarise the dependent variable (per capita expenditure), the independent variables to match participants and non-participants (gender, marital status, level of education) and the treatment variable (participation in village banks) (See Appendix 5).

The next step is to run a regression with dummy variables for participation and it is the same as conducting a t-test (See Appendix 6).

Furthermore, there was a need to estimate the PSM, and this was done using p-score. Here, a comparison is done solely on observations that have similar propensity scores (PS) in the same range (See Appendix 7).

After the comparison was done, a test of balancing the property of the propensity score was performed in order to ascertain if the balancing property was satisfied. Thus, to calculate the PS, the most important thing that one can obtain from this PS model, is to estimate the

predicted probability or the PS matched later. PS is the likelihood of having participated in a village bank. Then, the different matching techniques were examined using kernel matching technique as a reference. For robustness checking, the PS was matched with the neighbour matching and radius matching technique.

3.7. Model specification

For a model specification, the model was run first with per capita expenditure; and a very large coefficient and constant were obtained. To solve the problem of large coefficient, we natural log annual income per capita by log AC= ln (annual income per capita) to solve objective 2 and log EXP=ln (per capita expenditure) for objective 3 as shown in Table 4. In order to obtain better results, we tried to natural log variables for other variables that were not normally distributed such as total assets, autonomous consumption, and total expenditure using the K density test; however, bad results were obtained where participation was not endogenous. Furthermore, some variables such as farmers' experience and level of education were squared to see if these variables, when squared, can make significant impact on annual income; however, the results were bad. Based on the above tests, it is concluded that the model used in this study is well specified with four instruments (logarithm per capita expenditure and logarithm income per capita).

Table 3.3: Expected results for variables used in the study

Variables	**Symbol**	**Logistic (Participation)**	**SEM (per capita expenditure)**	**PSM (Welfare)**
Participation	Y		+	+
Gender of respondent	X_1	+	+	
Age of respondent	X_2	+	+	
Level of education	X_3	+	+	
Dependency ratio	X_4	-/+	-/+	
Land size	X_5	-/+	+	

Log income per capita	X_6	+	+	
Diversification of enterprise	X_7	-/+	-/+	
Distance from village bank office	X_8	-	-/+	
Hired labour	X_9	+	+	
Marital status	X_{10}	-/+	-/+	
Primary occupation	X_{11}	-/+	+	
Technology applied in the enterprise	X_{12}	-/+	+	
Farming experience	X_{13}	+	+	

3.8. Summary of chapter

In order to answer the research questions stated in chapter one, quantitative techniques were used to better understand how prospects for sustainable growth and poverty reduction through economic welfare could be stimulated in rural areas of South Africa. The methods used in the analysis were based mainly on data on smallholder farmers and primary sources of information collected from 200 smallholder farmers. The results presented in this chapter are based on statistical analysis and a description of demographic charateristics of smallholder farmers as well as asset base according to level of income per capita. A logit model was used to determine factors that influence smallholder farmers to participate in village bank savings in NMMDM and the contribution of village bank savings in terms of the sustainability of farms. In order assess the effect of participation in village banks on the welfare of smallholder farmers, simultaneous equation model (SEM) was first used to test the relationship between participation in village banks and per capita expenditure. The propensity score matching technique (PSM) was used to measure the actual impact of village bank on the income per capita of smallholder farmers by comparing differences in expenditure between participants and non-participants in village banks (which revealed the impact on the welfare of smallholder farmers in NMMDM, North West Province). Chapters four and five present the results and discussions.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0. Introduction

This chapter presents the results and discussions. The first section presents a descriptive analysis of the socioeconomic characteristics and welfare status of members and non-members of village banks.

It also discusses results of factors influencing the participation of smallholder farmers in village banks using the logistic regression model. The discussion also focuses on the impact of participation in village banks on the welfare of smallholder farmers using the Simultaneous Equation Model (SEM) and Propensity Score Matching (PSM).

4.1. Socio-economic characteristics of participants and non-participants of village banks

4.1.1. Demographic characteristics of head of household

4.1.1.1. Characteristics of head of household

Table 4.1 presents the distribution of heads of households in terms of gender. The Table shows that female respondents constituted the highest proportion of participants (61%), while most non-participants were males (59%). This result is in line with Mwalughali (2013) who found that majority of members of community saving and investment promotion programmes were females. This may be due to the fact that females generally take greater initiatives in terms of agricultural production and to enhance economic contributions to meet the needs of their families while males tend to abandon farming and migrate to cities for white collar jobs (Osondu, 2015).

In terms of level of education, the highest proportion of participants (27%) and non-participants (47%) attained secondary education. Primary education was attained by 24% of participants and 27% non-participants. The results further show that only 1% of non-members of village banks attained tertiary education, while 23% of participants had tertiary education. It should be noted that 26% of members and 25% of non-members had no formal education. These results indicate that the majority of non-participants attained primary and

secondary education compared to participants, although many of the participants had tertiary education. In countries where governments encourage education in rural areas, it is common to see members of groups having at least primary education. Literacy would enable farmers to effectively and efficiently utilise whatever resources are available to them. As expected, a higher level of education would enhance adoption of improved technology. This findings is in line with the study conducted by Ahmed et *al*., (2012) who found that increased level of education of farmers provide them with the advantage to access and use modern technology and subsequent increase in farming income.

Table 4.1 also shows the distribution of the marital status of respondents. The Table shows that 37% (participants) and 55% (non-participants) were married. Even though married and unmarried people can participate in a savings programme, the results show that unmarried respondents who participated in village banks outnumbered married respondents. It is worth noting that unmarried people may have financial management constraints in their income which could push them to seek additional income from village banks relative to their married counterparts for their livelihood (Mahlo, 2011).

Table 4.1: Demographic characteristics of members and non-members of village banks

	Members of village banks		**Non-members of village banks**	
Number of respondents	**100**		**100**	
Characteristics of farmers	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Gender				
• Male	39	39	59	59
• Female	61	61	41	41
Level of educational				
• Primary	24	24	27	27
• Secondary	27	27	47	47
• Tertiary	23	23	1	1
• Number of educated	26	26	25	25
Marital status				
• Married	37	37	55	55
• Not married	63	63	45	45

Source: Field survey data, 2016

4.1.1.2. Age distribution of head of household

Table 4.2 shows the distribution of heads of households according to age. The majority of participants (39%) were aged between 31 and 40 years while the majority of non-participants were between 51 and 60 years old. This is an indication participants were economically more active than non-participants. The average age of non-participant was 48.7 years while the average age of participants was 41.5 years. This finding is contrary to that of Sikwela and Mushunje (2013); and Apind *et al*., (2015) who found that the average age of participants involved in farmers' cooperatives was between 48 and 53.3 years. This is an indication that smallholder farmers involved in village banks were mostly the active population. This has implications on agricultural production considering the ability of this segment of the population to effectively withstand the rigours, strains and stress involved in agricultural production (Osondu et *al*., 2015).

Table 4.2 also shows the average age per gender of participants and non-participants. It shows that males and females who did not participate in village banks, had an average age of 50 and 46 years respectively compared to participants to male and female participants with average ages of 43 and 40 respectively. This implies that most men and women who participated in village banks were economically active and, therefore, could easily access financial services.

Table 4.2: Age distribution of members and non-members of village banks

	Members of village bank		**Non-members of village bank**	
Age	**N**	**%**	**N**	**%**
<=30	10	0.1	2	0.02
31-40	39	0.39	23	0.23
41-50	38	0.38	27	0.27
51-60	11	0.11	38	0.38
>60	2	0.02	10	0.1
	Mean	SE	Mean	SE
Age	41.5	0.87	48.79	0.99
Male	43.12	1.38	50.25	1.30
Female	40.45	1.11	46.68	1.49

Source: Field survey data, 2016

4.1.1.3. Main occupation of heads of households and their spouses

The results presented in Table 4.3 show that most of non-participants (67%) and participants (60%) were full time smallholder farmers, while most participants (40%) were part time farmers compared to non-participants (33%). This shows that there were more non-participants who were full time farmers compared to the number of participants. This result was not anticipated if one considers the importance of belonging to a farming group in a rural area. Over 90% of food produced in the country comes from rural areas. This result can be explained by the fact that village banks do not focus solely on full-time farmers (Sikwela and Mushunje, 2013).

The results further show that most spouses of heads of households (45.95% participants and 58.18% non-participants) were formally employed. 24.32% of spouses of participants farmed with their husbands compared to 38.18% of spouses of non-participants. Also, 24.32 of spouses of participants were pensioners compared to only 3.64% for non-participants. This is an indication that non-participants are supported financially and labour-wise compared to participants.

Table 4.3: Main occupation of farmers and their spouses

	Members of village banks		**Non-members of village banks**	
Number of respondents	**100**		**100**	
Characteristics of farmers	**N**	**(%)**	**N**	**(%)**
Main occupation				
• Full time farmer	60	60	67	67
• Part time farmer	40	40	33	33
Occupation of spouse				
• Farm together	9	24.32	21	38.18
• Pensioner	9	24.32	2	3.64
• Employed	17	45.95	32	58.18
• Nothing	2	5.4	0	0

Source: Field survey data, 2016

4.1.1.4. Farmers' experience and dependency ratio

The results in Table 4.4 indicate that most participants (48%) and non-participants (54%) had farming experience of between 5 and 10 years. However, 8% of participants had farming experience of less than 2 years, while 38% of participants had farming experience of between

3 and 5 years compared to 19% of non-participants. Only 6% of participants had more than 10 years of experience, compared to 27% of non-participants. The average farming experience was 8 years for non-members compared to 6 years for members. This may be attributed to the fact that village banks target less experienced farmers in order to accompany them through their development strategy (Karlan et *al.*, 2014).

Table 4.4 shows that average of the size of households of non-members of village banks was greater than that of members. No similar results were found for dependency ratios, where the dependency ratio for participants was greater (1.75) than that of non-participants. This is an indication non-members of village banks provided more labour (low dependency ratio) while members provided less labour (high dependency ratio). This was anticipated since the present economic crises and deepening poverty levels have forced rural households (through village bank counselling) to embark on family planning measures to reduce the number of children in their households. It has been shown in the past that rural farm women maintain large household sizes in order to be able to provide enough labour for agricultural production (Hlongwane et *al.*, 2014).

Table 4.4: Farmers' experience and dependency ratio

	Members of village banks		**Non-members of village banks**	
Number of respondents	**100**		**100**	
Farmers' experience	**N**	**(%)**	**N**	**(%)**
<=2	8	8	0	0
2 - 5	38	38	19	19
5 - 10	48	48	54	54
>10	6	6	27	27
	Mean	**Standard error**	**Mean**	**Standard error**
Household size	3.63	0.16	4.64	0.14
Dependency ratio	1.75	0.06	1.73	0.04
Farming experience	6.01	0.26	8.94	0.33

Source: Field survey data, 2016

4.1.1.5. Distance from households to village banks

Table 4.5 shows the distance from households to village banks. The Table reveals that out of the 89 members who received loans, 44% reside within a range of 1.5-3 kilometres from village banks; 37% stay within a range of 3.5-5 kilometres from village banks; while only 19% of members stay within a range of 0-1 kilometres from village banks.

However, out of the 53 non-members of village banks who received loans, about 54.71% reside within a range of 0-1 kilometre from village banks; while 45.28% stay within a range of 1.5-3 kilometres from village bank. This result can be explained by the fact that the average distance covered by non-members of village banks was 0.76 km compared to the average distance covered by members which was 2.99 kilometres. These findings contradict Mwalughali (2013) study that distance from household to the offices of associations must be closer for members than non-members.

Table 4.5: Distance from households to village banks

	Members of village banks		**Non-members of village banks**	
Distance from bank	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
0 – 1	19	19	29	54.71
1.5 – 3	44	44	24	45.28
3.5 – 5	37	37	0	0
>5	0	0	0	0
	Mean	**Standard error**	**Mean**	**Standard error**
	2.99	0.13	0.76	0.09

Source: Field survey data, 2016

4.1.2. Farm characteristics

4.1.2.1. Land ownership and size

The results in Table 4.6 show that 67% of participants were owners of their farmland, as against 64% of non-participants. However, amongst those who did not own land, 18.18% of participants used customary land while no non-participant used such land. Only 39.39 % of participants used free hold land, while 61.12% of non-members did. Furthermore, 42.42% of participants operated lease hold land compared to 38.88% of non-participants. These results could be the consequence of training and education as one of the principles of village banks is to promote successful development in terms of land (Garnevska *et al.*, 2011).

Participants and non-participants of village banks had, on average, almost the same size of land (3.64 ha) and (3.7 ha) respectively. 67% of participants and 74% of non-participants had between 2 and 5 hectares of land. However, only 13 % of participants had land size of

between 6 and 8 hectares compared to 15% of non-participants. Only 4% of participants had land greater than 8 hectares. Furthermore, 16% of participants and 11% of non-participants had land sizes less or equal to 1 hectare. This result is in agreement with the observation of Apind *et al*. (2015) that most farmers in rural areas generally have small holdings and are referred to as smallholder farmers.

Table 4.6: Land ownership and size

	Members of village banks		**Non-members of village banks**	
Characteristics	**N**	**(%)**	**N**	**(%)**
Land				
• Yes	67	67	64	64
• No	33	33	36	36
Type of land arrangement				
• Customary	6	18.18	0	0
• Free hold	13	39.39	22	61.12
• Lease hold	14	42.42	14	38.88
Size of land				
<=1	16	16	11	11
1.1 - 5	67	67	74	74
5.1 - 8	13	13	15	15
>8	4	4	0	0
	Mean	**Standard error**	**Mean**	**Standard error**
Size of land	3.64	0.21	3.7	0.16

Source: Field survey data, 2016

4.1.2.2. Types of enterprise and diversification

Table 4.7 shows the major types of farming enterprises in the study area. It reveals that 23% of participants grew grains while only 17% of non-participants did. The same proportion of farmers (18%) in both groups engaged in cattle and poultry farming. 20% of farmers who belong to village banks produce vegetables and fruits while only 5 % of non-members were involved in the cultivation of these crops. 17% of participants and 18% of non-participants engaged in grain farming, cattle and poultry production. 27% of non-participants were engaged in grain farming, vegetable and fruit production compared to 15% of participants. Similar finding applies to cattle, poultry, vegetable and fruit production where 12% of non-members were engaged. The results in the table further show that most participants (61%) did not diversify their farm products, while 60% of non-participants diversified their products.

This is an indication that smallholders' farmers (members of village banks) put greater emphasis in the production of staple food in the study area, thus they prefer to diversify less. By specialising in what they produce, workers become experts in a particular aspect of the production process. As a result, they become more efficient in such jobs, thus lowering the costs of production (Wickramasinghe and Weinberger, 2013).

Table 4.7: Types of enterprises and diversification

	Members of village banks		Non-members of village banks	
Characteristics	**Frequency**	**Percentage**	**Frequency**	**Percentage (%)**
Types of enterprise				
• Grain	23	23	17	17
• Cattle/poultry	18	18	18	18
• Vegetable/fruit	20	20	5	5
• Grain/ cattle/poultry	17	17	18	18
• Grain/ vegetable/fruit	15	15	27	27
• Cattle/poultry/ vegetable/fruit	7	7	12	12
• Grain/Cattle/poultry/ Vegetable/Fruit	0	0	3	3
Diversification				
Yes	39	39	60	60
No	61	61	40	40

Source: Field survey data, 2016

4.1.2.3. Labour, technology and accessibility

Figure 4.1 shows that 37% of non-members of village banks hired labour for their farming activities, while only 26% of participants hired labour. However, 62% of members did not apply technology on their farms. Only 13% of participating applied irrigation in their farming compared to 9% of non-members. As shown in Figure 4.1, 76% of members had access to technology, 8% had access to technology through the government subsidies programme, peer support and other savings groups. On the other hand, 40% of non-members accessed technology via other savings groups, 30% had access from peer support and 30% from government subsidies. This is an indication that participating in village banks is beneficial to members in order to access technology such as fertilizers, seeds and chemicals. Odetola *et al.,* (2015) suggest better strategic policy targeting to build strong farmers' cooperative that allow them to manage their farms efficiently.

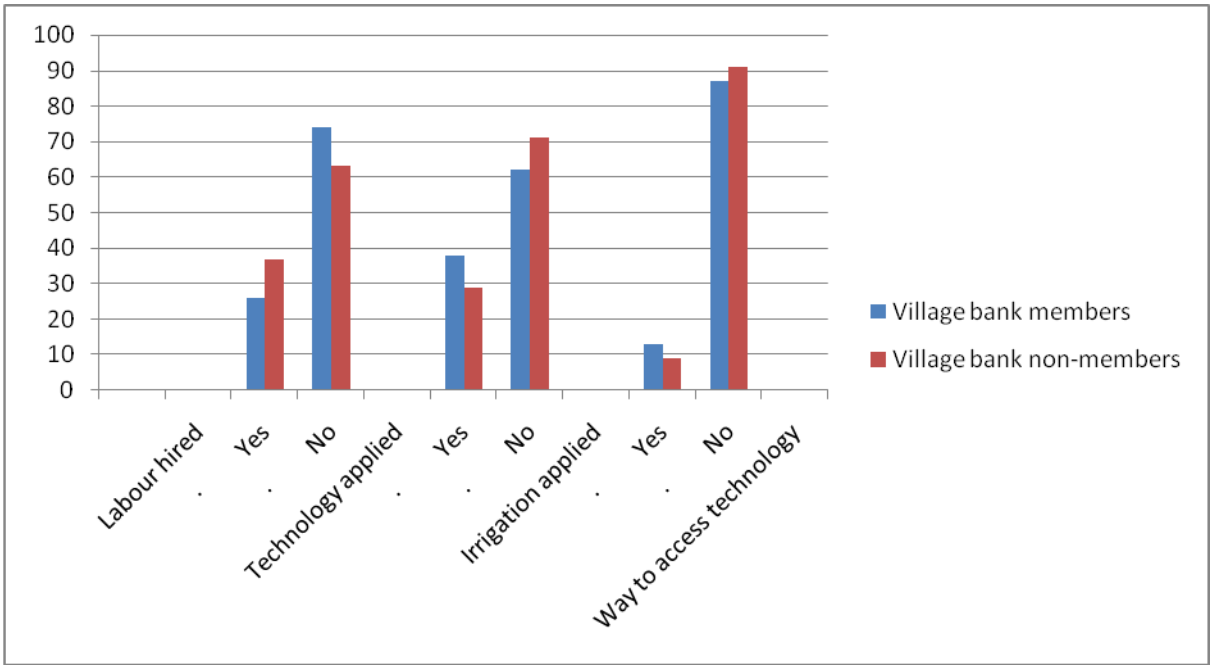

Figure 4.1: Labour, technology and accessibility

Source: Field survey data, 2016

4.1.3. Socio-economic indicators and current welfare status of membership and non-membership of village banks

4.1.3.1. Loans satisfaction and purpose

The results in Table 4.8 show that among those who received credit from village banks, 52.81 %of members were not satisfied with the amount received while 70% of non-members who received credit from other sources than village banks were not satisfied as well. This is an indication that majority of members and non-members were not satisfied with the amount of loans received. Despite the low rate of satisfaction, most members (80.9 %) used loans for agricultural purposes compared to non-members (40%). 33% of non-members used loans for personal businesses, only 7.86% of members did so. 26.66% of non-members also used loans for family issues compared to 11.24% of members. In terms of members using loans for agriculture purposes, 70.84% of members and 75% of non-members used loans for pre-harvest purposes while very few used such loans for post-harvest purposes. This is explained by Odetola *et al*., (2015) who found that pre-harvest investment in agriculture is not granted easily compared to post-harvest where production and part of the production can be used as collateral. Satisfaction, as a perception, cannot be enough for those belonging to village banks where they are aware of funds available, hence participants are willing to realise high

agricultural productivity compared to non-participants, since participants are relatively better in accessing credit (Giradi and Mwakaje, 2013).

Table 4.8: Loans satisfaction and purpose

	Members of village banks		Non-members of village banks	
Characteristics	**N(89)**	**(%)**	**N(89)**	**(%)**
Loans satisfaction				
• Yes	42	47.19	9	30
• No	47	52.81	21	70
Purpose of loan				
• Agricultural purpose	72	80.90	12	40
• Personal business	7	7.86	10	33.34
• Family issues	10	11.24	8	26.66
Loans for agricultural purposes	**N(71)**	**%**	**N(12)**	**%**
• Pre-harvest	51	70.84	9	75
• Post-harvest	21	29.16	3	25

Source: Field survey data, 2016

4.1.3.2. Annual expenditure, sources of income and gross margin by membership

Table 4.9 shows that 53 % of members and 57% of non-members spent most in household expenditure rather than farming expenditure, representing only 47% of total expenditure for members and 43% of total expenditure for non-members.

The major source of income of smallholder farmers was farming (representing 75% of total income of members and only 57% of the total income of non-members). However, off-farm income represented 22% of the total income of non-members and 17% of the total income of members. The contribution of spouses represented 21% of the total income of non-members and only 8% of the total income of members.

These results show that most members of village banks (70%) had a positive gross margin above specified cost compared to the majority (60%) of non-members of village banks with a positive gross margin. This can be explained by the high percentage of off-farm income and farm income from members of village banks compared to non-members of village banks.

Table 4.9: Annual expenditure, sources of income and gross margin by membership

	Members of village banks		Non-members of village banks	
Characteristics	**Amount**	**(%)**	**Amount**	**(%)**
Expenditure	**5406600**		**3898200**	
• Household	2869200	53	2212200	57
• Farming	2537400	47	1686000	43
Income	**7544142**		**4721400**	
• Contribution of spouse	580800	8	1002000	21
• Off-farm income	1251600	17	1050000	22
• Farm income	5711742	75	2669400	57
Gross margin above specified cost with	**N(100)**	**(%)**	**N(100)**	**(%)**
• Positive	70	70	60	60
• Negative	30	30	40	40

Source: Field survey data, 2016

4.1.3.3. Number of eating times per day for members and non-members of village banks

The results in Table 4.10 show that most non-members of village banks ate once a day while members ate at least twice a day. 61% of non-members ate twice a day compared to 41% of members. Non-members of village banks did not eat more than twice a day while 29% and 30% of members ate three and four times a day respectively. This is an indication that, on average, most members and non-members of village banks ate twice a day.

Table 4.10: Number of eating times per day for members and non-members of village banks

	Members of village banks		Non-members of village banks	
Number of eating times/day	**N=100**	**(%)**	**N=100**	**Percentage (%)**
1	0	0	39	39
2	41	41	61	61
3	29	29	0	0
4	30	30	0	0

Source: Field survey data, 2016

4.1.3.4. Current welfare status (poverty analysis) of members and non-members of village banks

Table 4.11 describe the poverty analysis of members and non-members of village banks. The results showed that 24 % of them fall under poverty line. It also indicated that amongst the

24%, 9.5% were female while 14.5% were male. Among the 24% of poor, farmers aged between 40 years and 50 years were the poorest. None were under the age of 30 years, 1.5% were aged between 30 years and 40 years, while 7.5% were aged between 50 years and 60 years, whereas 7% were aged more than 60 years.

Results also indicated that among the 24% who fall under poverty line, 15.5% were married while only 8.5% of them were unmarried. Regarding the education, most of farmers who attained secondary school were poor (10.5%) compared to 8% from primary school, 2% from tertiary education and 3.5 % who were not educated. Regarding the main occupation, those farmers who were not part-time represented 14% of the poor while 10% of the poor represented full-time farmers.

Table 4.11: Poverty analysis of members and non-members of village banks

Group	Estimate	Population	Absolute	Relative
Gender				
Female	0.186227	0.51	0.095	0.39583
Male	0.29592	0.49	0.145	0.60417
Age				
<30	0	0.035	0	0
30<40	0.04762	0.315	0.015	0.0625
40<50	0.25806	0.31	0.08	0.33333
50<60	0.31915	0.235	0.075	0.3125
>=60	0.66667	0.105	0.07	0.29167
Marital status				
Non- married	0.15741	0.54	0.085	0.35417
Married	0.33696	0.46	0.155	0.64583
Education level				
Primary	0.31373	0.255	0.08	0.33333
Secondary	0.28378	0.37	0.105	0.4375
Tertiary	0.16667	0.12	0.02	0.08333
No educated	0.13725	0.255	0.035	0.14583
Main occupation				
Part- time	0.22047	0.635	0.14	0.58333
Full-time	0.27397	0.365	0.1	0.41667
TOTAL		1	0.24	1

Source: Field survey data, 2016

4.2. Multivariate analysis

4.2.1. Logistic model

This section presents the results of the Logistic regression model. However, one of the basic hypotheses of this study was that there are no socio-economic and demographic variables influencing the decision of smallholder farmers to participate in village banks. Logit analysis was used to test this hypothesis by checking whether these variables were significant in the model, with participation as the dependent variable.

Appendix 2 shows the result of the correlation test was conducted. The results show that there was a high correlation for age and farmers' experience (0.68), justifying the removal of one of these variables (age, which is not explained the model better).

Result obtained from heteroskedasticity (Appendix 3) show a p-value =0.3686 which is greater than 0.05, therefore, it is concluded in the model that there was no presence of heteroskedasticity.

With the conclusion that there was absence of multicollinearity and heteroskedasticity in the model, Logit regression was performed to determine factors that influence participation in village banks by smallholder farmers. The results in Table 4.12 reveal that twelve independent variables were included in the model. Among these variables, six were not statistically significant (marital status, dependency ratio, main occupation, diversification, hired labour and technology applied), while six variables were significant (gender, level of education, farming experience, size of the land, log income per capita and distance from the village bank).

Table 4.12: Logit regression coefficient of factors affecting participation in village banks by smallholder farmers

Variables	Estimated	Odds	Standard error	P >|z|	Marginal
Gender	-1.0993*	0.3331	0.5815	0.059	-0.2659*
Marital status	-0.4759	0.6213	0.5834	0.415	-0.1174
Education	0.3977*	1.4883	0.2370	0.093	0.0984*
Dependency ratio	0.3408	1.4060	0.5607	0.543	0.0843
Main occupation	-0.8489	0.4278	0.6525	0.193	-0.2087
Farming Exp	-0.2853**	0.7517	0.1184	0.016	-0.0706**
Land size	0.2963*	1.3448	0.1700	0.081	0.0733*
diversification	-0.3399	0.7118	0.5405	0.529	-0.0839
Hired labour	0.1202	1.1277	0.5702	0.833	0.0296
Technology applied	0.6762	1.9663	0.5600	0.227	0.1635
Log AC	1.7553***	5.7851	0.5702	0.001	0.4633***
Office distance	1.7625***	5.8269	0.3245	0.000	0.4444***
Constant	-20.5978	0.000	6.2344	0.001	
Log likelihood	-48.698876				
Number of Obs	200				
LR chi2(12)	179.86				
Prob > chi2	0.0000				
Pseudo R2	0.6487				

Source: Computed from field survey data, 2016. Variables significant at 1 %(***); variables significant at 5 %(**); variables significant at 10 %(*)

Logistic regression does not have an equivalent to the R-squared found in OLS regression. However, many people have tried to come up with one. Even though this statistic does not perform the function of R-square in OLS regression (the proportion of variance explained by the predictors), it can still interpreted with great caution (as 64.87% of the dependent variable is explained by the independent variables).

The coefficients in the results are the values for the Logistic regression equation for predicting the dependent variable from the independent variable. They are in log-odds units. The prediction equation was represented as follows

$$\log\left(\frac{p}{1-p}\right) = -20.5978 + 0.3331^{*}gender + 0.6213\ maritalstatus + 1.4883^{*}education + 1.4060\ dependencyratio + 0.4278\ mainoccupation + 0.7517\ farmerexperience + 1.3448^{*}landsize + 0.7118\ diversification + 1.1277\ hirelabour + 1.9663techapply + 5.7851^{***}loginccap + 5.8269^{***}distance$$

4.2.1.1. Gender of heads of households

The odds ratio of gender was 0.3331 as shown in Table 4.12. It shows that gender has a significant influence on the decision of smallholder farmers to participate in village banks ($p<0.10$). This is an indication that the chances that smallholder farmers have to participate in village banks decrease among males. This result is in line with that of Bime and Mbanasor (2011) who found gender differentials as major predictors of farmers' participation in village banks. This is consistent with the results in Table 4.12 which show that village banks attract more women than men. The marginal effect of gender was -0.265, an indication that being a male farmer reduces the probability of participating in village banks by 0.265.

4.2.1.2. Level of education of heads of households

The results in Table 4.12 revealed the odds ratio of level of education was 1.4883 and was statistically significant at 10% level. Thus, level of education has a significant influence on the decision of smallholder farmers to participate in village banks. This is an indication that being educated significantly increases the probability of participating in village banks. In another aspect, level of illiteracy of the farmers was associated with self-exclusion and access to village banks. The results support earlier findings of studies conducted in Cameroon and Nigeria (Bime and Mbanasor, 2011; Akpan *et al*., 2011). In this study, the marginal effect of level of education was 0.098; an indication that being an educated farmer increases the probability of participating in village bank by 0.098.

4.2.1.3. Farming experience of heads of households

The odds ratio of farming experience was 0.7517 and was statistically significant at 5% level of significance (Table 4.12). This means that an increase by one year in farmers' experience decreases the likelihood of farmers to participate in village banks. This sign identity of farming experience does not make sense in general, whereby, farmers with more experience, normally become more dedicated to the group compare to young farmers. The more experience acquired by farmers, the more they gain knowledge in the business, which limits risks and, therefore, become more productive as supported by Giroy *et al*., (2012) and also by Akpan *et al*., (2011). This finding can be explained by the high percentage of participants (who are part time smallholder farmers). Even though not their main occupation, farmers

with more experience (even though they master and properly manage their businesses), they are not be willing to join village banks at a given point in life if they meet their expectations. This result is supported by the marginal effect of farming experience (which was -0.070), an indication that there will be a decrease of 7.0% in participation if farmers' experience increases by one year.

4.2.1.4. Size of the land

Table 4.12 shows that size of the land significantly influences the decision of smallholder farmers to participate in village banks ($p<0.10$) and the odds ratio was 1.3448. This is an indication that for every one hectare increase in land size, there is a likelihood of an increase of farmers to participate in village banks, if all other independent variables remain constant. This result is in line with the expectation that land area possessed by the household in hectare has a positive relationship with participation equation since farmers with more land have a greater incentive to participate in village banks where they can obtain money to efficiently use their land (Mwalughali, 2013; Bime and Mbanasor, 2011). This suggests the expansion of cultivated areas as a necessary requisite that could increase the chances of participating in village banks. This is confirmed by the marginal effect of land size (0.0733), an indication that there will be an increase of 7.33% in participation if the land size of farmers increases by one hectare.

4.2.1.5. Annual income per capita

The odds ratio of Logarithm annual income per capita was 5.7851 and statistically significant at 1% as shown in Table 4.12This means that for every increase (by one Rand) in log annual income per capita, a 5.7851 increase is expected of the likelihood of farmers to participate in village banks. This implies that log income per capita is an important determinant of participating in a group savings as reported by Fischer and Qaim (2012) and Uneze (2013). The results show that income per capita could, in the future, still influence smallholder farmers to participate in village banks in the study area. Therefore, farmers would find it necessary to participate in village banks and this can be explained by the proportion of full time farmers who could influence their participation positively. The marginal effect of Log annual income per capita was 0.4633, an indication that there will be an increase of 46.33% in participation if income increases by one rand, other things being constant.

4.2.1.6. Distance of households to village banks

The results in Table 4.12 show that distance is significantly related to participation in village banks at 1% level of significance, thus, distance of households to village banks influences the decision of smallholder farmers to participate in village banks. The odds ratio of the variable distance was 5.8269. This is an indication that for every increase by one kilometre in distance, a 5.8269 increase is expected in the likelihood of farmers to participate in village banks, if all other independent variables remain constant. This implies that the greater the distance from one's household to the village bank, the more likely they might want to participate in village banks. This is contrary to a priori expectations and theory which assume that the more households are closer to village banks, the more farmers are willing to participate in village banks. The marginal effect of distance from households to village banks was 0.4444, an indication that there will be an increase of 44.44% in participation if distance increases by one kilometre. This, on the contrary, was not a problem as farmers were willing to travel long distances to save as long they could access credit.

4.2.2. Simultaneous Equations Models (SEM)

In order to analyse the impact of participation in village banks on per capita expenditure of smallholder farmers, it was assumed that since village banks engage smallholder farmers in savings and entrepreneurship activities, this might be considered as a way of improving the annual per capita expenditure of smallholder farmers, members should be better off compared to non-members of village banks. They should be in a position to have, on average, higher expenditure than non-members with similar household characteristics. In our model, the dependent variable was log per capita expenditure, while the endogenous variable was participation. The instrumental variables were loan amount satisfaction, auto-consumption, number of eating times per day and total assets. Preliminary estimation procedures and tests are presented in Appendix 4 attached to this dissertation (showing the test for endogeneity conducted using Durbin score and Wu-Hausman test as described in Chapter 3). Their p-value was 0.000, which was significant and, therefore, the null hypothesis can be rejected and it could be concluded that participation is an endogenous variable. Furthermore, a test was conducted to check the validity of instruments which must be correlated with the endogenous variable (participation), but not correlated with the error term. Results from the correlation test (Appendix 3) show that, variables such as loan amount satisfaction, auto-consumption,

number of eating times per day and total asset correlate with the endogenous variable, participation. When a test for weak instrument at the first stage was conducted, it was discovered that the partial R square was high (0.3717) and the F-statistic (27.069) slightly higher than all variable of 2SLS and LIML between 10% and 25%. These results prove that instruments are strong.

The independent variables were gender, marital status, level of education, dependency ratio, main occupation, farmers' experience, land size, diversification, hired labour, apply technology, log per capita income and distance from households to village banks.

The instrumental variable estimated for per capita expenditure equation is presented in Table 4.13 below. From the results, seven variables were statistically significant (participation, marital status, dependency ratio, main occupation, technology applied, distance and per capita income).

Table 4.13: Simultaneous Equation Model of the impact of village banks on per capita expenditure of smallholder farmers

Log per capita expenditure	Coefficient	d_y / d_x	Robust standard error
Participation	0.8385***	0.8385***	0.1551
Gender	0.0690	0.0693	0.0625
Marital status	-0.2683***	-0.2683***	0.0638
Level of education	0.0036	0.0036	0.0270
Dependency ratio	-0.1202**	-0.1202**	0.06
Main occupation	-0.3073***	-0.3073***	0.0763
Farm experience	0.006	0.006	0.0113
Land size	-0.003	-0.003	0.0163
Diversification	0.0427	0.0427	0.0635
Hired labour	-0.0107	-0.0107	0.0654
Technology applied	0.1445**	0.1445**	0.0644
Distance	-0.1372***	-0.1372***	0.0318
Log per capita income	0.4141***	0.4141	0.0651
Constant	5.55		0.6607
Number of observations	200		
Wald chi2(12)	291.30		
Prob>chi2	0.0000		
R-squared	0.5202		
Root MSE	0.4144		

Source: computed from field survey data 2016

Variables significant at 1%(***); variables significant at 5%(**); variables significant at 10%(*)

4.2.2.1. Participation in village banks

The results in Table 4.13 revealed that participation in village bank is highly significant at 1% level. Thus, it is one of the main determinants of per capita expenditure. Participation in village banks had a positive coefficient (0.8385). Thus, participation is quite good for per capita expenditure. This result supports the work of Dupas and Robinson (2013); Van Rooyen *et al*., (2012); and Fasoranti (2013) who found that participating in savings groups was promising for promoting entrepreneurial investment in agriculture and, therefore, an increase in expenditure which will have a negative effect on poverty levels.

4.2.2.2. Marital status of heads of households

The coefficient of the marital status variable was negative (-.02683) and statistically significant at 1% level as indicated Table 4.13. This implies that being married decreases per capita expenditure by 0.026. This is not in line with theory where marital status is expected to be positive in the equation. It is believed that when people get married, their responsibilities increase because of the corresponding increase in the number of mouths to feed. This can be explained by the fact that in the study area, people get married to partners who are earning money and support one another. This finding is in agreement with the conducted by Bime and Mbanazor (2011) in Cameroon. They maintained that due to economic circumstances, marriage means sharing responsibilities and this could be an advantage to be accepted and trusted in informal savings amongst vegetable farmers (obtaining loans to improve productivity through increasing expenditure).

4.2.2.3. Dependency ratio of households

The results in Table 4.13 revealed that the dependency ratio variable was negative and statistically significant at 5% level. The unit change in dependent ratio reduced per capita expenditure by a coefficient of 0.1202 in the study. This is consistent with literature such as Okpala (2012), since variables can take any sign in the income equation and Towungana (2015). The results also revealed that dependency ratio was negative and statistically significant. A household with less efficient labour, will not decide to get credit easily because they do not earn much income, this will decrease their production due to lack of input and, therefore, affect their expenditure negatively.

4.2.2.4. Main occupation of heads of households

The results in Table 4.13 revealed that the main occupation of heads of households was negatively and statistically significant at 1%. This suggests that being a full-time farmer reduces the per capita expenditure of smallholder farmers by 0.3073. This result is in agreement with the findings of Talukder (2014) that occupation is an essential determinant of level of household income and expenditure.

4.2.2.5. Technology applied in farming

As indicated in Table 4.13, technology used is associated with a positive (0.1445) effect on per capital expenditure on farmers. This implies that farmers, who applied technology, increased their per capita expenditure by 0.1445. This is consistent with the study conducted by Chandra and Skinner (2012) who found that in the United States of America, health care technology contributed in raising survival rates; however, health care spending, relative to GDP, has also grown more rapidly than in any other country. The use of more technology generally requires more expenditure. According to the results, technology applied as a variable is a determinant of expenditure of most households from a village bank.

4.2.2.6. Distance of households to village banks

The results in Table 4.13 showed that the variable, distance, had a negative coefficient (-0.1372) and was statistically significant at 1% level of significance. This is an indication that distance from households to village a bank was a determinant of per capita expenditure. The negative sign suggests that the more farmers are closed to the village bank, the more their expenditure increases. This is contrary to the work of other researchers that the higher the transaction costs of farmers, the less their participation in village banks (Dupas *et al*., 2014).

4.2.2.7. Per capita income

According to table 4.13, the variable, per capita income had a positive coefficient (0.4141) and was statistically significant at 1% level. This is an indication that one unit increase in per capita income will increase per capita expenditure by 0.4141. This result is supported by the *Keynesian Consumption Theory* which states that household income expenditure highly correlates with income earned with that household per unit work period.

4.2.3. Propensity Score Matching (PSM)

This study examined the effect of participation in village bank on per capita expenditure of smallholder farmers. From the summary in Appendix 5 attached at the end of the dissertation, it is observed that about 50% of smallholder farmers participated in village banks and the average per capita expenditure was 9.371. A summary of the results in terms of participation showed that the mean of per capita expenditure for non-participants was 9.0671 while for participants, it was 9.676. Therefore, those who participate in village banks have a high per capita expenditure compared to those who did not participate. The difference can be explained by the fact that those who participated were different from those who did not participate. For example, those who participated were younger and less responsible than those who did not, thus were willing to spend more.

Results from regression with a dummy variable in Appendix 6 show that, the difference was +0.6091 which was significant. Therefore, it could be seen that participation increases per capita expenditure by 0.6091. One could still control the independent variables, and it could be seen that the coefficient in participation became smaller and those who participated in village banks could see their per capita expenditure increase by 0.5562.

The results in Appendix 7 show the estimate propensity score matching model. The results show that more males and married people are less likely to participate in village banks while the more educated are more likely to participate in village banks. It could be observed that the common support option has been selected and the region of common support propensity score in this range is [.24592085, .74612517], so one does not have a propensity score (PS) that goes highest 1; therefore, we simply do not have PS above 0.7. The final number of blocks is 4 and this ensures that the mean propensity score is not different for participants and control in each block, which is a good thing.

The results for the test of balancing property also showed that balancing property was satisfied , which is an indication that in each of the blocks we had, not only the PS were similar, but the characteristics of the independent variables matched were also similar.

Table 4.14 shows the estimation of average treatment effect of treated (ATT) for the different techniques. ATT is the difference between per capita expenditure of participants and per capita expenditure of control, it is also called effect. The ATT with kernel matching was 0.58,

an indication that if a smallholder farmer participates in a village bank, his or her annual per capita expenditure will increase by 0.58 Rand.

The ATT with the nearest neighbour matching confirmed that if a smallholder farmer participates in a village bank; his or her annual per capita expenditure will increase by 0.58 Rand. The same result is confirmed by the radius matching where if a smallholder farmer participates in a village bank, his or her annual per capita expenditure will increase by 0.58 Rand.

Table 4.14: Average treatment effect of treated in different matching techniques

Matching technique	ATT	t
Kernel matching	0.58	.
Nearest neighbour matching	0.58	6.39
Radius matching	0.58	7.80

Source: Computed from field survey data, 2016

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0. Introduction

This chapter summarises the research outcomes of the study and provides a brief discussion of the results of this study. A summary is given of the quantitative approach used in the empirical analysis, based on the research questions. This study was conducted in order to better understand the place and effectiveness of village banks for sustainable growth and poverty reduction in rural areas of Ngaka Modiri Molema District Municipality. Finally, the chapter examines policy implications, recommendations and areas for further research.

5.1. Conclusion

An analysis of the impact of participation in village banks on the welfare of smallholder farmers in Ngaka Modiri Molema District Municipality, North West Province, South Africa was done in this study. Using cross sectional data from three different villages, where village banks were first established in the study area, the first research question was addressed using univariate analysis such as frequency, mean and standard deviation. The second research question was addressed using a Logit regression model to determine factors that influence smallholder farmers to join village banks. The third research question was addressed employing the Simultaneous Equation Model (SEM) and Propensity Score Matching (PSM) to assess the impact of participation in village banks on the welfare of smallholder farmers. These models are organised to reduce selection bias as well as endogeneity in the sample. Finally, results obtained from these econometrics models were used to close the gap of knowledge on challenges faced by smallholder farmers in accessing credit and improving their welfare in rural areas of South Africa.

5.1.1. Univariate analysis

Results from univariate analysis revealed that:

- Most 63% of members of village banks were not married compared to only 37% of non-member;

- Most members and non-members of village banks had farming experience of between 5 and 10 years, even though only 6% of members compared had more than 10 years of experience compared to 27% of non-members who had at least 2 years of experience;
- Households that provided more labour were non-members of village banks;
- The number of full-time farmers was high amongst non-members of village banks compared to members, even though in both categories, the number of full-time farmers was high;
- The average size of land was high among non-members of village banks (3.7 hectares) compared to members (3.64 hectares); and
- Most non-members of village banks (60%) diversified their products compared to only 39% of members of village banks.

From the arguments presented above, it is concluded in the study that, in general, non-members of village banks have better socio-economic characteristics which can assist them in terms of enhancing their welfare better than smallholder farmers who are members of village banks.

5.1.2. Multivariate analysis

5.1.2.1. Logistic regression

The results obtained for the second research question from the Logit regression showed that variables such as gender, level of education, farming experience, size of the land, log income per capita and distance from village banks, affected significantly, the decision of smallholder farmers to join village banks. However, from these variables, only variables such as level of education, land size, income per capita and distance from household to village banks positively affected the decision of farmers to participate in village banks, even though the variable of distance was contrary to the literature. Consequently, the null hypothesis that socio-economic and demographic characteristics do not influence a smallholder farmer's decision to join a village bank was partially rejected.

5.1.2.2. Simultaneous Equation Model (SEM)

The second research question investigated the impact of village banks on the welfare of smallholder farmers and the overall results showed that the impact of participation of

smallholder farmers in village banks on their per capita expenditure is strong. The SEM estimates indicate that participation increases per capita expenditure by 83.85%. Thus, participation is quite good for per capita expenditure. The results also revealed that variables such as per capita income and technology applied were positively significant on per capita expenditure while variables such as marital status, dependency ratio, main occupation and distance were negatively significant on per capita expenditure.

5.1.2.3. Propensity Score Matching (PSM)

This result from PSM was confirmed with the estimation of ATT with kernel matching techniques which showed that if a smallholder farmer participates in a village bank, his or her per capita annual expenditure will increase by 58%. Generally, it can be concluded that village banks are important in reducing poverty among smallholder farmers in NMMDM, South Africa.

Despite the fact that over the years, agriculture has not been a strong engine of growth in rural South Africa, presents a big challenge to policy makers and donor agencies. It has been proved in this study that agriculture should form an integral part of the rural growth strategy in rural areas of South Africa. However, despite the little number of village banks in South Africa in general and in the North West Province in particular, the findings revealed that farmers who participate in village bank can improve their welfare through such participation. These results could be better unless barriers in savings are uplifted to improve chances of smallholder farmers to access better credit in order not to continue to remain at the margins of economic development and poverty.

5.2. Recommendations

The results suggest a number of potential ways to close the gap in the area for which public and private interventions may want to focus on in order to achieve a significant impact on expenditure, poverty reduction and improved productivity for sustainable agriculture.

5.2.1. Expertise training

The results revealed that farmers' experience was negative, yet significant. Therefore, there is a need to provide expertise training to farmers for them to be able to gain more experience in

order to have a positive effect on participation. This training could be helpful in terms of gaining more expertise in their business by investing efficiently.

5.2.2. The need for more land

It was found that size of the land was not significant for per capita expenditure even though significant for participation. Therefore, there is a need for more land to be made available to farmers if they have to be productive in their farming activities and benefit from the increase in land from village bank initiatives. Improving access to land can have an indirect positive impact on expenditure by enabling farmers to pursue more remunerative livelihood strategies. Given the inverse farm size participation relationship found in the study, improved land size could also increase total crop production in rural areas by enabling more productive smallholders to expand their production.

5.2.3. Promoting the participation of more women in village banks

Promoting the participation of more women participation in village banks can have an indirect positive impact on effective production in the study area. Given the inverse gender participation relationship found in this study, it is necessary to encourage more women to participate in village banks if such initiatives are to be productive and effective in the North West Province.

5.2.4. Development of a curriculum

Smallholder farmers in South Africa, in general, and the North West Province, in particular, have failed to access credit market opportunities because of their failure to develop an appropriate curriculum on microfinance. Therefore, a curriculum must be developed on microfinance with emphasis on savings in order to enlighten people on the role of micro-savings and development as education has proved to positively increase village bank initiatives. According to microfinance opportunities, the aim of financial literacy and education is to strengthen behavioural changes that lead to increased expenditure, better management, and protection of scarce assets and effective use of financial services. Village banks must create incentive measures to attract more smallholder farmers to save such as free entrance fees, better interest on savings and free choice of amount contribute.

5.2.5. Stabilisation on marital status and workers' ratio

The results revealed that marital status, even though not affecting choice of participating in a village bank was a positive determinant of per capita expenditure. Therefore, policy implementation must be made to stabilise marital status among farmers to the advantage of married people compared to non-married people and avoid segregation among farmers, by putting in place a mechanism that will benefit both categories in the study area.

It was also found in the study that dependency ratio, even though positively related to participation, was not significant, but negatively significant for per capita expenditure, therefore, there is a need to put in place a mechanism that will stabilise workers' ratio by reducing the size of households.

5.2.6. Improve savings behaviour in rural areas

With the significant improvement in 2009 of the savings ratio in South Africa, the country's general savings culture remains relatively poor compared to other emerging economies. This is an indication that households continue to live beyond their means while saving almost nothing. Creating a culture of savings for people in rural areas is fundamental. This could be achievable through changing the mind-sets and motivating rural people to put money aside for future use, instead of spending all that they have on consumer items that will soon be forgotten. Studies by the South African Savings Institute (SASI) show that rural people do save money in other savings groups for different purposes. The question is why do smallholder farmers chose such groups instead of village banks established by government to make access to credit easy for the poor? The answers could be found in the promotion of financial literacy to encourage better financial decisions.

5.2.7. Creation of more community-based village bank initiatives

The results also revealed that the village bank initiatives were within the proximity of farmers, in which distance was not an issue. Despite the non-proportion in the number of village banks established in NMMDM, village banks still make significant improvements in terms of expenditure of smallholder farmers and, therefore, the creation of more community-based village bank initiatives is recommended in order to ensure that farmers are able to easily access and promote their farming initiatives.

5.2.8. Promote and encourage more full-time farmers

The strength of each organisation depends of its members. An increase the number of full-time farmers in the study area led to better production as the focus of the farmer was on the business. Farmers were also able to gain fast knowledge by attending different trainings organised by the department of agriculture. It is important that village banks target more full-time farmers organised into cooperatives, this will allow the cooperative to better assist them in terms of skills and inputs.

Once most of these recommendations are implemented, there will a need for more empirical research to be conducted on integrated agriculture finance in the smallholder farming sector. Further research is particularly needed to analyse the impact of agricultural cooperatives in the value chain in order to integrate agricultural micro-finance for smallholder farmers.

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LIST OF APPENDICES

Appendix 1: Chi square test

	P	Interpretation
Gender	0.005	There is a significant association between gender and participation
Marital status	0.011	There is a significant association between marital status and participation
Level of education	0.000	There is a significant association between level of education and participation
Dependency ratio	0.007	There is a significant association between dependency ratio and participation
Main occupation	0.30	There is no significant association between main occupation and participation
Farm experience	0.000	There is a significant association between farm experience and participation
Land size	0.031	There is a significant association between land size and participation
Diversification	0.003	There is a significant association between diversification and participation
Hired labour	0.09	There is a significant association between hired labour and participation
Apply technology	0.17	There is no significant association between applied technology and participation
Distance	0.000	There is a significant association between distance and participation

Source: Computed by the author, 2016

Appendix 2: Linear probability model and variable inflation factor (VIF) test

```
regress  participationinvb gender age maritalstatus educationlevel dependencyratio
mainoccupation farmerxperience landsize diversification

> hirelabour techapply officdist   anninccapnooffarm


      Source |       SS       df       MS              Number of obs =     200
-------------+------------------------------           F( 13,   186) =   21.32
       Model |  29.9198611    13  2.30152778            Prob > F      =  0.0000
    Residual |  20.0801389   186  .107957736            R-squared     =  0.5984
-------------+------------------------------           Adj R-squared =  0.5703
       Total |          50   199  .251256281           Root MSE      =  .32857


------------------------------------------------------------------------------
participationinvb |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------+-----------------------------------------------------------
           gender |  -.1129022   .0489308    -2.31   0.022    -.2094329   -.0163714
              age |   .0014296   .0034577     0.41   0.680    -.0053918     .008251
    maritalstatus |  -.0514778   .0489609    -1.05   0.294    -.1480679    .0451123
   educationlevel |   .0228145   .0212112     1.08   0.284     -.019031      .06466
  dependencyratio |   .0605958   .0481477     1.26   0.210      -.03439    .1555815
   mainoccupation |    .019164   .0500134     0.38   0.702    -.0795025    .1178304
  farmerxperience |  -.0257537   .0099923    -2.58   0.011    -.0454664    -.006041
         landsize |   .0125524   .0129809     0.97   0.335    -.0130563     .038161
  diversification |  -.0650773   .0497811    -1.31   0.193    -.1632854    .0331309
       hirelabour |  -.0144244   .0517125    -0.28   0.781    -.1164429     .087594
        techapply |   .0354919   .0509151     0.70   0.487    -.0649534    .1359371
        officdist |   .1692807    .015629    10.83   0.000     .1384478    .2001136
anninccapnooffarm |   7.40e-06   2.06e-06     3.60   0.000     3.34e-06    .0000115
            _cons |    .085057   .1919834     0.44   0.658    -.2936878    .4638018
------------------------------------------------------------------------------


. vif
```

Variable	VIF	1/VIF
age	2.23	0.449267
farmerxper~e	2.06	0.484458
anninccapn~m	1.71	0.585803
dependency~o	1.19	0.839893
officdist	1.19	0.842044
diversific~n	1.15	0.871361
landsize	1.11	0.902094
gender	1.11	0.902178
maritalsta~s	1.10	0.906512
mainoccupa~n	1.07	0.931074
techapply	1.07	0.934684
hirelabour	1.07	0.935474
educationl~l	1.05	0.956455
Mean VIF	1.32	

Correlation test

```
. correlate  participationinvb gender age maritalstatus educationlevel dependencyratio mainoccupation farmerxperience landsize diversificatio
> n hirelabour techapply officdist logAC
(obs=200)
```

	partic~b	gender	age	marita~s	educat~l	depend~o	mainoc~n	farmer~e	landsize	divers~n	hirela~r	techap~y	officd~t	logAC
participat~b	1.0000													
gender	-0.2000	1.0000												
age	-0.3636	0.2223	1.0000											
maritalsta~s	-0.1806	-0.0618	0.1238	1.0000										
educationl~l	0.1205	-0.0603	-0.0792	-0.0941	1.0000									
dependency~o	0.0128	0.0319	0.1607	-0.0407	-0.0964	1.0000								
mainoccupa~n	0.0727	0.0048	0.0160	-0.0954	0.0058	0.1734	1.0000							
farmerxper~e	-0.4385	0.0882	0.6813	0.1901	-0.1211	0.1064	0.0103	1.0000						
landsize	-0.0159	0.0337	0.1500	-0.0566	-0.0788	0.0078	-0.0215	0.0932	1.0000					
diversific~n	-0.2100	0.1098	0.0914	0.0293	0.0346	-0.1064	-0.0236	0.0808	0.2371	1.0000				
hirelabour	-0.1184	0.0459	0.0611	-0.0644	0.0132	-0.1021	0.0001	0.0840	-0.0298	0.1252	1.0000			
techapply	0.0953	0.1096	-0.0546	-0.0174	0.0367	0.0102	0.1660	-0.0438	-0.0668	-0.0882	-0.0252	1.0000		
officdist	0.6883	-0.0787	-0.2352	-0.1610	0.0589	0.0373	0.0809	-0.2824	-0.0364	-0.1798	-0.0772	0.1038	1.0000	
logAC	0.5419	-0.1866	-0.5975	0.0045	0.0578	-0.1468	0.2986	-0.5288	-0.0127	-0.1036	-0.1736	0.0508	0.3665	1.0000

Appendix 3: Second linear probability model and variable inflation factor(VIF) test without age and with logAC

```
regress  participationinvb gender educationlevel maritalstatus dependencyratio
mainoccupation farmerxperience landsize diversification hirelabour techapply
officdist  logAC


      Source |       SS       df       MS              Number of obs =     200
-------------+------------------------------           F( 12,   187) =   25.08
       Model |  30.8384548    12  2.56987124           Prob > F      =  0.0000
    Residual |  19.1615452   187  .102468156           R-squared     =  0.6168
-------------+------------------------------           Adj R-squared =  0.5922
       Total |          50   199  .251256281           Root MSE      =  .32011


------------------------------------------------------------------------------
participation~b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
         gender |   -.092514   .0469932    -1.97   0.050    -.1852189    .0001908
 educationlevel |   .0251641   .0206492     1.22   0.225    -.0155713    .0658994
  maritalstatus |  -.0935056   .0489098    -1.91   0.057    -.1899914    .0029802
dependencyratio |   .0551175   .0457416     1.20   0.230    -.0351184    .1453535
 mainoccupation |   .0323286   .0488063     0.66   0.509    -.0639532    .1286104
farmerxperience |  -.0151404    .008591    -1.76   0.080    -.0320881    .0018074
       landsize |   .0094032   .0125829     0.75   0.456    -.0154196    .0342259
diversification |  -.0551047   .0486045    -1.13   0.258    -.1509883    .0407789
     hirelabour |  -.0076013   .0503658    -0.15   0.880    -.1069595    .0917568
      techapply |   .0370599   .0495206     0.75   0.455     -.060631    .1347508
      officdist |   .1554872   .0157826     9.85   0.000     .1243523    .1866221
        logAC |   .1920304   .0399715     4.80   0.000     .1131775    .2708834
          _cons |  -1.571373   .4366321    -3.60   0.000    -2.432731   -.7100154
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
     logAC |      1.88    0.532647
farmerxper~e |      1.61    0.622058
   officdist |      1.28    0.783743
```

```
maritalsta~s |      1.16    0.862216
diversific~n |      1.15    0.867579
dependency~o |      1.13    0.883256
    landsize |      1.10    0.911239
mainoccupa~n |      1.08    0.927983
      gender |      1.08    0.928375
  hirelabour |      1.07    0.936023
   techapply |      1.07    0.937822
educationl~l |      1.04    0.957908
-------------+----------------------
    Mean VIF |      1.22
```

. **estat hettest**

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of participationinvb

chi2(1) = 0.81

Prob > chi2 = 0.3686

```
. corr  participationinvb autoconsumption totalasset loanamountsatisfaction numberoftimeeatingperday
(obs=200)

             | partic~b autoco~n totala~t loanam~n number~y
-------------+---------------------------------------------
participat~b |   1.0000
autoconsum~n |   0.5259   1.0000
  totalasset |   0.1176   0.1084   1.0000
loanamount~n |   0.4938   0.2685   0.1006   1.0000
numberofti~y |   0.6832   0.3564   0.1310   0.2930   1.0000
```

Appendix 4: SEM with two stage least square with log AC= ln(annual income per capita) and logEXP= ln(per capita expenditure)

```
. ivregress 2sls logEXP gender maritalstatus educationlevel dependencyratio mainoccupation  landsize diversification hirelabour techapply  fa
> rmerxperience officdist logAC (participationinvb = loanamountsatisfaction numberoftimeeatingperday autoconsumption  totalasset)

Instrumental variables (2SLS) regression              Number of obs =     200
                                                      Wald chi2(13) =  291.30
                                                      Prob > chi2   =  0.0000
                                                      R-squared     =  0.5202
                                                      Root MSE      =   .4144
```

logEXP	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
participationinvb	.83858	.1551073	5.41	0.000	.5345754	1.142585
gender	.069372	.0625095	1.11	0.267	-.0531444	.1918885
maritalstatus	-.2683194	.0638892	-4.20	0.000	-.3935399	-.1430989
educationlevel	.0036439	.0270222	0.13	0.893	-.0493187	.0566064
dependencyratio	-.1202293	.060073	-2.00	0.045	-.2379701	-.0024884
mainoccupation	-.3073568	.0705873	-4.35	0.000	-.4457054	-.1690082
landsize	-.003116	.0163552	-0.19	0.849	-.0351715	.0289395
diversification	.0427849	.0635672	0.67	0.501	-.0818046	.1673743
hirelabour	-.0107554	.0654169	-0.16	0.869	-.1389701	.1174593
techapply	.1445731	.064461	2.24	0.025	.018232	.2709143
farmerxperience	.0060552	.0113412	0.53	0.593	-.0161731	.0282835
officdist	-.137243	.0318211	-4.31	0.000	-.1996112	-.0748747
logAC	.4141013	.0643747	6.43	0.000	.2879292	.5402735
_cons	5.550021	.6607998	8.40	0.000	4.254877	6.845165

```
Instrumented:  participationinvb
Instruments:   gender maritalstatus educationlevel dependencyratio mainoccupation
               landsize diversification hirelabour techapply farmerxperience
               officdist logAC loanamountsatisfaction numberoftimeeatingperday
               autoconsumption totalasset

. estat endog

  Tests of endogeneity
  Ho: variables are exogenous

  Durbin (score) chi2(1)          =  38.1684  (p = 0.0000)
  Wu-Hausman F(1,185)             =  43.6328  (p = 0.0000)

. estat firststage

  First-stage regression summary statistics
```

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	F(4,183)	Prob > F
participat~b	0.7587	0.7376	0.3717	27.0697	0.0000

```
  Minimum eigenvalue statistic = 27.0697

  Critical Values                       # of endogenous regressors:    1
  Ho: Instruments are weak              # of excluded instruments:     4
```

	5%	10%	20%	30%
2SLS relative bias	16.85	10.27	6.71	5.34

	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	24.58	13.96	10.26	8.31
LIML Size of nominal 5% Wald test	5.44	3.87	3.30	2.98

Appendix 5: Description and summary of variables with log EXP= ln (per capita expenditure)

```
. describe  participationinvb logEXP gender maritalstatus educationlevel

              storage  display     value
variable name   type   format      label      variable label
------------------------------------------------------------------------------
participation~b byte   %8.0g
logEXP          float  %9.0g
gender          byte   %8.0g
maritalstatus   byte   %8.0g
educationlevel  byte   %8.0g

. sum  participationinvb logEXP gender maritalstatus educationlevel

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
participat~b |        200          .5    .5012547          0          1
      logEXP |        200    9.371685    .5997672   8.139899   11.25674
      gender |        200         .49    .5011544          0          1
maritalsta~s |        200         .46    .4996481          0          1
educationl~l |        200       2.375    1.122799          1          4

. bysort  participationinvb: summarize  logEXP gender maritalstatus educationlevel

------------------------------------------------------------------------------
-> participationinvb = 0

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
      logEXP |        100    9.067125    .3805494   8.139899   10.18112
      gender |        100         .59    .4943111          0          1
maritalsta~s |        100         .55          .5          0          1
educationl~l |        100        2.24    1.111192          1          4

------------------------------------------------------------------------------
-> participationinvb = 1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
      logEXP |        100    9.676246    .6251952   8.188689   11.25674
      gender |        100         .39    .4902071          0          1
maritalsta~s |        100         .37    .4852366          0          1
educationl~l |        100        2.51    1.123621          1          4
```

Appendix 6: Regression with a dummy variable with log EXP= ln (per capita expenditure)

```
. reg  logEXP  participationinvb
```

Source	SS	df	MS	Number of obs =	200
Model	18.5514201	1	18.5514201	F(1, 198) =	69.26
Residual	53.0330057	198	.267843463	Prob > F =	0.0000
				R-squared =	0.2592
				Adj R-squared =	0.2554
Total	71.5844258	199	.359720733	Root MSE =	.51754

logEXP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
participationinvb	.609121	.0731906	8.32	0.000	.4647878	.7534542
_cons	9.067125	.0517536	175.20	0.000	8.965066	9.169184

```
. reg  logEXP  participationinvb  gender maritalstatus educationlevel
```

Source	SS	df	MS	Number of obs =	200
Model	20.8754839	4	5.21887098	F(4, 195) =	20.07
Residual	50.7089419	195	.260045856	Prob > F =	0.0000
				R-squared =	0.2916
				Adj R-squared =	0.2771
Total	71.5844258	199	.359720733	Root MSE =	.50995

logEXP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
participationinvb	.5562082	.0754138	7.38	0.000	.4074769	.7049396
gender	-.0417357	.0740782	-0.56	0.574	-.187833	.1043617
maritalstatus	-.2051817	.0741689	-2.77	0.006	-.3514579	-.0589056
educationlevel	.0282701	.0325544	0.87	0.386	-.0359337	.092474
_cons	9.141274	.1123331	81.38	0.000	8.91973	9.362818

```
.
```

Appendix 7: Estimation of the PS

```
Estimation of the propensity score

Iteration 0:   log likelihood = -138.62944
Iteration 1:   log likelihood =  -129.8348
Iteration 2:   log likelihood = -129.81557
Iteration 3:   log likelihood = -129.81557

Probit regression                                 Number of obs   =        200
                                                  LR chi2(3)      =      17.63
                                                  Prob > chi2     =     0.0005
Log likelihood = -129.81557                       Pseudo R2       =     0.0636
```

participat~b	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
gender	-.5416195	.1833396	-2.95	0.003	-.9009585	-.1822806
maritalsta~s	-.4889038	.1844107	-2.65	0.008	-.8503421	-.1274654
educationl~l	.1064017	.0817412	1.30	0.193	-.0538082	.2666116
_cons	.2367391	.2598818	0.91	0.362	-.2726198	.7460981

```
Note: the common support option has been selected
The region of common support is [.24592085, .74612517]


The balancing property is satisfied


This table shows the inferior bound, the number of treated
and the number of controls for each block
```

Inferior of block of pscore	participationinvb 0	1	Total
.2	30	12	42
.4	54	52	106
.6	16	36	52
Total	100	100	200

```
Note: the common support option has been selected
```

Appendix 8: Mean and standard deviation (SD) of variable of concern

Natural logarithm was used for the variable annual income per capita in this study

Variables	Mean	Standard	Min	Max	Comments
Participation	0.5	0.501	0	1	Mean closed to SD
Gender	0.49	0.501	0	1	Mean closed to SD
Marital status	0.46	0.499	0	1	Mean closed to SD
Level of education	2.375	1.122	1	4	Mean not closed to SD
Dependency ratio	1.742	0.527	1	4	Mean not closed to SD
Main occupation	0.365	0.482	0	1	Mean closed to SD
Farm experience	7.475	3.348	1	15	Mean not closed to SD
Land size	3.67	1.889	1	9	Mean not closed to SD
Diversification	0.495	0.501	0	1	Mean closed to SD
Hired labour	0.315	0.465	0	1	Mean closed to SD
Technology applied	0.335	0.473	0	1	Mean closed to SD
Log Annual income per	9.567	0.737	7.313	11.433	Mean not closed to SD
Office distance	1.875	1.624	0	5	Mean closed to SD

Source: Field survey data, 2016

QUESTIONNAIRE

SURVEY ON DETERMINANTS OF VILLAGE BANKS ANDEFFECTS ON THE WELFARE OF SMALLHOLDER FARMERS IN NGAKA MODIRI MOLEMA DISTRICT, NORTH WEST PROVINCE, SOUTH AFRICA

Name of municipality:……

Name of village:…….

Date of interview:…….

Questionnaire no:……..

A- Characteristics of smallholder farmers

1. Gender of respondent

Male ☐ Female ☐

2. Age of respondent (in years) …….
3. Marital status

Married ☐ Divorced ☐ Widowed ☐

Separated ☐ Single ☐ Cohabiting ☐

4. If married, what type of work does your spouse do?

Farm together	
Pensioner	
Small business/hawking	
Formal work	
Nothing	
Other ……	

5. How much does he/she contributes to the monthly household income?
   R……
6. Highest level of education of head of household

Primary (uncompleted) ☐ Secondary (uncompleted) ☐ Tertiary ☐

Primary (completed) ☐ Secondary (completed) ☐ No education ☐

7. For how long have you been staying in this village ?.....(in years)
8. What is the size of your household? .....

9. How many adults live together with you who are capable of working in the household? ……..

10. Do you participate in non-farm activities?

Yes ☐ No ☐

11. If yes, what are the other sources and how much do you receive as income?

Sources of non- farm income	Amount earned per month (Rand)
Pensioner	
Remittances from relatives	
Small business/hawking	
Formal work	
Grants	
Other (specify)	

B- Agricultural activities

12. For how long have you been involved in farming? (in years)……..

13. Do you own land?

Yes ☐ No ☐

14. If no, what is the type of land holding arrangement? (Please tick as appropriate)

Customary ☐ Freehold ☐ Leasehold ☐

15. What size of land do you own? (in hectare) ……..

16. What type of enterprise are you engaged in?

Enterprises	Yes=1	No=2
Cattle ranching		
Maize production		
Game farming		
Vegetable farming		

Wheat production		
Fruits production		
Poultry production		
Others……		

17. Do you hire labour in your farming activities?

Yes ☐ No ☐

18. If yes, how often?

Occasionally ☐ Seasonally ☐ Permanently ☐

19. Do you apply technology (fertilizer; seed, tractors) on your farmland during the planting season?

Yes ☐ No ☐

20. If yes, what quantity do you use?

Technology	1=Yes	Cost	Challenges to	Source of
Chemical fertilizer				
Improved seeds				
Tractors				
Pesticide/fungicide				
Farm yard manure				
Compost				
Herbicide				
Other……				

Cost:

1=Very high

2= High

3= Medium

4= Low

5= Very low

Challenges to access

1= High

2= Medium

3= Low

Source of farming

1= Own savings

2= Credit

3= Remittance

4= Other

21. How do you access them?

Through village bank credit	
Through government fertilizer subsidy programme	
Peer support (Community support)	
Through other sources	

22. Who is the major buyer of your farm produce?
    1= Rural consumers
    2= Cooperatives
    3= Middlemen from towns
    4= Urban consumers
    5= Government support
    6= Others (please specify)……

23. How much is your estimated annual farm income? R.....

24. How often do you cultivate your land in a given year?

    Once a year ☐ Twice a year ☐ More than twice a year ☐

25. Have you been irrigating your farm?

    Yes ☐ No ☐

26. If yes, what kind of irrigation do you use?

Stream/river diversion ☐ Dam ☐ Borehole ☐ Other ☐

27. Do you pay money for irrigation?

    Yes ☐ No ☐

28. If yes, how do you rate its affordability?

    Expensive ☐ Affordable ☐ Cheap ☐

29. How often do you cultivate using irrigation?

Once ☐ Twice ☐ Thrice ☐ More than thrice ☐

C. Participation in savings mobilisation

30. Are you aware of any savings mobilisation group around the area?

Yes ☐ No ☐

31. If yes, how did you come to know about the village bank?

Through friends/relatives	
Through the institution's campaigns	
Through posters	

Radio	
Newspapers	
Television	
Community education	
Agricultural extension workers	
Internet	
Other (state)……	

32. Are you a member of a village bank?

Yes ☐ No ☐

33. If no, do you save with others savings groups? (if No, go to question 48)

Yes ☐ No ☐

34. If yes, where?

Stockvel/burial society	
Farmers' association	
Bank	
Post office	
Keep money at home	
Agricultural cooperative	
Other (specify)	

35. How long have you been a member of the village bank/ group?.....years

36. Did you pay any registration fee to join the village bank/ group?

Yes ☐ No ☐

37. If yes, how much do you pay per year?

R……

38. How often do you save in the village bank/ group?

Daily ☐ Weekly ☐ Monthly ☐ Occasionally ☐

39. What is the amount contributed? (in Rand)…….

40. Are you aware of any interest earnings from savings?

Yes ☐ No ☐

If yes, how much interest on average did you earn? ……

If no, why…….....

41. What type(s) of savings plans do you use from the village bank/ group? (please tick)

Savings plan	
Individual plan	
Group plan	
Share	
Other.....	

42. What is your main reason for saving with the village bank/ group? (Tick all that are applicable)

Economics	Interest incentive	
	To meet emergencies	
	Consumption	
	Investment opportunities	
	Land purchase	
	Hiring labour	
	Buy livestock	
	Provide collateral	
Technology	Farm operations	
	House construction	
	Buy seeds, fertilizers	
	Buy machinery	
Socio/cultural	Future/old age	
	Children's education	
	Pay medical expenses	
	Social obligations (funerals, weddings)	

43. How far do you stay from the village bank/ group? (in kilometres)
……..km

44. What is your perception about the operation of the village bank/ group?

	Very poor	Poor	Average	Good	Very good
Process					
Information access					
Implementation					
Availability					

45. As a non-member of a village bank, what is your perception about reliability?

Very bad ☐ Bad ☐ Average ☐ Good ☐ Very good ☐

46. What are the reasons why group members do not join a village bank? (please tick as many responses as possible)

Factors	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Not benefit for member					
Poor performance of village					
Lack of education on the					
Lack of working capital/cash					
Lack of awareness of village					
Lack of market access					
Lack of village bank					
Distance to village bank					
Entrance fees					
Procedures for joining VB not					
Not interested with cooperative					
Others (specify)					

47. What discourages you from saving? (Tickas many responses as possible)

Low interest rates	
High transaction cost	
Distance to the institution	
Standing in queues	
No money to save	
Institution only gives credit	
Poor service provided by staff	
Unavailability of savings at short notice	

Lack of confidence in the institution	
Do not know	
Other	

D. Credit participation

48. Did the head of the household receive any loan from the village bank / group?

Yes ☐ No ☐

49. If no, what problems did you face?

Long procedure ☐ Insufficient of fund ☐ Lack of collateral ☐

High interest rate ☐ High transaction cost ☐

50. If yes, did the amount satisfy your expectations?

Yes ☐ No ☐

51. Were you able to obtain credit when you needed it?

Yes ☐ No ☐

52. How did you request for a loan/credit from your village bank?

Individually ☐ In group ☐

53. If in group, what were the advantages? List them

…….

……..

54. What was the loan for?

Agriculture purpose ☐ Personal business ☐ Family issues ☐

55. If the loan was for agricultural purposes, indicate how it was used:

Pre-harvest ☐ Post-harvest ☐

56. How do you assess the cost to getting credit (interest and other charges)?

Expensive ☐ Affordable ☐ Cheap ☐

57. Have you been able to settle all or part of your loan?

1= Yes, paid out all
2= Yes, paid out partially
3= No, not paid at all

58. Was there any follow-up or monitoring procedure?

Yes ☐ No ☐

59. Was the household investment profitable?

Yes ☐ No ☐

If no, why? List

…… ……

…… …….

60. Do you have a share in the village bank / group?

Yes ☐ No ☐

61. If yes, how many shares?.....

62. What is the amount of one share? R……..

63. What are the perceived problems of a village bank / group? (please tick)

Problems	
Lack of trust	
Method of saving mobilisation	
Leadership structure	
Interest rate on loans	
Lack of participation in decision-making	

64. Did you receive any training in entrepreneurship?

Yes ☐ No ☐

65. If yes, how often did you receive it?

Once ☐ Twice ☐ > twice ☐

66. How much is the estimated value of your total asset? R ……

E. WELFARE INDICATORS

67. How much did you roughly spend on the following:

Maize meal per month	R
Other foodstuff per month	R
Health per year	R
Kerosene per month	R
Transport per month	R
Clothes and shoes per month	R
Housing (iron-sheet cover) last month	R
Durable household expenditures per month	R
Education per year	R
Other (specify)……..	R
TOTAL	R

68. Farming expenditure

Inputs		Amount in Rand
Seeds	Improved	
	Local	
Chemical	Improved	
	Local	
Farm tools	Mechanic	
	Manual	

69. How much do you estimate could be your minimum expenditure? (in Rand)……..

70. How many times does your household consume basic food on average in a day?
    1= one time in a day
    2= two times in a day
    3= three times in a day
    4= more than three times in a day

71. Direct impact of village banks on welfare

Membership benefits	Strongly	Agree	Neutral	Disagree	Strongly
Fast inputs delivery					

Affordable input price					
Fair farm gate output price					
Strong bargaining power					
Reliable storable facility					
Easy access to credit					
Low cost of credit					
Increases savings habits					
Access to agricultural extension					
Credit obtained creates indebtedness					
Improvement of assets					
Increase income					

.....THANK YOU.....