

**ROLE OF FINANCIAL KNOWLEDGE ON EXTENT OF CREDIT ACCESS AND
PERFORMANCE OF WOMEN FARM ENTERPRENEURS IN KERICHO COUNTY,
KENYA**

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented for examination in any other university or any institution of higher learning.

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DEDICATION

This work is dedicated to my lovely parents Joseph Rono Koskei and Flora Rono and to all my siblings for their moral and resource support.

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ABSTRACT

Women farm enterprises in Kenya have in the recent past gained considerable prominence and attention. Several research studies have underpinned the role they can play in economic development and poverty reduction through increased production and employment. However, these farm enterprises have had limited access to credit to enhance their growth. Table banking (TB) is a concept that has been promoted, particularly among women, to enhance access to credit. The role of women farmers' financial knowledge in influencing the extent of credit accessed and performance of women farm enterprises has not been clear in the empirical literature. In particular this study sought: to assess the level of financial knowledge among women members and non-members of TB groups; to determine the factors influencing the extent of credit access of women farm entrepreneurs; and to determine the role of financial knowledge on the performance of women farm enterprises. The study was based on data collected from a sample of 384 women entrepreneurs (including members and non-members) drawn from Kericho County. Multistage sampling technique was used to arrive at the intended sample and semi-structured questionnaires were used to collect qualitative and quantitative data through face to face interviews. The first objective was assessed using objective and subjective measures and was analysed using descriptive and inferential statistics. The second objective was analysed using the double hurdle model. The third objective was analysed using propensity score matching approach. The results revealed that more women belonging to table banking (71%) had high financial knowledge level compared to the counterparts (66%). The results also showed that the extent of credit accessed was positively influenced by financial knowledge, marital status, participation in off-farm occupation, risk-taking tendency, type of farm enterprise, total land owned and access to extension services; while it was negatively influenced by the degree of innovativeness and proactiveness of the women. Furthermore, financial knowledge impacted positively on performance of women farm enterprises as shown by the positive average treatment effect on the treated for all matching algorithms (ranging from KES 12265.15 to KES 19589.78) for savings and (KES 19460.60 to KES 26344.48) for enterprise margin annually. In conclusion, members of table banking exhibited high financial knowledge and that financial knowledge positively influenced both access to credit and performance of women farm entrepreneurs. Therefore, in a bid to further enhance the extent of credit accessed and performance of farm enterprises, the study recommends that, financial knowledge should be beefed up. This can be done through refocussing the modes of delivering financial knowledge to not only improving individual financial knowledge but also promoting proper use of financial resources.

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LIST OF ACRONYMS AND ABBREVIATIONS

ATT	Average Treatment Effect on the Treated
BEWO	Belgut Women Organization
CGAP	Consultative Group to Assist the Poor
DHM	Double Hurdle Model
FI	Financial Institution
FK	Financial Knowledge
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
GOK	Government of Kenya
ILO	International Labour Organization
KIPPRA	Kenya Institute of Public Policy Research and Analysis

KNBS	Kenya National Bureau of Statistics
KES	Kenya shillings
KWEFS Plan	Kenya Women Enterprise Fund Strategic Plan
LDC	Least Developed Countries
PEC	Poverty Eradication Commission
PSM	Propensity Score Matching
RBV	Resource Based View
SBP	Sought Business Permit
SDG	Sustainable Development Goals
SEEWO	Social Economic Empowerment Women Organization
SID	Society International Development
SME	Small and Medium Enterprise
TB	Table Banking
UNDP	United Nation Development Program
UNIDO	United Nations Industrial Development Organization
UNIFEM	United Nations Development Fund for Women

CHAPTER ONE

INTRODUCTION

1.1 Background information

Farm enterprises play a major role in triggering and sustaining economic growth in both developed and developing countries (Gordon and Brayden, 2014; Adefolake, 2016; Maksimov *et al.*, 2016). This is through their potential for poverty reduction (Trivedi and Gaur, 2015), which is among the broader socio-economic objective in the Sustainable Development Goals (SDGs) (UNDP, 2014). In Kenya, farm enterprises account for over 50% of the total GDP with the Annual GDP growth projected at 6.4% in the year 2017 as compared to the registered GDP growth of 5.2% in 2014 (KNBS, 2014), with expected significant contribution from all sectors but majorly from farm enterprises (UNDP, 2012; KIPPRA, 2013; KNBS, 2014). In addition, farm enterprises contribute more than 50% of employment through creation of four out of five new job positions and represent over 90% of the private businesses in Kenya (Habib and Zurawicki, 2010; Osoro *et al.*, 2013; Mbugua *et al.*, 2014).

Most developing countries, Kenya included, are experiencing an influx of the number of women venturing into farming, particularly the small scale farming in the recent years (Le and Raven, 2016). This is mainly attributed to advocacy on women empowerment programs and policies advanced by Governments and other institutions including International Labor Organization (ILO) and United Nations Development Fund for Women (UNIFEM). The advocacy emerged as a result of recognizing the importance of women in economic development in both developed and developing countries (Al-Dajani and Marlow, 2013). This is also as a result of different initiatives by governments and other development partners in encouraging women participation majorly in farm enterprises (Tambunan, 2009; Al-Dajani and Marlow, 2013). Women farm entrepreneurs are the facilitators of micro economic development in their communities and more so, significant contributors to the increase in the households' level of income (ILO, 2008; UNIDO, 2012; Le and Raven, 2016).

Despite the recorded success of women farm enterprises (McGowan *et al.* 2012; Le and Raven 2016), one of the obstacles to better performance of these enterprises is underfinancing (UNIDO, 2012). According to the Kenya Women Enterprise Fund Strategic (KWEFS) Plan (2009-2012), 40% of all Kenyan women have no access to finance at all and 40% have access to informal financial systems only. Previous studies (Kostov *et al.*, 2015; Allen *et al.*, 2016) have attributed this majorly to low levels of financial knowledge among other factors such as collateral,

institutional factors, high transaction cost, socio-economic factors, and information asymmetry. According to statistics, the Kenyan population especially the rural women population that is around 51.3% have low financial knowledge and thus cannot efficiently manage their finances (Lusardi and Mitchell, 2008; FSD and KNBS, 2016).

Financial knowledge has its definition differ by various studies though with a lot similarities. Warthington (2006) defined financial knowledge as the ability to make informed judgments and to take effective decisions regarding the use and management of money. Atkinson and Messy (2011) defined financial knowledge as a combination of awareness, skills, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial well-being. Houston (2010) defined financial knowledge as the necessary numerical and non-numerical skills and understanding of basic economic concepts required for educated saving and borrowing decisions. The study adopted the later definition of financial knowledge. Therefore, financial knowledge is critical especially for the women population if they are to contribute to breaking the poverty cycle through participation in farm enterprises.

Following the recorded challenge of underfinancing, the Kenyan government through the Poverty Eradication Commission (PEC) established table banking program. The major aim of table banking was to curb the financial problem through provision of credit to the women farmers. Table banking typically refers to a form of group funding whereby members pool their savings together and borrow immediately from the same savings either for a short or long period. This type of table banking takes the form of Grameen Bank of Bangladesh and the village savings and loan schemes of Zanzibar (Kariuki *et al.*, 2014). As a result, over 50% of Kenyan adults and especially women are active in table banking program with more than half of the women in table banking groups citing this program as their only access to financial services (Gugerty 2007; Marti and Mair, 2009).

Contrary to other formal financial institutions, table banking aim at helping rural women save and access affordable and easily available funds for investment in income generating projects such as farm enterprises. This is because it allows women groups to benefit through group guarantee and joint liability lending which is favorable to most lending institutions aiming to curb credit risk and default risk (Brown *et al.*, 2011). This is attributed to the fact that members generally come from same geographic locations, share similar values and beliefs meaning that peer-pressure, social cohesion and cooperation often enhance timely repayment of loans (Atieno, 2012). Through table banking savings, women can easily dip into their savings to address a shock (Dupas *et al.*, 2013; Silvia, 2015; Lambisia *et al.*, 2016). In addition, members benefit from sharing ideas and

knowledge on funds management and business experience thus creating social capital based on trust, which tends to facilitate resource exchange and value creation among entrepreneurs (Jonsson, 2015). This social capital becomes a motivating factor for table banking spread within a community (Asseto, 2014). As a result, women are urged to join hands in pooling resources to help overcome poverty and financial illiteracy through table banking programs (GOK, 2013; Kariuki *et al.*, 2014).

Following the recorded success of table banking programs, women across the country have resorted into these forms of banking by organizing themselves into groups of between 10-30 members (Aterido *et al.*, 2013). Among these groups is the Social Economic Empowerment of Women Organization (SEEW), a women group based in Kericho County. SEEW was formed in 2010 as a non-profit making organization to empower the rural women both socially and economically through table banking (SEEW, 2016). Therefore, through the table banking program, SEEW women are in a position to access funds enabling them to start and run their agricultural SMEs that replaces ‘hands of beggar into the hands of the worker’ (meaning being self-reliant) (Atieno, 2012).

1.2 Statement of the problem

Micro-economic development has improved both at community and national level as a result of most rural women venturing into farm enterprises in Kenya. Moreover, there is an increase in income level in the households. Despite the benefits attributed to farm enterprises by women entrepreneurs, access to finance tends to pose a challenge. This is because formal financial institutions have failed to address and meet the credit needs of women entrepreneurs thus resulting in most women resorting to informal banking groups. The emergence of table banking groups attempts to fill the existing credit gap. Despite most women having potential access to table banking, not all women in table banking take table banking loan. In addition, the extent of credit accessed by women members and non-members from other financial institutions is still low. Among other socio-economic and institutional factors, financial knowledge could play a role. This is because financial knowledge has the key role in not only improving personal financial management, but also transforming the same into action in terms of borrowing and saving decisions and sound financial management decisions. Furthermore, the role played by financial knowledge on performance of women farm enterprises has not been clear in empirical literature. It is on this backdrop that this study sought to address these knowledge gaps among women farm entrepreneurs.

1.3 Objectives

1.3.1 General objective

To contribute towards development and growth of farm enterprises among women farmers through enhanced financial knowledge in Kericho County.

1.3.2 Specific objectives

- a. To determine the level of financial knowledge of women members and non-members of table banking groups.
- b. To compare the factors influencing the extent of credit access of women farm entrepreneurs based on membership in table banking groups.
- c. To determine the role of financial knowledge on the performance of women farm enterprises.

1.4 Research questions

- a. What is the level of financial knowledge of women members and non-members of table banking groups?
- b. i) What are the factors influencing the extent of credit access of women farm entrepreneurs?
ii) How do these factors differ by membership in table banking groups?
- c. What is the role of financial knowledge on the performance of women farm enterprises?

1.5 Justification of the study

In Kenya, SMEs play a critical role in national development. This is more evident in women-owned farm enterprises whereby farm enterprises have the potential to contribute significantly to economic growth and poverty reduction through increased production and employment. This role has long been recognized by the Government of Kenya through the vision 2030, through the economic, social and political pillars. Therefore it is not negotiable that a competitive farm enterprise sector is critical and strategic engine for growth in attaining vision 2030.

Despite the Government efforts in improving SMEs through financial enhancement which is one of the economic pillars, low levels of financial knowledge invariably appears as one of the leading hurdles to realizing farm enterprise growth (CGAP, 2013). Therefore, this study will inform policy makers and local leadership on the role of financial knowledge in stimulating the performance of farm enterprises. The findings will also be used by policy makers in enhancing economic growth towards the realization of Sustainable Development Goals (SDGs) 1 (eradicate extreme poverty and hunger) and 3 (promote gender equality and empower women). This can be done through enabling women access funds and education on the management of the same especially through improvement of table banking in order to promote businesses and enterprises at micro level.

In addition, founders of Kenya Women Enterprise Fund Strategic (KWEFS) Plan will use the findings to enhance accessible and affordable credit access and business support services to women especially through table banking so as to start or expand their businesses (KWEFS 2013-2017) plan (GOK, 2014). Finally, the study will be used by government agencies, other financial institutions and development partners in enhancing financial inclusion among different population strata particularly, women.

1.6 Scope and limitation of the study

The study focused on analyzing the role of financial knowledge on access of credit and performance of women farm enterprises. The study was limited to registered members of SEEWO women groups and non-members women farm entrepreneurs in Kericho West Sub-County. The study focused on women farm enterprises that have been in existence for over five years.

1.7 Operational definition of terms

Agricultural small and medium enterprise: It refers to small and medium scale women owned businesses in agricultural sector. In this study, it is used interchangeably with farm enterprises.

Credit access: It refers to getting approved for a loan by the woman farm entrepreneur either from table banking or from any other financial institution.

Financial knowledge: It is an integral of financial literacy and sometimes used interchangeably with financial literacy. It refers to the necessary numerical and non-numerical skills and understanding of basic economic concepts required for educated saving and borrowing decisions.

Financial management: Refers to the act of planning, organizing, directing and controlling the financial activities of an individual, group or organization.

Membership: It refers to the state or status of being a member to a particular group with a common agenda

Performance: It refers to both quantitative and qualitative changes in the agricultural SMEs experienced by the woman entrepreneur such as changes in savings and changes in enterprise margin.

Table banking: It refers to a group funding strategy where members of a particular group meet after a certain period, place their savings, loan repayment and other contributions on the table then borrow immediately either as short term or long term loan.

Women group: It is a village-based financial intermediary committee usually composed of local women dwellers with a common agenda.

CHAPTER TWO

LITERATURE REVIEW

2.1 Status of women in farm enterprises in Kenya

The Kenyan economy predominantly depends on agriculture whose major contributors are the women-owned farm enterprises. There are three profiles of women SMEs in Kenya namely; *Jua Kali* micro enterprises (full range of enterprises), small scale enterprises and very small micro enterprises with 85% in the informal sector and two-thirds in the rural areas (Garikai, 2011). Most of the rural women practice subsistence farming and any other agricultural activities in order to provide for their families and contribute to the economy (Makena *et al.*, 2014). Despite many women venturing especially into farm enterprises, they tend to experience challenges of low growth rate and limited potential. The challenges are attributed to limited market access (distance to market), low levels of education and trainings (extension services) among others (Trivedi and Gaur, 2015).

The ability to tap into new markets requires knowledge, contacts and expertise. Women many a times fail to market their goods and services strategically because they lack access to training and experience on how to participate aggressively in the market. In addition, most women owned farm enterprises have not been exposed to international market and thus lack knowledge on what is accepted internationally in terms of quality and standards (Kimondo *et al.*, 2013). In this regard, markets for farm enterprises tend to be spotty and uneven and as a result most enterprises sell their products to low and middle income local consumers. Women in farm enterprises use traditional ways of marketing which no longer appeal to customers and are less informative thus cannot generate the level of sales revenue to match the current competition (Garikai, 2011). Moreover, women farm entrepreneurs tend to fear and face a high cost and prejudice or sexual harassment of developing new business in a new market. Therefore, the need for an aggressive campaign to penetrate a market is relevant in enhancing performance and growth of women-owned farm enterprises. However, farm enterprises find it difficult and challenging to engage in aggressive marketing campaigns due to low income levels. All these lead to low profits thus inability to repay loan in order to access more loan and hence low performance.

Women have limited access to vocational training and technical training due to low levels of education among women (Thapa *et al.*, 2007). Despite the argument that absence of education does not lead to failure and its presence neither does not lead to success, entrepreneurs with higher levels of education tend to be more successful (Wanigasekara and Surangi 2011) while the less

educated and less experienced entrepreneurs have challenges of accessing finance (Kira, 2013). Moreover, education and training determines the type and range of technology adopted and absorbed by an entrepreneur which in turn determines the product quality and competitiveness in the market.

Access to information is a challenge in terms of acquisition (source), capacity to interpret and effective utilization and dissemination of acquired information. Limited access to timely, reliable, relevant and simplified information on market opportunities, government regulations, financial issues and production technologies inhibits women owned farm enterprises from thriving and surviving in a dynamic and highly competitive market environment (ROK, 2005). Despite the above challenges, in Kenya just like in other countries women owned farm enterprises are associated with significant changes to societal norms that is, women are becoming business owners, providing for their families and operating independently (Trivedi and Gaur 2015).

2.2 Financial provision and access by farm enterprises in Kenya

Access to finance has proved to be one of the main hindrances to growth and survival of farm enterprises as noted by previous studies, with nearly a half of the SMEs in developing countries rating it as a major constraint (Shariff *et al.*, 2010; World Bank, 2010). Finance is not only a by-product of development but an engine propelling performance of SMEs (Shariff *et al.*, 2010). In this regard, Kenya in the recent past has experienced tremendous growth and deepening of financial sector with various sources of finances such as banks, microfinance, cooperatives, international institutions donors, government instruments, as well as personal finances being availed to the SMEs. Despite many formal and informal organizations providing credit, farm enterprises are more credit constrained with only 4% of their credit accessed (ILO 2008) thus affecting farm enterprises possibilities to innovate and grow (Krasniqi, 2010).

The failure of the specialized financial institutions to address and meet the credit needs of the poor and the very poor and women in particular, has resulted in popularity of informal banking groups (Marti and Mair, 2009; Kariuki and Ngugi, 2014). Table banking typically refers to a group funding where members pool their savings and borrow immediately from those savings on the table for a short or long period (Brannen, 2010). Table banking concept is based on the belief that for the extremely poor, particularly women, the best approach is to begin by building their financial assets and skills through savings rather than debt (Asseto, 2014). This is because most poor households have neither the assets nor the skills to interact with formal institutions, even those dedicated to reaching the poor (Kariuki and Ngugi, 2014).

Table banking is founded on the principle that credit should be accepted as a human right and is not based on assessing the material possession of a person but is based on the potential of a person. Through table banking, women in groups would pool formidable resources and loan it to a well-trained entrepreneurial woman whose investments would yield them good returns enough to save (Asseto, 2014). Therefore, the main aim of table banking especially among women is to bring financial services closer to them thus enabling them fight poverty, stay financially sound and operate profitably (Asseto, 2014). In addition, women obtain loan to address household needs and for precautionary purposes since they cannot afford insurance premiums. Despite table banking program bringing services closer to the poor and especially women, not all the women in table banking program take loan and among the obstacles to credit access by farm enterprises are enterprise characteristics, financial characteristics and entrepreneur's characteristics.

2.2.1 Enterprise characteristics

Agricultural SME's age is worth looking at since the enterprise sources of finance change overtime. For instance, a new SME may start as family owned enterprise by using personal and family finance. As it grows, it may obtain finance from local financial providers and when it has well established a good business track record, established a legal identity and develop accounting systems, it may be able to access credit from the formal institutions such as banks. In this regard, new startup and relatively young SMEs (three years and below) based on the past studies face financial constraints due to low established contacts since most financial providers use relationship lending to reduce the problem of information asymmetry (Berger and Udell, 2006).

The type of enterprise ownership plays a role in credit access. Sole proprietorship type tend to depend much on table banking credit since they are viewed by the formal credit markets as non-risk seeking enterprises thus are limited from formal credit access and hence the reason why they turn to table banking credit (Crocia, 2011). Partnerships as opposed to sole proprietorships tend to support one another in terms of financing the enterprise and thus the reason why they demand less credit from table banking (Geburu, 2009)

2.2.2 Financial characteristics

This looks into importance of financial information in acquisition of credit. Access to credit information is important to both farm enterprises and financial providers since farm enterprises need to identify potential suppliers of financial products and services and at the same time they need information to evaluate the type of financial products and services offered including their relative costs. Financial providers on the other hand require information in order to assess the

creditworthiness of farm enterprises (Mole and Namusonge, 2016). Kinyanjui (2006) conclude that firm enterprises face difficulty in accessing finances since they do not fully understand the requirements of accessing and repaying loan.

2.2.3 Entrepreneur's characteristics

This looks into entrepreneurs' network and education level. Researchers have noted that networks can be used as solutions to overcome the problem of financial access and limited markets (Dufhues *et al.*, 2012). According to Mwangi and Ouma (2012), networking such as business and social networking create learning by facilitating the sharing of knowledge and ideas on market opportunities thus leading to steady cash flows in the enterprise (Kozan *et al.*, 2006). As a result, agricultural women entrepreneurs due to steady cash flows are in a position to repay the loan and access more loan thus maintaining a good relationship with the group members. Women with higher levels of education tend to demand more loan from table banking. This is because due to their education qualifications, they are probably employed elsewhere and thus have other sources of income which they can use to boost their farm enterprises and hence the low demand from table banking (Togba, 2004).

2.3 Financial knowledge and performance of farm enterprises

Over the last decade, scholars and policy makers in both developing and developed countries have recognized the importance of financial knowledge in establishment and survival of SMEs especially in agricultural sector (Wise, 2013). The first step in improving financial knowledge is to measure it. There are two approaches of measuring financial knowledge (self-assessment and objective measures like test scores). The first approach is where respondents evaluate their financial knowledge as well as provide information on their attitude towards financial borrowing, saving and investment decision. Objective test assesses the respondents knowledge of understanding financial concepts and ability to apply numerical skills related to finance (Jappelli, 2010). Based on the above measures, the government and other stakeholders in the financial sector through the Financial Sector Deepening (FSD) initiative identified the gap and made effort to educate people to enhance their financial knowledge so as to be in a position to make informed decisions (Jappelli, 2010). The need for improvement of entrepreneur's knowledge is attributed to factors such as development of new financial products, the complexity of financial markets and dynamic changes in technological and environmental factors (Nunoo and Andoh, 2012)

Financial knowledge is suitable for survival and management of farm enterprises since it empowers and educate the entrepreneur to be able to evaluate financial products, facilitate

proper debt management which improves the credit worthiness of potential borrower and make informed decisions (Nunoo and Andoh, 2012). Financial knowledge prepares entrepreneurs for tough financial times such as shocks through strategies that mitigate risks such as accumulation of savings, diversification of assets, avoiding over indebtedness, less vulnerability to fraudulent schemes and purchase of insurance (Alessie *et al.*, 2011; Klapper *et al.*, 2012; Mabhandha, 2015).

Financial knowledge covers the combination of entrepreneurs understanding of financial concepts and products and their ability to appreciate both risks and opportunities, to make informed decisions and to take effective actions to improve the well-being of their farm enterprises (Kapteyn and Teppa, 2011; Rooij *et al.*, 2012). This is because all entrepreneurs regardless of the field they are in are involved in decision making activities with financial consequences (Oseifuah, 2010). Thus, entrepreneurs with adequate financial knowledge are better placed to adapt their farm enterprises to constantly changing business environments. Chung *et al.* (2015) suggest that low financial knowledge leads to more financial disputes and thus hinders the growth of farm enterprises. Low levels of financial knowledge is widely spread and particularly acute among women, elderly and those with low levels of education (Gallery *et al.*, 2011; Bateman *et al.*, 2012). In this regard, women entrepreneurs are compelled to poses high levels of financial knowledge if at all their enterprises are to survive.

2.4 Determinants of access to finance

Age is a significant determinant to credit access. Age of entrepreneur is negatively correlated to access to finance. Abdul-Jalil (2015) argues that as individual is ageing, the tendency to borrow loan declines since the ability to repay decreases as individual might be too weak to work to generate the needed income to repay loan. Thus elderly women tend to rely more on their past savings and accumulated wealth for consumption as compared to the younger women who tend to borrow and save more for various activities (Mpuga, 2010). Contrary, Tang *et al.* (2010) proved that elder women farmers are more likely to borrow than young women farmers due to elder women farmers having more social networks/capital thus have more access to credit. Spousal age gap determines the access to credit and the amount borrowed. A family with the husband being older than the wife and especially if the husband is above 65 years leads to the wife taking more responsibility in family decision making. Thus, with more responsibilities attributed to taking the lead in decision making the wife tends to demand more loan from table banking in order to run the family. On the contrary, with the man making decisions in the family may result in more loan

borrowed especially if the man convinces the wife to take more loan due to limited income or due to emergencies (Togba, 2004).

Dependency ratio and participation in off-farm activities influence access to finance. High dependency ratio is assumed to contain more children and elderly people thus are more likely to consume a large share of their income and have less finance left to repay the loan (Tang *et al.*, 2010). Participation in off-farm activities affects the smallholder's likelihood and intensity of participation in credit access. This is explained by the fact that participation in off-farm activities lead to accrual of higher levels of income since the sources of income are diverse. As a result the household income tends to be stable thus increasing the chances of more credit access due to timely repayment of the loan (Mujeri, 2015). In addition, participation in off-farm activities leads to greater market participation which translates to greater sales volumes of on-farm produce as a result of the off-farm income being used in expanding the on-farm activities. Contrary, participation in off-farm activities results in low demand for loan to be used in on-farm activities since the income from the off-farm is used to boost the on-farm production (Lerman, 2004).

Entrepreneurial orientation is a construct used previously to measure the extent of credit access among farm enterprises (Wiklund and Shepherd, 2003). Entrepreneurial orientation refers to an enterprise degree of entrepreneurship which can be seen as the extent to which it innovates, takes risks and acts proactively (Miller, 1983). Innovativeness is the predisposition to engage in creativity and experimentation through introduction of new products/services as well as technological leadership via research and development. Risk taking involve taking bold action by venturing into unknown and or committing significance resources to venture in unknown environment. Proactiveness is an opportunity-seeking, forward-looking perspective characterized by introduction of new products and services ahead of the competition and acting in anticipation of future demand.

Entrepreneurial orientation reflects the enterprise's decision making styles, methods and practices that lead to new entry. Thus, farm enterprises that have an entrepreneurial orientation are more prone to focus attention and effort toward emerging opportunities such as table banking credit (Wiklund and Shepherd, 2003). Having a high level of entrepreneurial orientation might allow an enterprise to thrive in its external environment and cultivate a high financial performance because they are able to take risks and be innovative and proactive when it comes to venturing into new investments and entering a new market. In this respect, entrepreneurial orientation should be expected to influence access to table banking credit directly. In addition, there is a positive link

between entrepreneurial orientation and enterprise performance (Lumpkin and Dess, 1996). Thus, the higher the level of entrepreneurial orientation possessed by the woman entrepreneur the higher the credit access and enterprise performance.

An enterprise age and enterprise diversification (number of farm enterprises) also matter in financial access since older firms above 3 years are competitive on average and have lower information opacity since they already have well established market share (Pandula, 2011). Old firms have high degree of consolidation and experience with customers and market structure thus generate steady cash flows which enhances their access to finance (Gonzalez *et al.*, 2007). Diversification determines the creditworthiness and profitability of the enterprise thus influence credit access. Enterprises with more diversified agricultural activities are considered more profitable and thus tend to demand more loan than their counterparts dealing with only one line of business. This is because diversification make small farm enterprises more resilient to economic downturns and thus are in a position to earn steady and high income hence high profitability which enhance loan repayment and more access (Nikaido *et al.*, 2015).

Like any other financial institutions, access to credit from table banking program is likely to be influenced by the perception of interest rate charged. Despite the fact that interest rate charged by table banking is considered low as compared to other financial institutions, perceptions on the rate charged tend to differ among different individuals whereby some women tend to perceive the rate as high and thus this lowers the demand for loan (Togba, 2004).

2.5 Indicators of performance of farm enterprises

Farm enterprise performance is assessed by measuring both the success and failure of an organization in achieving its goals and thus can be defined in many ways. In SME economic literature, an approach to define and measure SME performance remains controversial among scholars, arguably due to the fact that SME performance indicators are multi-dimensional (Simpson *et al.*, 2012). Therefore, based on the various literature, it can be deduced that performance of SMEs is synonymous to success and growth since they are measured using similar indicators and refers to how the enterprise is successful using performance, growth and success interchangeably.

Farm enterprise performance indicators include the use of financial indicators. Financial measures include but not limited to changes in savings in table banking and changes enterprise margin (Forsman, 2008; Gerba and Viswanadhan, 2016). Financial indicators of performance such as the profit margin and savings were used as proxy of performance by Wiklund and Shepherd who

analyzed entrepreneurial orientation and small business performance in Sweden (Wiklund and Shepherd, 2005). Despite the wide use of enterprise margin, this indicator tend to be susceptible, problematic and incredible as SMEs hesitate to disclose the true value of enterprise margin for fear of tax burden from government (Gebreeyesus, 2007). As a result, the use of multidimensional approach is considered better since it takes advantage of various approaches and minimizes the shortcomings of single approach that may conflict the results (Gerba and Viswanadhan, 2016).

2.6 Theoretical framework

This study is anchored on resource based approach theory. The resource based view (RBV) suggests that competitive advantage and performance results are a consequence of firm-specific resources whereby resources are anything thought of as strength or weakness of a given enterprise and include all assets, capabilities, organization processes, enterprise attributes, information and knowledge among others (Eniola and Enterbang, 2014). The theory fits the study because performance of farm enterprise by woman entrepreneur in table banking program is influenced majorly by limited credit which together with performance are influenced by socio-economic characteristics, the level of financial knowledge and institutional characteristics. Thus with low financial knowledge, socio-economic and institutional characteristics, there is constrained utilization of resources which leads to low demand for loan and hence low performance of agricultural SMEs.

The RBV suggest that lack of financial, human and organizational resources and capabilities reduce the enterprise innovation activities since it prevents acquisition of new technology that would enhance productivity and competitiveness (Hewitt-Dundas, 2006; Adomako and Danso, 2014). Thus to enhance our knowledge of this relationship, this study dwell on RBV to discuss the beneficial effect of resources in demand for finance and performance of farm enterprises arguing that the relationship between financial knowledge, socioeconomic and institutional characteristics are positively moderated by credit. All the above are essential for generating competitive advantage and can be used to demand credit and undertake other various activities to achieve growth (Eniola and Entebang, 2014). Thus using the RBV this study examine the performance implications of socio-economic characteristics, level of financial knowledge and institutional characteristics on amount of loan borrowed and performance relationship of farm enterprises in Kenya.

2.7 Conceptual framework

The adopted conceptual framework is built on the relationship between socio-economic characteristics, level of financial knowledge, institutional characteristics, financial policies, amount of loan borrowed and performance of farm enterprises. First, the woman entrepreneur decide whether to take loan or not either from table banking or any other financial institution, then provided she takes loan, how much loan to borrow. It is important to acknowledge that despite the fact that all women have access to credit specifically in table banking, not all tend to borrow loan from table banking. In this regard, some women will have zero loan borrowed from table banking over the last one year. The amount of loan borrowed and performance of farm enterprises are influenced by: socioeconomic characteristics such as age of entrepreneur, spousal age gap, education, dependency ratio, participation in off-farm activities, marital status, entrepreneurial orientation, years of woman farm enterprise in operation, number of farm enterprises, type of business ownership and land size; level of financial knowledge, that is both objective and subjective measures used to measure constructs such as interest rate, inflation, sales discount, risk and returns and prices verses income and institutional characteristics including perception of interest rate, extension visits, access to information and woman decision level in the family. The intervening variable is financial policies and intervene between the independent and dependent variables. More details on conceptual framework are provided in figure 1

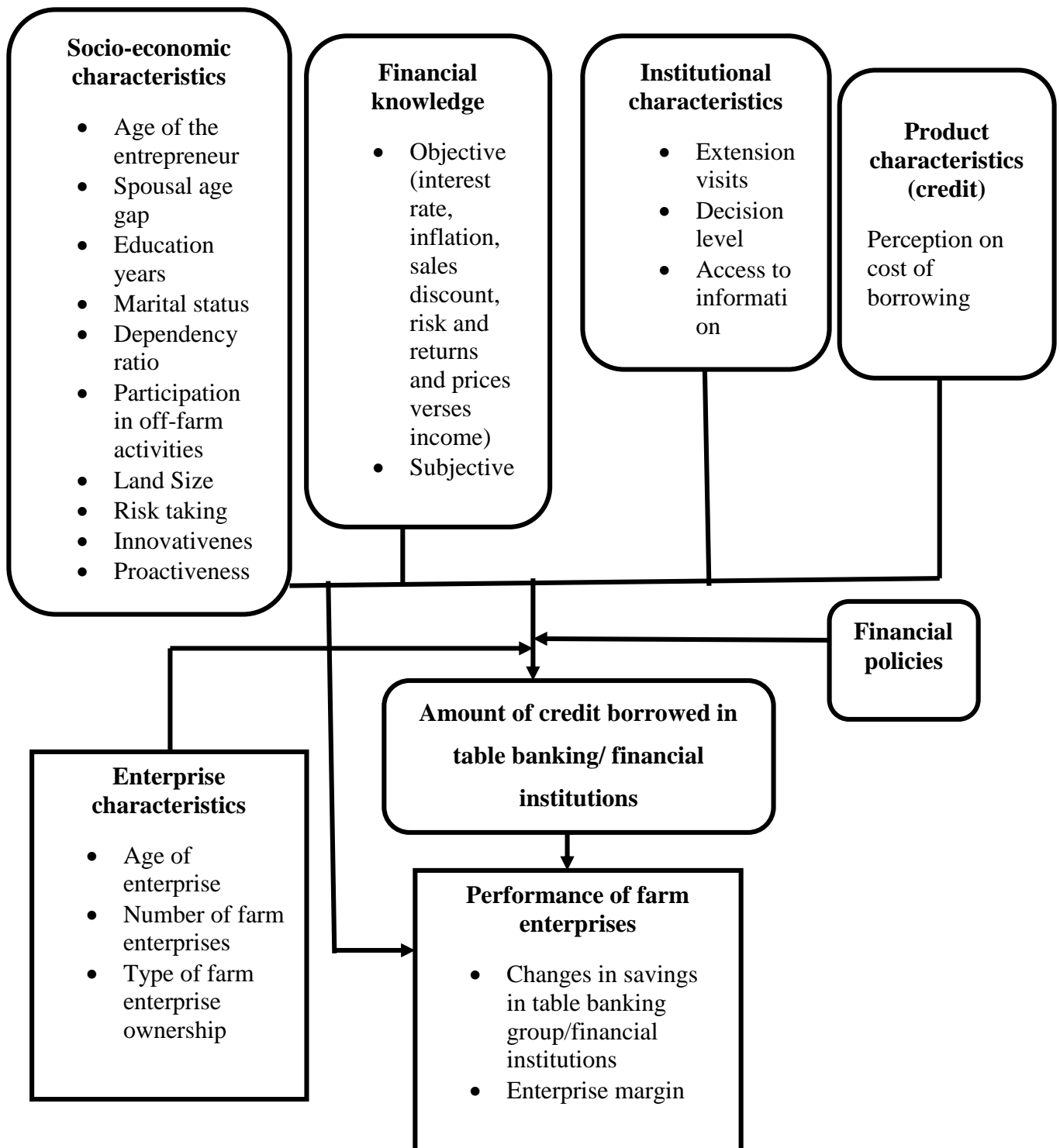


Figure 1: Conceptual framework

CHAPTER THREE

METHODOLOGY

3.1 Study area

The study was carried out in Kericho County. The study area was chosen because it is in this County that SEEWO was first formed in 2010 whereby it was named Belgut Women Organization (BEWO) before its spread to other parts of the Country. Moreover, Kericho County has the largest number of SEEWO women groups. Kericho County has a population of 758,339 as per the 2009 national population and Housing Census and covers a total area of 2479km² with female contributing 48.8% of the total population. It has a population density of 306 people per km² with annual growth rate of 2.5% per annum between 1999 and 2009 (KNBS, 2013). Kericho County is located in the Rift valley with temperatures ranging from 16^oC to 20^oC. The average rainfall ranges between 1400mm to 2125mm per annum with two annual seasons: the long rain season occurs between April and June whereas the short rain season occurs between October and December. January to February is mostly the driest season (KNBS and SID, 2013).

Most of the economic activities within Kericho town and its environments revolve around agriculture that is food and cash crop farming and livestock rearing. With a high altitude and virtually adequate rainfall, it's the country's leading tea growing zone with multinational companies such as Unilever and Finlays being the major large scale tea growers. In addition, other crops such as coffee, sugarcane, potatoes, maize, beans, pineapples, horticulture (tomatoes, vegetables) among others are also grown. On the livestock side, dairy and beef cattle, goats and poultry are the types of livestock bred across the whole County (KNBS and SID, 2013).

SEEWO women group formally known as Belgut women organization (BEWO) is one of the major women organizations in Kericho. It has 600 women groups and 12000 registered members distributed across the entire Kericho County with expected population of 100000 members by the end of 2017. SEEWO was founded by the wife of the then Member of Parliament for Belgut constituency (Hon. Charles Keter) as a non-profit making organization. The main objective was to empower rural women economically, socially and financially through table banking model. In addition to Kericho County, SEEWO is also operational in Bomet County. This organization helps women in income generating activities through table banking program, SMEs startups, market access and community training. This group engages in an agribusiness program, goat auction

program, education booster program, and sanitation and safe drinking water program (SEEWO, 2016; SEEWO, 2017)

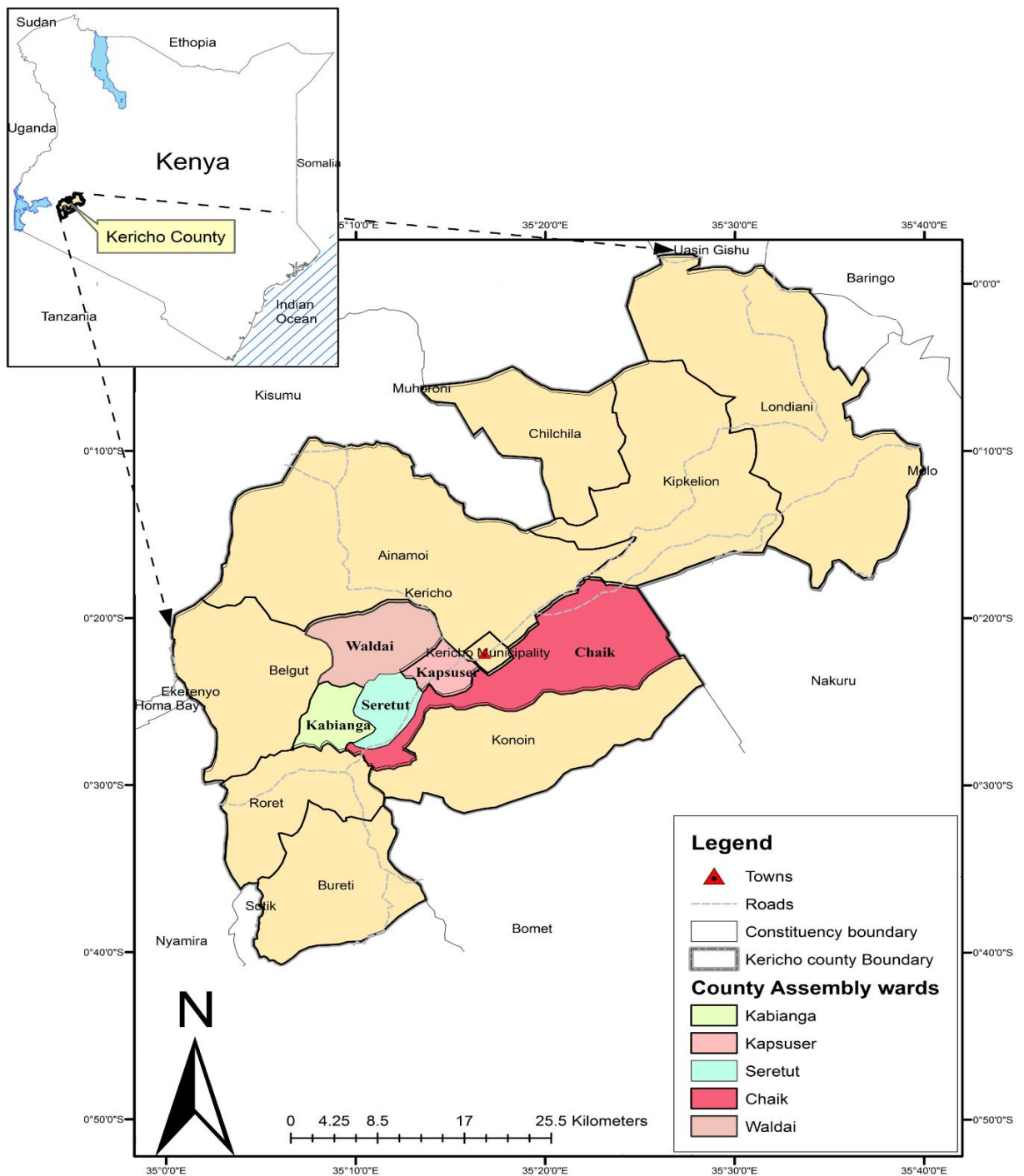


Figure 2: Study area; Kericho West Sub-County

Source: World Resource Centre, (2017)

3.2 Sampling procedure

The study adopted multistage sampling technique. At the first stage, Kericho West Sub-County was purposively selected owing to a large number of SEEWO women groups and it being the first Sub-County in which SEEWO was initiated. Kericho West Sub-County has five wards (Waldai, Kabianga, Chaik, Kapsuser and Cheptorriet/Seretut). From the five wards, three wards were randomly selected and from the SEEWO ward office, the list of small scale farm entrepreneurs were generated for selecting the respondents (members) for the study. However, the population of non-member farmers was unknown. Random sampling was then used to select 384 women who own farm enterprises. Respondents were composed of women members and women non-members of table banking group.

3.3 Sample size determination

The sample size was calculated by using Kothari (2004) formula for the unknown population owing to unknown population size for non-members, with 95% confidence interval. This formula has also been used by Sahle, (2014). The formula is as presented below.

$$n = \frac{z^2 pq}{e^2} \dots\dots\dots (1)$$

Where: n= sample size required, z^2 is the confidence interval at 95%, for example $z = 1.96$, e is the desired level of precision, p is the estimated proportion of interest that is present in the population, and q is 1-p.

Substituting the numbers in the formula: $n = \frac{1.96^2 * 0.5 * 0.5}{(0.05)^2} = 384 \dots\dots\dots (2)$

The sample constituted both members and non-members of table banking and summed up to 384 respondents. The members of table banking were oversampled because individuals in this group had a lesser chance of being selected out of the general population owing to their small number as compared to non-members. The sample size was distributed proportion to size according to the three randomly selected wards.

3.4 Data collection and analysis

The study used both primary and secondary data. The primary data was collected using semi-structured questionnaires administered by the trained enumerators. The questionnaire was pretested in Kericho East Sub-County where 15 questionnaires were administered to randomly selected women farmers. As a result, improvement and validation of the tool was undertaken. The questionnaire was organized into several sections which included: socio-economic and

institutional characteristics, level of financial knowledge, extent of credit access and performance of farm enterprise. Secondary data was obtained from the SEEWO and ministry of agriculture ward offices. The data collected from the questionnaires was coded, cleaned, and entered in STATA version twelve software for analysis.

3.5 Analytical framework

Objective one: To assess the level of financial knowledge of women members and non-members of table banking groups.

To assess the level of financial knowledge of women members and non-members of table banking groups, both subjective and objective measures was used. While it is imperative to expand the range of measures of financial knowledge these two approaches have become the standard measures of financial knowledge by the researchers across the world (Lusardi and Mitchell, 2008; De Mel *et al.*, 2009). Measuring financial knowledge level of the population is important in order to identify potential needs and gaps, as well as identify groups at risk. Just as there is no standard definition of financial knowledge, determining how best to measure financial knowledge also has no standard way (Huston, 2010; Remund, 2010). The two measures of financial knowledge were used to determine the level of financial knowledge among women farm entrepreneurs, to find out the relationship between financial knowledge and women characteristics, and to provide information that may assist with development of strategies to improve financial knowledge among women.

The first part of the measure (objective test) was based on test questions that are embedded in a questionnaire (Lusardi and Mitchell, 2008; Jappelli, 2010). In this case, a survey instrument (questionnaire) was used to measure constructs such as interest rate, inflation, sales discount, risk and returns and prices verses income. For the purposes of this research, this was labelled as “actual” financial knowledge, a distinction used in the research literature (Lusardi and Mitchell, 2011; Allgood and Walstad, 2013). The second part of the measure (subjective evaluation) focused on what people thought they knew about personal finance based on self-assessments of their financial knowledge (Atkinson and Messy, 2012). This was based on a 5- point Likert scale with rating of three point five and less being low financial knowledge and above three point five being high financial knowledge. Again, this was labelled as “perceived” financial knowledge (Allgood and Walstad, 2013). In this case, one, two and three represented very bad, bad and average respectively whereas four and five represented good and very good respectively. The results were analyzed descriptively based on women characteristics such as age, education, extension visits, dependency ratio and spousal age gap. The item on subjective measure provided insights into how

respondents perceive their level of financial knowledge without having to answer test questions (refer to the questions for both objective and subjective measures in the questionnaire, appendix 1, section B). The rationale for combining both dimensions was to provide a better estimate of the total effect of FK and also to offer robust and nuanced insights about how the two measures work together to influence credit access and performance of women farm enterprises.

Following the study by Allgood and Walstad (2016), the availability of the two overall measures of financial knowledge allowed the grouping of the sample into four distinct groups. First, the sample was split into “actual-high” and “actual-low” groups using test scores and then split into “perceived-high” and “perceived-low” based on self-ratings. The split of sample into “actual-high” and “actual-low” groups was done using test mean score to determine the grouping (high>mean; low≤ mean). The split of sample into “perceived-high and “perceived-low” groups was based on the mean self-ratings (high>mean; low≤ mean). From the two splits, the sample was grouped into one of the four distinct groups: high actual and high perceived; high perceived and low actual; low perceived and high actual; low perceived and low actual financial knowledge as shown in figure 3. Finally, the sample was split into two groups composing of women with high financial knowledge (4 and 2) and those with low financial knowledge (3 and 1) (Allgood and Walstad, 2016).

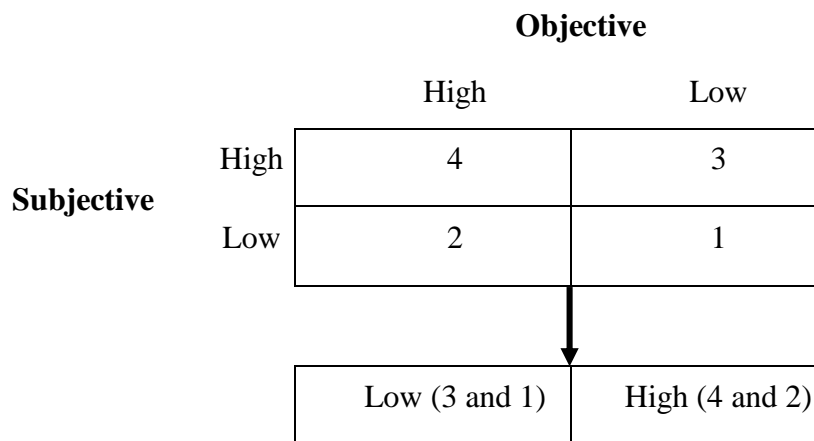


Figure 3: Measurement of financial knowledge

The results were analyzed using descriptive and inferential statistics to determine the difference in the level of FK between women members and non-members in table banking group. Descriptive statistics included the mean and percentage and were further presented in graph. To test the significance in relationship between the level of FK and membership in table banking group, a chi-square test was used to compare members and non-members.

Objective two: To compare the factors influencing the extent of credit access of women farm entrepreneurs by membership in TB groups.

To determine the influence of socio-economic and institutional characteristics on the extent of credit access of women members and non-members of table banking program, the double hurdle (DH) model formulated by Cragg (1971) was used. In this case, women farm entrepreneurs' access to credit was modelled as a two-tier decision. This includes the decision to access credit and the actual amount borrowed from table banking or other financial institutions or both (Rao and Qaim, 2013). Moreover, in DH model, variable that influence access to credit and actual amount borrowed may overlap but are also allowed to differ. Tobit and Heckman model are the two other models that could be applied in this study but the two have limitations in that the Tobit model assumes that the same variables are used to model the two decisions (access to credit decision and actual amount of loan borrowed decision) and more so with the same sign (Ricker-Gilbert *et al.*, 2011; Noltze *et al.*, 2012). Thus the Tobit model assumes that the access and amount borrowed decisions can be modelled as one equation.

Heckman's sample selection model on the other hand assumes that the zeros in the first tier are not observed due to missing values as a result of non-access solely, then the actual amount of loan borrowed decision includes only non-zero observations. (Wooldridge, 2002; Akpan *et al.*, 2013). This was not the case in this study since zero observations in the sample were due to some entrepreneurs' deliberate decision not to access. Thus DH model was thought of as a flexible version of both the Tobit and Heckman models. This was because it relaxed the two model's assumptions such that it modeled both decisions separately unlike the case of Tobit model and allowed zero observations in both decisions assuming that the zeros were due to entrepreneurs deliberate decision or random circumstances unlike the case of Heckman's model. Therefore, due to the presence of two independent decisions that the woman entrepreneur has to make, different latent variable were used to model each decision.

Each of the hurdle tend to be dependent on socio-economic characteristics, level of financial knowledge and institutional characteristics of the woman entrepreneur as shown in the Table 1. In the first hurdle, the zero values reported arose from the zero access to credit whereas those in the second hurdle arose from zero loan acquisition. Therefore the first hurdle equation was estimated using the normal probit model as shown in equation 3:

$$C_i^* = x_i' \beta + u_i, \quad u_i \sim N(0,1)$$

$$\text{and } C_i^* = \begin{cases} 1 & \text{if } C_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \dots\dots\dots (3)$$

Where; C_i^* is the latent variable for C_i denoting access to credit when $C_i = 1$ and no access to credit when $C_i = 0$, x_i is a vector of explanatory variables, β_i is a vector of parameters and u_i is the independent, homoscedastic, normally distributed error term.

The second hurdle based on the actual amount of loan borrowed was determined using the tobit regression model where only the women with $y_i^* > 0$ were observed. The tobit regression model was as follows:

$$y_i^* = z_i \beta + v_i, \quad v_i \sim N(0, \sigma^2)$$

$$\text{and } y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \text{ and } C_i = 1 \\ 0 & \text{otherwise} \end{cases} \dots\dots\dots (4)$$

Where; y_i^* is the observed amount of loan borrowed that is when $y_i^* > 0$. For entrepreneurs with zero loan borrowed, $y_i = 0$. This indicated that the women farm entrepreneurs with zero loan were censored since censoring was done at zero.

Given equation three and four, the likelihood function for the double hurdle model can be expressed as;

$$L(y_i | x_i, \theta) = \prod_{y_i=0} [1 - \Phi(x_i \alpha / \sigma_u)] \Phi(z_i \beta / \sigma_v) \prod_{y_i>0} \Phi(x_i \alpha / \sigma_u) \Phi(z_i \beta / \sigma_v) * \frac{\phi[(y_i - z_i \beta) / \sigma_v]}{\sigma_v \Phi(z_i \beta / \sigma_v)} \quad (5)$$

Where ϕ and Φ are the probability density and cumulative distribution function of the normal distribution. Similarly, σ_u and σ_v are the standard deviations of u_i and v_i respectively. Equation five will be solved for α, β and σ^2 through maximum likelihood estimation. The variables that will be used in DH model are presented in Table 1 and were derived from a review of past studies (Tang *et al.*, 2010; Covin and Lumpkin, 2011, Garikai, 2011; Kelley *et al.*, 2011; Wanigasekara and Surangi, 2011; Nunoo and Andoh, 2012; Wachira and Kihiu, 2012; Kimondo *et al.*, 2013; Kira, 2013; Nikaido *et al.*, 2015).

Table 1: Variables used and expected outcome in Double Hurdle model

Variables	Description	Measurement	Expected sign
Dependent variable			
CrdAccss	Access to credit	0=No access 1=Access	
Crdamnt	The amount borrowed by the woman farm entrepreneur over the last one year	Currency (KES)	
Independent variables			
Farmer characteristics			
Age	Age of the woman entrepreneur	Number of years	±
Educlvl	Education level of the woman entrepreneur	Number of years	+
Marital	Marital status of the woman entrepreneur	0=Single 1=Married	+
Spsalagegap	Spousal age gap	Number of years	+
Dependency_ratio	Family members depending on the woman	Number of dependents	+
Off-farm	Woman entrepreneur's participation in off-farm activities (non-agricultural activities)	0=Non-participation 1=Participation	±
Entrepreneurial orientation			
EO	Woman level of entrepreneurial orientation based on the three constructs: risk taking, innovativeness and proactiveness	Average scores (1=high>mean; 0= low≤mean)	+
Farm characteristics			
FrmAge	Years of woman farm enterprise in operation		±
FrmType	Farm enterprise type	0=Otherwise 1=Sole proprietorship	±
FrmLines	Number of farm enterprises	Number	±
TtlLndSize	Total land size owned by the Family	Acres	+
Institutional characteristics			
Infor	Access to agribusiness information by woman entrepreneur	0=Access 1= No access	+
PrcvedIntrst	The woman perception on interest rate charged by table banking/financial institution	0=Low 1=High	±
Extsn	Access to extension services by woman entrepreneur	Number of contacts	+
DcsnLvl	The level of decision made by woman entrepreneur in the family	Number	+
FK	Objective and subjective measures of financial knowledge of women	0=Low 1=High	+

Objective three: To determine the role of financial knowledge on the performance of women farm enterprises.

The third objective was to determine the role of financial knowledge on the performance of women farm enterprises. Estimation of gains from participation in agricultural projects based on non-experimental observations is usually not an easy task because of the need to estimate the counterfactual situation if a participant had not participated in the project (Asfaw *et al.*, 2012). In experimental studies, the challenge of getting a counterfactual is addressed by randomly assigning some people to the control (non-participants) and treatment (participants) status (Asfaw, 2010; Asfaw *et al.*, 2012). In this study, performance will be measured by savings and margin of the woman farm enterprise.

To determine the role of financial knowledge on performance of farm enterprise, Propensity Score Matching proposed by Rosenbaum and Rubin (1983) was used. In this case, the participants or rather the treatment group are the women with high level of financial knowledge whereas the non-participants (control group) are the women with low level of financial knowledge. The impact of financial knowledge on performance of farm enterprise is given by the difference in performance when a woman possess high level of FK and the performance when the same woman possess low level of financial knowledge, that is performance with and without treatment. Clearly, both outcomes for the same woman at the same time cannot be assessed. In this case, one has to develop a proxy for the counterfactual. Taking the mean outcome of women with low FK as an approximation of the counterfactual is not advisable since participants and non-participants differ even in the absence of treatment. This problem is known as selection bias (Caliendo and Kopeinig, 2008).

The simplest approach to evaluate the impact of FK on performance of farm enterprise would be to include a dummy variable equal to one if the woman possess high FK, otherwise equal to zero and then, to apply ordinary least square (OLS) regression. However, this approach, might yield biased and inconsistent estimates because it assumes that having high FK is exogenously determined while it is potentially endogenous. This is because some unobservable characteristics, like skills and motivation among the women may affect not only the level of FK but also performance of farm enterprise leading to endogeneity and self-selection problems in the model (Asfaw, 2010). The issue of selection bias arises if unobservable factors influence both the error term of participation equation and the error term of the outcome equation. Therefore estimating the outcome equation using ordinary least square (OLS) will lead to biased estimates (Pan, 2014).

To avoid selection bias, various methods have been proposed (Gitonga *et al.*, 2013): First, an experimental study in which participants can be randomly assigned to either control or treatment groups has been proposed. The shortcoming with this approach is that it is not possible to apply it for ex-post studies. Second method is the use of the instrumental variables (IV). However, this method is involving since it requires valid instruments that determine the treatment status but not the outcome variable, hence difficult to find valid IVs. In addition, IV procedure assumes that interactions between the treatment variable and other covariates does not exist since the treatment variable is assumed to only induce a parallel shift (intercept effect) on the outcome variable (Ali and Abdulai, 2010). Third, Heckman’s two-step method has also been proposed. The limitation of using this method is that the two-step procedure depends on the restrictive assumption that the unobserved variables are normally distributed (Heckman *et al.*, 1997). Finally, a difference-in-difference estimation is limited to studies with longitudinal data (Pan, 2014).

Therefore, unlike the above mentioned methods, PSM method requires no assumption about the functional form specifying the relationship between outcomes and outcome predictors. Further, PSM approach avoids the difficulty of finding valid instrumental variables and that cross-sectional data collected at one point in time can be used (Pan, 2014). With regard to these attributes, PSM method is chosen to control for the selection bias in the analysis.

To begin with, the probability of FK by a woman based on observable characteristics can then be estimated using a binary probit. Therefore the dependent D_i^* variable indicating the level of financial knowledge is not observed but can be expressed as a function of the observed characteristics denoted as Z_i in the latent variable model as follows (Kassie *et al.*, 2011):

$$D_i^* = \beta Z_i + \varepsilon_i \dots\dots\dots (6)$$

$$D_i = \begin{cases} 1 & \text{if } D_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \dots\dots\dots (7)$$

Where: D_i is a binary indicator variable that equals 1 if a woman has high FK level, zero otherwise, β is a vector of the parameters to be estimated, Z_i is a vector of explanatory variables including farmer, farm entrepreneurial orientation and institutional characteristics, ε_i is the error term assumed to be normally distributed in the probit model.

Following the probit model, propensity scores are estimated using choice models either probit or logit model which yield similar results. The basic idea of using PSM method is to find in a control group women who are similar to treatment group in all relevant pretreatment characteristics (X). Once this is achieved, differences in outcomes of the treatment and control group can be attributed to FK level. Balancing score $b(X)$ which is a function of the relevant observed covariates X is used since conditioning on all covariates is limited in the case of a high dimensional vector X. As such, the conditional distribution of X given $b(X)$ is independent of the assignment into treatment. The balancing score is the propensity score that is the probability of high FK given the observed characteristics X. This can be specified as follows (Chege *et al.*, 2015):

$$b(X) = \Pr(Z = 1 / X) \dots\dots\dots (8)$$

Where: Z denotes the participation status in FK and 1 denotes a woman who participates and 0 otherwise. X is the vector of pretreatment characteristic

Common support region

The main interest of the research is to calculate the average treatment effect on the treated and it is important to note that they are only defined in the region of common support. Therefore, to check the overlap or common support condition entails a histogram technique, by drawing propensity scores against their frequency density distribution. Implementing the common support condition ensures that any combination of characteristics observed in the treatment group can also be observed among the control group (Caliendo and Kopeinig, 2008). The histogram shows the distribution of propensity scores between the two groups within the region of common support. Treatment cannot be estimated for individual that fall outside the common support region (those below the minima and above the maxima), thus are discarded (Ayenew, 2016).

Matching algorithm

The probability of observing two units with exactly the same value of the propensity score is in principle zero since $b(X)$ is a continuous variable. Therefore, an estimate of the propensity score is not enough to estimate the average treatment effect (ATT). To overcome this problem, various matching procedures have been proposed in the literature (Nicoletti, 2011; Pan, 2014). In all matching algorithm, each treated individual is paired with some group of comparable non-treated individuals and the outcome of the treated individual is linked with the weighted outcomes of non-treated individuals. Basically, all matching algorithms should yield the same

results, but in practice there are trade-offs in terms of bias and efficiency with each algorithm (Caliendo and Kopeinig, 2008). Three of the most widely used matching procedures are:

Nearest neighbor matching (NNM): In this matching technique, observations are randomly ordered and the first treatment observation is matched with the first control group observation having the nearest propensity score (Nicoletti, 2011; Pan, 2014). It can be applied with replacement or without replacement. For the first case of with replacement, the control group observation is put back into the sample and may be matched to another treatment group observation if necessary. With no replacement, the control and treatment group observations are matched, compared and dropped from the sample from the highest to the lowest. The benefit associated with replacement approach is that the quality of matching will increase and the resulting treatment effect bias will decrease (Caliendo and Kopeinig, 2008). Moreover, matching with replacement allows one to keep additional observations, by oversampling from the limiting group. However, matching with no replacement can be an issue especially where treated and non-treated individual are different because it becomes hard to find a satisfactory match. Therefore, matching with replacement is the preferred choice since it minimizes the propensity score distance between matched groups especially if the propensity score distributions are different between the two group units (Nicoletti, 2011).

Kernel-based matching (KBM): In the KBM, all the treated subjects are matched with a weighted average of all controls using weights inversely proportional to the distance between the propensity scores of treated and non-treated groups. As a result, there is less variance in the estimated treatment effects and observations are seldom dropped from the sample (Nicoletti, 2011; Pan, 2014).

Radius/caliber matching (RM): In this matching method, a pre-defined propensity score radius identifies all possible matches. Radius matching uses a tolerance level on the maximum propensity score distance between a unit in the treatment group and all units in the control group who are within that distance (radius) (Pan 2014). Where a radius is pre-determined (the control group members within the radius can be matched more than once) reduces the likelihood of bad matching while still enforcing the common support (Nicoletti, 2011). The shortcoming associated with caliber matching is that it enforces the common support area which could reduce the number of possible matches, hence increasing variance of the treatment effect estimate (Caliendo and Kopeinig, 2008).

Average treatment effect on the treated (ATT)

To determine the impact of FK on performance, ATT will be computed by matching treated and control groups. The validity of the PSM method depends on two conditions; the assumption of unconfoundedness or the conditional independence assumption (CIA) and the common support assumption (CSA) (Chege *et al.*, 2015). The CIA indicates that given a set of observable covariates, the respective treatment outcomes are independent of the actual participation status (Rosenbaum and Rubin, 1983). The CIA assumption permits the use of matched control women to measure how the treated women would have performed had they not participated. On the other hand, the CSA rules out the phenomenon of perfect predictability by ensuring that every individual has a positive probability of either being with high FK or low FK. ATT is only defined within the region of common support since comparable observations can be matched only in the overlapping subset of comparison group and treatment group (Heckman, 1997; Pan, 2014). Given the CIA holds and that there is assumption of overlap between both groups, the ATT effect can be estimated as follows (Pan, 2014):

$$ATT = E\{E\{Y_i / D_i = 1, p(X_i)\} - E\{Y_o / D_i = 0, p(X_i)\} / D_i = 1\} \dots\dots\dots (9)$$

Where: ATT is the average treatment effect on the treated conditioned on having high FK, Y_1 denote the performance outcome for an individual if the person is a participant, Y_o is the performance outcome if the person is not a participant.

Matching quality

The main purpose of PSM is to reduce selection bias by increasing the balance between the participants and non-participant (Lee, 2013). Therefore balancing test is normally required after matching to check whether the differences in the covariate in the two matched sample groups have been eliminated. The following method will be used to check the matching quality. First, the standardized bias should be considered such that after matching they should be no significant difference (Rosenbaum, 2002). Secondly, pseudo-R squared should be reduced after matching, thus the low value of pseudo-R squared indicates that the balancing is satisfied (Pan, 2014). Finally, the mean absolute standardized bias should be less than 20% after matching (Rosenbaum and Rubin, 1983).

Sensitivity test

The sensitivity test is used to check for the sensitivity of the ATT to “hidden bias” after matching. This is because PSM only controls for selection bias due to observable variables. Therefore, if there are unobserved variables that simultaneously affect the participation decision and outcome variable, a “hidden bias” (selection on unobservable variables) bias might arise and PSM may no longer be consistent. To address this problem, sensitivity analysis called bounding approach is used (Rosenbaum, 2002). The purpose of sensitivity analysis is to check whether the inferences about participation effects may be changed by unobserved variables. In this case, the upper and lower bounds are calculated to test the null hypothesis of no participation effects for different hypothesized values of unobserved selection bias (Pan, 2014).

Table 2: Variables used and expected outcome in PSM model

Variables	Description	Measurement	Expected sign
Dependent variable			
Saving	Savings by the woman farm entrepreneur	Currency (KES)	
EntprseMrgin	Woman farm enterprise margin	Currency (KES)	
Independent variables			
Farmer characteristics			
Age	Age of the woman entrepreneur	Number of years	±
Educllevel	Education level of the woman entrepreneur	Number of years	+
Marital	Marital status of the woman entrepreneur	0=Single 1=Married	+
Spsalagegap	Spousal age gap	Number of years	-
Dependency_ratio	Family members depending on the woman	Number of dependen	-
MbrShip	Woman membership to table banking	0= Non-member 1= Member	+
Off-farm	Woman entrepreneur's participation in off-farm activitie (non-agricultural activities)	0=Non-participation 1=Participation	+
Entrepreneurial orientation			
EO	Woman level of entrepreneurial orientation based on the three constructs: risk taking, innovativeness and proactiveness	Average scores (1=high>mean; 0= low≤ mean)	+
Farm characteristics			
FrmAge	Years of woman farm enterprise in operation		+
FrmType	Farm enterprise type	0=Otherwise 1=Sole proprietorship	-
FrmLines	Number of farm enterprises	Number	+
TtlLndSze	Total land size owned by the family	Acres	+
Institutional characteristics			
Infor	Access to agribusiness information by woman entrepreneur	0=Access 1= No access	+
PrcvedIntrst	The woman perception on interest rate charged by table banking/financial institution	0=Low 1=High	±
Extsn	Access to extension services by woman entrepreneur	Number of contacts	+
DcsnLvl	The level of decision made by woman entrepreneur in the famil	Number	+

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results of analysis of the data obtained. It has been divided into sections according to the objectives of the study. The first section discusses the descriptive statistics of socio-economic and institutional characteristics in relation to membership to table banking. It also presents the level of financial knowledge, both objective, subjective and overall level of financial knowledge among the members and non-members of table banking. The second section discusses the results of the double hurdle model (DHM) on factors influencing extent of credit access of women farm entrepreneurs. The third section presents the results of propensity score matching (PSM) model on the role of financial knowledge on performance of women farm enterprises. The discussion of the findings is presented while making comparison with those of other studies. Members to table banking constituted 63.80% whereas non-members constituted 36.20% of the sample size.

4.1 Descriptive statistics

4.1.1 Socio-economic and institutional characteristics by membership in table banking

Table 3 presents the socio-economic and institutional characteristics of farmer by membership in table banking. The mean age of members of table banking was 43 years and non-members 40 years. The results showed a statistically significant difference in age at 5% level. Members had slightly higher mean age than the non-members though they were still within the category of energetic people who could effectively utilize the borrowed funds. Young women farmers are more likely to engage in new opportunities as they are assumed to be energetic and risk takers. Further, young generation tend to be aggressive in trying new ways of doing things, probably due to the higher level of responsibilities bestowed on them. Mwobobia (2016) noted that many middle aged and especially those with low education level tend to utilize table banking as a source of finance. Further, Gichuki *et al.* (2015) argued that majority of the women who participated in informal banking groups were within the child-bearing age, and thus needed funds to support their family needs.

Table 3: Farmer socioeconomic and institutional characteristics for continuous variables

Variables	Non-members		Members		t-value
	Mean	Std. Err.	Mean	Std. Err.	
Socio-economic characteristics					
Age of the respondent (years)	40.396	0.848	42.526	0.647	-1.983**
Spousal age gap (years)	5.144	0.297	5.175	0.269	-0.074
Education of woman (years)	13.827	0.330	12.183	0.255	3.897***
Dependency ratio (number)	0.577	0.016	0.623	0.014	-2.083**
Average off-farm income (‘000 KES)	22.362	2.603	15.636	1.095	2.744***
Years of woman farm enterprise in operation (years)	11.874	0.588	10.731	0.422	1.595
Number of farm enterprises	2.273	0.055	2.255	0.039	0.279
Family total land size (acres)	2.333	0.152	2.708	0.149	-1.627
Institutional characteristics					
Perception on interest rate (scale)	2.784	0.082	3.139	0.061	-3.490***
Extension access (number of contacts)	1.165	0.127	0.789	0.084	2.554**
Woman family decision level (level)	5.043	0.171	5.020	0.110	0.119

Note ** and *** means significant at 5% and 1% respectively

There was significance difference in the mean years of women farmers’ education at 1% level. However, members had lesser years of education (12years) compared to non-members (14years). The low level of education by members impeded the opportunity for off-farm employment and performance of farm enterprises thus their resort to table banking so as to acquire knowledge and skills through the various trainings and education conducted in table banking. Table banking provides a platform for knowledge and skills support through trainings and education. According to the study by Gichuki *et al.* (2015) among the women entrepreneurs in Kenya participating in table banking, it was perceived that illiterate and lowly educated women participated in informal banking groups. Further, Reshma (2016) argued that women with low education lack the opportunity for employment and therefore they engaged in self-help groups for support in income generation and self-employment activities.

Dependency ratio was statistically significant at 5% level with members having more dependency ratio of 0.623 as compared to non-members 0.577. The results revealed that members of table banking had more dependent family members whom they had to support thus their resort to table banking so as to acquire loan to manage the same. This could be because table banking offered loan to all its members after every month thus making it easy for families with more dependents to support their families. Further, high dependency ratio calls for more food and non-food expenditure, thus the demand for funds so as to meet the same that could be obtained through table banking. Large households especially consisting of more dependent members need more funds in order to support their members (Onumadu and Osahon, 2014).

There was significant difference in the average off-farm income at 1% level. The average off-farm income mean of members and non-members were KES15636.04 and KES22361.92 respectively. This is attributed to the time constraint among the non-members. This is because non-members unlike members were more in off-farm activities hence had limited time to participate in table banking which entails regular scheduled meetings that require time in order to attend. Members on the other hand had enough time to participate in table banking since they had no other engagement that could take most of their time. According to Ngumbau *et al.p* (2017), group members under table banking meet on a regular basis for example monthly to place their contributions on table and then lend to interested members.

The number of contacts with the extension agent was significant at 5% with non-members having more contacts 1.165 as compared to their counterparts 0.789. Due to the high number of contact with the extension agent, non-members had likely more access to extension services related to information on technology and at the same time information on credit access from cheaper loan sources. This was unlike members who had less number of contacts with extension agents thus sought information related to farm enterprise from table banking since table banking provided a platform on trainings and education programs related to agriculture. High number of contacts with the extension service providers reduces transaction cost associated with access to information since it contributed to the awareness and subsequent adoption to the innovation (Asfaw *et al.*, 2012).

4.1.2 Categorical socio-economic variables by membership in table banking

Table 4 presents the results of categorical variables by membership to table banking. The results revealed that there was a significant relationship between the marital status of women farmers and membership to table banking groups at 10% level. A large proportion of women

farmers were married (89%), where the married were 90% among members and 88% of non-members. Contrary, majority of the singles were higher among the non-members (10%) as compared to members (6%). This could be explained that married women farmers were assumed to hold more responsibilities especially pertaining to the family thus, require more funds to run the same. However, married women in most African communities tend to seek permission from their spouses in order to participate in any activity as enshrined in the African culture. Such women without the interest of the spouses hardly join self-help groups (Sani *et al.*, 2016). Singles in most communities do not join self-help groups since they are not fully recognized as those that need economic stability since they are still living under their parents care (Sani *et al.*, 2016). Ndaejii *et al.* (2014) found that women who fall in the category of single, divorced and widowed were more likely to participate in self-help groups due to less duties and less home affairs due to less dependant family members.

Table 4: Chi-square results on categorical socio-economic variables (%)

Variable	Description	Non-members	Members	Chi-value
Marital status	Married	87.77	89.64	7.141*
	Single	10.07	5.58	
	Divorce	0.72	0.00	
	Widowed	1.44	4.78	
Off-farm participation	No	6.47	11.55	2.624
	Yes	93.53	88.45	
Family decision maker	Myself	17.99	14.34	2.569
	My husband	24.46	19.92	
	Both of us	57.55	65.74	
Farm Type	Sole proprietorship	99.28	97.21	1.907
	Partnership	0.72	2.79	
Access to information	No	3.60	4.78	0.301
	Yes	96.40	95.22	

Note * means significant at 10% level

4.1.3 Woman entrepreneurial orientation characteristics

Table 5 presents the factor loadings, Cronbach alpha values, Kaiser-Meyer-Olkin values and average variance extracted (AVE) results of entrepreneurial orientation constructs using factor analysis. In entrepreneurial orientation, 10 items related to 3 constructs were adopted as previously used by Vogelsang (2015) A likert scale (1-5 where 1 meant strongly disagree and 5 strongly agree was used to rank the variables for each construct (risk, innovativeness and proactiveness) in order to generate a weighted score. Factor analysis was used in the

computation of the correlation matrix where eigenvalues of the correlation matrix, factor loadings of the variables and “uniqueness” were displayed. Factors were identified using orthogonal rotation (varimax method) so that a smaller number of highly-correlated variables might be put under each factor and interpretation becomes easier (Kaiser, 1970; Yong and Pearce, 2013). In accordance with Kaiser’s criterion, all factors exceeding an eigenvalue of one were retained (Kaiser, 1970). Kaiser’s criterion is accurate when the number of variables is less than 30 which was the case for this data set (Goswami *et al.*, 2013). Factor loadings should be above the recommended threshold of 0.7 (Hair *et al.*, 2011). All factor loadings were above the more restrictive threshold of 0.7 (ranged from 0.705 to 0.978).

According to Kaiser (1974), KMO values greater than 0.5 are considered acceptable. Furthermore, values between 0.5 and 0.7 are mediocre, between 0.7 and 0.8 are good, between 0.8 and 0.9 are great and finally above 0.9 are superb. The sampling adequacy was measured using the Kaiser-Meiyer-Olkin (KMO) whereby the KMO values were 0.873, 0.712 and 0.731 for risk, innovativeness and proactiveness respectively. For most purposes alpha (α) should be above 0.7 to support reasonable internal consistency (Yang, 2016). To test the scale reliability coefficient, alpha (composite reliability) was computed where the scale reliability coefficients were as follows; risk=0.719, innovativeness= 0.956 and proactiveness= 0.876. All the Cronbach alpha values (ranging from 0.719 to 0.956) were higher than the 0.7 threshold, indicating that the measurement model possessed adequate reliability. Kaiser (1974) criterion is reliable when the average variance extracted (AVE) estimates are at least more than 0.5 and when there are less than 30 variables and sample size below 250 (Yang, 2016). In terms of AVE, the values ranged from (0.582 to 0.723) and were all greater than 0.5. The results on confirmatory factor analysis indicated a good fit with the data (chi-square= 127.612; df = 3; p-value= 0.000). The summarizing approach adopted was used by (Olsen *et al.*, 2017).

Table 5: Factor analysis for profiling entrepreneurial orientation constructs

Entrepreneurial orientation Constructs	Items	Factor loadings	KMO	CR	AVE
Risk-taking (Lumpkin and Dess, 1996; Bolton and Lane, 2012; Vogelsang, 2015)	I like to take bold actions by venturing into the unknown	0.927	0.873	0.719	0.723
	I am willing to invest a lot of time and/or money on something that might yield a high return	0.893			
Innovativeness (Lumpkin and Dess, 1996; Bolton and Lane, 2012; Vogelsang, 2015)	I tend to act boldly in situations where risk is involved	0.797	0.711	0.956	0.582
	I tend to do things the same way and not try different, unproven approaches	0.822			
	I favor experimentation and original approaches to problem solving rather than using methods others generally use for solving problems	0.978			
	I prefer to try my own unique ways when learning new things rather than doing it like everyone else does	0.791			
Proactiveness (Lumpkin and Dess, 1996; Vogelsang, 2015)	I often like to try new and unusual activities that are not typical (not common, not regular, not expected) but not necessarily risky	0.705	0.731	0.876	0.612
	I usually act in anticipation of future problems, needs or changes	0.927			
	I tend to plan ahead on projects	0.893			
	I prefer to 'step up' and get things going on projects rather than sit and wait for someone else to do	0.797			

Note: chi-square= 127.612; *df*= 3; p-value= 0.000; KMO: Kaiser-Meiyer-Olkin; CR: composite reliability; AVE: average variance extracted

Finally, factor scores were computed basing on the rotated factors as presented in Table 6. The mean differences in the three constructs for the two farmer types was determined using the *t*-test. The findings revealed that entrepreneurial orientation (risk-taking, innovativeness and proactiveness) were statistically significant at 5%, 10% and 1% respectively. The factor scores were expected to range between a scale of 1 and 5. Except for the case of innovativeness, results revealed that members were more risk-takers and proactive as compared to their counterparts. Generally, most of the members were entrepreneurially inclined and thus were more likely to embrace new innovation and technology such as table banking. Farm enterprises that have high entrepreneurial orientation are more prone to focus attention and effort toward emerging opportunities (Wiklund and Sherpherd, 2005; Wang, 2008; Mirzaei *et al.*, 2016). Entrepreneurial orientation provides enterprises the ability to find and discover new opportunities that can differentiate them from other farms and create a competitive advantage (Wiklund and Shepherd, 2005).

Table 6: Factor analysis results on entrepreneurial orientation constructs

Construct	Non-members		Members		<i>t</i> -value
	Mean	Std. Err.	Mean	Std. Err.	
Risk-taking (scale)	3.211	0.071	3.384	0.035	-2.460**
Innovativeness (scale)	3.221	0.069	3.078	0.049	1.712*
Proactiveness (scale)	3.754	0.058	3.959	0.030	-3.447***

Note *, **, *** means significant at 10%, 5% and 1% respectively

The risk-taking mean of members was 3.384 while non-members mean was 3.211 and was statistically significant at 5%. Members were risk-takers as compared to their counterparts possibly because table banking entailed commitment of resources such as savings in table banking and experiment of somewhat risky ventures such as new technology. In addition, members risked by borrowing heavily from table banking so as to invest in uncertain environments with the expectation of earning more income so as to settle the loan and still take home some profit. The informal group lending institutions had compulsory savings component perceived as traditional and riskier to provide a backup in case of default (Dallimore, 2013).

Non-member were more innovative as revealed by the mean of 3.221 which was slightly higher than members mean of 3.078 and was statistically significant at 10%. It could be that non-members may be better equipped in terms of knowledge and financial resources to carry

out new agricultural developments. This could be explained by non-members high education level and high off-farm income thus the ability to engage in creation and experimentation of new ideas. Nielsen (2001) found out that innovation was explained by variables such as age, education and financial capability.

Members were more proactive with a mean of 3.959 as compared to the counterparts' mean of 3.754 and was statistically significant at 1%. This could be explained by members' ability to more accurately and quickly realize the present and anticipate future needs of customers and thus develop new products or adopt new techniques to meet these needs ahead of competitors. Members belonging to an informal group tend to be informed of the current and future needs of the customers as well as the means by which current and future competitors could meet these needs (Dollimore, 2013).

4.1.4 Financial knowledge level of women farm entrepreneurs

A significant challenge for conducting research on financial knowledge is the difficulty of determining how best to measure financial knowledge because there is no standard definition of it in the research literature (Huston, 2010). Most research on financial knowledge focuses on the cognitive dimensions of the construct and relies on a test measure of what people know or understand about financial concepts. This objective approach to the measurement of financial literacy is most often conducted by economists and other researchers using a set of multiple-choice test questions or true–false test questions that are embedded in a questionnaire (Allgood and Walstad, 2013).

Just as there is no standard definition of financial knowledge, there is no standardization in the measures that are used in research studies. In spite of the differences within and across these measures, the operational definition of financial knowledge that is common to these studies is to test what people actually know about financial concepts. For the purposes of this research, this was labelled as “actual” financial knowledge, a distinction used in the research literature (Lusardi and Mitchell 2011). An alternative way to assess financial knowledge was to use some type of subjective measure such as a self-assessment of financial knowledge. Although economists have preferred to use objective measures in their research, there is growing interest in the use of subjective measures for studying different types of political, economic or financial behaviors (Remund, 2010). In this study, the two types of knowledge have been shown to be distinct and useful constructs because self-assessed or subjective knowledge reveals what people think they know whereas objective knowledge reveals what they do know about a

particular financial matter. For this study, and following practices in the research literature on financial knowledge (Allgood and Walstad 2013), the subjective assessment of financial knowledge was labelled as “perceived” financial knowledge.

Presumably those respondents who actually knew more about financial literacy would likely give themselves a higher self-rating and vice versa but this was not the case. Some individuals showed a high level of actual financial literacy but a low level of perceived financial literacy, whereas other individuals exhibited just the opposite, and still others had high or low concentrations of both attributes. The scores for the objective measure based on the seven questions were generated by adding up the correct scores of each respondent. Each question was assigned one mark. The correct scores for all the respondents were then summed up and the mean computed. For subjective measure, the ratings of all the respondents based on the five-point likert scale were summed up and the mean computed.

Table 7: Average scores of financial knowledge

Construct	Overall (non-members and members)		t-value
	Mean	Std. Err.	
objective score	4.915	0.061	1.727*
Subjective score	3.508	0.029	-3.045***

The average scores of financial knowledge were presented in Table 7. The two measures of financial knowledge were grouped into two categories of high and low levels of financial knowledge each based on the mean. The average test score across all the seven items (actual FK) was 4.915 compared to the highest score of 7 while the average self-rating (perceived FK) was 3.508 compared to the highest rate of 5 on the five-point scale.

Table 8 presents the results on financial knowledge level by membership in table banking. Individuals were grouped into “actual-high” and “actual-low” groups using the test mean score (high > mean; low ≤ mean). The split of the sample into “perceived-high” and “perceived-low” groups was based on the mean self-ratings (high > mean; low ≤ mean). From the two splits, the sample was grouped into one of four distinct groups: high actual and high perceived financial literacy (non-members=30.94%; members=44.62%); high actual and low perceived financial literacy (non-members=35.25%; members=26.30%); low actual and high perceived financial literacy (non-members=4.32%; members=15.54%); and, low actual and low perceived financial literacy (non-members=29.50%; members=13.55%).

Table 8: Women farmers' financial knowledge levels (%)

Variable	Knowledge level	Non-members	Members	Chi-value
Objective knowledge	Low	33.81	29.08	0.939
	High	66.19	70.92	
Subjective knowledge	Low	64.75	41.04	22.214***
	High	35.25	58.96	
Overall knowledge	Low_Low	29.50	13.55	28.248***
	Low_High	4.32	15.54	
	High_Low	35.25	26.30	
	High_High	30.94	44.62	

Note *** means significant at 1% level

Members had a higher subjective score of 58.96% as compared to non-members' 35.25% and was statistically significant at 1% level. This could be attributed to the fact that members due to the various trainings and education they underwent in table banking, perceived themselves as financially knowledgeable. The result on overall financial knowledge indicated that 44.62% of members were in the high-high category as compared to 30.94% of non-members with a 1% significance level. This could be because members were offered trainings on financial knowledge matters that could boost them in financial borrowing, saving and management decisions both in table banking and outside. Possibly because table banking revolves around funds borrowing, saving and management in order to avoid default and instead enhance better profits. In addition, table banking provided a platform for financial knowledge and skills through the trainings and education offered. Ngumbau *et al.* (2017) noted that table banking gives the forum for easy access to credit, access to business information, professional support in terms of training and education and a platform to network. Houston (2010) argued that financial knowledge was necessary in understanding basic economic concepts required for safe borrowing and saving decision. The financial illiteracy problem is especially acute among women (Lusardi and Mitchell, 2008).

Finally the four groups were split into two groups as presented in figure 4. Since objective measure termed as actual required cognitive skills which involves conscious intellectual activities such as thinking, reasoning or remembering, the women farmers who performed above the mean in the objective measure were grouped under high financial knowledge. This was despite them rating themselves below the mean in the subjective measure because objective measure revealed what the women farmers actually knew about financial matters. The first group was that of women with high financial knowledge consisting of high actual and

high perceived and high actual and low perceived financial literacy levels (members = 70.92%; non-members = 66.19%). The second group was made up of women with low financial knowledge consisting of low actual and high perceived and low actual and low perceived financial knowledge level (members = 33.81%; non-members = 29.08%)

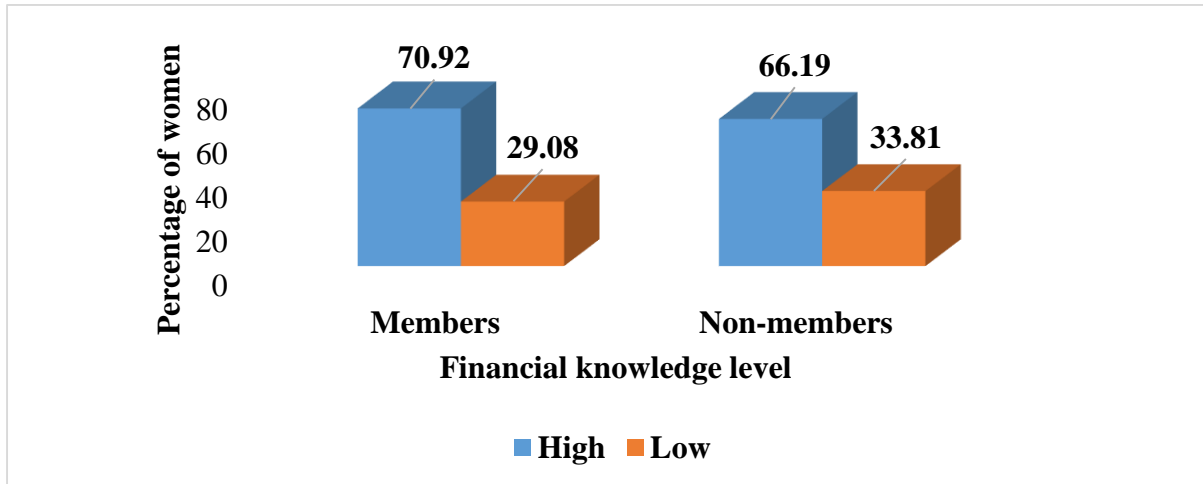


Figure 4: Level of financial knowledge of women farm entrepreneurs

4.2 Econometric analysis

4.2.1 Preliminary data analysis

Prior to econometric analyses, the degree of multicollinearity was evaluated by using variance inflation factor (VIF) test for all the continuous variables as presented in Table 9 and pair-wise correlation test for all the categorical variables as presented in Table 10. According to Yang and Wu (2016), multicollinearity is a statistical phenomenon in which there exists a perfect relationship between predictor variable. Multicollinearity occurs when several of the predictors under consideration are highly correlated with other predictors thus may lead to lack of statistical significance of individual predictor variable even though overall model may be significant. The recommended VIF value should be below the common cutoff threshold of 10 or a more restrictive criterion is that VIF should be less than 5 (Hair *et al.*, 2011). Variance inflation factor measure how much variances of estimated regression coefficients are inflated when compared to having uncorrelated predictors.

The VIF values of all the continuous variables were all below the common cutoff threshold of 10 and less than the more restrictive value of 5 as presented in Table 9 indicating that multicollinearity was not a concern. By rule of thumb, VIF values that exceed 5 or 10 implies that the associated regression coefficients are poorly estimated because of multicollinearity.

Table 9: Results for continuous explanatory variables using variance inflation factor (VIF) test

Variable	VIF	1/VIF
Age of the respondent (years)	1.690	0.593
Years of woman farm enterprise in operation (years)	1.620	0.616
Proactiveness (scale)	1.460	0.685
Risk-taking (scale)	1.440	0.693
Education level of the respondent (years)	1.220	0.818
Dependency-ratio (number)	1.220	0.822
Interest rate perception (scale)	1.210	0.827
Decision level by respondent (level)	1.200	0.835
Spousal age gap (years)	1.140	0.876
Number of farm enterprises (number)	1.140	0.879
Extension access (number of visits)	1.130	0.885
Total land size (acre)	1.110	0.902
Innovativeness (scale)	1.100	0.911
Mean VIF	1.280	

The pairwise correlation values ranged from 0.006 to 0.121 which was actually below the accepted threshold of 0.5 as presented in Table 10. This indicated that there was no relationship or association among the categorical variables.

Table 10: Pair wise correlation test results for categorical explanatory variables

	Marital status	Information	Membership	Off-farm	Farm type	FK
Marital status	1.000					
Information	-0.006	1.000				
Membership	0.055	-0.028	1.000			
Off-farm	-0.121	-0.028	-0.082	1.000		
Farm type	0.040	-0.031	-0.070	0.014	1.000	
FK	0.049	0.021	0.049	-0.013	-0.097	1.000

Heteroscedasticity was tested using the white test and results presented in Table 11. Heteroscedasticity refers to residuals for a regression model that do not have a constant variance (Greene, 2012). Breusch-Pagan test only checks for the linear form of heteroscedasticity whereas white test allows the independent variable to have a non-linear and interactive effect on the error variance. The white test unlike Breusch-Pagan test is able to detect more general form of heteroscedasticity (Wooldridge, 2004). Results revealed that there was heteroscedasticity as the chi-square was significant. According to Wooldridge (2004), robust standard errors provide a simple method for computing t statistics that are asymptotically t distributed whether or not heteroscedasticity is present.

Table 11: Heteroscedasticity test

Source	chi ²	Df	P value
Heteroscedasticity	148.780	119	0.034
Skewness	190.020	14	0.000
Kurtosis	0.110	1	0.745
Total	338.910	134	0.000
chi2(1) =	15.64		
Prob > chi2 =	0.0001		

chi²= chi-square; df = degrees of freedom and P value = significance level

4.2.2 Factors influencing access to credit by women farm entrepreneurs

Table 12 presents the maximum likelihood estimates of the first hurdle of the independent double-hurdle model. Separate models for women members and non-members were estimated since the extent of credit accessed by both women farmer types differed by volume and source. The log likelihood ratio LR -51.600448 and -53.826636 for members and non-members respectively were significant meaning that the explanatory variables included in the probit model jointly explained the probability of women farmers' decision to access credit from various credit sources.

Age of the respondent was significant for non-members but not among the members of TB. This is because non-members accessed their credit from other financial institutions and that some of these institutions tend to place an age limit on the loan borrower as they assume responsibility to ensure that one can comfortably afford to repay the loan without undue financial constraints. Increase in non-member farmers' age decreases the likelihood to access credit as indicated by the negative influence that was significant at 10% level. Young women tend to be risk takers in nature thus they require more capital so as to invest in the risky ventures

which may translate to more access. In addition, younger women farmers tend to have accumulated less wealth compared to older women farmers thus requires more capital to invest so as to accumulate enough wealth before retirement that can be acquired through credit access. According to Abdul-Jalil (2015), older farmers reduces their tendency to borrow loan as individual might be too weak to work in order to generate the needed income used to repay loan. Further, older farmers tend to rely more on life savings and accumulated wealth overtime thus demand less amount of loan (Mpuga 2010). In contrast, Tang *et al.* (2010) found out that older farmers are more inclined to demand for loan because older farmers have more social capital, exposure and experience due to more interactions especially with the financial agents thus have more access to credit sources.

Table 12: Factors influencing access to credit by women farm entrepreneurs

Variable	Members		Non-members	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Farmer characteristics				
Age of the respondent (years)	-0.004	0.018	-0.029*	0.017
Education level of respondent (years)	-0.054	0.041	-0.025	0.041
Dependency ratio (	-0.306	0.742	0.894	0.785
Participation in off-farm activities	0.753*	0.452	1.081	0.693
Entrepreneurial orientation				
Risk taking	-0.476	0.332	0.027	0.241
Innovativeness	-0.751***	0.221	0.238	0.189
Proactiveness	-0.388	0.377	-0.241	0.266
Farm characteristics				
Number of farm enterprises	0.325	0.235	0.502**	0.231
Total land size	0.119	0.085	0.128	0.090
Institutional characteristics				
Access to information	-0.561	0.705	-0.318	0.730
Interest rate perception	0.199	0.176	1.029***	0.201
Extension access (numbers of contacts)	0.169	0.149	0.481**	0.169
Financial knowledge level	0.539*	0.292	0.942**	0.325
Log likelihood	-51.600		-53.827	
Number of observations	245		139	
LR chi2(13)	31.40***		84.46***	
Pseudo R2	0.233		0.440	

Note *, **, *** means significant at 10%, 5% and 1% significant levels, respectively

The result revealed that participation in off-farm activities had a positive and significant influence for members but not among non-members of TB. This is because TB groups allow

members to save the extra income earned from off-farm activities unlike non-members. This makes members with off-farm occupations able to increase their credit access. The results conformed to a *priori* expectations because women farmers belonging to table banking who participated in off farm activities had more access to credit compared to those who did not participate. Participation in off-farm activities could lead to more interactions with the co-workers thus resulting in more information flow especially financial related information. As a result, women were able to share information pertaining to loan issues such as cheaper loan sources and hence leading to more access to credit. Women who participate in off-farm activities tend to diversify their sources of income to off-farm activities thus lending institutions, especially the formal ones prefer to give loans to such farmers resulting in more chances of accessing credit. According to Njeru *et al.* (2017), participation in off-farm activities may lead to more access to credit since farmers participating in off-farm activities may have low risk of default due to diversified asset portfolio and more diversified incomes thus lenders prefer such farmers.

However, innovativeness negatively influenced credit accessed among the members but not among the non-members of TB and was significant at 1% level. Innovativeness is the predisposition to engage in creativity and experimentation of new products and services through coming up with new products and services. In the first round of borrowing loan, the women farmers may require huge funds to practice farming of new products and thus may result in heavy borrowing. In future practice of new farming, the woman may plough back the returns from the first round rather than access fresh loans thus reducing the chances for more credit access. Mirzaei *et al.* (2016) argued that it could be that the farmer may have been better equipped in terms of financial resources to carry out new product development initiatives.

The coefficient for number of farm enterprises was positive and significant at 5% level for non-members but not among the members of TB. This was probably because all members were eligible to access credit, despite the number of farm enterprises, as long as one was a member and had shares with table banking. Chances of accessing credit by non-members were boosted by the need for more production inputs that increases demand for funds. In addition, more farm enterprises enhance steady income due to diversified farming thus leading to diversified sources of income that enhanced easy repayment of loan. The more number of farm enterprises implies diversification which may require more capital to manage. In addition, failure of one line of enterprise can be salvaged by the income from the other enterprises thus leading to steady income flow that can be used to repay loan. Further, those engaged in more diversified

activities can be expected to be more profitable and creditworthy thus are more prone to access credit because they are more likely to repay with ease. This was because they were likely to have low risk of default thus lending institutions prefer them. According to Nikaido *et al.* (2015), diversification make small farm enterprises more resilient to economic downturns and thus are in a better position to earn steady cash flows which enhances loan repayment and easy access.

Perception on interest rate positively influenced the credit accessed among the non-members but not among the members of TB and was significant at 1% level. The perception on interest rate is the belief that one has about the interest rate charged. This was significant among the non-members since they accessed credit from other financial institutions which tend to charge varying interest rates. This was unlike members who were charged same interest rate by table banking thus giving them equal chances of accessing credit. Positive perception of interest rate leads to higher probability of accessing credit. This was attributed to the motivation the women farmers got from the positive interest perception thus encouragement and willingness to access more credit. Possibly, positive perception of interest rate was a motivating factor in credit access. The issue of negative perception on interest rates may discourage the borrowers hence reducing accessibility of credit among them (Auma and Mensah, 2014).

Extension access influenced positively the credit accessed and was significant among the non-members but not among the members of TB at 5% level. This was only significant among the non-members since the more contacts with the extension service providers could have led to them gaining information on other and cheaper sources of credit. For the members of TB, every woman had access to credit despite the number of contacts with the extension service providers as long as one was a member. As a proxy for information access, higher number of extension visits led to women farmers gaining useful information that may have encouraged them to access credit because it enhances dissemination of information pertaining to farm enterprises including financial information. This can be through sharing information on availability of loan services or bridging linkages to where borrowing terms are better. In addition, extension access could have exposed the women farmers to new technologies which may require more funds to implement thus translating to more credit access. High number of extension visits exposes the woman farmer to various information sources on various sources of credit and thus increase the tendency to acquire loan as well (Sunday *et al.*, 2013). However, Sunday *et al.* (2013) reported that the farmers might be misinformed and their decision to access credit daunt if the

extension service providers are not efficient and also the policy content and focus of the extension system not well organized.

Financial knowledge level for both members and non-members was positive and significant at 10% and 5% respectively. High levels of financial knowledge relative to low levels increases the probability of accessing credit. Probably, high level of financial knowledge increases the capacity to make rational decisions with regard to loan borrowing, loan repayment and general management of funds. This is because high level of financial knowledge among women may likely translate to better evaluation and choice of cheaper credit options which may lead to easy loan repayment thus higher credit access. Mounting evidence shows that financially illiterate farmers are more likely to face challenges with regard to debt management, savings and credit thus this hinders their access to credit (Wachira and Kihiu, 2012).

4.2.3 Factors influencing the amount of loan by women farm entrepreneurs

The maximum likelihood estimates of the second hurdle (censored/tobit regression model) are presented in Table 13. The log likelihood ratios were significant at 1% for both models of members and non-members of table banking, indicating that the independent variables used in the tobit model jointly and adequately explained the amount of loan borrowed by women farmers. The coefficients in the second hurdle indicate how an explanatory variable influences the amount of loan borrowed by the woman.

Following the results of the second hurdle (tobit model), marital status positively influenced the amount of loan borrowed and was significant at 10% level among the women farmers belonging to table banking. The results indicated that married women belonging to table banking borrowed more loan than the singles. This was only significant among the members since majority of the women farmers belonging to table banking were married. Possibly, married women had more dependents to cater for which may have translated to more need for funds thus they were more likely to demand more loan. Singles are assumed to have fewer dependents which translate to low consumption from small dependent size and as such less responsibilities and thus requires less credit unlike the married who have more dependents and responsibilities pushing them to borrow more loan in order to augment their working capital (Alhassan and Sakara, 2014). Diagne and Zeller (2001) argues that married women are more trustworthy than unmarried because they are perceived to be less risky and not easy to default.

Table 13: Factors influencing the actual loan amount borrowed by farm entrepreneurs

Variable	Members		Non-members	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Farmer characteristics				
Education of respondent	-0.047	0.052	-0.068	0.238
Marital status	1.453*	0.860	-6.188	3.878
Spousal Age gap	0.029	0.049	0.337	0.251
Participation in off-farm activities	0.828	0.631	9.276**	3.807
Entrepreneurial orientation				
Risk taking	-0.418	0.396	2.457*	1.318
Innovativeness	-0.736**	0.265	-0.724	1.007
Proactiveness	-0.881**	0.452	-3.328**	1.458
Farm characteristics				
Years of woman farm enterprise in operation	0.017	0.031	-0.084	0.130
Farm enterprise type	3.729**	1.246	1.589	10.391
Total Land Size	0.164**	0.083	0.488	0.472
Institutional characteristics				
Access to information	-0.600	0.895	-0.525	4.238
Extension access	0.511***	0.153	1.054	0.657
Decision level	0.138	0.145	-0.430	0.630
Financial knowledge	0.882**	0.421	8.605***	1.878
Sigma	2.927	0.140	8.016	0.748
Log likelihood	-609.221		-302.792	
Number of obs	245		139	
LR chi2(14,)	48.060***		46.570***	
Pseudo R2	0.038		0.071	
Left-censored observations at				
Log_Total loan amount<=0	19		65	
Uncensored observations	232		74	
Right-censored observations	0		0	

Note *, **, *** means significant at 10%, 5% and 1% significance levels, respectively

The results revealed that off-farm participation was positive and significant for the non-members but not among members of TB at 5% level. This can be linked to the first hurdle whereby off-farm participation was also positive and significant for members. This was significant only among the non-members since for the members the amount of loan borrowed was based on the shares and the amount needed by the woman farmer. This may be attributed to more exposure whereby women farmers participating in off-farm activities may get to interact with more people in the line of work. This is because more interactions may result in better ideas, knowledge and information flow especially on financial issues. This may translate to information sharing on loan issues and possibly on cheaper sources of loan. In addition, it

may lead to information on better terms of credit access thus resulting in more loan borrowed. According to Ngumbau *et al.* (2017), social capital helps people to take advantage of social interactions in obtaining given benefits.

Risk-taking was positive and significant for non-members but not among the members of TB at 10%. This depicted that the more risk-taking a woman farmer is, the more loan that particular farmer borrow from financial sources. This is because risk-taking women farm entrepreneurs are involved in making large and risky resource commitments by investing in uncertain ventures, in the interest of potentially obtaining high returns by seizing opportunities in the market. This may result in greater demand for financial capital that may be obtained through heavy loan borrowing. Similarly, Covin and Slevin (1991) indicated that risk-taking involves making bold actions by venturing into the unknown, borrowing heavily and /or committing significant resources to ventures in uncertain environment. According to Fatoki (2012), high risk taking behavior leads to large commitment of resources with an aim of securing high returns through seizing of new opportunities in the market thus result in high demand of loan in order to manage the same. In addition, entrepreneurs depicting more risk-taking behavior exhibit more willingness to take risky resources such as external finances (Huang *et al.*, 2011).

Innovativeness negatively influenced the amount of loan borrowed and was significant for the members at 5% level. Innovative women farmers have the tendency to create and experiment with new farming ideas and information that might result in new farm products or new farming techniques which may require more funds to implement. Through successful introduction of new farm products into competitive market may lead to greater sales from new farm products and hence greater profitability. The woman farm entrepreneur may then re-invest the profits in further creation of new farm products in the future thus reducing on the amount of loan borrowed. Covin and Lumpkin (2011) argued that innovativeness engage with process of creating new ideas, experimenting and novelty which needs huge capital. Further, Covin and Lumpkin (2011) reported that innovativeness and proactiveness are perceived progressive in seeking perspective that require huge amounts of capital that can be obtained through credit.

Proactiveness negatively influenced the amount of loan borrowed and was significant at 5% level for both members and non-members of table banking group. Proactive woman farmer tend to utilize the opportunities by being a first mover and this result in high profits which enables to get a head start in establishing new farm products. The high profits are then ploughed back in further creating and introducing new products and services ahead of competitors and

dealing with future demands. This reduces on the frequency of credit access and ultimately result in less amount of loan borrowed. Contrary to the findings, proactiveness is crucial in seeking networks and creating links with financial suppliers thus facilitating easy access to credit (Covin and Lumpkin, 2011).

The type of farm enterprise which represented the enterprise ownership was positive and statistically significant at 5% level among the members. This indicated that sole-proprietorship as opposed to partnership ownership of farm enterprise increases the amount of credit accessed by the woman farmer from credit sources. A farm enterprise owned by one person is likely to be undercapitalized thus more likely to employ debt financing leading to more need for large amount of credit. This is because partnership results in partners contributing towards the capital which minimizes on the amount of loan required unlike the sole proprietor who has no support in terms of raising capital. This corroborates the findings reported by Crocia (2011) that sole proprietorship ownership of farm enterprise tend to depend much on informal credit since they are viewed by formal credit markets as non-risk seekers.

Total land size among the members was positive and significant at 5% level. This was only significant among the members probably because they could easily be given a plot to try their farm enterprises owing to the immediate loans they could get from TB. Possibly, larger household land size means women farmers can have higher chances of being apportioned a bigger plot to try their farm enterprises and also make it easy for them to get. This may require higher investment hence higher demand for loan. Presumably, large portion of land cultivated by the woman farmer provides an incentive to seek for more loan in order to sustain production. This is because larger portion of land cultivated implies that the woman farmer utilizes more farm inputs that need additional financial resource that might be obtained through credit. In addition, with large land portion, the farmer can easily generate more income which ensures stability to repay loan and loan cost without default. Further, land as a proxy for collateral is the most important readily acceptable form of collateral since farmers with large land sizes tend to demand more loans because of available securities. Larger land sizes affect the amount of loans needed through a greater need for variable cash inputs thus calling for more capital investment, consequently increasing the need for loans (Akpan *et al.*, 2013; Charmaine *et al.*, 2015). Land has been the most important collateral for formal credit and that farmers with more land are more likely to seek credit as long as exploitation requires more capital (Muhongayire, 2012; Olateju *et al.*, 2017).

Extension access among the members was positive and significant at 1% level. Extension access was used as a proxy for financial knowledge and information. This was only significant among the members since in addition to the extension on new agricultural technology, the women could easily get immediate funds from table banking to implement the new technology thus leading to more loans borrowed. High extension access enhances dissemination of knowledge and information on loan issues thus facilitating easy and more access of credit. In addition, the more extension access could lead to exposure of women to new technologies which may require huge capital investments which may be obtained through credit. Access to high number of extension services reduces the transaction cost attached to credit information seeking thus increasing profits and consequently the ability to repay loan and loan expenses in time and with ease. According to Kinyanjui (2006), access to extension services as a proxy for financial information access reduces the difficulty of accessing finances as the farmers fully understand the requirements of accessing and repaying loan.

Financial knowledge for both members and non-members influenced the amount of loan borrowed positively and were statistically significant at 5% and 1% respectively. Women farmers with high levels of financial knowledge were able to borrow more loan. Lack of necessary financial management skills as result of low levels of financial knowledge may result to poor management of loans and confiscation leading to indebtedness thus reducing on the amount of future loans applied. High levels of financial knowledge is associated with greater wealth accumulation that enhances easy repayment of loan and provide collateral needed in loan access thus facilitating more loans borrowing. Similarly, Nunoo and Andoh (2012) reported that people with high levels of financial knowledge were more likely to utilize financial services. In addition, individuals with low levels of financial knowledge tend to have low debt literacy leading to transaction in high cost manners like high interest rates which impeded further credit access and hence the amount borrowed.

4.3 Impact of financial knowledge on the performance of women farm enterprises

In this section, the common steps used to implement the PSM method are outlined. First, a probability model (binary probit model) was used to determine the factors influencing the level of FK among women farm entrepreneurs. This was because the level of FK tends to differ based on women characteristics. As a result of varying levels of FK, a binary was created where the women farmers who scored above the mean in both subjective and objective measures, or in the objective measure only, were grouped as women with high FK while those who scored

the mean value or below were grouped under low FK (refer to 4.1.4). The reason for emphasizing more on objective measure was because unlike subjective measure that only revealed what people perceived of their FK level, it required cognitive skills. In the second step, each participant is matched to a non-participant with similar propensity score to estimate ATT.

4.3.1 Factors influencing the level of financial knowledge among women entrepreneurs

The factors that affect the level of financial knowledge among women entrepreneurs were estimated using the probit model and results presented in Table 14. The marginal probability column indicates changes in probability of financial knowledge given one unit change in the explanatory variables. The results revealed that six explanatory variables including; age of the woman, education level of the woman in years, farm years of woman enterprise in operation, total land size, interest rate perception and number of contacts with the extension agent significantly influenced the level of financial knowledge among the women and were all positive except for age of the respondent. The log pseudo likelihood of -222.51679 was statistically significant at 5% level and the pseudo value of 0.0756 indicates that the equation explain 7.5% of the variance in financial knowledge level.

Age negatively influenced level of financial knowledge and was significant at 5% level. The results revealed that younger women farmers were more likely to possess a high level of financial knowledge. This is because young women farmers tend to be risk takers in nature thus their acquisition of financial knowledge may be motivated by the need to grow and make optimal investment decisions as they seek to accumulate wealth before they reach retirement age. In addition, young women farmers have recently undergone education on financial courses which helps to boost their financial knowledge. Ansong and Gyensare (2012) argued that the low level of financial knowledge among the elderly is a result of cognitive processes declining at a very fast rate, thereby affecting the ability to recall important aspects relating to finance. Yoshihiko and Mustafa (2016) argued that older people learn out of life time experience since the time period in which they have handled finances is more compared to the young generation thus resulting in accumulation of knowledge based on more practical real life exposure to financial issues.

Table 14: Probit regression estimates to determine the level of financial knowledge among women entrepreneurs

Variables	Coefficient	Robust Std. Err.	(dy/dx)
Farmer characteristics			
Age of the respondent	-0.022**	0.009	-0.008
Education level of woman	0.035*	0.019	0.012
Marital status	-0.132	0.348	-0.044
Spousal age gap	-0.002	0.020	-0.001
Dependency-ratio	-0.095	0.370	-0.033
Membership to table banking	0.223	0.150	0.078
Off farm participation	-0.069	0.247	-0.023
Entrepreneurial orientation			
Risk-taking	0.177	0.135	0.061
Innovativeness	-0.130	0.092	-0.045
Proactiveness	0.000	0.145	0.000
Farm characteristics			
Years of woman farm enterprise in operation	0.043**	0.014	0.015
Number of farm enterprises	-0.155	0.123	-0.053
Total land size	0.072**	0.037	0.025
Institutional characteristics			
Information access	-0.045	0.329	-0.015
Interest rate perception	0.147*	0.079	0.050
Extension access (number)	0.175**	0.081	0.060
Woman family decision level	0.005	0.058	0.002
Number of observations	384		
Wald chi-square(17)	32.23**		
Pseudo R-square	0.0756		

Note * and ** means significant at 10% and 5% significance levels, respectively

Education level positively influenced level of financial knowledge and was significant at 10% level. Women with high education level may have attended subjects related to finance which positively influenced their financial knowledge. Sanjib (2016) noted that education level leads to higher understanding of financial matters which result in higher financial literacy. Van Rooij *et al.* (2011) points out that greater financial knowledge are found in individuals with higher education levels and especially among individuals who specialized in courses to do with financial matters.

Financial knowledge was positively influenced by the years of woman farm enterprise in operation and the coefficient was significant at 5% level. Increase in the farm years of woman enterprise in operation increased the likelihood of high level of financial knowledge. This is because with many years of operation in farm enterprise, the woman acquire financial knowledge through experience possibly due to frequent and larger financial handling. This

could be facilitated by the desire to utilize resources such as finances through cost minimization so as to maximize returns thus the motivation to acquire and improve financial knowledge level in order to manage the same. In addition, the high financial knowledge level among women with many years of enterprise operation is because they are motivated by the need to sustain production which calls for efficient management of funds for continuous production. Previous studies observed that individuals with longer labor experience undergo a larger number of financial situations, therefore they acquire more financial knowledge, thus facilitating the analysis of more complex information and providing a basis for decision making (Ani *et al.*, 2014).

Land size positively and significantly influenced the level of financial knowledge. Owning a large land size requires high financial knowledge for effective utilization of the land through proper financial management. The woman being one of the decision makers in the household needs financial knowledge in order to effectively contribute in proper utilization of resources such as land. The need for FK could be attributed to higher inputs requirement, calling for more finances that need to be managed effectively for continuous production. Further, this could be attributed to handling huge returns from cultivating the big portion of land thus they are motivated to acquire more financial knowledge in order to manage own returns. In a similar vein, Mahfudh (2014) argued that land as one of the assets and the income resulting from land utilization has an impact on financial literacy as the need for personal asset and financial management motivates the acquisition of financial knowledge.

Perception on the loan interest rate also positively influenced the level of financial knowledge among the farmers. It is expected that positive perception towards the interest rate triggers the demand for financial products and services through which the farmer may enhance financial knowledge level. In addition, positive perception on the loan interest rate may motivate the need to learn more about the financial issues especially the loan thus may lead to higher gaining of financial knowledge. According to Mandell (1971), positive perception of interest rate may result in more borrowing as the person may develop the interest to know more about loans leading to improved financial knowledge.

Women with more access to extension services were more likely to have high level of financial knowledge as indicated by the positive coefficient that was significant at 5% level. Extension access as a proxy for information provided women with financial related information that assisted in boosting their financial knowledge level. Possibly, agricultural extension is being

refocused to agribusiness which has some financial knowledge and management component. Access to information and especially financial information on savings, borrowing, financial decision making and general financial management enhanced the level of financial knowledge among the women. This could be more posited by women belonging to table banking whereby they were able to acquire extension services through the various trainings and education provided in table banking since most of the educations offered were geared towards financial management. Moreover, high number of contacts with extension agents may lead to provision of information on new technology which may require huge amount of funds in order to adopt. As a result, this may require high level of financial knowledge in order to invest effectively in this kind of technology. According to Eniola and Entebang (2016), proper sensitization and dissemination of information on financial products through extension services helps to boost the level of financial knowledge

4.3.2 Impact of financial knowledge on farm enterprise performance

Following the results of the first step using probit model, the next step in PSM is computing the impact of FK on performance of women farm enterprises. Prior to computing the impact of FK on performance of women farm enterprises, matching algorithm was chosen followed by checking the overlap and the region of common support between treatment and comparison group and results presented in figure 5. This is because the ATT are only defined in the region of common support.

To check the overlap or the common support condition entails a histogram that shows the distribution of the propensity scores (x-axis) between the groups of women with low levels of financial knowledge (untreated) and those with high financial knowledge (treated). The region of common support among the treated ranged from 0.314 to 0.999 with a mean of 0.696. Implementing the common support condition ensures that any combination of observed characteristics in the treatment group can also be observed among the control. Looking at the distribution of the propensity scores and the overlaps, the results revealed that the propensity scores between the groups of women with low financial knowledge and those with high financial knowledge were within the region of common support. This was indicated by the more overlaps between the two groups and that most of the observations were within the region of common support. Accordingly, it can be concluded that few observations can be rejected from the analysis, hence a good match was achieved.

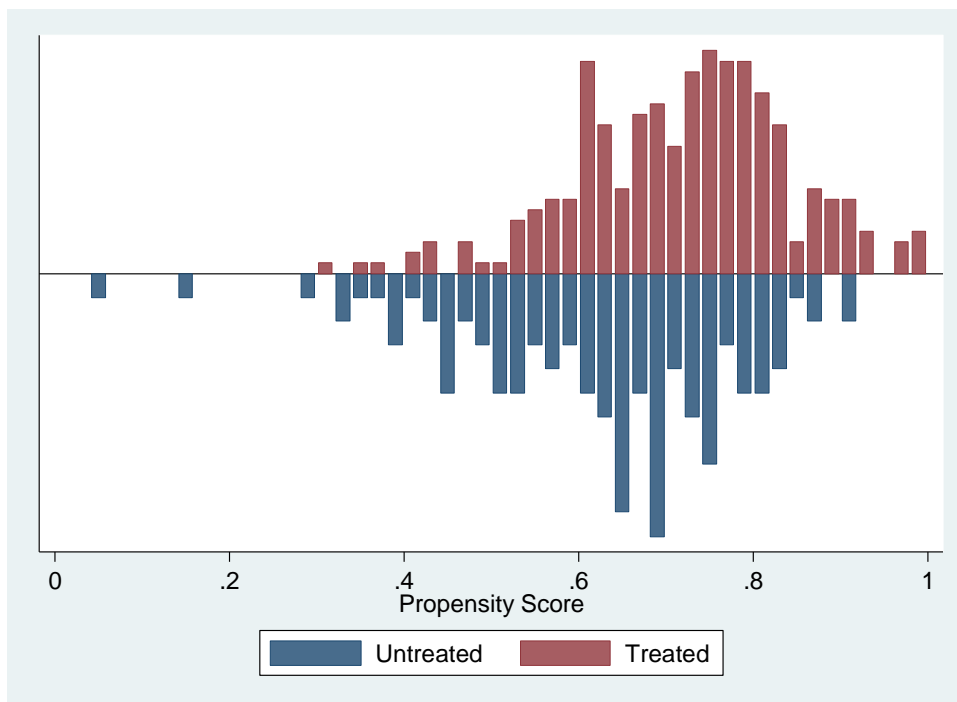


Figure 5: Common support graph of propensity scores

Once the common support condition is satisfied and matching algorithm chosen to match the different scores of participants to those of non-participants, then treatment effects are estimated. With reference to the final grouping done in objective one, the women with high financial knowledge were assigned to the treated group whereas the women with the low financial knowledge were assigned to the control group. The results modelling the impact of financial knowledge level on farmer performance measured by savings and enterprise margin with nearest neighbor matching (NNM), Kernel-based matching (KM) and Radius matching (RM) estimates are presented in Table15. The three matching methods indicated that high levels of financial knowledge had a positive impact on farmer farm enterprise performance measured by savings and enterprise margin. Both savings and enterprise margin were positively influenced by financial knowledge and were statistically significant at 1% and 10% respectively. The average treatment on the treated (ATT) column shows the difference in savings and enterprise margin between the treated and control groups. On average, the treated group (high financial knowledge) performed better than the counterparts as revealed by the positive difference.

Table 15: Estimates of average treatment effect on the treated (ATT) on performance of women farm enterprises measured by savings and enterprise margin (KES)

Outcome variable	Matching algorithm				Standard error	t-statistics
		treated	controls	ATT		
Savings	Nearest neighbor	264	83	19589.78	6140.646	3.190***
	Kernel	264	114	19143.36	5610.400	3.412***
	Radius	235	113	12265.15	4187.014	2.929***
Women enterprise margin	Nearest neighbor	264	83	26344.48	14710.166	1.791*
	Kernel	264	114	19722.93	11453.452	1.722*
	Radius	235	113	19460.60	11751.290	1.656*

Note * and *** means significant at 10% and 1% significant levels, respectively; *t*-values are bootstrapped with 50 replications.

The impact of financial knowledge on farmer savings was positive and significant for all the matching algorithms at 1% level. With reference to savings, the ATT ranged from KES12265.15 to KES19589.78 annually implying that on average women farmers with high levels of financial knowledge saved more than matched counterparts with low level of financial knowledge. The results posit that financial knowledge had a positive impact on saving as high level of financial knowledge enabled individual to make more substantive financial plans and more informed decisions regarding their money allocations and savings. Further, high levels of financial knowledge are associated with good investment behavior that guarantees high returns resulting in more savings. According to Mahdzan and Tabiani (2013), financial knowledge is very crucial aspect in any financial decision making since it impacts key major outcomes such as borrowing, savings, investments. Further, financial knowledge is an investment in human capital that promotes wealth accumulation resulting in higher levels of savings (Mahdzan and Tabiani, 2013). Less financial literacy is linked to low propensity to save in that individuals who are less financially literate are less likely to save for the future (Van Rooij *et al.*, 2011).

High levels of financial knowledge also led to positive and significant impact on farmer enterprise margin for all matching algorithms at 10% level. Women farmers with high level of financial knowledge experienced more enterprise margins that ranged from KES 19460.60 to KES 26344.48 annually relative to the women farmers with low levels of financial knowledge. Women with high financial knowledge are likely to make better, informed and effective financial decisions regarding better investment practices which translate into higher income.

Reverse causation is that the desire for greater enterprise margin and better management of the same motivates one to increase their financial knowledge. Rasoaisi and Kalebe (2015) reported that high financial knowledge allows an individual to make informed and effective financial decisions especially regarding better investment decision which translate to higher income.

Table 16: Test for selection bias after matching using propensity score test

Variables	Matched sample		Bias %bias	%reduction bias	t-test	
	Mean Treated	Control			t	p>t
Farmer characteristics						
Age of the respondent	41.02	41.081	-0.60	96.80	-0.070	0.946
Education level	12.871	12.782	2.20	87.10	0.250	0.801
Marital status	0.894	0.885	3.10	64.80	0.340	0.734
Spousal age gap	5.141	5.142	0.00	99.10	-0.000	0.998
Dependency ratio	0.597	0.607	-4.60	18.10	-0.520	0.600
Membership to table banking	0.655	0.683	-5.90	44.20	-0.680	0.496
Off-farm participation	0.906	0.908	-0.90	69.70	-0.100	0.922
Entrepreneurial orientation						
Risk-taking	3.334	3.292	6.20	73.90	0.750	0.454
innovativeness	3.110	3.108	0.30	97.60	0.030	0.976
Proactiveness	3.884	3.879	0.80	94.00	0.090	0.925
Farm enterprise						
Farm years of woman enterprise in operation	11.204	11.014	2.70	79.40	0.300	0.768
Number of farm enterprises	2.267	2.256	1.80	83.80	0.200	0.841
Total land size	2.492	2.552	-2.90	84.40	-0.360	0.717
Institutional characteristics						
Access to information	0.957	0.969	-5.90	-33.50	-0.740	0.460
Interest rate perception	3.059	3.098	-4.00	77.50	-0.470	0.640
Extension access	0.835	0.785	3.90	86.30	0.590	0.557
Woman family decision level	5.009	5.180	-9.40	-70.90	-1.060	0.290

Following the computation of ATTs the next step was to check the matching quality. To determine the matching quality, balancing test was used to ascertain whether the differences in the covariates in the two matched sample groups have been eliminated and the results presented in Table 16. The matching process was checked using different methods to determine the balance in distribution of the covariates in both treatment and control groups. To determine whether the matching process balanced the distribution of the relevant covariates in both

treatment and control groups, propensity score test was used. The propensity score test using kernel matching which was the best matching technique for this data indicated a significant reduction in bias after matching as all the covariates revealed no significant differences ($p>t$) in matched non-participants and participants. In other words, there was no significant difference in the mean distribution of the participants and non-participants after matching procedure.

Table 17: Covariate balancing test (pctest) (summary table)

Matching algorithm	Mean bias		% bias reduction	Pseudo-R square		P-value	
	U	M		U	M	U	M
	Nearest neighbor	12.60	6.70	46.83	0.076	0.016	0.004	0.827
Kernel	12.60	3.20	74.60	0.076	0.006	0.004	0.999
Radius	12.60	9.40	25.40	0.076	0.056	0.004	0.264

Where U and M means unmatched and matched mean bias

Further, the results presented in the summary Table 17 revealed that the mean bias before matching was 12.60% whereas the mean bias after matching was reduced to 6.70, 3.20 and 9.40 with nearest neighbor, kernel and radius matching respectively. The percentage reduction bias with NNM, KM and RM was 46.83, 74.60 and 25.40 respectively which was above the recommended value of 20% by Rosenbaum and Rubin (1985) as a sufficiently large enough reduction in bias. This indicated that the matching substantially reduced the selection bias. In addition, the pseudo-R square of the estimated probit model reduced after matching for all matching algorithms indicating that the balancing property is satisfied. Further, P-value was rejected after matching for all the matching algorithms indicating that there was no difference in the distribution of covariates between treated and control after matching.

4.3.3 Testing for hidden bias with sensitivity analysis

Finally, sensitivity analysis was conducted using Rosenbaum bounds in order to test for the hidden bias. To test for the hidden bias, mhbounds was used and results presented in Table 18. Since PSM only control for the selection bias due to observable variables, there is need to check for the sensitivity of the ATT to hidden bias (selection on unobservable) after matching, that is selection bias due to unobservable variables. In case of unobserved variables that

simultaneously affect assignment into treatment and the outcome variable, a hidden bias might arise to which matching estimators may not be robust (Rosenbaum, 2002). To address this problem bounding approach proposed by Rosenbaum (2002) is used to determine how strongly an unmeasured variable must influence the selection process to undermine the implications of the matching analysis.

The sensitivity analysis involves calculating upper and lower bounds with a Wilcoxon sign-rank test to test the null hypothesis of no participation effect for different hypothesized values of unobserved selection bias (Rosenbaum and Rubin, 1983). Absence of a hidden bias means that the two individuals with the same observed covariates have same chances of receiving treatment and therefore the odds ratio will be one. This means that the test statistic Q_{mh+} given that we have overestimated the treatment effect and Q_{mh-} the case where we have underestimated the treatment effect gives an odd ratio of one or rather should be equal. The result revealed that Q_{mh+} and Q_{mh-} are equal meaning that the odd ratio is one, implying the absence of hidden or unobserved selection bias.

Table 18: Sensitivity analysis with Rosenbaum bounds

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	.	.	.	.
1.05	-0.078	-0.078	0.531	0.531
1.1	-0.078	-0.078	0.531	0.531
1.15	-0.078	-0.078	0.531	0.531
1.2	-0.078	.	0.531	.
1.25	-0.078	.	0.531	.
1.3	-0.078	-0.078	0.531	0.531
1.35	-0.078	.	0.531	.
1.4	-0.078	.	0.531	.
1.45	-0.078	-0.078	0.531	0.531
1.5	-0.078	-0.078	0.531	0.531
1.55	.	-0.078	.	0.531
1.6	-0.078	.	0.531	.
1.65	-0.078	-0.078	0.531	0.531
1.7	-0.078	-0.078	0.531	0.531
1.75	-0.078	-0.078	0.531	0.531
1.8	-0.078	-0.078	0.531	0.531
1.85	.	-0.078	.	0.531
1.9	-0.078	-0.078	0.531	0.531
1.95	-0.078	-0.078	0.531	0.531
2	-0.078	-0.078	0.531	0.531

Gamma : odds of differential assignment due to unobserved factors

Q_mh+ : Mantel-Haenszel statistic (assumption: overestimation of treatment effect)

Q_mh- : Mantel-Haenszel statistic (assumption: underestimation of treatment effect)

p_mh+ : significance level (assumption: overestimation of treatment effect)

p_mh- : significance level (assumption: underestimation of treatment effect)

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Three conclusions were drawn from the study as follows:

- a. Members were more knowledgeable than the non-members thus revealing the importance of group membership in enhancing financial knowledge.
- b. Findings indicated that financial knowledge was significant and positively influenced both credit accessed and amount of loan borrowed for both members and non-members. Risk-taking behavior also influenced positively on amount of loan borrowed.
- c. The level of financial knowledge impacted positively on savings and enterprise margin.

5.2 Recommendations

- a. Sensitization of farmers on importance of group membership.
- b. Promoting the risk-seeking tendency through encouraging farmers to build up on self-insurance so as to mitigate unexpected agricultural losses.
- c. Devising strategies aimed at improving financial knowledge such as refocussing the extension services to agribusiness with financial knowledge and management components.

5.3 Area of further research

This study focused more on analyzing the level of financial knowledge among the women farmers and the role of financial knowledge on the extent of credit accessed. Moreover, the impact that this financial knowledge had on savings and women farm enterprise margin was analyzed. Further research is therefore proposed on the analysis of the factors influencing possible drop-out of women from table banking. Further, in order to fully capture the multidimensional nature of performance, a non-financial perspective should also be addressed by future researchers.

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APPENDICES

Questionnaire serial No.

Appendix one: Questionnaire

The questionnaire is designed to assist in collecting data on the role of financial knowledge on extent of credit access and performance of farm enterprises of women in Kericho West Sub-County. Please note that the findings of this research are solely meant for academic purposes and all responses will be treated with utmost confidentiality.

Ward:

Group name:

SECTION A: Socio-economic characteristics of women

A1. What is your age (in years)? (**Age**):

A2. What is your marital status? (**MrtlStus**):

(1=Married; 2=single; 3=divorce; 4=separated; 5=widowed; 6=others (specify))

A3. What is the age of your spouse ? (**SpseAge**):

A4. What is your education level (years of schooling)? (**EducYrs**):

A5. Indicate the total number of household size (**HhSize**):

A6. Using the table below, indicate the number of dependents below 18 years and above 65 years of the working age.

Household member composition	Number
------------------------------	--------

Children (below 18 years): (**Chldrn**)

Working age (19-65 years): (**WkngAge**)

Old family members (above 65 years): (**Old**)

A7. Do you participate in other off-farm activities? (**OffFrm**): *(1=Yes; 0=No)*

If yes, fill the table

Off-farm activities: (OffFacties)	Number of months that you have earned income in past months: (NMnth s)	Average monthly income: (AvrgIcm)	

Sources of off-farm activities: *1= salary; 2=remittances; 3=pension scheme; 4=casual labor; 5=self-employment; 6=rental payments; 7=others (specify)*

Entrepreneurial orientation

A8. Using the items measuring entrepreneurial orientation in the table below, use a 5-point likert scale.

Entrepreneurial orientation (EO)	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
Risk taking					
a) I like to take bold actions by venturing into the unknown: (Risk1)					
b) I am willing to invest a lot of time and/or money on something that might yield a high return: (Risk2)					
c) I tend to act boldly in situations where risk is involved: (Risk3)					
Innovativeness					
a) I tend to do things the same and not try different, unproven approaches: (Innovat1)					
b) I favor experimentation and original approaches to problem solving rather than using methods others generally use for solving problems: (Innovat2)					
c) I prefer to try my own unique ways when learning new things rather than doing it like everyone else does: (Innovat3)					
d) I often like to try new and unusual activities that are not typical (not common, not regular, not expected) but not necessarily risky: (Innovat4)					
Proactiveness					
a) I usually act in anticipation of future problems, needs or changes: (Proact1)					
b) I tend to plan ahead on projects: (Proact2)					
c) I prefer to 'step up' and get things going on projects rather than sit and wait for someone else to do: (Proact3)					

A9. Please indicate the person responsible for decision making in the family. **(DecsnMkr)**:
..... (1= Myself; 2= My husband; 3= Both of us; 4= Others (specify))

A10. On a scale of 1 to 10, please indicate to what level you make decisions for the family.

(Decsnlvl):

(Where scale of 1-10 represent the number of decisions made in the family)

SECTION B: Measurement of financial knowledge

Objective evaluation

B1. Suppose you had KES 100 in the savings account and the interest rate is 2% per year, after five years how much will you have in your account if the money is left to grow? **(Intrst)**:

(1 = More than KES102; 2=exactly KES102; 3=less than KES102; 4= do not know)

B2. Assume that your friend saved KES 100,000 in the year 2016 and you saved the same amount (KES 100,000) this year in table banking/other financial institution, who is richer due to savings?

(Svngs): (1 = Both; 2=Me; 3=Friend; 4=Not sure)

B3. Let us assume that you saw bean seeds of the same type on sale in two different agrovets. The initial retail price of bean seeds was KES. 10 000. One agro-vet offered a discount of KES. 1500, while the other offered a 10% discount. Which one is a better bargain? **(PrcDiscnt)**:

.....
(1= Discount of KES. 1500; 2= 10% discount; 3= I cannot estimate it even roughly)

B4. Suppose that in the year 2016 your income was KES. 50,000 and prices of goods/services were constant. In the year 2017, your income and prices doubled, will you buy the same amount of goods/services in 2017? **(PrcIncom)**: (1=Yes; 2= No; 3= Not sure)

B5. Imagine that the interest rate on your savings in table banking/ other financial institution was 1% per year and the inflation was 2% per year. After one year, how much would you be able to buy with the money in this account? **(IntrstSvngs)**:

(1= More than today; 2= Exactly the same as today; 3= Less than today; 4= Do not know)

B6. High inflation means that the cost of living is increasing rapidly. **(Infltion)**:

(1= True; 0= False):

B7. An investment with a high return is likely to be high risk. **(RetrnRsk)**: (1=True; 0=False)

Subjective evaluation

B8. On a 5-point Likert scale where 1 means bad and 5 means excellent, how would you assess your overall level of financial knowledge (set of skills and knowledge that allows one to manage financial resources)?

Financial knowledge	Very bad 1	Bad 2	Average 3	Good 4	Very good 5
How can you assess your overall level of financial knowledge: (Percvdfk)					

SECTION C: Institutional characteristics

C1. Do you have access to farm enterprise information? **(Infor)**: (1=Yes; 0=No)

C2. Please indicate the distance from farm gate to the market (Walking minutes). **(Dstnce)**:
.....

C3. Please indicate the number of contacts with the extension agents over the last one years?
(Extnsn):

SECTION D: Access to credit and amount borrowed

D1. Are you a member of table banking program (SEEW0)? **(MbrShip)**:
..... (1=Yes; 0=No)

D2. Have you taken credit from table banking over the last three years? **(LnAccssTB)**:
..... (1=Yes; 0=No)

D3. If yes, please indicate how much loan you borrowed from table banking over the last one year?
(LnAmntTB):

D4. To what use did you put the last loan borrowed from table banking? **LnUseTB1**:
..... **LnUseTB2**: **LnUseTB3**: **LnUseTB4**:
(1 = Education; 2 = Consumption; 3 = Agricultural SME investment; 4=others (specify))

D5. With relation to question D3, please indicate the amount of loan invested in farm enterprises.
(LnInvstTB):

D6. Have you defaulted over the last three years? **(LnDfault)**: (1=Yes; 0=No)

D7. If yes, how many times have you defaulted? **(DfltTmes)**:

D8. How much have you defaulted for the last three years? **(DfltAmnt)**:

D9. Have you defaulted ever before? **(EvrDflt)**: (1=Yes; 0=No)

D10. If yes, how many times have you defaulted before? **(DfltTmesEvr)**:

D11. How much have you defaulted before? **(DfltAmntEvr)**:

D12. Have you taken credit from other financial institution over the last three years? **(LnAccssFI)**:
..... (1=Yes; 0=No)

D13. If yes, please indicate how much loan you borrowed from other financial institution over the last one year? **(LnAmntFI)**:

D14. To what use did you put the last loan borrowed from other financial institution? **LnUseFI1:**
 **LnUseFI2:** **LnUseFI3:** **LnUseFI4:**

(1 = Education; 2 = Consumption; 3 = Agricultural SME investment; 4=others (specify))

D15. With relation to question D9 (non-members), please indicate the amount of loan invested in farm enterprises. (**LnInvstFI**):

SECTION E: Product characteristics

E1. On a five-point likert scale, how do you perceive the rate of interest charged by table banking program? (**PrevdIntrstTB**):

(1=very bad, 2=bad, 3=average, 4=good, 5=very good)

E2. On a five-point likert scale, how do you perceive the rate of interest charged by other financial institutions? (**PrevdIntrstFI**):

(1=very bad, 2=bad, 3=average, 4=good, 5=very good)

SECTION F: Enterprise characteristics

F1. How long has the farm enterprise been in existence? (**BssAge**):

F2. Indicate the type of farm enterprise you run. (**BssType**):

(1 = Sole proprietorship; 2 = Partnership; 3=others (specify))

F3. How many lines of farm enterprises do you own? (**BssLines**):

SECTION G: Performance

G1. How many acres of land do you own in total? (**TtalLndSize**):

G2. From the farm enterprises, please indicate the amount of savings for past twelve months.

Type of farm enterprises (EntrprsTyp)	Amount saved in Table banking (AmntSvdTB)	Amount saved in other financial institutions (AmntSvdFI)	Type of financial Institution where the money was saved (InstTyp)

On-farm activities: 1=crop farming; 2=livestock farming; 3=selling of on-farm produce; 4=others (specify)

Appendix two: Stata output of the econometric results

Variance inflation factor stata output

```
reg Log_TLnAmount age educ SpsalAgeGap dependency_ratio risk_taking proactive
innovativeness FrmAge FrmLines TtalLndSze PrcvdIntrstF1 Extnsn Decsnlvl, robust
```

Linear regression

Number of obs = 390
 F(13, 376) = 6.44
 Prob > F = 0.0000
 R-squared = 0.1727
 Root MSE = 4.2064

Log_TLnAmount	Robust		t	P>|t|	[95% Conf. Interval]	
	Coef.	Std. Err.				
age	-.0514945	.0275684	-1.87	0.063	-.1057021	.0027131
educ	-.0631369	.0573638	-1.10	0.272	-.1759309	.0496572
SpsalAgeGap	.0337852	.053344	0.63	0.527	-.0711047	.1386751
dependency_ratio	1.921341	1.19321	1.61	0.108	-.4248601	4.267542
risk_taking	.6879726	.4300168	1.60	0.110	-.1575665	1.533512
proactive	-.3735148	.5016196	-0.74	0.457	-1.359846	.6128165
innovativeness	-.4031727	.2827504	-1.43	0.155	-.959143	.1527976
FrmaAge	.0309936	.0419026	0.74	0.460	-.0513992	.1133865
FrmaLines	1.282666	.3801682	3.37	0.001	.5351434	2.030188
TtalLndSze	.184869	.0987274	1.87	0.062	-.0092581	.3789961
PrcvdIntrstF1	1.540801	.2612528	5.90	0.000	1.027101	2.0545
Extnsn	.5639122	.1250588	4.51	0.000	.31801	.8098144
Decsnlvl	.0466991	.1378504	0.34	0.735	-.2243551	.3177533
_cons	1.457018	2.811034	0.52	0.605	-4.070299	6.984334

vif

Variable	VIF	1/VIF
age	1.69	0.592834
FrmaAge	1.62	0.615528
proactive	1.46	0.685354
risk_taking	1.44	0.692554
educ	1.22	0.817946
dependency-o	1.22	0.822390
PrcvdIntrs~l	1.21	0.826536
Decsnlvl	1.20	0.835368
SpsalAgeGap	1.14	0.875750
FrmaLines	1.14	0.879305
Extnsn	1.13	0.884822
TtalLndSze	1.11	0.901710
innovative~s	1.10	0.910592
Mean VIF	1.28	

Pairwise correlation

pwcrr marital Infor MbrShip offarm FrmType

	marital	Infor	MbrShip	offarm	FrmType
marital	1.0000				
Infor	-0.0055	1.0000			
MbrShip	0.0549	-0.0278	1.0000		
offarm	-0.1208	-0.0278	-0.0820	1.0000	
FrmType	0.0402	-0.0309	-0.0699	0.0135	1.0000

Double hurdle stata output for non-members and members of table banking respectively

Non-Members

dhreg Log_TLnAmount educ Marital SpSalAgeGap offarm Infor risk_taking innovativeness proactive FrmAge FrmType TtalLndSize Extnsn Decsnlv FK if MbrShip==0, hd (age educ dependency_ratio offarm Infor risk_taking innovativeness proactive FrmLines TtalLndSize PrcvdIntrstF1 Extnsn FK)

Probit Regression

```
Iteration 0: log likelihood = -96.055887
Iteration 1: log likelihood = -55.975243
Iteration 2: log likelihood = -53.849486
Iteration 3: log likelihood = -53.826637
Iteration 4: log likelihood = -53.826636
```

```
Probit regression                               Number of obs   =          139
                                                LR chi2(13)    =          84.46
                                                Prob > chi2    =          0.0000
Log likelihood = -53.826636                    Pseudo R2      =          0.4396
```

__000002	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	-.0287105	.0166413	-1.73	0.084	-.0613269 .0039059
educ	-.0253226	.0407233	-0.62	0.534	-.1051389 .0544937
dependency_ratio	.8943755	.7849741	1.14	0.255	-.6441455 2.432897
offarm	1.081336	.692787	1.56	0.119	-.2765016 2.439174
Infor	-.3182688	.7300528	-0.44	0.663	-1.749146 1.112608
risk_taking	.0267816	.2412912	0.11	0.912	-.4461405 .4997037
innovativeness	.2383009	.1893247	1.26	0.208	-.1327687 .6093706
proactive	-.2412266	.2659296	-0.91	0.364	-.762439 .2799858
FrmLines	.5017257	.2308014	2.17	0.030	.0493633 .9540882
TtalLndSize	.1281273	.0896225	1.43	0.153	-.0475296 .3037842
PrcvdIntrstF1	1.028898	.2005879	5.13	0.000	.6357527 1.422043
Extnsn	.4806079	.1687032	2.85	0.004	.1499556 .8112601
FK	.9422009	.3249389	2.90	0.004	.3053324 1.579069
_cons	-5.11163	2.080085	-2.46	0.014	-9.188521 -1.034739

starting values conditional on hurdle being passed

Tobit regression

Tobit regression

Number of obs = 139
 LR chi2(14) = 46.57
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.0714

Log likelihood = -302.79154

Log_TLnAmount	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
educ	-.0684993	.2377184	-0.29	0.774	-.5389735	.4019749
Marital	-6.18805	3.878284	-1.60	0.113	-13.86366	1.487556
SpsalAgeGap	.3370079	.2507751	1.34	0.181	-.1593072	.8333229
offarm	9.275718	3.806882	2.44	0.016	1.741426	16.81001
Infor	-.5248666	4.238379	-0.12	0.902	-8.913145	7.863411
risk_taking	2.456979	1.317752	1.86	0.065	-.1510156	5.064973
innovativeness	-.7236189	1.007473	-0.72	0.474	-2.717534	1.270296
proactive	-3.327559	1.457546	-2.28	0.024	-6.212223	-.4428942
FrmAge	-.0844139	.1297771	-0.65	0.517	-.3412589	.1724311
FrmType	1.589056	10.39126	0.15	0.879	-18.97654	22.15465
TtalLndSze	.4877857	.4719199	1.03	0.303	-.4462023	1.421774
Extnsn	1.05433	.6567301	1.61	0.111	-.2454206	2.35408
Decsnlvl	-.4304327	.6301835	-0.68	0.496	-1.677644	.8167786
FK	8.605139	1.877561	4.58	0.000	4.889212	12.32107
_cons	-.3377493	15.0671	-0.02	0.982	-30.15741	29.48191
/sigma	8.016154	.7479522			6.535864	9.496444

Obs. summary: 65 left-censored observations at Log_TLnAmo~t<=0
 74 uncensored observations
 0 right-censored observations

Members

dhreg Log_TLnAmount educ Marital SpSalAgeGap offarm Infor risk_taking innovativeness proactive FrmAge FrmType TtalLndSize Extnsn Decsnlv FK if MbrShip==1, hd (age educ dependency_ratio offarm Infor risk_taking innovativeness proactive FrmLines TtalLndSize PrcvdIntrstF1 Extnsn FK)

Probit regression

```
Iteration 0: log likelihood = -67.301277
Iteration 1: log likelihood = -53.295628
Iteration 2: log likelihood = -51.615966
Iteration 3: log likelihood = -51.600449
Iteration 4: log likelihood = -51.600448
```

```
Probit regression                               Number of obs   =       251
                                                LR chi2(13)    =       31.40
                                                Prob > chi2    =       0.0029
Log likelihood = -51.600448                    Pseudo R2     =       0.2333
```

__000002	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
age	-.0036407	.0176974	-0.21	0.837	-.038327	.0310457
educ	-.0540631	.0405862	-1.33	0.183	-.1336106	.0254845
dependency_ratio	-.3059871	.7415208	-0.41	0.680	-1.759341	1.147367
offarm	.7531855	.4517234	1.67	0.095	-.132176	1.638547
Infor	-.5612995	.7052562	-0.80	0.426	-1.943576	.8209773
risk_taking	-.4759264	.3322979	-1.43	0.152	-1.127218	.1753655
innovativeness	-.7514903	.2210546	-3.40	0.001	-1.184749	-.3182312
proactive	-.3883894	.3773455	-1.03	0.303	-1.127973	.3511942
Frmlines	.3247133	.2353675	1.38	0.168	-.1365985	.7860252
TtalLndSize	.1185376	.0853595	1.39	0.165	-.0487639	.2858391
PrcvdIntrstF1	.1985527	.1761252	1.13	0.260	-.1466464	.5437517
Extnsn	.168917	.1491639	1.13	0.257	-.1234388	.4612728
FK	.5390099	.2916779	1.85	0.065	-.0326683	1.110688
_cons	6.016326	2.55553	2.35	0.019	1.00758	11.02507

starting values conditional on hurdle being passed

Propensity Score Matching (PSM)

Probit model

probit FK age educ Marital SpsalAgeGap dependency_ratio MbrShip offarm Infor risk_taking
 innovativeness proactive FrmAge FrmLines TtalLndSize PrcvdIntrstF1 Extnsn Decsnlv, robust

```
Iteration 0: log pseudolikelihood = -240.72429
Iteration 1: log pseudolikelihood = -223.01828
Iteration 2: log pseudolikelihood = -222.51759
Iteration 3: log pseudolikelihood = -222.51679
Iteration 4: log pseudolikelihood = -222.51679
```

```
Probit regression                               Number of obs   =       390
                                                Wald chi2(17)  =       32.23
                                                Prob > chi2    =       0.0141
Log pseudolikelihood = -222.51679             Pseudo R2      =       0.0756
```

FK	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
age	-.0222747	.0086193	-2.58	0.010	-.0391682	-.0053813
educ	.0353518	.0191355	1.85	0.065	-.0021531	.0728566
Marital	-.1316182	.3478187	-0.38	0.705	-.8133303	.5500939
SpsalAgeGap	-.0019905	.0201433	-0.10	0.921	-.0414706	.0374895
dependency_ratio	-.0952962	.3695034	-0.26	0.796	-.8195096	.6289173
MbrShip	.2233727	.1500008	1.49	0.136	-.0706234	.5173688
offarm	-.0686583	.2467921	-0.28	0.781	-.5523619	.4150452
Infor	-.0446665	.3291891	-0.14	0.892	-.6898652	.6005323
risk_taking	.1773389	.1352163	1.31	0.190	-.0876802	.4423581
innovativeness	-.1300801	.0923186	-1.41	0.159	-.3110212	.050861
proactive	.0000779	.1448964	0.00	1.000	-.2839137	.2840696
FrmAge	.0425489	.014166	3.00	0.003	.014784	.0703138
FrmLines	-.1554802	.1227744	-1.27	0.205	-.3961135	.0851532
TtalLndSize	.0723783	.0368623	1.96	0.050	.0001295	.1446271
PrcvdIntrstF1	.1474413	.0785526	1.88	0.061	-.0065189	.3014015
Extnsn	.1749505	.0809389	2.16	0.031	.0163132	.3335878
Decsnlv1	.0054141	.0584043	0.09	0.926	-.1090563	.1198844
_cons	.0551563	1.055577	0.05	0.958	-2.013736	2.124049

Propensity score matching

pscore FK age educ Marital SpsalAgeGap dependency_ratio MbrShip offarm Infor risk_taking
 innovativeness proactive FrmAge FrmLines TtalLndSze PrcvdIntrstF1 Extnsn Decsnlvl,
 pscore(p1) blockid(Blocks) comsup level(0.001)

 Algorithm to estimate the propensity score

The treatment is FK

Financial Knowledge	Freq.	Percent	Cum.
Low	120	30.77	30.77
High	270	69.23	100.00
Total	390	100.00	

Estimation of the propensity score

Iteration 0: log likelihood = -240.72429
 Iteration 1: log likelihood = -223.39777
 Iteration 2: log likelihood = -222.53515
 Iteration 3: log likelihood = -222.51679
 Iteration 4: log likelihood = -222.51679

Probit regression

Number of obs	=	390
LR chi2(17)	=	36.42
Prob > chi2	=	0.0040
Pseudo R2	=	0.0756

Log likelihood = -222.51679

FK	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	-.0222747	.008734	-2.55	0.011	-.039393 -.0051564
educ	.0353518	.019786	1.79	0.074	-.003428 .0741316
Marital	-.1316182	.3250393	-0.40	0.686	-.7686836 .5054472
SpsalAgeGap	-.0019905	.0186066	-0.11	0.915	-.0384588 .0344778
dependency~o	-.0952962	.3644468	-0.26	0.794	-.8095988 .6190064
MbrShip	.2233727	.1584904	1.41	0.159	-.0872627 .5340081
offarm	-.0686583	.2477977	-0.28	0.782	-.5543329 .4170163
Infor	-.0446665	.3597994	-0.12	0.901	-.7498604 .6605275
risk_taking	.1773389	.1299444	1.36	0.172	-.0773473 .4320252
innovative~s	-.1300801	.0945267	-1.38	0.169	-.3153491 .0551889
proactive	.0000779	.1486659	0.00	1.000	-.2913019 .2914577
FrmAge	.0425489	.0132147	3.22	0.001	.0166484 .0684493
FrmLines	-.1554802	.1216009	-1.28	0.201	-.3938136 .0828532
TtalLndSze	.0723783	.0393569	1.84	0.066	-.0047598 .1495163
PrcvdIntrst~1	.1474413	.0813243	1.81	0.070	-.0119515 .306834
Extnsn	.1749505	.0806165	2.17	0.030	.0169451 .332956
Decsnlvl	.0054141	.0529793	0.10	0.919	-.0984234 .1092515
_cons	.0551563	1.09619	0.05	0.960	-2.093337 2.20365

Note: the common support option has been selected
 The region of common support is [.36902918, .99951086]

Description of the estimated propensity score
 in region of common support

Estimated propensity score					
	Percentiles	Smallest			
1%	.3992635	.3690292			
5%	.4596322	.3761183			
10%	.5204884	.3816345	Obs		384
25%	.6217009	.3992635	Sum of Wgt.		384
50%	.7145062		Mean		.6985351
		Largest	Std. Dev.		.1265282
75%	.7829343	.9950574			
90%	.851667	.9981166	Variance		.0160094
95%	.903853	.9987013	Skewness		-.2515992
99%	.9950574	.9995109	Kurtosis		2.886906

 Step 1: Identification of the optimal number of blocks
 Use option detail if you want more detailed output

The final number of blocks is 5

This number of blocks ensures that the mean propensity score
 is not different for treated and controls in each blocks

 Step 2: Test of balancing property of the propensity score
 Use option detail if you want more detailed output

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	Financial Knowledge		Total
	Low	High	
.2	1	3	4
.4	36	41	77
.6	66	164	230
.8	11	62	73
Total	114	270	384

Note: the common support option has been selected

 End of the algorithm to estimate the pscore

Savings

```
. attnd saving FK, pscore(p1) comsup
```

The program is searching the nearest neighbor of each treated unit.
This operation may take a while.

ATT estimation with Nearest Neighbor Matching method
(random draw version)
Analytical standard errors

n. treat.	n. contr.	ATT	Std. Err.	t
270	83	19589.778	6140.646	3.190

Note: the numbers of treated and controls refer to actual
nearest neighbour matches


```
. attr saving FK, pscore(p1) comsup radius(0.01)
```

The program is searching for matches of treated units within radius.
This operation may take a while.

ATT estimation with the Radius Matching method
Analytical standard errors

n. treat.	n. contr.	ATT	Std. Err.	t
241	113	12265.145	4187.014	2.929

Note: the numbers of treated and controls refer to actual matches within radius

Enterprise Margin

```
. attnd totalprofits FK, pscore(p1) comsup
```

The program is searching the nearest neighbor of each treated unit.
This operation may take a while.

ATT estimation with Nearest Neighbor Matching method
(random draw version)
Analytical standard errors

n. treat.	n. contr.	ATT	Std. Err.	t
270	83	26344.478	14710.166	1.791

Note: the numbers of treated and controls refer to actual nearest neighbour matches

```
. attk totalprofits FK, pscore(p1) comsup bootstrap reps(50)
```

The program is searching for matches of each treated unit.
This operation may take a while.

ATT estimation with the Kernel Matching method

n. treat.	n. contr.	ATT	Std. Err.	t
270	114	19722.934	.	.

Note: Analytical standard errors cannot be computed. Use the bootstrap option to get bootstrapped standard errors.

Bootstrapping of standard errors

```
command:      attk totalprofits FK , pscore(p1) comsup bwidth(.06)
statistic:    attk          = r(attack)
```

```
Bootstrap statistics          Number of obs   =      390
                             Replications    =      50
```

Variable	Reps	Observed	Bias	Std. Err.	[95% Conf. Interval]	
attack	50	19722.93	-2732.235	11453.45	-3293.64	42739.51 (N)
					1052.775	41391.16 (P)
					3863.588	43515.55 (BC)

Note: N = normal
P = percentile
BC = bias-corrected

ATT estimation with the Kernel Matching method
Bootstrapped standard errors

n. treat.	n. contr.	ATT	Std. Err.	t
270	114	19722.934	11453.452	1.722

```
. attr totalprofits FK, pscore(pl) comsup radius(0.20)bootstrap reps(50)
```

The program is searching for matches of treated units within radius.
This operation may take a while.

ATT estimation with the Radius Matching method
Analytical standard errors

n. treat.	n. contr.	ATT	Std. Err.	t
270	114	19460.599	11751.290	1.656

Note: the numbers of treated and controls refer to actual matches within radius

Matching quality

psmatch2 FK age educ Marital SpsalAgeGap dependency_ratio MbrShip offarm Infor
 risk_taking innovativeness proactive FrmAge FrmLines TtalLndSize PrcvdIntrstF1 Extnsn
 Decsnlvl, outcome (saving) neighbor (1) common

Probit regression
 Number of obs = 390
 LR chi2(17) = 36.42
 Prob > chi2 = 0.0040
 Pseudo R2 = 0.0756
 Log likelihood = -222.51679

FK	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
age	-.0222747	.008734	-2.55	0.011	-.039393	-.0051564
educ	.0353518	.019786	1.79	0.074	-.003428	.0741316
Marital	-.1316182	.3250393	-0.40	0.686	-.7686836	.5054472
SpsalAgeGap	-.0019905	.0186066	-0.11	0.915	-.0384588	.0344778
dependency_ratio	-.0952962	.3644468	-0.26	0.794	-.8095988	.6190064
MbrShip	.2233727	.1584904	1.41	0.159	-.0872627	.5340081
offarm	-.0686583	.2477977	-0.28	0.782	-.5543329	.4170163
Infor	-.0446665	.3597994	-0.12	0.901	-.7498604	.6605275
risk_taking	.1773389	.1299444	1.36	0.172	-.0773473	.4320252
innovativeness	-.1300801	.0945267	-1.38	0.169	-.3153491	.0551889
proactive	.0000779	.1486659	0.00	1.000	-.2913019	.2914577
FrmAge	.0425489	.0132147	3.22	0.001	.0166484	.0684493
FrmLines	-.1554802	.1216009	-1.28	0.201	-.3938136	.0828532
TtalLndSize	.0723783	.0393569	1.84	0.066	-.0047598	.1495163
PrcvdIntrstF1	.1474413	.0813243	1.81	0.070	-.0119515	.306834
Extnsn	.1749505	.0806165	2.17	0.030	.016945	.332956
Decsnlvl	.0054141	.0529793	0.10	0.919	-.0984234	.1092515
_cons	.0551563	1.09619	0.05	0.960	-2.093337	2.20365

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
saving	Unmatched	45717.4074	25970.5	19746.9074	7809.43137	2.53
	ATT	40527.0588	26488.0784	14038.9804	4507.41918	3.11

Note: S.E. does not take into account that the propensity score is estimated.

psmatch2: Treatment assignment	psmatch2: Common support		Total
	Off suppo	On suppor	
Untreated	0	120	120
Treated	15	255	270
Total	15	375	390

Sensitivity analysis

mhbounds saving, gamma (1 (0.05)2) treated(FK)

Mantel-Haenszel (1959) bounds for variable saving

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	.	.	.	.
1.05	-.077851	-.077851	.531027	.531027
1.1	-.077851	-.077851	.531027	.531027
1.15	-.077851	-.077851	.531027	.531027
1.2	-.077851	.	.531027	.
1.25	-.077851	.	.531027	.
1.3	-.077851	-.077851	.531027	.531027
1.35	-.077851	.	.531027	.
1.4	-.077851	.	.531027	.
1.45	-.077851	-.077851	.531027	.531027
1.5	-.077851	-.077851	.531027	.531027
1.55	.	-.077851	.	.531027
1.6	-.077851	.	.531027	.
1.65	-.077851	-.077851	.531027	.531027
1.7	-.077851	-.077851	.531027	.531027
1.75	-.077851	-.077851	.531027	.531027
1.8	-.077851	-.077851	.531027	.531027
1.85	.	-.077851	.	.531027
1.9	-.077851	-.077851	.531027	.531027
1.95	-.077851	-.077851	.531027	.531027
2	-.077851	-.077851	.531027	.531027

Gamma : odds of differential assignment due to unobserved factors

Q_mh+ : Mantel-Haenszel statistic (assumption: overestimation of treatment effect)

Q_mh- : Mantel-Haenszel statistic (assumption: underestimation of treatment effect)

p_mh+ : significance level (assumption: overestimation of treatment effect)

p_mh- : significance level (assumption: underestimation of treatment effect)