

**PARTICIPATION IN MICROFINANCE AND ITS EFFECTS ON
HOUSEHOLD WELFARE AND PERFORMANCE OF MICRO AND SMALL
ENTERPRISES IN KENYA**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university or for any other award.

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DEDICATION

To my wife, Esther Nyaboke and children, Taraji Obonyo and Tatenda Chweya.

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ABBREVIATIONS AND ACRONYMS

AMFI	Association of Microfinance Institutions
ASCA	Accumulating Savings and Credit Association
ATET	Average Treatment Effect on the Treated
CBK	Central Bank of Kenya
ERS	Economic Recovery Strategy for Wealth and Employment Creation
ESR	Endogenous Switching Regression
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
IRA	Insurance Regulatory Authority
KNBS	Kenya National Bureau of Statistics
KWFT	Kenya Women Finance Trust
MFB	Microfinance Bank
MFI	Microfinance Institution
MGRG	Merry-Go-Round Groups
MIX	Microfinance Information Exchange
MSE	Micro and Small Enterprise
MSME	Micro, Small and Medium Enterprise
MTP	Medium Term Framework
PSM	Propensity Score Matching
ROSCA	Rotating savings and credit association
SACCO	Savings and Credit Co-operative
SASRA	SACCO Societies Regulatory Authority
WCG	Welfare and Clan Group

OPERATIONAL DEFINITION OF TERMS

Firm: refers to a micro or small enterprise in the economy.

Household: refers to a person or group of persons who live together under a single roof or within a single compound, share a common source of food and income and are answerable to the same head.

Household Welfare: refers to the changes in the economic wellbeing of the household indicated by per capita household expenditure and/or per capita household income.

Microfinance: refers to the provision of financial services such as microcredit, microsavings, microinsurance and facilitating payments through an MFB, ROSCA, ASCA, Supplier and Shopkeeper.

Microcredit: refers to the issuance of small loans with little or no collateral to low-income households and firms.

Microenterprise: refers to a firm that employs less than ten people.

MSE performance: refers to the amount of annual gross income generated by a firm

Participation in Microfinance: refers to a situation where a household or a MSE has borrowed credit from a MFB, ROSCA, ASCA, Supplier or Shopkeeper.

Small enterprise: refers to a firm that employs between 10 and 49 people.

Youth: refers to a firm owner aged between 16 and 34 years.

ABSTRACT

The development of microfinance in Kenya is seen as a catalyst for promoting household welfare and performance of micro and small enterprises (MSEs). Through various policy frameworks, the sub-sector has recorded considerable increases in; microfinance gross lending, usage of informal microfinance and the number of licensed microfinance banks. Despite these developments, households continue to face low levels of welfare while MSEs continue to suffer from high levels of financial exclusion and shortage of operating funds. This contrasting scenarios raise policy questions on whether participation in microfinance has effects on household welfare and performance of MSEs. Past studies on Kenya demonstrated that participation in microfinance had positives effects on household welfare and MSE performance. However, such studies did not account for the distributional effects of participation in microfinance and also, the studies only focussed on a small area. In addition, there is need to account for microfinance developments that have taken place in the last decade. In light of this, the purpose of the study was to determine the effect of participation in microfinance on household welfare and performance of MSEs in Kenya. To address various objectives, the study used the 2016 FINACCESS dataset. Analysis of the determinants of household participation in microfinance was done using a heteroskedastic probit while the effect of household participation in microfinance on household welfare was estimated using the endogenous switching regression model. The determinants of MSE participation in microfinance was assessed using the probit model while the effect of MSE participation in microfinance on MSE performance was estimated using propensity score matching model. From the results, the key determinants of household participation in microfinance were; residence, age, household size, vulnerability level, financial literacy and gender. In the case of MSEs, the key determinants of participation included, age, financial literacy level, numeracy level, possession of business permit, age of firm and number of employees. On welfare, the results showed households increased their annual per capita expenditure by Kshs 28,713 when they participated in microfinance. In addition, welfare levels were higher among female-headed households than male-headed households. Also, the welfare effects generally increased with increase in wealth quintiles. On MSE participation, annual firm income increased by Kshs 36.660 when a firm participated in microfinance. Further analysis revealed that, participation in microfinance had an impact on male-owned firms only, firms aged 2 years and below and firms whose owners were above 34 years. From the results, it's recommended that the government should enact policies that would increase participation in microfinance by both households and firms. This may be through scaling up financial literacy programmes, extending microfinance outreach to the rural areas and women.. To increase MSE performance, the government should encourage acquisition of permits and licences. Finally, policy should address obstacles that hinder youth and women-owned firms from benefiting from microfinance.

CHAPTER ONE

INTRODUCTION

1.1 Background

1.1.1 The Role of Microfinance in Development

Microfinance encompasses the provision of microcredit, microsavings and microinsurance services especially to the low-income households and Micro and Small Enterprises (MSEs) (Armendariz & Morduch, 2005). Many microfinance institutions (MFIs) have adopted the social objective of assisting the poor and small-scale businesses to become more self-sufficient without sacrificing the commercial objective of providing financial services to make profit (Armendariz & Morduch, 2005). In addition to provision of these financial services, MFIs provide social intermediation services which include; facilitating formation of groups (whose members come together for purposes of obtaining credit) and training group members on enterprise development, financial literacy and management capabilities (Ledgerwood, 1999; 2013). The clients who receive these services from MFIs include; the self-employed, small-scale traders, vendors and low income households.

Globally, microfinance is estimated to have reached about 200 million people by the year 2013 (Cull & Morduch, 2017). Further, it is estimated that almost two billion people in the world were financially excluded as of 2016 (Demirgüç-Kunt, Leora, Dorothe, Saniya & Jake, 2018). Therefore, there are opportunities for the expansion of microfinance services by providers so as to reach the poor households as well as the micro and small enterprises.

The emergence of microfinance was a result of the poor performance of government programmes set up in the 1960s and 1970s to provide subsidized credit to farmers

and small scale entrepreneurs in developing countries. In the 1970s, Mohamed Yunus, an economist in Bangladesh came up with a novel idea of lending small loans to local villagers based on trust and local information about the borrowers (Armendariz & Morduch, 2005). In 1976, he founded the Grameen bank, an institution that did not require collateral in order to extend credit to low income earners. The Grameen bank has grown to become a special banking institution, which allows individuals to borrow through mechanisms of group lending, dynamic incentives and joint liability and therefore avoid collateral that is often required by formal financial institutions (Yunus, 1999; Armendariz & Morduch, 2005; Ledgerwood, 2013).

The nature and innovations of microfinance makes the sub-sector a useful tool for addressing problems of financial exclusion of both low income households and small businesses. Through group lending, individuals without collateral come together and form groups with the aim of obtaining loans from a lender and as such they can borrow without the conventional collateral which many low-income economic agents lack. In the process, the problems of adverse selection and moral hazard that inhibit households and businesses from obtaining financial services from the mainstream financial institutions are overcome (Yunus 1999; Armendariz & Morduch, 2005). Since group members are responsible for the individual repayments of the loan, they become jointly liable for the repayments. With this joint liability, the groups allow for, positive assortative matching, where only the less riskier individuals group themselves in order to receive a loan. In addition, peer monitoring gives the members an incentive to take remedial action against a partner

who misuses his or her loan which in effect overcomes moral hazard (Ghatak & Guinnane, 1999).

Microfinance institutions (MFIs) are generally more preferable to low-income households and MSEs because of their attributes such as; short-term loans, frequent repayment schedules, simple application procedures, short processing periods, dynamic incentives (clients who pay on time become eligible for repeat loans with higher amounts), little or no collateral required and use of tapered interest rates (decreasing interest rates over several loan cycles) as an incentive to repay on time (Yunus, 1999). In light of these innovations, studies view microfinance as an important tool for; promoting welfare among poor households, growth of MSEs, informal intermediation and financial inclusion of the unbanked and uncollateralized citizens (Ravallion, 2001; Barr, 2004; Vanroose & D’Espallier, 2009; Maksudova; 2010).

1.1.2 Microfinance Development in Kenya

The microfinance sub-sector in Kenya is part of the larger financial system that consists of the formal and informal financial sectors. The formal financial sector consists mainly of: 42 Commercial Banks, 13 Microfinance Banks (MFBs), 8 Development Financial Institutions and 38 Insurance Companies (CBK, 2016). On the other hand, the informal sector consists of firms and individuals under the titles of; Accumulating Savings and Credit Associations (ASCAs), Rotating Savings and Credit Associations (ROSCAs), Merry-Go-Round Groups (MGRGs), Welfare and Clan Groups (WCGs), moneylenders, informal groups, employers, suppliers and shopkeepers. (CBK & FSD Kenya, 2013).

The microfinance subsector in Kenya can be classified into three broad classes namely; formal, semi-formal and informal organizations. Formal organizations are regulated and supervised by independent statutory regulatory agencies such as SACCO Societies Regulatory Authority (SASRA) and Central Bank of Kenya (CBK). Examples in this category include deposit taking microfinance banks (MFBs) and commercial banks with a microfinance arm. Semi-formal institutions are those that are registered under the Finance Act (2006) and consists mainly of credit only MFIs. The informal organizations are those that have unregulated forms of structured provision and they include, ASCAs, ROSCAs, MGRGs, WCGs, shopkeepers, moneylenders and employers.

In the post – 2000 period, the microfinance sub-sector recorded considerable developments. According to the Association of Microfinance Institutions (AMFI), (2014), the microfinance sub-sector was worth Kshs 317 billion as of December 2013. In addition, CBK (2015) reported that deposit taking microfinance banks (MFBs) alone registered enhanced growth in total assets from Kshs. 32.9 billion in 2013 to Kshs. 72.5 billion in 2015. The key factors driving this growth included; increase in microfinance gross lending, increase in usage of informal microfinance, prudent regulation of the subsector; introduction and maintenance of a microfinance arm by commercial banks and, licencing of more microfinance banks.

The significant increase in microfinance gross lending is one of the major developments that have taken place in the subsector as shown in figure 1.1.

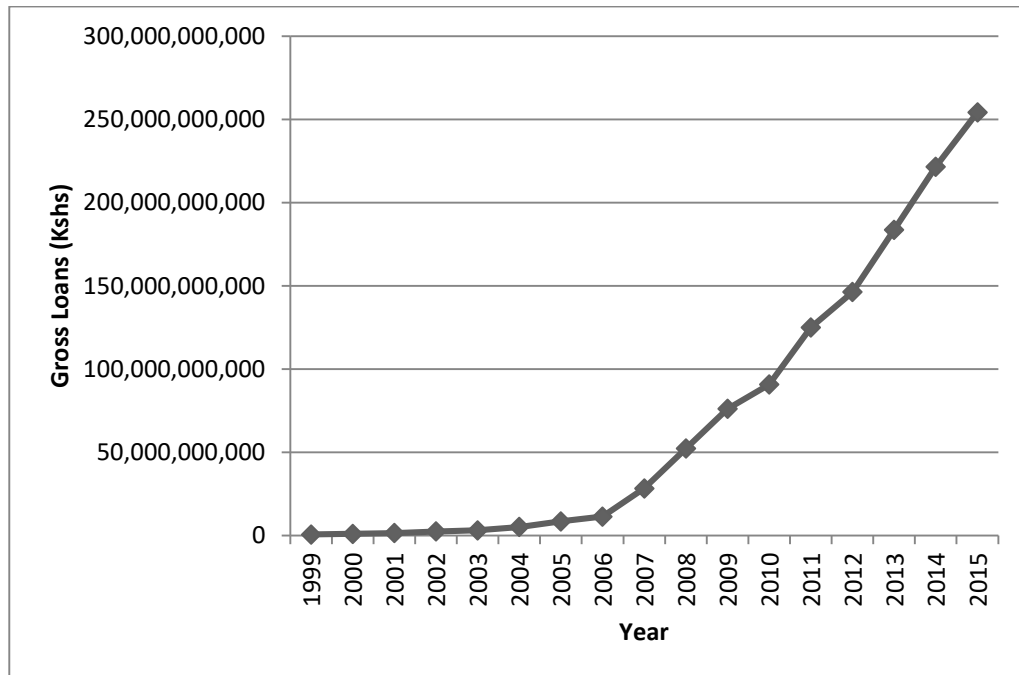


Figure 1:1: Trends in Gross Loans of Leading MFBs in Kenya (1999 – 2015)

Source: Microfinance Information Exchange Data, 2016

Figure 1.1 shows the amount of gross loans of four leading MFBs in Kenya namely; Faulu Kenya, Equity Bank (microfinance arm), Kenya Women Finance Trust (KWFT) and Small and Micro-enterprise Programme (SMEP) in the period 1999-2015. In the period under consideration, there was a significant increase in the gross loans from Kshs 707 million in 1999 to Kshs 254 billion in 2015 (MIX, 2016). This increase in gross lending was fuelled by the introduction of legislation to expand outreach of financial services especially to the low income economic agents (CBK, 2015). This growth therefore, highlights the growing importance of the subsector in providing credit especially to the low-income households and individuals and small businesses – who are often financially excluded.

In terms of usage of financial services, informal microfinance accounted for at least 41% of all financial usage in Kenya in 2016. The trends in usage are shown in figure 1.2.

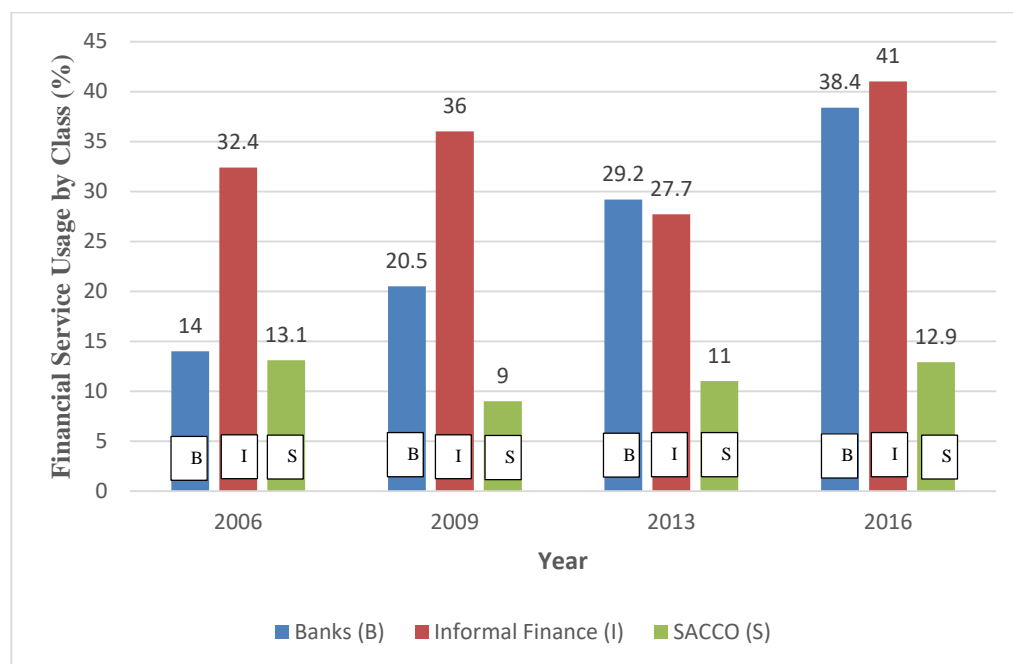


Figure 1.2: Trends in Financial Service Usage by Class in Kenya (2006 -2016)

Source: FinAccess Data, 2016

Figure 1.2 shows that informal finance was the most used class of finance (ranging between 27.7 percent and 41 percent) by households over the period 2006 - 2016. This percentage of usage is higher than that of commercial banks or Savings and Credit Co-operatives (SACCOs) as depicted in the figure. Moreover, the informal finance usage increased by almost 10 percent in the same period. This growth emphasizes the increasing role of microfinance in promoting financial inclusion among households and businesses.

On microfinance regulation, the introduction of a legal framework to promote the microfinance sub-sector has also been a major development in the sector. The

Microfinance Act (2006) sought to improve the legal and regulatory framework of the microfinance institutions so as to promote greater access to financial services by the economic agents. Specifically, the act sought to: increase financial outreach, streamline registration and licensing of MFIs, promote corporate governance and management capacity of MFIs, improve capacity of MFIs in mobilization of funds and, promote healthy MFI competition (Republic of Kenya, 2012). As a result, there has been an increase in the number of licensed MFBs from one in 2009 to thirteen in 2016 (CBK, 2016).

In nurturing the microfinance sub-sector, banks such as Equity Bank, Family Bank and Jamii Bora now maintain a microfinance portfolio that is targeted towards the low income households and small businesses especially those that do not qualify for, or lack appropriate access to other formal financial institutions or services (AMFI, 2014). These banks therefore, perform an important role of driving microfinance growth in the economy.

In the last decade, there have been efforts by the Government of Kenya to promote financial inclusion of households and MSEs through administration of public funds such as the Youth Enterprise Development Fund, Uwezo Fund and Women Enterprise Fund (Republic of Kenya, 2016a). These funds offer financial products and services that are of microfinance nature. For instance, typical loans from these funds require that persons form small enterprise groups as a way of instilling a culture of joint liability and financing using dynamic incentives. As a result, there has been a significant increase in credit advances to the youth enterprise groups. For example, in the period 2006-2010, the Youth Development Fund advanced loans

worth Kshs 5.2 billion to over 144,000 youth enterprises in the country (Republic of Kenya, 2011).

Overall, these microfinance developments coupled with other financial sector changes, increased financial inclusion where 75 percent of the adult population accessed financial services from any type of formal financial provider in 2016 compared to 27.4 percent in 2006. Moreover, the proportion of the financially excluded stood at 17.5 percent in 2016 up from 39.3 percent in 2006 (CBK, KNBS & FSD Kenya, 2016). Despite these gains, the economy still faces low levels of household welfare and challenges of financial access by MSEs. In light of this contrast, there is need to understand whether participation in microfinance aids in higher levels of household welfare and MSE performance.

1.1.3 Microfinance Development and Household Welfare in Kenya

The origins of microfinance were based on the premise that its services could lift the poor and low-income households from poverty and therefore increase household welfare (Armendariz & Morduch, 2005). Rooyen, Stewart & Wet (2012) showed that microfinance services have positive impacts on both financial and non-financial outcomes on households in Africa. These outcomes include changes in; household expenditure, household income, savings accumulation, food expenditure, asset accumulation, nutrition, health, and women empowerment. The overall effect of these improvements can lead to increased welfare among households.

Microfinance services are considered to be a flexible avenue for obtaining credit, accumulating savings, investment, enhancing networking and social contacts and providing emergency funds to households (CBK & FSD Kenya, 2013). Microcredit,

microsavings and microinsurance are the main forms of microfinance services offered to economic agents. Microcredit allows households to engage in more production, investments and expenditure thereby increasing household consumption and income (Weiss & Montgomery, 2005; Duong and Thanh (2015). In Kenya, microcredit is the most popular form of microfinance service offered to households.

Microsavings are primarily motivated by the need for precautionary savings, consumption smoothing and investment (Islam, 2009). Households save for business uses, school fees, building up a stock of assets, and for future consumption (Armendariz & Morduch, 2005; CBK, KNBS & FSD Kenya, 2016). In some instances, low income households must save (compulsory savings) as a form of collateral against which they can borrow micro-loans. In addition, households may save in terms of money and other forms such as livestock and agricultural produce.

Microinsurance relates to the provision of insurance to low income households and small businesses. This form of insurance aims at enabling low income households manage risks such as accidents, death, floods, drought and poor harvest - at affordable premiums. Typically, microinsurance services tend to work better within the context of group insurance rather than individual insurance due to the cost of premiums being more affordable to the group than to the individual. In Kenya, microinsurance services relate to life, personal accident and health, with premiums being as low as Kshs 30 per day for the insured (Smith *et al.*, 2010). While the Insurance Regulatory Authority of Kenya (IRA) has been encouraging the provision of these insurance services, microinsurance provision is still limited and uptake is very low (IRA, 2014). Therefore, there are opportunities for increasing penetration levels by leveraging on technology and innovation (Smith *et al.*, 2010).

Microfinance may influence household welfare through two pathways namely; consumption smoothing and enhancing household capacity for income generation. Through consumption smoothing, households are able to mitigate against transitory income shocks by borrowing from a microfinance institution so as to augment their liquidity needs (Zeller, 1999; Arun, Adjei & Hossain, 2009; Duong & Thanh, 2015). Therefore, households can cope in cases of shocks such as poor food harvests, reduced commercial produce, illness, death of household income-earners and natural disasters. In addition, households can access desired levels of food, nutrition and education through borrowing from an MFI (Haughton & Khandker, 2009).

In enhancing capacity for income generation, households may borrow credit from an MFI to enhance their investments. This may include starting or expanding their entrepreneurial activities, purchasing and building a stock of productive assets such as machines to increase production, investing in new technology and increasing human capital (Zeller, 1999; Arun *et al.*, 2009). These activities may in turn increase their income thereby improving their welfare.

In the context of developing economies therefore, microfinance is considered a more favourable avenue for accessing financial services for low income households than in the case of formal financial services. For instance in Kenya, in 2015, households at lower quintiles used more microfinance services compared with the households at higher quintiles as shown in figure 1.3.

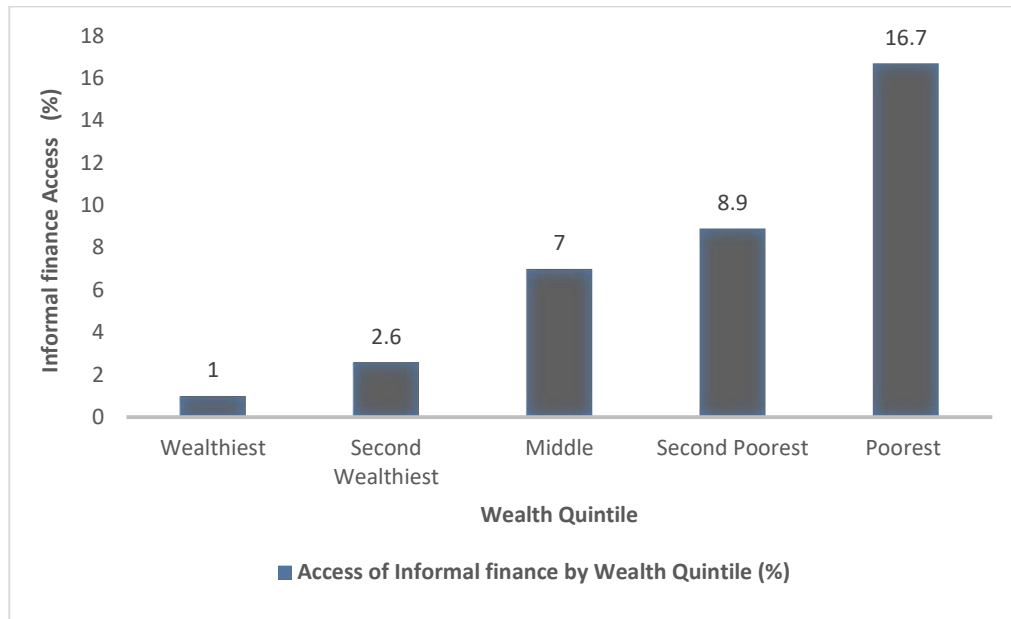


Figure 1.3: Trends in Access to Informal Microfinance by Wealth Quintile in Kenya (1999-2015)

Source: FinAccess Data, 2016.

Figure 1.3 shows that about 25.6 percent of the population that comprised of the second poorest and poorest quintile used informal microfinance as their most popular form of finance in the year 2016. This is in contrast to only 3.6 percent of the wealthier population that accessed microfinance services (CBK, KNBS & FSD Kenya, 2016). Therefore, this trend upholds the view that poorer households tend to access microfinance more than the wealthier households.

Given this importance of microfinance in increasing the welfare of households, the Government of Kenya has over the years sought to improve the welfare of its people through financial inclusion. The improvements in welfare are embedded in the changes of poverty indicators such as poverty gap and poverty headcount. The changes in these poverty indicators may be informed by changes in per capita expenditure and per capita income, among other variables (Haughton & Khandker, 2009). For instance, the 1997 Welfare Monitoring Survey estimated the absolute

poverty line income at Kshs 1,239 per person per month and Kshs 2,648 for rural and urban areas, respectively (Republic of Kenya, 1999a). Therefore changes in household expenditure or income may be used to indicate changes in household welfare.

In light of these indicators, the efforts to tackle low levels of welfare (poverty) in the country are contained in policies such as the National Poverty Eradication Plan (NPEP), Poverty Reduction Strategy Paper (PRSP), Economic Recovery Strategy for Employment and Wealth Creation (ERS) and the Kenya Vision 2030 (Republic of Kenya, 1999a, 2000; 2004; 2007).

The NPEP (1999 - 2015) aimed at reducing the poverty headcount by 50% by the year 2015 through strategies such as; enhancing the assets and income streams of the poor, building capacity of the poor to earn income, improving access to essential services by low income households and increasing access to education for children of low income groups. Through the NPEP framework, the PRSP followed. The PRSP (2000 – 2004) outlined strategies that sought to; promote sustained and rapid economic growth, improve governance, increase the ability of the poor to raise their incomes, improve the quality of life of the poor and, improve equity and participation (Republic of Kenya, 2000).

The ERS (2003-2007) was introduced to focus on economic growth, poverty reduction, employment creation, and the well-being of the citizens (Republic of Kenya, 2004). Some of the specific objectives of this plan included; creating 500,000 jobs annually, reducing poverty levels by at least 5 percentage points, increasing the real GDP growth rate by 6 percent in the period and increasing

domestic savings so as to enable higher levels of investment in the economy. To achieve this, the financial sector was considered key in supporting the economic recovery. Chief among the strategies would be to increase access to affordable credit through development of MFIs and other financial institutions.

Succeeding the ERS, was the Kenya Vision 2030 (2008-2030) (Republic of Kenya, 2007). The Vision 2030 plan sought to transform Kenya into “a newly industrializing middle income country” by the year 2030. To that end, the plan sought to ensure that the citizens had a high quality of life in a socially just and equitable society without extreme poverty. The overarching theme in the highlighted policy frameworks was to improve the income and consumption levels of the people so as lift them out of poverty.

The introduction of the Microfinance Act (2006) was considered one of the ways that could help promote the welfare of the people both directly and indirectly (Republic of Kenya, 2006). The Act sought to improve the legal and regulatory framework of microfinance in order to promote greater access to, and sustainable flow of financial services to the low-income households. In addition, the creation of government sponsored funds such as Youth Fund and Uwezo Fund were meant to help households to generate higher incomes through promoting value in their small businesses. As a result, the sub-sector has recorded considerable increases in microfinance gross lending, usage of informal microfinance and the number of licensed microfinance banks. Despite these developments, households continue to face below target levels of welfare.

The National Poverty Eradication Plan (NPEP) envisaged to reduce the poverty headcount from 56 percent in 1999 to 28 percent by the year 2015, but failed to meet its target as the poverty headcount was 43 percent in the year 2015 (Republic of Kenya, 1999; Republic of Kenya; 2014a; Republic of Kenya, 2016). In addition, the country had an average poverty gap of 12.2 per cent with large disparities across counties ranging from 4.1 per cent to 46.1 per cent (Republic of Kenya, 2014a; 2016a).

Kenya's Medium Term Framework 2 (2013 - 2017) of the Kenya Vision 2030, identified poverty reduction as a key strategy to achieving the desired socioeconomic status of the people by the year 2030. To achieve this goal in the medium term, the strategies would include; creation of jobs, promotion of micro and small enterprises, increased access to affordable credit by households and, increased savings and investment in the economy. To this end, microfinance is expected to play a role in achieving these strategies (Republic of Kenya, 2012). Therefore, an understanding of whether participation in microfinance transmits into welfare improvements, is a policy question that will be useful in addressing low levels of welfare in the economy.

1.1.4 Microfinance Development and Performance of MSEs in Kenya.

According to Beck *et al.* (2005), greater performance of MSEs is seen as an engine for promoting economic growth, employment creation, value addition and poverty alleviation in developing countries. Increased MSE performance affects the economy in three main ways namely: increasing productivity and investment of businesses hence leading to higher incomes; enhancing competition and entrepreneurship thus leading to greater economy-wide efficiency and innovation

and; increasing employment in the economy since many MSEs in developing countries are largely labour-intensive. Therefore increased performance of MSEs is a catalyst for productivity, income, innovation, employment and economic growth in the economy.

Past studies have shown that participation in microfinance by MSEs can increase microenterprise profits and revenue thus promoting their performance (Copestake *et al.*, 2001; Copestake *et al.*, 2005; Tedeschi, 2008; Banerjee *et al.*, 2015; Crepon *et al.*, 2015). The emergence of microfinance provides MSEs with services such as microcredit, microsavings, microinsurance, financial literacy services, training and business networking. These services are often in relatively small transactions, accessible and affordable to the MSEs (Copestake *et al.*, 2001; Tedeschi, 2008). Therefore, participation in microfinance can help MSEs overcome challenges of inadequate capital, lack of access to affordable credit, lack of collateral and inadequate managerial and technical skills (Republic of Kenya, 2013a).

In Kenya, MSEs are well recognised in the Kenya Vision 2030 as drivers of economic growth and employment (Republic of Kenya, 2007). On its contribution to economic growth, the sector accounted for 33.8 percent of the Gross Domestic Product (GDP) in the year 2015 (Republic of Kenya, 2016b). This share is an increase from 18.4 percent in 1999 when the country had its first MSE baseline survey (Republic of Kenya, 1999b). The key sectors of contribution of MSEs to GDP included; manufacturing (24.3%), wholesale and retail trade (22.8%), transport and storage (15.4%) and education services (7.3%). This contribution confirms the growing influence of MSEs in promoting economic growth.

On employment, the sector employed at least 14.9 million people in 2015 accounting for at least 90 percent of the total employment in Kenya. Overall, micro enterprises comprised 81 per cent of the total employment while the remainder was for small and medium enterprises. The highest proportion of employment all MSMEs was recorded in Nairobi County thus accounting for 20 percent of all the persons engaged. (Republic of Kenya, 2016b).

The MSEs in Kenya may be characterised by the number of employees, licensing status, registration status and economic activity. Overall, there were 7.4 million business establishments in Kenya in the year 2015. Of all these establishments, 1.5 million businesses were licenced while 5.9 million businesses were not. The variance between the licenced and unlicensed businesses is testament to the large number of undocumented businesses in Kenya yet licencing is a mandatory requirement by law (Republic of Kenya, 2016b).

On classification by the number of employees and licensing status, 81 percent of the total businesses were microenterprises while 19 percent were for small or medium enterprises. On licencing status, only about 43 percent of the establishments were licenced while 57 percent of them were unlicensed. Of the licenced businesses (43 percent of total establishments), 92 percent were microenterprises while the rest were small enterprises and medium enterprises, respectively. Notably, all the 8.6 million unlicensed businesses (or 57 percent of total establishments) were micro in nature (Republic of Kenya, 2016b).

Considering registration status of licenced businesses, 74.6 percent of the businesses with valid operating licences or permits, had not formalised their status with the

registrar of companies while 24.6 percent of the firms were formally registered. Of the unregistered licenced businesses, 78.2 percent were micro sized enterprises while the rest were either small or medium establishments. It also worth noting that the formality of businesses increased with size of establishments since 21.8, 66.8 and 72.5 per cent of micro, small and medium businesses were registered, respectively (Republic of Kenya, 2016b). This low level of registration raises policy issues around the challenges in the registration process as reported by many businesses (Republic of Kenya, 2016b).

Regarding the levels of business income, the sector reported an average normalised monthly turnover (in the period 2011 - 2015) of Kshs 635 billion of which Kshs 569 billion was due to licenced businesses while the difference accrued to unlicensed businesses (Republic of Kenya, 2016b). In addition, most of the net income generated by the businesses was often ploughed back to the enterprises while some of the money was spent on household needs. Notably, licenced establishments recorded more net income than their counterparts (Republic of Kenya, 2016b).

Given the important contribution of businesses in supporting the economy, the Government of Kenya has initiated a number of policies to promote the sector. Sessional Paper No. 1 of 1986 on Economic Management for Renewed Growth, underscored the role of MSEs in promoting economic growth. The policy outlined the importance of supporting the growth of informal businesses into large enterprises especially in the manufacturing, construction, transport and housing sectors through provision of adequate capital and business training. (Republic of Kenya, 1986). The policy culminated in the creation of its successor - Sessional Paper No 2 of 1992 on Small Enterprises and Jua Kali Development.

The Sessional Paper No 2 of 1992 sought to address the effects of tight business regulation by addressing the legal and regulatory framework so as to create an enabling business environment especially access to credit by MSEs. The policy was concerned with reviewing laws, regulations and licenses for MSEs and how they impacted on their performance. Some of the key provisions included; creating incentives for lending to MSEs by commercial banks, establishment of schemes such as credit guarantee schemes, export credit guarantee mechanisms and venture capital institutions. In addition, the policy promoted formation of associations to address access to information pertaining to taxation, licensing and legal requirements by MSEs (Republic of Kenya, 1992). Despite part implementation of some of these strategies, the MSEs continued facing challenges relating to access to affordable credit. The challenges were due to stringent collateral requirements, inappropriate credit assessment of MSEs and lack of business support services (Mullei & Bokea, 1999).

The Sessional Paper No 2 of 2005 on Development of Micro and Small Enterprises aimed at identifying the persistent challenges facing MSEs and the solutions thereof. The challenges included; limited access to financial services, high transaction costs, inadequate business skills, competition from foreign products, low demand, lack of legal structures, inadequate financial information by MSEs and limited access to appropriate technology (Republic of Kenya, 2005). To overcome some of these constraints, the policy proposed to establish a legal policy framework that would promote innovative ways of lending to MSEs through MFIs and enhancing existing MFIs to engage in value added services such as special credit schemes and business training.

The Micro and Small Enterprises Act of 2012 was enacted to provide a legal framework for the promotion, development and regulation of MSEs. The main purpose of the Act was to; promote financial services access by MSEs; facilitate formalization and upgrading of informal MSEs and; promote an entrepreneurial culture. Within the context of promoting finance in MSEs, the act was mandated with policies that would help provide affordable and accessible credit to MSEs (Republic of Kenya, 2012).

In terms of government financing efforts, the establishment of the Kenya Industrial Estates (KIE) was one of the policy moves that promoted direct financial support for MSEs. The aim of the organization was to provide subsidized credit and improve entrepreneurial skills to indigenous owned Micro, Small and Medium Industries (MSMIs) with special focus on rural industrial development. Currently, KIE has about 37 branches country wide and is active in providing affordable medium to long-term finance to MSEs, special credit facilities for marginalized areas and top-up loan facilities for credit worthy MSEs (Republic of Kenya, 2013b).

The creation of government administered funds such as the Youth Fund, Uwezo Fund and Women Enterprise Fund is among efforts to increase financial outreach to MSEs. These funds are generally of microfinance nature and are aimed at addressing the challenges that business owners face in accessing affordable financial services. Therefore, these funds were mandated to promote financial inclusion, business support services, business linkages and infrastructural support (Republic of Kenya, 2011; 2015).

The Youth Enterprise Development Fund was set up to provide loans and other business support services to different youth enterprises across the country. The fund disbursed over Kshs 5.2 billion between 2006 and 2011 to over 144,000 youth enterprises (Republic of Kenya, 2011). On Women Enterprise Fund and Uwezo Fund, the number of registered and active women groups increased from 143,792 in 2011 to 154, 215 in 2015. The loans administered to these groups under Uwezo Fund rose from Kshs 80 million in 2011 to Kshs 4.24 billion in 2015. In the case of Women Enterprise Fund, the loans increased from Kshs 440 million to Kshs 524 million in the same period (Republic of Kenya, 2016a).

The Kenya Vision 2030, highlights the role of MSEs in driving Kenya into “a middle-income country providing a high quality life to all its citizens by the year 2030” (Republic of Kenya, 2007). The sector is considered important in increasing employment, business income and tax revenues. During implementation of the Vision 2030 in the first phase, the Medium Term Framework 1 (2007-2012) reported that inadequate access to finance was one the challenges that MSEs faced while trying to build their capacity and improve their performance (Republic of Kenya, 2013a).

The reviewed policies and programmes outline the provision of appropriate financial services as a critical input to the success of MSEs. Given that MSEs suffer from financial exclusion challenges, the emergence of microfinance is expected to be a suitable alternative in addressing these exclusions. This is because microfinance attributes can address financial access challenges such as stringent collateral requirements, adverse selection and moral hazard and lack of business support services (Armendariz and Morduch, 2005). Therefore, MSEs who would ordinarily

be excluded from accessing finance from mainstream financial providers should access these services through microfinance providers. Despite the development of the microfinance subsector in Kenya, the MSEs continue to face challenges of access to affordable finance (Republic of Kenya, 2012; 2016b)

In the period 2011-2015, at least 2.2 million businesses closed with the average age of closure being of 3.8 years. In addition, 46 percent of these businesses closed within the first year and this proportion rose to 61 percent by the end of the second year. Further, it was reported that that least 54 per cent of the closed establishments were owned by women. (Republic of Kenya, 2016b). The main reasons of closure were financial exclusion and shortage of operating funds, among other challenges (Republic of Kenya, 2012; Republic of Kenya, 2016b). This level of closures raises policy concerns of how the MSEs can be supported in order to promote their performance.

The FinAccess Business survey by FSD-Kenya (2013) also reported that 33 percent of the MSEs indicated that access to financial services as one of the main obstacles to their growth (Berg et al. 2015). Moreover, the MTP II (2013-2017) reports that high levels of exclusion from financial services, low utilization of financial services and inadequate access to finance are some challenges that continue to affect MSEs (Republic of Kenya, 2012). Given that microfinance has been touted in policy documents as a catalyst for increasing financial inclusion among MSEs and therefore increase performance, an understanding of how microfinance can influence MSE performance is necessary for designing policies towards addressing some of these MSE challenges.

1.2 Statement of the Problem

The microfinance sub-sector is viewed as a catalyst for increasing household welfare and enhancing Micro and Small Enterprises (MSEs) performance in developing countries (Demirguc-Kunt & Leora, 2012; Rooyen *et al.*, 2012). In Kenya, efforts to promote microfinance are contained in various government policy documents (Republic of Kenya, 1999; 2007; 2012; 2013; 2015). Through these policy efforts, the sub-sector has recorded considerable developments including; increase in gross lending by leading microfinance banks from Kshs 707 million in 1999 to Kshs 254 billion in 2015; increase in the number of licensed microfinance banks from one in 2009 to 13 in 2016 and; increase in the usage of informal microfinance from 32 percent in 2006 to 41 percent in 2016 (Republic of Kenya, 2012; CBK, 2015; CBK, KNBS & FSD-Kenya, 2016).

Despite these developments, the country continues to experience low welfare levels and MSE performance bottlenecks. The low levels of welfare are evidenced by high poverty headcount and poverty gap. The poverty headcount in 2016 stood at 43 percent, which was way above the 2015 target of 28 percent (Republic of Kenya, 2016a). In addition, the country's average poverty gap was 12.2 percent with large disparities in counties ranging from 4.1 per cent to 46.1 percent (Republic of Kenya, 2014a; 2016a). In terms of MSE performance, many of them continue to face challenges associated with high levels of exclusion from financial services and shortage of operating funds (Republic of Kenya, 2012; 2016b). In the period 2011-2015, at least 2.2 million businesses closed with the average age of closure being 3.8 years. Of these businesses that closed, at least 46 percent of them closed within the first year of operation (Republic of Kenya, 2016b).

This contrasting scenarios raise policy questions on whether participation in microfinance has had any effects on household welfare and MSE performance. Studies that have analysed the effects of household participation in microfinance on welfare have found mixed effects with some reporting a positive effect (Nghiem *et al.*, 2007; Silva, 2012; Duong & Thanh, 2015) and others showing no effect (Diagne & Zeller, 2001). These studies indicate that the effects are varied depending on the economic context thus pointing to the need for a study on Kenya. A study by Kiiru (2007), found that participation in microfinance had a positive effect on household welfare. However, the study focussed only on a small area and did not account for the distributional effects of participation in microfinance on household welfare.

On the effect of MSE participation in microfinance on MSE performance, studies have demonstrated that the effects are mixed (Copestake *et al.*, 2001; Copestake *et al.*, 2005; Tedeschi, 2008; Augsburg *et al.*, 2015; Banerjee *et al.*, 2015; Tarozzi *et al.*, 2015; Crepon *et al.*, 2015). In addition, studies on Kenya, (Chole, 2017; Omondi and Jagongo, 2018) showed that participation in microfinance had positive effects on welfare but used methodologies that did not address endogeneity in their analysis.

In light of this, a study in the Kenyan context is necessary to account for the significant microfinance developments that have taken place in the last decade. An understanding of the distributional effects of microfinance on different segments of the households and MSEs is also necessary in designing relevant policy changes in the subsector. An analysis of the determinants of participation in microfinance by both households and MSEs is also important in light of low uptake of microfinance in the country. Finally, the use of a nationally representative dataset may improve

the generalisation of the findings of the study. Therefore, the purpose of the study is to determine the effect of participation in microfinance on household welfare and performance of MSEs in Kenya.

1.3 Research Questions

- i) What are the determinants of household participation in microfinance in Kenya?
- ii) What is the effect of household participation in microfinance on household welfare in Kenya?
- iii) What are the determinants of MSE participation in microfinance in Kenya?
- iv) What is the effect of MSE participation in microfinance on MSE performance in Kenya?

1.4 Objectives of the Study

The main objective of the study is to determine the effect of participation in microfinance on household welfare and performance of micro and small enterprises in Kenya. The specific objectives are to:

- i) Analyse the determinants of household participation in microfinance in Kenya.
- ii) Determine the effect of household participation in microfinance on household welfare in Kenya.
- iii) Analyse the determinants of MSE participation in microfinance in Kenya.
- iv) Determine the effect of MSE participation in microfinance on MSE performance in Kenya.

1.5 Significance of the Study

This study seeks to enhance the body of knowledge in a number of perspectives. First, the determinants of both household and MSE participation in microfinance will provide the MFI providers with information that will be useful in designing products and incentives that would promote uptake of microfinance products within the households and firms. Second, the effect of household participation in microfinance on household welfare will help government in designing policy within the context of using microfinance as a tool for promoting welfare especially among women and poorest households.

Third, the effect of MSE participation in microfinance on MSE performance will help government assess the role of microfinance in promoting MSE – led growth in the economy. Moreover, a special focus on how participation in microfinance affects youth-owned and female-owned enterprises will help government refine policy in addressing the MSE bottlenecks among these groups. Besides these perspectives, the study will contribute to debate by researchers and academicians on whether participation microfinance has important effects in the economy.

1.6 Scope and Limitations of the Study.

This study examined the effect of participation in microfinance on household welfare and performance of micro and small enterprises in Kenya. Specifically, the study focussed on; determinants of household participation in microfinance in Kenya; effect of household participation in microfinance on household welfare in Kenya; determinants of MSE participation in microfinance in Kenya and; effect of MSE participation in microfinance on MSE performance in Kenya.

On the unit of analysis, the study focussed on both the urban and rural households in Kenya. In addition, the study also used micro and small enterprises to analyse some of its objectives. The micro and small enterprises comprised those firms with less than 50 employees. Therefore, medium and large enterprises were not a subject of this study. Concerning geographical scope, the study covered the whole country since the dataset used - FINACCESS dataset (2016), was nationally representative. The data used in the study was collected in the year 2015 by Central Bank of Kenya, Kenya National Bureau of Statistics & FSD-Kenya. The various modules of the data included household variables, finance variables, firm variables and institutional variables.

On the variable of interest, the definition of participation in microfinance was limited to when either a household or an MSE obtained microcredit from an MFB, ROSCA, ASCA, Supplier or Shopkeeper. Therefore, other forms of participation such as microsavings, microinsurance and payments were excluded. This definition was considered suitable as microcredit was most widely used microfinance service and therefore it was representative of participation in microfinance.

1.7 Organization of the Study

Chapter one has introduced the background, objectives, statement of the problem, significance and scope and limitations of the study. The rest of the thesis is organized as follows. Chapter two presents the theoretical and empirical literature as well as overview of the literature. Chapter three presents the methodology, where the research design, data types and sources, theoretical framework and model specification are discussed. Chapter four presents the findings of the study and discussions thereof. Finally, chapter five presents the summary, conclusion, policy

implications of the findings, contribution to knowledge and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the theoretical literature and empirical literature that relates to the determinants of participation in microfinance by both households and MSEs; effect of household participation in microfinance on household welfare and; effect of MSE participation in microfinance on MSE performance. In addition, an overview of the literature is also discussed.

2.2 Theoretical Literature

This section discusses the micro foundations of how participation in microfinance affects household welfare as well as MSE performance. The microfinance – household welfare relation is based on the theory of household utility maximization while the relationship between participation in microfinance and MSE performance is based on the theory of a firm.

2.2.1 Theory of Household Utility Maximization.

The theory of household utility maximization by Singh *et al.* (1986) was developed to capture microeconomic behaviour of how a household's decisions on production, consumption and labour maximize household utility. The output of this theory provides a range of theoretically sound relationships that may be used to model the relationship between household participation in microfinance and household welfare. Basically, the objective of the household is to maximize a utility function of the home produced good, market purchased good and leisure, subject to a set of constraints. The household utility problem may be given as

$$\text{Max } U = U(C_h, C_m, \tau; M^h) \quad (2.1)$$

Where the U is the utility of the household, C_h is the home good, C_m is the market good, τ is leisure and M^h is a set of household variables affecting consumption. The household faces a production constraint

$$Q_h = f(X, L_h) \quad (2.2)$$

Where Q_h is the total household production – which is shared between home consumption and sale in the market, X represents inputs other than labour and L_h is household labour. Further, the household faces a cash constraint where the cash may be received through household income from selling some of the home good, working in the labour market and borrowing so as to allocate to purchasing of the market good and purchasing the inputs for production of the home good such that

$$Y^* = P_h(Q_h - C_h) + wL_w + NB = P_m C_m + P_x X \quad (2.3)$$

Where Y^* is the total cash received by the households, P_h is the output price for the home good sold in the market, $(Q_h - C_h)$ is the level of home produced good that is sold in the market, w is the wage rate, L_w is labour supplied to the market, NB is the net borrowing by the household, P_m is price of the market good, C_m is level of the market consumed good, P_x is the input price and X is the level of inputs.

The household also faces a time problem where it has to allocate its total time (T) between production of the home good (L_h), participating in the labour market (L_w) and leisure (τ) such that

$$\text{Time constraint: } T = L_w + L_h + \tau \quad (2.4)$$

Equations 2.2 – 2.4 can be rearranged to obtain a full income constraint such that

$$[P_h f(X, L_h) - P_x X - wL_h] + wT + NB = P_h C_h + P_m C_m + w\tau \quad (2.5)$$

Where the three left hand terms represent household profit, full value of time, net borrowing and the right hand terms represent the cost of the home consumed good, market consumed good and leisure.

Given the full income constraint, the augmented utility function may be defined as

$$L = U(.) + \lambda [P_h f(X, L_h) - P_x X - wL_h + wT + NB - P_h C_h - P_m C_m - w\tau] \quad (2.6)$$

The first order necessary conditions are given as

$$\frac{dL}{dC_h} = U_{ch} - \lambda P_h = 0 \quad (2.7)$$

$$\frac{dL}{dC_m} = U_{cm} - \lambda P_m = 0 \quad (2.8)$$

$$\frac{dL}{d\tau} = U_\tau - \lambda w = 0 \quad (2.9)$$

$$\frac{dL}{d\lambda} = U_\lambda - [P_h f(X, L_h) - P_x X - wL_h + wT + NB - P_h C_h - P_m C_m - w\tau] = 0 \quad (2.10)$$

By solving for the first order conditions from the joint system of equations in 2.7 – 2.10, the standard demand functions of the home good, market good, and leisure can be obtained. These demands are a function of price of home good (P_h), price of market good (P_m), wage rate(w), input price of home produced good (P_x), level of inputs (X), net borrowing from financial institutions (NB) and a set of household variables affecting consumption (M^h).

Additionally, the optimal production decisions of the household can be derived from the system of equations and will depend on the variables in equations 2.7 – 2.10. Following Sadoulet & de Janvry (1995) and Huffman (2010), the first order conditions may be used to derive the reduced form of the consumption and production decisions of the households such that

$$C_i = C_i(P_h, P_x, P_m, X, NB; M^h) \quad \text{for } i = h, m \quad (2.11)$$

$$Q_h = Q_h(P_h, P_x, P_m, X, NB; M^h) \quad (2.12)$$

Equations 2.11 and 2.12 imply that the optimal consumption and production decisions depend on net borrowing among other parameters. In the context of participation in microfinance, a household who would potentially be excluded from accessing financial services from the mainstream institutions, may utilise microfinance and therefore influence its utility - through altering their consumption and production decisions. The choice of microfinance is facilitated by the institutional arrangements that make it more accessible and affordable than the mainstream financial services (Yunus, 1999; Ghatak & Guinnane, 1999; Armendariz & Morduch, 2005).

From the reduced form functions, microfinance is thought to affect household utility in two ways. First, microfinance can help households mitigate against any transitory income shocks such as downturns in agricultural produce for sale, illness or death of income-earners or natural disasters by borrowing from a microfinance so as to augment their liquidity constraints thereby smoothing their consumption (Zeller, 1999; Arun *et al.*, 2009; Duong and Thanh, 2015). Second, microfinance may provide households with resources to purchase productive assets such as machines to increase production, invest in new technology and increase human capital thereby increasing their production income (Zeller, 1999 and Arun *et al.*, 2009).

In the face of transactions costs in the microfinance market, households must endogenously determine whether they will gain more utility from participating in microfinance or not. To obtain the optimal values of microfinance that maximize the household utility, use of the first order conditions cannot give an interior solution

since microfinance is modelled as a choice variable (Key, Sadoulet & de Janvry, 2000). Therefore the optimal choice of microfinance may be modelled using the random utility model (RUM) as postulated by Marschak (1960) and McFadden (1974; 1976).

The RUM is a probabilistic representation of the Neo-classical theory of choice where households are faced with preferences over a finite choice set (Marschak, 1960). Under RUM, households choose an alternative by comparing the utility between one or more choices and will choose an alternative which maximizes the individual household utility such that

$$\Pr(X_n / T) = \Pr(U_n \geq U_m) \text{ for all } X_n \in T, X_m \in T, m \neq n \quad (2.13)$$

Where X_n is the preferred choice among a set of alternatives (T) and the choice (X_n) is preferred to another choice (X_m) because it maximises the utility of the real valued function (U) given the alternatives.

Within the context of microfinance, the household's choice to participate or not depends on the comparison of the utility of a household when it participates versus its utility when it does not participate (Nghiem *et. al.*, 2007). The utility of each alternative depends on cost of microfinance services, transaction costs and household-specific attributes. Therefore each household will choose to participate after incorporating these factors and will only participate if the utility (V_i) due to participation is higher than the utility due to non-participation (Ali, 2008). This comparison can be expressed as

$$V_i(P_h, P_x, P_m, X, M^h / NB = 1) > V_i(P_h, P_x, P_m, X, M^h / NB = 0) \quad (2.14)$$

Equation 2.14 forms the basis for illustrating the relationship between participation in microfinance and household welfare.

In summary, the household utility theory postulates that a household makes consumption and production decisions that would maximize its utility and therefore welfare. The extended framework to capture net borrowing (NB) in the household's cash constraint ensures that the consumption and production levels that maximize utility depend on borrowing from a microfinance among other variables. Additionally, since participation in microfinance is modelled as a choice variable, the random utility model extends the framework of utility maximization as a comparison between participation and non-participation in microfinance. In effect, these comparison depends on observed covariates that include household and institutional variables thus providing a basis for estimating the determinants of participation in microfinance.

2.2.2 Theory of a Firm

The theory of a firm is one of the neo-classical theories that can be used to describe the behaviour of a firm in relation to profit, production and cost. According to Demsetz (1988), the earliest foundations of this theory dates back to the works of Smith (1776), Knight (1921) and Coase (1937) who stressed on the view that firms sought to achieve the objectives of profit maximisation, production maximization and cost minimization. Based on this foundation, the effect of MSE participation in microfinance on MSE performance is based on the assumption that a firm seeks to maximise its profit subject to a production constraint. A firm with multiple inputs and multiple outputs seeks to maximize its profits such that

$$\text{Max } \pi(p, w) = py - wx \quad (2.15)$$

Where $\pi(p, w)$ is profit of the firm, p is vector of output prices, w is vector of input prices, y is vector of outputs and x is a vector of inputs.

Equation 2.15 is based on the assumption that the profit function is increasing in output prices (p); decreasing in input prices (w); homogeneous of degree one in p and w ; convex in p and w and; differentiable in p and w (Jehle & Reny, 2011).

In the profit maximization framework, a firm has production function where s a vector of inputs (x) is used to produce a vector of outputs (y) such that

$$y = f(x) \quad (2.16)$$

Equation 2.16, $f(x)$ is assumed to be finite, non-negative, real-valued and single-valued for all non-negative and finite x . It is assumed $f(x)$ is continuous and twice-continuously differentiable everywhere in the interior of the production set and that the inputs have diminishing returns. Additionally, the profit function can be rewritten to incorporate the production function such that

$$\pi(p, w) = pf(x) - wx \quad (2.17)$$

Equation 2.17 can be used to generate the first order necessary condition that maximizes profit as

$$p \frac{df(x^*)}{x} = w \quad (2.18)$$

Equation 2.18 implies that the profit of a firm will be maximised when the marginal revenue product of each of the inputs equals the cost of each of the inputs. Consequently, the reduced form optimal input demands that will maximise profit may be given as

$$x^* = x^*(p, w) \quad (2.19)$$

To characterise how microfinance influences firm profit, it's assumed that MSEs who are undercapitalized or excluded from the formal financial markets can borrow from a microfinance to expand their capital inputs and in turn increase their profit

through higher output (De Mel *et al.*, 2008). With capital resources from participation in microfinance, firms can relax the isocost constraint therefore resulting in increased output and hence higher profit (Jehle & Reny, 2011). A firm may be faced with an isocost constraint (λ) given as

$$wx = \lambda \quad \text{for all } \lambda > 0 \quad (2.20)$$

Where λ is the total cost of inputs

By borrowing from a microfinance to increase its capital inputs, the isocost line will shift outward resulting in a new constraint (λ') which may be given by

$$wx' = \lambda' \quad \text{such that } \lambda' > \lambda \quad \text{for all } \lambda > 0, \lambda' > 0 \quad (2.21)$$

Equation 2.21 implies that firms now enjoy a higher output with participation in microfinance since the isocost constraint is now relaxed. Through resources provided by microfinance, households may purchase productive assets such as machines to increase production, invest in new technology and increase human capital thereby increasing their output (Zeller, 1999 and Arun *et al.*, 2009). Therefore, the reduced-form optimal input demands may be modified to incorporate participation in microfinance such that

$$x^* = x^*(p, w, m) \quad (2.22)$$

Where m represents participation in microfinance

Equation 2.22 extends the framework to include participation in microfinance as one of the inputs that affects the input demand and therefore by extension the production level and profitability of the firm. Given that a firm wishes to maximize a certain level of profit subject to production and cost, it may choose an optimal level of inputs which depend on the input prices, output prices and participation in

microfinance among other variables. Plugging the optimal input demand functions in 2.22 into 2.16 obtains the optimal output supply function such that

$$y^* = f(x^*(p, w, m)) \quad (2.23)$$

As the input demand functions and output supply functions reflect the profit maximizing choices of the parameters, the resulting indirect profit function can be given as:

$$\pi(p, w, m) = pf(x^*(p, w, m)) - wx^*(p, w, m) \quad (2.24)$$

Equation 2.24 shows that the profit of the firm, output supply and input demand functions depend on output prices, input prices and participation in microfinance. The first order conditions of profit with respect to participation in microfinance may be used to obtain the level of participation in microfinance that maximizes profit. However, since participation in microfinance is modelled as a discrete variable, the use of first order conditions cannot yield an interior solution to an optimal microfinance level (Key *et al.* 2000).

The optimal choice for participation in microfinance, can only be derived by the firm's comparison of profits in the two regimes. Firms will choose to participate or not by comparing the profits due to participation with the profits due to non-participation and will choose to participate if the profits due to participation (π_p) are greater than the profits due to non-participation (π_N) such that

$$\pi_p^*(p, w, m = 1) > \pi_N^*(p, w, m = 0) \quad (2.25)$$

In considering whether to participate, firms consider factors such as transaction costs, service requirements, business attributes of the firm and attributes of the firm owner. Therefore any choice to participate or not would have taken care of these

considerations. It is on the basis of this comparison that the effect of MSE participation in microfinance on MSE performance is analysed.

In a summary, the theory of a firm shows that a firm seeks to maximize its profits given a set of production and cost constraints. The theory is extended to show that participation in microfinance can afford a potentially financially excluded firm capital resources that can enable it to relax the isocost constraint thus expanding production and therefore profit. As such microfinance becomes one of the choice variables for increasing firm profit. The choice to participate or not depends on the comparison between profits from participation versus profits from non-participation. A comparison of this profits depends on observed covariates such as firm, firm owner and institutional characteristics thus providing a basis for estimating the determinants of MSE participation in microfinance

2.3 Empirical Literature

This section discusses the empirical studies that relate to participation in microfinance and household welfare as well as participation in microfinance and MSE performance. The studies have been reviewed on the basis of their relevance to the study.

2.3.1 Microfinance and Household Welfare

Diagne & Zeller (2001) conducted a non-experimental study on the impact of formal and informal credit on the welfare of poor agricultural households in Malawi. The study sample comprised 296 participants of a micro-credit programme and 105 non-participants collected between the years 1993-1995. The study used the Limited Information Maximum Likelihood (LIML) technique to estimate a set of Heckman-

type simultaneous equations. From the results, it was established that credit access to selected informal and formal microfinance programmes did not have a significant effect on the households' per capita income, crop income or nutritional status. This implies that microcredit did not have significant impacts on the household welfare. Unlike the study which used the LIML technique, the current study used the Full Information Maximum Likelihood (FIML) technique to estimate the effect of participation in microfinance on household welfare. The FIML technique is preferred to the LIML as it generates more efficient estimators (West, 1986; Enders & Bandalos, 2001)

Copestake *et al.* (2001) conducted a study on the impact of microfinance on poverty in Zambia. Specifically, the study sought to establish the direct and indirect impacts of two large microcredit programmes on borrowers, their microenterprises and their household income. Collected in the year 1999, the sample data comprised 420 clients selected randomly from three cohorts namely; borrowers who obtained their first loan between one and two years before the reference month; borrowers who obtained their first loan between one year and eight months before the reference month and borrowers who had yet to receive a loan by the end of the reference month. This last cohort of potential borrowers also acted as a control group in the study. By using 'with and without', least squares regression and qualitative enquiry methodologies, they found mixed results. The study found out that individuals who graduated from their first to the second loan experienced significantly higher performance in their enterprise profits and household income, as compared with individuals who had near similar businesses but did not graduate to the second loan or seek for any credit. Second, the study established that 52 percent of borrowers

were better off after the microcredit, while the rest were left worse-off. While the study provided useful insights, the problems of endogeneity and self-selectivity were not adequately addressed as the methodologies used could not overcome them. To address this, the current study employed a treatment effects model. This model uses the inclusion of the Inverse Mills Ratio (IMR) as an additional regressor to take care of the unobserved variables and therefore corrects for the endogeneity or self-selection biases.

Khandker (2005) conducted a study on the relationship between microfinance and poverty in Bangladesh using panel level data collected in the periods, 1991/1992 and 1998/1999. Specifically, the study sought to establish the determinants of demand for microcredit as well as the impact of microfinance on poverty. On determinants, the study used fixed level effects and household level fixed effects to estimate the determinants on both women and men sub-samples. This separation was informed by the hypothesis that credit markets are imperfect and labour markets are different across gender. The findings of the study were that, an increase in landholding size reduced the total borrowing for women but had no effect on men's borrowing. On education, the results showed that female education had a negative significant effect on the amount of borrowing. While the study provided useful insights, the model did not include some other determinants such as financial literacy levels and vulnerability levels as postulated by economic thought and empirical observation. On estimating the impact of microfinance on household welfare, the study used the instrumental variable method within the household fixed-effect approach to address potential endogeneity. The results revealed that participation in microfinance generally increased household consumption especially for female participants. In

addition, microfinance had a higher impact on the extreme poor than the moderately poor. This study provided a basis for estimation of welfare across gender and wealth quintiles since credit use is not perfectly fungible across gender and wealth quintiles of different households.

Nghiem *et al.* (2007) conducted a study on the impact on microfinance programs on 470 Vietnamese households. Of the 470 households, 278 were households in treatment villages while 192 were households in control villages. To address self-selection bias, the study used a quasi-experimental survey approach. Using a fixed effects model, the results of the study indicated that household income per capita and consumption per capita were positively affected by participation in microfinance programs with the size of the effect increasing at a decreasing rate as the households spent more time in the microfinance program. The coefficients showed that, on average, a one percent increase in microfinance duration increased household per capita income and per capita consumption by 18.5 percent and 7.2 percent, respectively. Based on this study, the current study borrowed some of the control variables for use and they included; education status, household size, gender, age and marital status. The variable of time spent in a microfinance was not used since it was not available in the data set used. In addition, the treatment effects in the current study was used to overcome the self-selection biases without need for heavy data requirements like in the case of quasi-experimental methodologies.

Kiiru (2007) conducted a study on the impact of microfinance on rural poor households' income and vulnerability to poverty in Makueni district in Kenya. Using experimental research design, data on both participant and non-participant households was collected after every six months for a period of 18 months so as to

create pooled primary data. Using fixed effects and difference in difference methods, the study established that participation in microfinance had a positive effect on the income of the households but only after sometime. While experimental research design solves for the self-selection bias, the study focused only in Makueni area. In the current study, the study scope was expanded to include a nationally representative sample so as to improve the generalization of the results for policy making. In addition, the current study was conducted within the context of significant microfinance developments that have taken place in Kenya in the last decade including growth of microfinance gross loans, increase in the number of MFBs and increase in the usage of informal microfinance.

Shah *et al.* (2008) carried out a study on the determinants of microcredit by households in Sargodha Town in Pakistan. The study collected sample data from 910 low income households between the years 2004 and 2005. Using a logistic regression, the study found out that the factors that positively influenced household participation in microcredit included; household size, number of household earners, variable rate of interest on credit, access to formal finance institutions and household income. In addition, the study also found out that the education level of the household head was not important in explaining participation in microcredit. On the basis of this analysis, the current study used some of the variables in estimating the determinants of household participation in microfinance in Kenya. The variables included; household size, education level and age of the household head. In addition, the current study used additional variables that are considered important in light of participation in microfinance including vulnerability level of the household, gender of household head and financial literacy level of the household head. Moreover the

present study addressed the problem of heteroscedasticity through the use of a hetprobit model – an issue this study did not address.

Silva (2012) did a study on the impact of microfinance on household savings and income in Sri Lanka. The study used data from 11,722 households to analyse the objectives. Using propensity score matching (PSM) method, the findings of the study were that microfinance programmes had a positive impact on the overall income of the household. When the impacts were disaggregated by wealth quintiles, the findings showed that microfinance impacts did not increase with the level of wealth quintiles. This implies that the existing loans and saving schemes were insufficient to help the poorest to become highly productive in their income-generating activities. Since PSM does not generate other factors that affect household welfare, the ESR model was used in the current study to provide insights on the factors that affect household welfare other than participation in microfinance.

Duong & Thanh (2015) conducted a study to evaluate the impact of microfinance programs on the welfare of the poor in Vietnamese rural households. The data used was drawn from the Vietnam Household Living Standard Survey for the years 2006 and 2008. Using the propensity score matching (PSM) and difference in difference (DID) methods, the study revealed that microcredit loans had a positive impact of improving the monthly per capita expenditure but not monthly per capita income. This is because the extreme poor people were likely to spend the microcredit to smooth their consumption on basic needs and not use the resources to engage in income generating activities. In the construction of the dependent variables, the current study used both per capita expenditure and per capita income as measures of

welfare so as to incorporate the biases associated with the poorest quintile and misreporting of the household income.

2.3.2 Microfinance and MSE Performance

Copestake *et al.* (2005) conducted a study on the impact of microfinance on welfare outcomes and poverty of individuals and as well as growth in microenterprises in Peru. The data used in the study was collected from a sample of 547 clients and 388 non-clients from two microfinance institutions. The respondents were interviewed twice, one year apart, on microenterprise indicators namely; firm income, profits and employment levels, as well as household welfare indicators namely; income, savings, and assets. Using the difference-in-difference (DID) method, the study found that participation in the microfinance programme had a significant positive impact on individual income. However, microenterprise revenues and profits had not significantly improved as a result of participation in microfinance. Using this study, firm income was employed as a measure of firm performance in the current study.

Tedeschi (2008) conducted a study on the impact of microcredit on microenterprise profits in Peru. The study used different methods namely; the naïve model, fixed effects and quasi-experimental cross-sectional analysis. In running the naïve function, the results of impact of microcredit on profits was found to be overestimated when compared with the fixed effects model which controlled for self-selection bias. Moreover, the fixed effects model found that a microenterprise which engaged in borrowing from an MFI had higher profits than the one that did not. When comparing the results with the quasi-experimental cross-sectional model, the results were largely similar. The present study also used a treatment effects model that addressed self-selection and endogeneity biases without necessarily

conducting a randomized experiment especially due to data, cost and time constraints associated with these experiments.

Gubert & Roubaud (2011) conducted a study on the impact of microfinance loans on small informal enterprises in Antananarivo, Madagascar using data that was collected in the years 2001 and 2004. Using a standard Propensity Score Matching (PSM) technique to control for endogeneity, the study found that participation of microfinance increased the participants' annual turnover by about 68 percent in both periods. In addition, participation in the microfinance programme increased the production levels and operating profit by 39 and 47 percent, respectively. The current study also used the PSM model to address potential endogeneity biases since the matching procedure creates the conditions of a randomized experiment and produces unbiased and consistent estimators coefficients (Awotide *et.al*, 2015). In addition, the present study, disaggregates the microfinance effects along variables of interest namely; age of firm, age of firm owner and gender of firm owner.

Chemjor (2013) did a study on the factors affecting women participation in microfinancing programmes in Garissa County in Kenya. The study collected primary data from a sample of 148 women entrepreneurs who operated small businesses in Garissa town. The data included socio-economic characteristics of the respondents and levels of access to loans from MFIs. Using descriptive statistics and correlation analysis, the study found out that the key socio-economic factors driving participation were level of education, religious affiliation, political affiliation, family size and social networking. In addition, cultural factors such as women`s right to keep property, male chauvinism, family type and inheritance practices were also key in influencing women participation in microfinance. This study was faulted for using

descriptive statistics and correlation analysis since these methods only measure the degree of association and not causation. Therefore these results can be misleading when drawing conclusion about the causation effects.

Augsburg *et al.* (2015) carried out a study on the impact of microcredit on microenterprises in Bosnia and Herzegovina. The study population consisted of microentrepreneurs who applied for a loan in selected MFIs and were marginally rejected. After selecting a subset from the population, the sample was given loans from the MFIs. Using a randomized control experiment that was carried out in the period 2008 – 2010, the study found out that provision of MFI loans led to increased business activity and firm inventory. Overall, participation in microfinance increased business activity but had no effect on the firm profits. However, once quintile regression was applied, the results showed that positive effects were driven by impacts at the top quintile of the distribution of profits. As such, profits were driven by the size of the firm. Therefore, the present study will also estimate the distributional impacts of participation in microfinance along the age of firm, age of firm owner and gender of firm owner.

Banerjee *et al.* (2015) did a study on the effect of microfinance on small businesses in Hyderabad, India in the period 2005 - 2010. The study used a total sample size of 6,864 households who had small businesses. In measuring participation in microfinance, the study considered microcredit borrowers from selected MFIs in India. Using randomized experimental research design, the study found that most of the households that borrowed microcredit (38 percent of the total sample) did not experience any significant changes in business profits at each quintile between the 5th and the 95th percentile. Therefore, only the top five percent of businesses

experienced some positive effects in their profits. Moreover, only pre-existing businesses before the loans were administered experienced increases in assets and business profits. This implies that on average, microfinance effects were insignificant for new and small firms. In light of these distributional effects, the current study tested the microfinance effects against selected variables of age of firm, age of firm owner and gender of firm owner.

Tarozzi *et al.* (2015) did a study on the impact of microcredit in Ethiopia. The study used data from a randomized control trial that was carried out between 2003 and 2006 in rural households in Amhara and Oromiya areas. Using fixed effects model, it was established that participation in microfinance did not have any effects on non-farm business indicators used - business revenues, female-led businesses, net sales from businesses, age of business and business expenses. The current study also tested the hypothesis of the effects of participation in microfinance on selected firm variables in Kenya.

Crepon *et al.* (2015) conducted a study on the impact of microcredit on the businesses of rural households in Morocco in 2006. The study employed a randomized control experiment to measure the microfinance impact among the 13 percent of the households in treatment villages that took a loan on their businesses. The findings of the study showed that access to microcredit resulted in a significant increase in investment in business assets and self-employment income. In addition, these increases were only for existing businesses at the time of the administration of the loans. The current will test these results for the case of Kenya.

Chole (2017) did a study on the effect of microfinance services on the performance of micro and small enterprises in the Kariobangi Light Industry in Nairobi, Kenya. The study collected data using questionnaires from a census of all the 210 industries in the area. Specifically, the study sought to determine the effect of microfinance savings, loans and business training on the firm`s performance. The performance was measured in terms of how the MSEs rated each of the services provided by the MFIs on their variables such as employment, value of assets acquired due to use of MFI credit, stock levels, market share acquired and management skills acquired by the firm`s employees. Using methods of descriptive statistics, linear regression and Chi-Square tests, the study found that over 60 percent of the MSEs rated “good” the influence of the MFI savings and loan services on their performance indicators. On training, the results revealed that 44 percent rated “poor” the influence of MFI training on their performance. The bi-variate regression between the dependent variables and each of the MFI services offered each returned an Adjusted R of over 50 percent for the models. While this study may be useful for policy, it used subjective measures of microfinance effects which would potentially misleading during analysis. Moreover, the use of a bivariate linear regression has a potential to suffer problems of misspecification and endogeneity thus leading to misleading results. To overcome these problems, the current study employed firm income as a more objective measure of performance and also used a treatment effects model to address endogeneity biases in the model.

Omondi and Jagongo (2018) carried out a study on the influence of microfinance services on the financial performance of Small and Medium Enterprises (SMEs) in Kisumu County, Kenya. The study assessed how microfinance services namely;

access to credit, savings mobilization, financial skills training and role in modelling affected performance of a sample of 135 SMEs in the study area. The study used an ordinary linear regression model to analyse each of these effects. The results revealed that, other things equal, a unit increase in access to credit, increased firm performance by 0.855 while a unit increase in savings, increased firm performance by 0.886 units. In addition, a unit increase in financial skills training and role modelling, lead to an increase in SME performance by 0.965 units and 0.960 units, respectively. While this analysis concluded that MFI could increase SME performance, the model used did not address endogeneity problems associated with firms. The employed a treatments effects framework which overcomes endogeneity and is also able to isolate effects across different segments of MSEs.

2.4 Overview of Literature

The theoretical literature reviewed is anchored on two main theories namely; household utility maximization and theory of a firm. The household utility maximization theory illustrates the relationship between microfinance and household welfare. The theory asserts that the household's optimal production and consumption decisions depend on participation in microfinance among other parameters. As such, households that seek to maximize their utility, must choose whether to participate in microfinance or not. Since this choice is discrete, an extended household model to include the random utility model (RUM) was considered. Under RUM, the household choice to participate or not depends on the comparison of the utility of a household when it participates versus its utility when it does not participate. In effect, these comparison depends on observed covariates that include household and institutional variables thus providing a basis for estimating

the determinants of participation in microfinance as well as effects of microfinance on welfare.

The theory of a firm describes the relationship between microfinance and firm performance. The theory assumes that a firm seeks to maximise its profits subject to production and cost constraints. Firms who are undercapitalized or financially excluded can relax their cost constraint by borrowing capital resources from an MFI so as to augment production thereby increasing their profit. Therefore, participation in microfinance becomes one of the choice variables for increasing firm profit. Since the choice to participate is a binary one, the decision to participate or not depends on the comparison between profits from participation versus profits from non-participation. A comparison of this profits depends on observed covariates such as firm, firm owner and institutional characteristics thus providing a basis for estimating the determinants of MSE participation in microfinance.

From the empirical literature surveyed, there are a number of studies that analysed the effect of participation in microfinance on both household welfare and performance of MSEs. On the relationship between microfinance and household welfare, the studies showed that the effects were mixed. Moreover, most of these studies showed that the effects were varied depending on the regional context where they were conducted. In Kenya, a study by Kiiru (2007), found that participation in microfinance had a positive effect on household welfare. However, the study focussed only on a small area and did not account for the distributional effects of participation in microfinance on household welfare. In addition, there is need to conduct a study within context of significant microfinance developments that have taken place in the country since 2007.

Regarding the effect of MSE participation in microfinance on MSE performance, the studies showed that effects were mixed in various economic contexts. In the case of Kenya, studies by Chole (2017) and Omondi and Jagongo (2018) showed that participation in microfinance had positive effects on welfare. However these studies were discounted on the basis of failure to account for endogeneity in the analysis. In addition, these Kenyan studies focussed on small areas and also used bivariate least squares regression – a model that is prone to problems of misspecification. This study overcomes these issues by using a treatments effects framework which overcomes endogeneity and is also able to isolate effects across different segments of MSEs.

On the determinants of participation by both households and MSEs, studies by Khandker (2005), Shah *et al.* (2008) and Chemjor (2013) illuminated on some of the factors that would influence participation in microfinance. However, these studies did not address issues of heteroscedasticity or used methods that would not objectively link the causal relationships. Therefore a Kenyan study is necessary to understand these factors in the face of low levels of uptake of microfinance.

In light of the foregoing, an empirical study was necessary to develop an understanding of the distributional effects of participation in microfinance on different segments of the households and MSEs. In addition, there was need to conduct a study within context of significant microfinance developments that have taken place in the country since 2007. Also, an analysis of determinants of participation was necessary given the low levels of uptake of microfinance in the country. Finally, the use of a nationally representative dataset was considered necessary in improving the generalisation of the findings of the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology adopted for the study. The chapter examines the theoretical framework, model specification, definition and measurement of variables, data types, data sources and estimation techniques.

3.2 Research Design

The study employed a non-experimental cross-sectional research design in the analysis of the objectives. The design was considered more feasible in light of time and data considerations (Hawkins *et al.*, 2007). This is because the experimental design requires that data must be collected within a controlled experiment over a specified period of time. In addition, experimental design may be prone to contamination between the treatment and control groups due to spill-over effects (Hawkins *et al.*, 2007). Therefore, to account for the causal relationships between variables in the study, treatment effects models were used.

3.3 Theoretical Framework

3.3.1 Household Participation in Microfinance and Household Welfare

The relationship between household participation in microfinance and household welfare is based on the theory of household utility maximization. As described in Section 2.2.1., the objective of the household is to maximize its utility subject to a set of production and isocost constraints. The resulting choice functions imply that the optimal consumption and production decisions depend on borrowing, among other parameters. From the theory, it is assumed that participation in microfinance may affect both consumption and production decisions of the household. This may

be through consumption smoothing and expanding income generation through increased household production. As a result, the household can increase its utility. To model how participation in microfinance may affect household welfare, the random utility theory was used. This is because of the discrete nature of household participation in microfinance, where a household chooses to participate in microfinance or not.

Using the random utility theory, the effect of household participation in microfinance on household welfare can be modelled by comparing the indirect utility of a household under participation with the indirect utility under non-participation. A household will participate in microfinance if the value of indirect utility due to participation exceeds the value of indirect utility due to non-participation.

To model this binary choice decision problem, let $V_P(w)$ be the indirect utility of the welfare indicators for participating households and $V_N(w)$ be the indirect utility of the welfare indicators for non-participating households and that w is a set of welfare indicators. The household's decision to participate or not is observed but the decision stage of selecting that choice is not observed. Therefore, the choice decision can be represented by a latent variable (D_i). To specify the latent variable, it is assumed that the household's choice to participate or not depends on an unobservable threshold utility $V^*(w)$. The household obtains the threshold utility by comparing the utility due to participation and the utility due to non-participation such that

$$V^*(w) = V_P(w) - V_N(w) \quad (3.1)$$

Given this threshold level of utility, the latent variable may be defined as

$$D_i = 1 \text{ if } V^*(w) > 0 \text{ and } D_i = 0 \text{ if } V^*(w) \leq 0 \quad (3.2)$$

Since the choice to participate or not is binary, the probable choice model that can estimate the probability of household participation given the observed covariates may be given by

$$D_i = X' \beta + \mu \quad (3.3)$$

Where D_i is the household's decision to participate or not, X' is a vector of explanatory variables affecting the decision choice to participate or not, β is a vector of unknown parameters and μ is a random error term.

To estimate the binary choice model, a probit regression was used. The choice of this model was based on the assumption that the residuals of the model were normally distributed (Verbeek, 2012).

By construction, the probit may be set as

$$\Pr(D_i = 1) = \phi(X' \beta) \quad (3.4)$$

Where X' , β are described as before and ϕ is the cumulative distribution function of a standard normal random variable, that is, a normally distributed random variable with a mean of zero and a constant variance for the error term.

However in the presence of heterokedasticity, a heteroskedastic probit (hetprobit) as proposed by Harvey (1976) and generalised by Alvarez & Brehm (1995) would be more suitable. The heteroskedastic probit modifies the probit model by generalizing a cumulative distribution function (CDF) of a standard normal random variable to a normal CDF with a variance that is no longer fixed at one (1) but can vary as a function of the independent variables (Harvey, 1976; Alvarez & Brehm, 1995).

The hetprobit relaxes the homoscedastic assumption by introducing a multiplicative term in the probit model such that

$$\Pr(D_i = 1) = \phi\left(\frac{(X'\beta)}{\exp(\rho\omega)}\right) \quad (3.5)$$

Where X' , β , ϕ are described as before, ρ is a vector of covariates that are suspected to have heterokedasticity and ω is a vector of parameters associated with ρ variables. If $\omega = 0$, then the hetprobit becomes the probit. Based on the probit framework, the empirical model for determinants of household participation in microfinance was set up.

To model the effect of household participation in microfinance on household welfare, a treatment effects framework was employed. Under this framework, the endogenous switching regime (ESR) model by Lee (1978) was used. This model is suitable for addressing potential endogeneity and self-selection biases, which if not addressed, may yield biased and inconsistent estimates (Maddala, 1983). The biases arise because some of the factors affecting choice of participation may also affect household welfare. Also, they may arise because participation in microfinance is non-random. This is because the choice to participate is voluntary and depends on both observable and unobservable characteristics of the household.

Under the ESR framework, the participant and non-participant equations conditional on participation, are specified as

$$w_p = Z' B_p + \varepsilon_p \quad \text{if } D_i = 1 \quad (3.6)$$

$$w_N = Z' B_N + \varepsilon_N \quad \text{if } D_i = 0 \quad (3.7)$$

Where, w_p and w_N are a set of household welfare indicators for participants and non-participants respectively, Z_i' is a set of explanatory variables affecting welfare in both regimes, B_p and B_N are unknown parameters in both regimes and ε_p and ε_N are error terms in both regimes. According to Lee (1978), the associated error terms of equations 3.3, 3.6 and 3.7 are assumed to have a trivariate normal distribution with mean zero and non-singular variance-covariance matrix.

To address these endogeneity and self-selection biases in the model, Maddala (1986) proposed the use of the Inverse Mills Ratio (IMRs) terms as additional regressors in the model. The IMR is the ratio of the probability density function (PDF) to the cumulative distribution function (CDF) of the distribution of the error terms. Using the binary choice model in Equation 3.4, the IMRs can be computed as

$$E(\varepsilon_p / D = 1) = \sigma_{p\mu} \left\{ \frac{\phi(X' \beta)}{1 - \psi(X' \beta)} \right\} = \sigma_{p\mu} \lambda_p \quad (3.8)$$

$$E(\varepsilon_N / D = 0) = -\sigma_{N\mu} \left\{ \frac{\phi(X' \beta)}{1 - \psi(X' \beta)} \right\} = \sigma_{N\mu} \lambda_N \quad (3.9)$$

Where $\sigma_{p\mu}$ is the covariance between μ and ε_p , $\sigma_{N\mu}$ is the covariance between μ and ε_N , $\phi(X' \beta)$ and $1 - \psi(X' \beta)$ are probability density and cumulative density functions of the standard normal distributions, respectively. The terms λ_p and λ_N denote the IMRs for the participation and non-participation equations, respectively.

To correct for the biases, the IMRs are added as regressors in equations 3.6 and 3.7 such that

$$w_p = Z' B_p + \sigma_{p\mu} \lambda_p + \varepsilon_p \quad \text{if } D_i = 1 \quad (3.10)$$

$$w_N = Z' B_N + \sigma_{N\mu} \lambda_N + \varepsilon_N \quad \text{if } D_i = 0 \quad (3.11)$$

Utilizing the estimates obtained from equations 3.10 and 3.11, the treatment effects of household participation in microfinance on household welfare are derived. The average treatment effect on the treated (ATET) is obtained by the difference between expectations of household welfare conditional on participation for participants and expectations of household welfare conditional on non-participation for the same participants. This may be described as

$$ATET = E(w_p / D = 1) - E(w_N / D = 1) \quad (3.12)$$

Where $E(w_p / D = 1)$ is the expected welfare for participants conditional on participation and $E(w_N / D = 1)$ is the expected welfare for participants conditional on non-participation. The second term estimates the potential welfare that participants would have enjoyed had they not participated.

The estimation of this second term assumes the conditional independence assumption which may be given as

$$E(w_N / D = 1 / X) = E(w_N / D = 0 / X) \quad (3.13)$$

Equation 3.13 implies that, conditional on observed covariates (X) in both participant and non-participant households, selection into the treatment is not related to the potential outcome of welfare (Verbeek, 2012). Therefore, the potential non-treatment effect does not depend on participation status. This assumption makes it possible to obtain the potential welfare of participants had they not participated.

3.3.2 MSE Participation in Microfinance and MSE Performance

The relationship between participation in microfinance and MSE performance can be modelled through the theory of a firm. As presented in section 2.2.2, a firm with multiple inputs and multiple outputs is assumed to maximize its profits subject to a

production constraint. To illustrate how participation in microfinance may affect MSE performance, it's assumed that MSEs who are undercapitalized or excluded from the formal financial markets can rely on microfinance for financing and therefore increase their income. Therefore, the reduced form optimal input demands and output supply functions may be modified to incorporate microfinance.

To account for microfinance in affecting MSE performance, a firm with multiple inputs and outputs has an extended indirect profit function that can be given as

$$\pi(p, w, m; F^h) = pf(x^*(p, w, m) - wx^*(p, w, m)) \quad (3.14)$$

Where $\pi(p, w, m, F^h)$ is profit of the firm, p is output price, w is input price, x is a vector of inputs, F^h is a set of firm, firm-owner and institutional characteristics that may affect profit, m represents firm participation in microfinance where $m = 1$ if a firm participates in microfinance and $m = 0$, otherwise.

Equation 3.14 postulates that firm profit is a function of output prices, input prices and microfinance participation and firm, firm-owner and institutional characteristics. In the context of firm participation in microfinance, firms that are financially excluded by requirements such as high collateral and high transactional costs, may benefit from microfinance since its services are often designed to be in relatively small transactions, accessible and affordable to the MSEs (Copestake *et al.*, 2001; Tedeschi, 2008).

Firms will choose to participate ($m=1$) or not ($m=0$) by comparing the level of profits due to participation with the level of profits due to non-participation. The firms will choose to participate if the profits due to participation (π_p) are greater than profits due to non-participation (π_N) such that

$$\pi_p(p, w; F^h / m = 1) > \pi_N(p, w, F^h / m = 0) \quad (3.15)$$

Equation 3.15 provides a framework for estimating the determinants of microfinance participation by MSEs as well as how this participation affects MSE performance. In modelling MSE participation in microfinance, the firm's optimal decision that maximizes profit is a discrete comparison of the expected profits from participation with those profits from non-participation.

Let π_p be the profit of a firm that is due to participation and π_N be the profit of a firm that is due to non-participation. For firms to choose to participate or not, it must that they have an unobservable threshold level of profit that would make them take the decision. The threshold level of profits may be given as

$$\pi^* = \pi_p - \pi_N \quad (3.16)$$

Since this decision stage is not observable, it can be represented by a latent variable (F_i) which is defined as

$$F_i = 1 \text{ if } \pi^* > 0 \text{ and } F_i = 0 \text{ if } \pi^* \leq 0 \quad (3.17)$$

Equation 3.17 implies that firms will participate in microfinance ($F_i = 1$), if the critical profit is greater than zero, otherwise, they will not participate ($F_i = 0$).

To estimate determinants of MSE participation in microfinance, the binary decision choice can be estimated using observed covariates such that:

$$F_i = T' \delta + \eta \quad (3.18)$$

Where F_i is the decision to participate or not, T' is an observed vector of the firm, firm-owner and institutional covariates that affect participation in microfinance, δ is a vector of unknown parameters and η is a random error term.

In estimating the determinants, the probit model that was used was specified as

$$\Pr(F_i = 1) = \phi(T' \delta) \quad (3.19)$$

Where, $\Pr(F_i = 1)$, T' , δ are described as before and ϕ is the cumulative distribution function of a standard normal random variable, that is, a normally distributed random variable with mean of zero and a constant variance for the error term (Verbeek, 2012). Following this framework, the empirical model that was used to estimate the determinants of MSE participation in microfinance was specified.

To estimate the effects of MSE participation in microfinance on MSE performance, a treatment effects model was considered. This is due to the need to address potential endogeneity biases associated with unobserved variables. These biases may be associated with entrepreneurial abilities and risk taking behaviour of the firm (Tedeschi, 2008). To account for this biases, the Propensity Score Matching (PSM) by Rosebaum and Rubin (1983), was used.

The PSM method is a semi-parametric technique which does not depend on the functional form or distributional assumptions of a model (Rosebaum and Rubin, 1983). The PSM method is used to match observations of participants and non-participants according to the predicted propensity of the treatment variable. The matching procedure creates the conditions of a randomized experiment in order to estimate a causal effect of the variables. The coefficients of the matching process enjoy unbiased and consistent estimators (Awotide *et al.*, 2015).

The first step of the model was to estimate the propensity score of participation in microfinance. The propensity score is the conditional probability of assignment to a particular treatment given a vector of observed covariates (Rosebaum and Rubin,

1983). Since this is a non-randomised experiment, the propensity scores are almost unknown but may be estimated with observed data using one of the common approaches such as a probit regression. Using a probit model described in equation 3.19, the propensity score can be estimated as

$$p(T) = \Pr(F_i = 1/T) \quad (3.20)$$

Where $p(T)$ is the propensity score and $\Pr(F_i = 1/T)$ is conditional probability of assignment to participation in microfinance (treatment) given a vector of observed determinants of MSE participation in microfinance (T)

To ensure that the propensity scores can be used for matching, two assumptions must be satisfied. First, the model assumes the unconfoundness or conditional independence assumption which may be stated as

$$\pi_p, \pi_N \perp F/T \quad (3.21)$$

Where π_p and π_N are profits due to participation and non-participation respectively, F is the treatment (participation) and T is a vector of observed covariates affecting participation and \perp means independence. Equation 3.21 implies that firms have the same distribution for their outcomes, regardless of participation or non-participation status. Given this assumption, it becomes possible to construct a suitable simulation for estimating the participation effects (Verbeek, 2012).

Second, the common support or overlap assumption assumes that the propensity scores ($\Pr(F_i = 1/T)$) are bounded between zero and one such that

$$0 < \Pr(F_i = 1/T) < 1 \quad (3.22)$$

The second assumption assumes that all the treated units have a counterpart in the control population. If any of the propensity scores are equal to zero or one, then

these will be outside the region of common support and will not be successfully matched.

If these two assumptions are satisfied, propensity scores can be successfully matched using a suitable matching algorithm. In the study, nearest neighbour matching (NNM) was adopted where a unit from the control group is selected as a matching partner for a treated unit that is closest to it in terms of the propensity score. The NNM approach is suitable in the case of large samples since it can minimise bias during matching and also produce good quality matches (Smith and Todd, 2005).

In matching, the propensity scores were compared between the treated observations (participants) and control observations (non-participants) such that the differences (ATET) in the outcome variable (firm income) could be attributed to participation in microfinance. The ATET can be defined as

$$ATET = E(\pi_p / F = 1) - E(\pi_N / F = 1) \quad (3.23)$$

Where $E(\pi_p / F = 1)$ the expected outcome of treated firms conditional on participation and $E(\pi_N / F = 1)$ is the expected outcome of the treated firms conditional on non-participation. Equation 3.23 formed the basis for estimating the effect of MSE participation in microfinance on MSE performance.

3.4 Model Specification.

3.4.1 Determinants of Household Participation in Microfinance.

Based on Equation 3.5, the heteroskedastic probit model that assessed the determinants of household participation in microfinance was given as

$$D_i = X' \beta + \mu \quad (3.24)$$

Where D_i is the decision to participate such that $D_i = 1$ if a household participates and $D_i = 0$, otherwise, X' is a vector of explanatory variables and they include: wealth index of the household, education level of the household head, residence of the household, marital status of the household head, age of the household head, household size, dependency level of the household, vulnerability level of the household, gender of the household head, financial literacy level of the household head, internet use by the household and cost of transport to nearest financial service provider, β is a unknown vector of parameters to be estimated and μ is the error term.

3.4.2 Effect of Household Participation in Microfinance on Household Welfare.

To analyse the effect of household participation in microfinance on household welfare, the study employed the endogenous switching regression (ESR) model which was specified as

$$D_i = X' \beta + \mu \quad (3.25)$$

$$w_p = Z' B_p + \sigma_{p\mu} \delta_p + \varepsilon_p \quad \text{if } D_i = 1 \quad (3.26)$$

$$w_N = Z' B_N + \sigma_{N\mu} \delta_N + \varepsilon_N \quad \text{if } D_i = 0 \quad (3.27)$$

Where D_i is a latent variable denoting the household choice to participate or not, X' is vector of explanatory variables that determine household participation in microfinance and they include: wealth index, education level, residence, marital status, age, household size, dependency level of the household, vulnerability level, gender, financial literacy level, cost of transport to nearest provider and internet use by the household, β is a unknown vector of parameters to be estimated and μ is the error term of the selection equation.

w_p and w_N are welfare indicators measured by per capita expenditure and per capita income, Z' is a set of household variables affecting welfare in both regimes and they include: wealth index, education level, residence, marital status, age, household size, dependency level, vulnerability level and gender.

$\beta_p, \beta_N, \sigma_{p\mu}, \sigma_{N\mu}$ are unknown vector of parameters both regimes, δ_p and δ_N are IMRs in both regimes, ε_p and ε_p the error term in both regimes.

3.4.3 Determinants of MSE Participation in Microfinance

Based on Equation 3.18, the probit model that estimated the determinants of MSE participation in microfinance is given as

$$F_i = T' \nu + \eta \quad (3.28)$$

Where F_i is the decision to participate such that $F=1$ if the firm participates and $F=0$, otherwise, T' is a vector observed covariates of participation and they include; number of business units in a firm, age of owner, age squared of owner, age of firm, education level of owner, gender of owner, financially literacy level of owner, numeracy level of owner, ownership of radio, motorcycle and bicycle, number of employees, location type of firm, possession of permit, registration status of firm, inward credit policy, outward credit policy and bank finance participation, ν is an unknown vector of parameters to be estimated and η is the error term.

3.4.4 Effect of MSE Participation in Microfinance on MSE Performance.

Based on Equation 3.23, the PSM model that was used to estimate the effect of MSE participation in microfinance on MSE performance was defined as

$$ATET = E(Y_p / F = 1) - E(Y_N / F = 1) \quad (3.29)$$

Where $E(Y_p / F = 1)$ the expected annual firm income of treated firms conditional on participation $E(Y_N / F = 1)$ is the expected annual firm income of the treated firms conditional on non-participation. The estimation, $E(Y_N / F = 1)$ is based on a simulation of what the firm income would have been for the participating firms had they not participated.

3.5 Definition and Measurement of Variables

The definition and measurement of variables in the models that were estimated are described in Table 3.1 and 3.2.

Table 3.1: Variables for Household Participation in Microfinance and Household Welfare

Variable	Definition and Measurement
Household participation in microfinance	Refers to if a household borrowed microfinance credit from an MFB/ ROSCA/ ASCA/ Supplier / Shopkeeper where 1=Household participates and 0 = Otherwise
Per Capita Expenditure	Refers to the annual amount of money spent on non-durable goods per household member in the past year in shillings. The variable is a proxy for household welfare.
Per Capita Income	Refers to the annual amount of money earned per household member in the past year in shillings. The variable is a proxy for household welfare.
Wealth Index	Refers to an index of selected household durable goods ownership, utilities access and living conditions of the household
Household Size	Refers to the number of members in the household in the past year.
Dependency level of the household.	Refers to the burden of dependency in the household and is proxied by the number of children in the household who were attending school in the past year.
Age of household head	Refers to the age of the household head in years
Education level of household head	Refers to the highest education level attained by the household head where, 1=No Education 2 = Primary, 3= secondary and 4 = Tertiary
Residence of the household	Refers to where a household ordinarily lived or stayed in the past year where, 1=Urban and 0=Rural
Marital status of the household head	Refers to whether a household head was married or not in the past year where, 1= if household head is married, 0 = Otherwise
Vulnerability level of the household	Refers to whether a household involuntarily went without food at any time in the past year, where, 1 = Not Vulnerable, 0 = Vulnerable
Internet use by the household	Refers to whether a household head used internet in the last four weeks before interview , where, 1 = Yes and 0 = No
Financial literacy level of the household head	Refers to whether a household head correctly answered a set of simple financial questions where, 1= Financially Literate and 0 = Otherwise
Gender of household head	Refers to the gender of the household head where, 1= female and 0 = male.
Cost of transport to the nearest financial service provider	Refers to the average cost of public transport to the nearest financial service provider measured by Kshs per trip. The variable is a proxy for transaction costs.

Source: Study Data (2017)

Table 3.2: Variables for MSE Participation in Microfinance and MSE Performance.

Variable	Definition and Measurement
MSE participation in microfinance	Refers to if an MSE (firm) borrowed microfinance credit from an MFB/ ROSCA/ ASCA/ Supplier where, 1= MSE participates and 0 = Otherwise
Annual Firm Income	Refers to the annual gross income earned by an MSE (firm) in the past year measured in Kshs. This variable is the proxy for firm performance.
Number of business units	Refers to the number of independent businesses operated within the firm in the past year.
Age of firm owner	Refers to the age of the firm owner in years
Age of firm	Refers to the number of years the firm has been in operation
Number of employees	Refers to the number of employees of the firm in the past year (whether casual or permanent)
Education level of firm owner	Refers to the highest education level attained by the firm owner where, 1 = No Education 2 = Primary, 3 = secondary and 4 = Tertiary
Gender of firm owner	Refers to the gender of firm owner where, 1 = male and 0 = female
Financial literacy level of owner	Refers to whether a firm owner correctly answered a set of simple financial questions where, 1= Financially Literate and 0 = Otherwise
Numeracy level of owner	Refers to whether the firm owner correctly answered a set of numerical questions where, 1 = Numerate and 0 = Otherwise
Ownership of radio by owner	Refers to whether the firm owned a functioning radio in the past year where, 1 = Yes and 0 = No
Location type of the business	Refers to the type of location of the business whether fixed or not fixed in the past year where 1= Fixed and 0 = Not Fixed
Business Permit	Refers to whether a firm possessed a valid business license or permit in the past year where, 1 = Yes and 0 = No
Formal Registration	Refers to whether a business was formally registered either as a sole proprietorship, company or partnership in the past year where, 1= Yes and 0 = No
Motorbike	Refers to whether a firm owned an operational motorbike in the past year where, 1= Yes and 0 = No
Bicycle	Refers to whether a firm owned an operational bicycle in the past year where, 1= Yes and 0 = No
Credit policy (Outward)	Refers to whether a firm ever issued credit to its customers in the past year where, 1= Yes and 0 = No
Credit policy (Inward)	Refers to whether a firm ever received business credit from its suppliers in the past year where, 1= Yes and 0 = No
Bank finance participation	Refers to whether a firm ever borrowed credit from a commercial bank in the past year where, 1= Yes and 0 = No

Source: Study Data (2017)

3.6 Data Types and Sources

To achieve the objectives of the study, the study used secondary data that was extracted from the 2016 FINACCESS dataset. The dataset is a cross-sectional survey that was conducted by the Central Bank of Kenya, Kenya National Bureau of Statistics & FSD-Kenya in the year 2015. The dataset captures information on financial landscape, household variables, finance variables and firm variables. In addition, data was also collected on agriculture and the business modules of the households.

The survey sample is a nationally representative data set that was drawn from a sample of households and individuals in the country. The sample of respondents was drawn using KNBS `s National Sample Survey and Evaluation Programme (NASSEP V) framework. Under this framework, interviewees were randomly selected at the household level using the Kish grid. To ensure that the sample was representative, a two stage stratified cluster sampling was followed.

The first stage involved the selection of the enumeration areas from the all sub-regions in the country. Within the sub-regions, all the counties were included for data collection. In each of the counties, enumeration areas (EAs) were identified on the basis of strata along, geographical, demographic and economic indicators. The selection of EAs ensured that these characteristics were reflected. After sampling the EAs, the second stage involved sampling of households. From each of the EAs, households were selected randomly from each of the strata in the cluster areas. Finally, in each of the sampled households, the Kish method was used randomly select respondents for the survey.

3.7 Diagnostic Tests

To ensure validity of the models, a number of diagnostics were carried out. These included, presence of severe multicollinearity using Variance Inflation Factor, model specification using Link test, Goodness of Fit using Hosmer-Lemeshow test, heterokedasticity using Langrange Multiplier test and overlap condition of the PSM model using the Balancing test.

3.8 Data Analysis

The objectives of the study were achieved using both parametric and semi-parametric methods. Before analysis, the data was checked to ensure that it was devoid of inconsistencies, missing observations, outliers and errors. The descriptive statistics were then computed to determine the suitability of the dataset for analysis. This included means, standard deviation, range and proportions. To further test for statistical differences between the means and frequencies of the variables, the t-test was used for the continuous and count variables while the z-test was used for categorical variables. These statistics gave preliminary ideas about the consistency and validity of the data with respect to priori expectations.

The first objective of the study was to assess the determinants of household participation in microfinance. To achieve this, a heteroskedastic probit model was fitted using the maximum likelihood estimation method. The model was preferred since the null hypothesis of no heteroscedasticity was rejected. To ensure validity of the regression, the model was subjected to a number of diagnostic tests. Upon estimation of the hetprobit model, the marginal effects were estimated and the coefficients of the variables were interpreted accordingly.

The second objective of study was to establish the effect of household participation in microfinance on household welfare. To achieve this, a one-step approach using the Full-Information Maximum Likelihood (FIML) estimation was used (see Lokshin and Sajaia, 2004). The FIML fitted the selection, participation and non-participation equations simultaneously to give rise to estimates that enjoyed all the properties of maximum likelihood estimators. Within FIML, the probit model of the selection equation was first estimated to generate the inverse mills ratios (IMRs) for each of the observations. The predicted IMR values were then added back to the participation and non-participation equations as regressors and the equations were re-estimated simultaneously. To achieve the ATET, the difference between the expected welfare for participants conditional on participation and the expected welfare for participants had they not participated, was computed.

The third objective of the study was to estimate the determinants of MSE participation in microfinance. To achieve this, the probit regression was fitted using the maximum likelihood estimation. To ensure validity of the model, a number of post-estimation tests were undertaken. Once the probit model satisfied these tests, the marginal effects were estimated and the coefficients of the variables were interpreted as necessary.

The fourth objective sought to analyse the effects of MSE participation in microfinance on MSE participation using the PSM method. The first step was to estimate the propensity scores using the probit model of the determinants MSE participation in microfinance. Secondly, the propensity scores were tested for the overlap condition and balancing properties to ensure that the scores were adequate enough to produce quality matches. Thirdly, a matching process of the scores was

conducted using nearest neighbour matching (NNM) algorithm. Finally, the ATET was derived from the matching and checked for statistical significance using the t-test and analysis of variance (ANOVA).

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents the results, discussions and findings of the study. The chapter contains a discussion of the descriptive statistics of the variables used in the analysis. The chapter also includes presentation and discussion of results for each of the objectives. Where applicable, diagnostic tests of various models used in the study are also presented.

4.2 Descriptive Statistics for Data on Household Welfare

Based on the FinAccess Dataset (2016), this section discusses the descriptive statistics of the variables that were used in analysing the determinants of household participation in microfinance as well as the effect of household participation in microfinance on household welfare. These statistics are important in creating understanding of the data, giving preliminary feel of how good the data is for analysis and whether the data collected is consistent with some priori expectations. The descriptive statistics used in the study were, range, mean and standard deviations of the variables.

To account for the differences between the participating and non-participating households, the relevant summary statistics are discussed. To further test for differences between the means and frequencies of the variables between the groups, the t-test was used for the continuous and count variables while the z-test was used for categorical variables. Table 4.1 shows the descriptive statistics for the count and continuous variables for the household welfare models.

Table 4.1: Descriptive Statistics for Continuous and Count Variables: Households

Variable	Range		Total Sample N=5071	Participants (1) N=1253 (24.71%)	Non-participants (0) N=3818 (75.29%)	Difference (1 – 0)	P. value
	Minimum	Maximum	Mean (S.D)	Mean (S.D)	Mean (S.D)		
Per Capita Expenditure	22,900	622,000	95,458.41 (91,546.05)	98104.90 (96116.14)	94589.88 (89991.74)	3515.02	0.880
Per Capita Income	3120	660,000	67457.46 (88579.4)	60572.00 (83106.56)	69717.00 (90199.17)	- 9145***	0.000
Wealth Index	-1.357	3.160	0.190 (1.036)	0.115 (1.018)	0.214 (1.042)	- 0.099***	0.003
Household Size	1	17	3.623 (2.163)	4.119 (2.314)	3.460 (2.086)	0.659***	0.000
Dependency level of the household	0	14	1.421 (1.592)	1.593 (1.632)	1.365 (1.576)	0.228***	0.000
Age	16	100	37.562 (17.144)	38.205 (21.604)	37.351 (15.399)	1.854	0.937
Cost of transport to nearest financial service provider	50	500	71.347 (75.469)	72.406 (78.252)	70.999 (74.540)	1.407	0.567

N = Number of Observations; S.D = Standard deviation in parenthesis; Asterisk *** denotes level of statistical significance at 1% level; P. value is probability value associated with differences in means between participants and non-participants

Source: Own Computation from Study Data (2017)

As shown in Table 4.1, the total sample used to analyse the determinants of household participation in microfinance as well as the effect of household participation in microfinance on household welfare was 5,071 households. Of all the households, 24.71 percent of them participated in microfinance while 75.29 percent did not. This level of usage may be considered low in light of the many developments that have been undertaken in the last 10 years to promote financial inclusion. As such this low participation may point to some households still facing exclusions from financial markets.

The descriptive statistics show that the mean annual per capita expenditure for the household was Kshs 95,458 with a standard deviation of Kshs 91,546. This value compares favourably with Kenya's GDP per capita which stood at Kshs 91,738 in 2015 (Republic of Kenya, 2016a). Further, the statistics showed that the mean per capita income for the household was Kshs 67,457 with a standard deviation of Kshs 88,579 implying that the variability of household income is widely dispersed among households.

The difference in per capita expenditure between participating and non-participating households was Kshs 3,515 but this difference was not statistically significant since the associated probability of the t-value was 0.880. In terms of per capita income, the non-participants, on average, earned Kshs 9,145 more than the participants with this difference being statistically significant at one percent level. This difference may be consistent with the view that poorer people tend to use microfinance more than the less poor (CBK, KNBS & FSD Kenya, 2016). As expected, the reported values of per capita expenditure were higher than those of per capita income. This is

due to the possibility of misreporting of income or that the households finance part of their spending through credit. (Haughton & Khandker, 2009).

The wealth index, which is a measure of the household assets value, was between -1.357 and 3.160. The mean wealth index of the total sample was 0.19 with a standard deviation of 1.036 implying there was wide variability in the wealth levels of households. On average, the wealth index of non-participants was higher than that of participants and the difference was statistically significant at one percent level. This difference may imply that households with more assets participate less in microfinance. This view is plausible because wealthier households can use their productive assets to smoothen consumption by liquidating their assets or they are more likely to have collateral to enable borrow from other providers such as banks. In addition, they may generate income by deploying their productive assets into investment which will provide them with additional income to spend (Frankenberg *et al.*, 2003).

The household size had a minimum of one person and a maximum of 17 persons. Observable also, was that the average household size for the sample was about 3.6 persons with a standard deviation of 2.2. This mean value compares favourably with that of the Kenya Demographic Health Survey in 2014 which reported an average household size of 3.9 persons (Republic of Kenya, 2014b). On average, participants had a higher mean household size of 4.1 persons than non-participants who had 3.4 persons. The difference in household size between the participants and non-participants was statistically significant at one percent level. The difference may point to the need for a bigger household to participate in microfinance for consumption smoothing. (Libois & Somville, 2014).

To account for the dependency level of the household, the number of school-going children in a household was considered. The sample revealed that the mean of household members who were schooling was higher for participants (1.6 children) than for non-participants (1.4 children). The corresponding standard deviations both the participants and non-participants were 1.5 and 1.6, respectively. The difference between the means for the two groups was statistically significant at one percent level. This status may support the view that households who have a higher burden of dependency tend to require more resources to finance their needs such as school fees and nutrition (Barnes, 2001; Chowdhury & Bhuiya, 2001; Maldonado, 2008). For instance, based on FinAccess dataset (2016), there was evidence that 21 percent of all credit borrowed by households was to finance educational needs (CBK, KNBS & FSD Kenya, 2016).

The age of the household head ranged between 16 and 100, with the average age being 37 years. For participants, the average age was 38.20 years with a standard deviation of 17.14 years. On the other hand, the average age for non-participants was 37.35 years with a standard deviation of 21.60 years. On the cost of transport to nearest provider, the study found out that the average cost of transport to the nearest financial service provider ranged between Kshs 50 and 500 with the mean cost being Kshs 71.34. However, the difference in cost between the participants and non-participants was statistically insignificant. To characterise the categorical variables for the household welfare models, the summary statistics are presented in Table 4.2.

Table 4.2: Descriptive Statistics for Categorical Variables: Households

Variable	Total Sample N=5071			Participants (1) N=1253 (24.71%)		Non-Participants (0) N=3818 (75.29%)		Difference (1 – 0)	P. Value
	Measurement	N	%	N	%	N	%		
Microfinance Participation	Yes	1,253	24.71						
	No	3,818	75.29						
Education of household head	None	755	14.89	188	15.00	567	14.85	0.15	0.962
	Primary	2,149	42.38	569	45.41	1,580	41.38	4.03	0.216
	Secondary	1,540	30.37	359	28.65	1,181	30.93	- 2.28	0.483
	Tertiary	627	12.36	137	10.94	490	12.84	- 1.90	0.559
Residence of the household	Rural	2,617	51.61	859	68.55	1,758	46.05	22.50***	0.000
	Urban	2,454	48.39	394	31.45	2,060	53.95	-22.50***	0.000
Marital status of household head	Married	3,351	66.30	903	72.07	2,448	64.37	7.70**	0.016
	Not Married	1,720	33.92	350	27.93	1,370	35.63	-7.70**	0.014
Vulnerability level of household	Vulnerable	1,985	39.19	590	47.05	1401	36.62	10.43***	0.000
	Not Vulnerable	3,080	60.81	663	52.95	2,417	63.38	-10.43***	0.000
Internet use by the household	Yes	1,035	20.41	212	16.92	823	21.56	- 4.64	0.154
	No	4,036	79.59	1,041	83.08	2,995	78.44	4.64	0.154
Financial literacy level of household head	Yes	3,638	71.74	922	73.58	2,716	71.14	2.44	0.452
	No	1,433	28.26	331	26.42	1,102	28.86	- 2.44	0.452
Gender of household head	Male	3,608	71.15	841	67.12	2,767	72.47	- 5.35*	0.050
	Female	1,463	28.85	412	32.88	1,051	27.53	5.35*	0.050

N = Number of Observations; S.D = Standard deviation in parenthesis, asterisks ***, **, * denote levels of statistical significance at 1%, 5% and 10%, respectively and; P. value is probability value associated with differences in proportions between participants and non-participants

Source: Own Computation from Study Data (2017)

Table 4.2 shows the statistics of the various categorical variables that were used to analyse aspects of household welfare in the study. The frequencies of education level of the sample revealed that, the primary level of education for the household head was highest at 42.00 percent followed by secondary level at 30.37 percent, no education level at 14.89 percent and tertiary level at 12.26 percent. For participants, the proportions of education levels were 15.00 percent, 45.41 percent, 28.65 percent and 10.94 percent for no education, primary, secondary and tertiary levels, respectively. For non-participants, distribution of the education levels was 14.85 percent for no education, 41.38 percent for primary level, 30.93 percent for secondary level and 12.84 percent for tertiary level.

Considering the residence of the household, more than half of the households in the sample resided in rural areas (51.61 percent) while the rest (48.39 percent) resided in urban areas. Among the participating households, 68.55 percent of them lived in rural areas while 31.45 percent lived in urban areas. As such, rural households participated more in microfinance than the urban households. This view is valid considering that rural households tend to suffer more financial exclusion than the urban households (Okurut *et al.*, 2014). For non-participants, 46.05 of the households resided in rural areas compared to 53.95 percent who lived in urban areas. The difference in frequency between participants and non-participants in both the rural and urban households was statistically significant at one percent level.

Of the sampled households, roughly two-thirds of household heads were married while the remaining third were unmarried. Among the participants, the proportion of the married household heads was 72.07 percent while that of the unmarried was 27.93 percent. This observation may be consistent with the view that marriage

increases the household size thus increasing the level of expenditure. Consequently, an increase in expenditure creates a greater need for consumption smoothing therefore increasing participation in microfinance. Notably, the difference in proportion of the participants and non-participants in both the married and the unmarried groups was statistically significant at five percent level

From the study sample, about 61 percent of the households were considered not vulnerable while 39 percent of the households were vulnerable. In addition, the vulnerable households participated more in microfinance than their counterparts. Among the participants, 47.05 percent of the households were vulnerable compared to 52.95 who were not vulnerable. In the case of non-participants, 36.62 of the households were vulnerable while 63.38 percent were not vulnerable. Therefore, vulnerability decreases the household's ability to deal with future shocks, exposes the household to food insecurity and may adversely affect the household's capabilities (Swain, 2010). In light of this, vulnerable households are expected to engage more in microfinance than the non-vulnerable ones since they have greater liquidity needs and they suffer more financial exclusion in financial markets.

On internet use, only 20 percent of the households used it while 80 percent did not. The difference in internet use between the participants and non-participants was not statistically significant. On financial literacy, 71.74 percent of the sampled household heads were considered financially literate against 28.26 percent who were not. This proportion implies that majority of Kenyans were thought to have the ability to make informed judgements and decisions regarding the use and management of financial services - microfinance included. However, difference in

the financial literacy between the participants and non-participants was not significant.

Concerning the variations in gender of the household head, 71.15 percent of the households were headed by males while 28.85 were female-headed. In addition, the difference in proportion between the users and non-users of microfinance in both male and female categories was statistically significant at 10 percent level. Therefore there exists gender-related differences that would affect the levels of participation. Further, the data revealed that among the female-headed households, there were more users of microfinance than non-users. This observation is associated with the view that women tend to use microfinance more than men as access to the services is more tailor-made to fit them (Ekumah & Essel, 2001).

4.3 Determinants of Household Participation in Microfinance in Kenya

The first objective of the study was to analyse the factors that determine household participation in microfinance in Kenya. To achieve this, a probit regression model was first estimated using the Maximum Likelihood Estimation procedure (MLE). The resulting output is presented in Table A1 in the Appendix. Based on this output, a number of diagnostic tests were undertaken to verify validity of the model. The results of the tests are presented in the next section.

4.3.1 Results of the Diagnostic Tests

A multicollinearity test was done using the Variance Inflation Factor (VIF). The VIF estimates the factor by which the variance of a regression coefficient of a variable is inflated compared with the scenario where there is no correlation between the variable and other explanatory variables (Verbeek, 2012). Using the VIFs,

multicollinearity is deemed to be a problem when the VIF is greater than 10. From the results presented in Table A2 in the Appendix, the model did not have a multicollinearity problem as the VIFs for all variables were less than 10. In addition, a mean VIF of 2.04 was suggestive of absence of severe multicollinearity in the model.

To check if the model was correctly specified, the link test was utilised. The link test requires that the linear predicted value of the model (\hat{y}) is statistically significant ($p < 0.10$) while square of the linear predicted value of the model (\hat{y}^2) is statistically insignificant ($p > 0.10$). This is because if the model is correctly specified, the squared predicted value should not have any explanatory power in the model. From the results in Table A3 in the Appendix, the probability values of \hat{y} and \hat{y}^2 were 0.000 and 0.118 respectively. This implies that the model was correctly specified and therefore the regressors of the model were considered sufficient to explain the changes in the dependent variable.

To ascertain goodness of fit of the model, the Hosmer-Lemeshow (H-L) test was employed. The H-L test is used to check whether the number of expected outcomes from the regression reflect the number of observed outcomes in the data. If the predictors in the model are to fit the data well, it requires that the probability value associated with the H-L test statistic be statistically insignificant. As shown in Table A4, the Hosmer-Lemeshow statistic was 5.90 with a probability value was 0.6579 thus implying that the model fitted the data well.

The Wald Chi square test was also used to confirm goodness of fit of the model. From the results in Table A1 in the Appendix, the probability value of the Wald test

statistic was 0.000. This implies that the null hypothesis of no joint significance of the explanatory variables was rejected at one percent level and therefore the model could explain the determinants of participation in microfinance.

To check for heterokedasticity, the null hypothesis of no heterokedasticity was tested using the Langrange-Multiplier test (LM test). The LM test uses an auxiliary regression where the error variance is a function of the model`s regressors and other interactive regressors likely to cause heterokedasticity. The null hypothesis of the test is that the parameters of the auxiliary regression are jointly equal to zero. From the results in Table A5 in the Appendix, the probability value associated with the LM statistic was 0.0549 implying that the joint parameter of the auxiliary regression is different from zero. Therefore the null hypothesis of no heterokedasticity was rejected at ten percent level. To address the problem, the study used the heteroskedastic probit as proposed by Harvey (1976) and generalised by Alvarez & Brehm (1995).

The heteroskedastic probit modifies the probit model by generalizing a cumulative distribution function (CDF) of a standard normal random variable to a normal CDF with a variance that is no longer fixed at one (1) but can vary as a function of the independent variables. As such this model corrects for unequal variances with binary outcomes by generating heteroskedastic-robust standard errors. To estimate the factors that determine household participation in microfinance, the hetprobit was fitted and its output is shown in Table A6 in the Appendix.

4.3.2 Results of the Determinants of Household Participation in Microfinance

Based on the output of the hetprobit model, the marginal effects of the model were computed and the results are presented in Table 4.3.

Table 4.3: Marginal Effects of Determinants of Household Participation in Microfinance

Model	Heteroskedastic Probit		
Dependent variable (dummy variable)	Dependent variable = 1 if a household participated in microfinance and 0 otherwise		
Independent Variables	Marginal effects (dy/dx)	Robust Std Errors	Probability Value
Wealth Index	- 0.0025	0.0078	0.754
Education (No education)	0.0231	0.0302	0.444
Education (Primary)	0.0256	0.0234	0.275
Education (Secondary)	0.0088	0.0206	0.671
Residence (Urban)	- 0.1400***	0.0127	0.000
Marital Status (Married)	0.0466***	0.0128	0.000
Age	- 0.0019***	0.0003	0.000
Household size	0.0436***	0.0056	0.000
Dependency level of the household	- 0.0367***	0.0074	0.000
Vulnerability level (Not Vulnerable)	- 0.0698***	0.0139	0.000
Gender of household head (Female)	0.0505***	0.0141	0.000
Financial Literacy level (Financially literate)	0.0666***	0.0169	0.000
Cost of Transport to Nearest Provider	- 0.0097	0.0009	0.911
Internet Use (Yes)	- 0.0265	0.0184	0.151

Note: Number of Observations = 5048; Wald Chi square (14) = 37.37; Prob > chi2 = 0.0006; Tertiary education is the reference level; Asterisk *** denotes level of statistical significance at 1% level; dy/dx is for discrete change of dummy variable from 0 to 1

Source: Own Computation from Study Data (2017)

From the results in Table 4.3, residence of the household, marital status of the household head, age of household head, household size, dependency level of the household head, vulnerability level of the household, financial literacy level of the household head and gender of the household head had coefficients that were statistically significant indicating that they influenced participation in microfinance.

However, the variables of wealth index of household, education level of household head, cost of transport to nearest provider and internet use by household, had statistically insignificant coefficients. This indicates that across the sampled households, the variables do not explain the difference in participation in microfinance.

On urban residence, the coefficient was negative and statistically significant at one percent level. On average, the probability of participation in microfinance for urban households was 14 percent lower than that of the rural households. This finding may be explained by the view that urban households have greater access to many financial services compared to their rural counterparts (Amine, 2016). Therefore urban residents may opt for other non-microfinance alternatives such as commercial banks. Also, urban residents on average earned Kshs 10,765 more than the rural residents (CBK, KNBS & FSD Kenya, 2016). Therefore, their need for borrowing to augment their liquidity needs may have been lower than that of the households living in rural areas.

With regard to marital status of the household head, the coefficient of the married household head was positive and statistically significant at one percent level. Other factors constant, the probability of participation of a household whose head was married was 4.66 percent higher than a household whose head was not married. This finding may suggest that married couples have greater liquidity needs due increased financial needs of more persons in the household. This study contradicts that of Amine (2016) in Eritrea who found out that married individuals had a lower probability of participation in microfinance when compared to the unmarried

For age, the coefficient was negative and statistically significant at one percent level. Other things being equal, an increase in age of the household head by one year reduced the probability of participation by 0.19 percent. An increase in age may be associated with greater accumulation of wealth and higher incomes. If these additional resources are used to ease the household's liquidity constraints, it may minimise probability of participation in microfinance.

The coefficient of household size was positive and statistically significant at one percent level. An increase in the household size by one person, increased the probability of participation by 4.36 percent. This result supports the findings of Nguyen (2007) in Vietnam & Shah *et al.* (2008) in Pakistan who showed that an increase in household size increased household participation in microfinance. Agreeably, bigger households tend to face greater liquidity constraints therefore precipitating greater participation.

On the dependency level of the household, the coefficient was negative and statistically significant at one percent level. An increase in the dependency level of the household reduced the probability of participation by 3.67 percent. As such, this result was unexpected since a higher burden of dependence should enable more participation in microfinance (Shah *et al.*, 2008).

The coefficient of the vulnerability level of the household was negative and statistically significant at one percent level. On average, the probability of participation in microfinance by households that were not considered vulnerable was 6.98 percent lower than that of vulnerable households. This implies that vulnerability can increase participation in microfinance. This is because vulnerable

households are associated with higher poverty levels, risks, shocks and liquidity constraints therefore they would participate more in microfinance to minimise these constraints (Swain & Floro, 2012). This finding is consistent with Swain (2010) whose study in India found that vulnerability of a household increased participation in microfinance.

The coefficient of gender of the household head was positive and statistically significant at one percent level. Therefore, the probability of participation by female headed households was 5.05 percent higher than that of male headed households. This finding may be explained by the view that women are generally more constrained and restricted than men in terms of their access to financial services as well as control over household resources and capital (Fletschner, 2009; Wawire, 2010). Such exclusions increase their propensity to participate in microfinance due to the need to smoothen consumption or expand their enterprises. Moreover, many microfinance products are tailor-made for women to address issues of gender inequalities and high poverty levels among them (Mayoux, 2001). This finding is different from that of Swain (2010) whose study in India found no evidence of gender affecting the participation in microfinance.

On financial literacy, the results showed that households whose heads were considered to be financially literate were more likely to participate than those who were financially illiterate. The probability of participation for households whose heads were financially literate was 6.66 percent higher than households whose heads were financially illiterate. Financial literacy increases an individual's knowledge on financial markets, incentives and practises thereby improving financial decision making ability that promotes prudent borrowing, budgeting and credit use (Miller *et*

al., 2009). Chibba (2009) also identified financial literacy as key pillar in helping households make informed judgements about the borrowing and spending of microfinance. The findings of this study therefore shows that these premises hold in the sampled households.

4.4: Effect of Household Participation in Microfinance on Household Welfare in Kenya.

The second objective of the study sought to determine the effect of household participation in microfinance on household welfare in Kenya. To achieve this, the Endogenous Switching Regression (ESR) model was estimated using the Full Maximum Likelihood Procedure (FIML). In the study, relevant data from the FINACCESS dataset 2016 was used. The study used per capita expenditure as main measure of household welfare (Nghiem *et al.*, 2007; Duong & Thanh, 2015). The ESR regression results are presented in the Table 4.4.

Table 4.4: ESR Results for the Effects of Participation in Microfinance on Per Capita Expenditure

Model	Selection (Probit) equation		MFI participation equation		MFI non-participation equation	
Dependent variable	Microfinance participation		Log of Per capita expenditure		Log of Per capita expenditure	
Independent Variables	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Wealth Index	- 0.1528***	0.000	0.1124***	0.000	0.1991***	0.000
Education (No education)	0.1150	0.143	- 0.1201	0.178	- 0.1587	0.114
Education (Primary)	0.2981***	0.000	- 0.3468***	0.000	- 0.3406***	0.000
Education (Secondary)	0.1893***	0.001	- 0.2397***	0.001	- 0.2359***	0.000
Residence (Urban)	- 0.3604***	0.000	- 0.2120***	0.000	0.2172***	0.000
Marital Status (Married)	- 0.0024	0.952	0.1416***	0.001	0.0925***	0.000
Age	- 0.0692***	0.000	-0.0336***	0.000	0.0381***	0.000
Age squared	0.0008***	0.000	0.0004***	0.000	- 0.0004***	0.000
Household size	0.2389***	0.000	- 0.0968***	0.000	- 0.2360***	0.000
Dependency level of household	- 0.1091***	0.000	0.0097	0.819	- 0.0637**	0.022
Vulnerability level (Not Vulnerable)	- 0.1130***	0.002	- 0.0183	0.378	0.0772***	0.000
Gender (Female)	0.1123***	0.002	0.0111	0.794	0.0480*	0.077
Constant	- 0.1525	0.252	11.5974***	0.000	10.8022***	0.000
Financial Literacy level (literate)	0.0642**	0.019				
Cost of transport to nearest provider	0.0005	0.672				
Internet Use (Yes)	- 0.039	0.212				
Sigma_1 0.8206 (0.0501) Rho_1 0.7795 (0.0558) Sigma_2 0.8278 (0.0119) Rho_2 - 0.9921 (0.0030) Wald chi2(12) = 277.16; Prob > chi2 = 0.0000 LR test of indep. eqns. : chi2(1) = 273.25 Prob > chi2 = 0.0000						

Note: Number of observations = 5048; Tertiary education is the reference level; Asterisks ***, **, * denote level of statistical significance at 1%, 5% and 10% levels, respectively.

Source: Own Computation from Study Data (2017)

Table 4.4 shows the results of the three jointly estimated equations of the ESR model namely; selection equation, participation equation and non-participation equation. The selection equation estimated the factors that affect a household's choice to participate in a microfinance using a probit model. The output of the probit model was used to generate selection bias terms that were added back as additional regressors in the participation and non-participation equations to correct for endogeneity biases. To account for the effects of household participation on household welfare, the participation equation and non-participation equations were used to calculate establishing the average treatment effect on the treated (ATET). Before ATET was done, the model was subjected to some post-estimation diagnostic tests.

4.4.1 Results of the Diagnostic and Model Property Tests.

The Wald Chi square test was test to check for the null hypothesis of no difference between the participation and non-participation equations when the model was estimated jointly. From the results in Table 4.4, the Wald Chi Square coefficient was significant since its probability value was 0.000. This test confirmed that participant and non-participant equations were statistically different therefore including both of them in the model was appropriate.

To test for joint independence of the equations in the model, the log likelihood ratio (LR) test was used. The LR tests the null hypothesis that the set of coefficients in the joint model are simultaneously equal to zero. From the results in Table 4.4, the probability value of the LR was 0.00 implying that the null hypothesis of no joint independence of the model in equations was rejected. Therefore the equations in the

model are independent thus justifying the need for separation of the outcome equations.

To test for the presence of endogeneity in the model, the significance of the correlation coefficient terms namely, correlation coefficient between the error term of the selection equation and participation equation (Rho_1) and correlation coefficient between error term of the selection equation and non-participation equation (Rho_2) were considered. From Table 4.4, the coefficients' associated probabilities of 0.0558 for Rho_1 and 0.0030 for Rho_2 imply that they were non-zero and statistically significant at ten percent and one percent levels, respectively. The statistical significance of this correlation coefficient denotes presence of endogeneity biases in the model. For instance, for Rho_1 , some factors that would increase participation in microfinance would also increase household welfare.

The non-correction of these endogeneity biases would upwardly or downwardly result in biased and inconsistent estimates. To address this problem, the ESR model is preferred since it generates the self-selection terms from the selection (probit) model and adds them back to the welfare equations (as additional regressors) to correct for the biases. To address potential heteroscedasticity in the model, the FIML method that simultaneously fits the selection and outcome equations, yields consistent standard errors that are homoscedastic (Maddala, 1983). Overall the diagnostic tests point to a model that is valid and therefore suitable for interpretation.

4.4.2 Results of the Effects of Household Participation in Microfinance on Household Welfare.

To obtain the effects of household participation in microfinance on household welfare, the study used the estimates of the participation and non-participation equations in Table 4.4 to calculate average treatment effect (ATET) due to participation. Following the simulation described in equation 3.12, the ATET measures the difference between expectations of household welfare conditional on participation for participants and expectations of household welfare conditional on non-participation for participants. The results of ATET are shown in the table that follows.

Table 4.5: Treatments Effects of Household Participation in Microfinance on Per Capita Expenditure

$E(W_{i1}/D_i = 1)$		$E(W_{i2}/D_i = 1)$		$E(W_{i1}/D_i = 1) - E(W_{i2}/D_i = 1)$
Mean	Standard Deviation	Mean	Standard Deviation	ATET
78,489.66	37,831.40	49,776.22	11,259.89	28,713.44

Source: Own Computation from Study Data (2017)

Table 4.5 shows that the value for ATET was Kshs 28,713. Therefore, on average, the per capita expenditure for a household increased by Kshs 28,713 when it participated in microfinance. This result is consistent with the studies of Pitt & Khandker (1998) in Bangladesh, Imai & Azam (2012) in Bangladesh, Nghiem *et al.* (2007) in Vietnam and Duong & Thanh (2015) in Vietnam who established that participation in microfinance increased household expenditure. The study however contradicts that of Diagne & Zeller (2001) who found out that microcredit did not have significant impacts on the household welfare in Malawi.

Microfinance may affect household welfare through two ways namely: consumption smoothing and enhancing capacity of households for income generation. Through consumption smoothing, households are able to mitigate against transitory income shocks by borrowing from a microfinance institution so as to augment their liquidity constraints (Zeller, 1999; Arun *et al.*, 2009; Duong and Thanh, 2015). As such, households are able to cope better in cases of shocks such as downturns in food harvests, reduced agricultural produce for sale, illness, death of household income-earners and natural disasters.

In enhancing capacity for income generation, households that have access and use microfinance may borrow to enhance their investments. Enhancement of investments may include starting or expanding their entrepreneurial activities, purchasing and building a stock of productive assets such as machines to increase production, investing in new technology and increasing human capital (Zeller, 1999; Arun *et al.*, 2009). These activities may in turn increase their income thereby availing additional income for expenditure.

To assess the stability of the effect of participation in microfinance on per capita expenditure, the study used per capita income as an alternative measure of household welfare. Per capita income was considered suitable in addressing household heterogeneities in consumption needs and also economies of scale in consumption which may distort the true value of per capita expenditure (Haughton & Khandker, 2009). To estimate the alternative model, a FIML estimation similar to that of per capita expenditure model was used. The full results of the regression are presented in Table A7 in the Appendix. From these results, the ATET for per capita income was derived as presented in the next table.

Table 4.6: Treatments Effects of Household Participation in Microfinance on Per Capita Income

$E(W_{i1}/D_i = 1)$		$E(W_{i2}/D_i = 1)$		$E(W_{i1}/D_i = 1) - E(W_{i2}/D_i = 1)$
Mean	Standard Deviation	Mean	Standard Deviation	ATET
40,466.95	29,063.94	16,092.79	9,874.68	24,374.16

Source: Own Computations from Study Data (2017)

Table 4.6 reveals that the ATET for per capita income was Kshs 24,374. This implies that on average, the per capita income for a household increased by 24,374 when it participated in microfinance. This result is consistent with the studies of Kiiru (2007) and Silva (2012) who found that participation in microfinance increased household income in Kenya and Sri Lanka, respectively. The per capita income model therefore, yields a near similar ATET results to that of the per capita expenditure thus indicating stability of the model.

To address distributional effects of household participation in microfinance on per capita income and per capita expenditure, the effects on gender and wealth quintile were estimated. These categories were considered important because microfinance is often motivated as a tool for supporting the poorest households as well as women (Zeller, 1999). To obtain the effects of participation in microfinance on household welfare across gender, the results of the ESR model in Table 4.4 were used to obtain the ATET for both male headed and female-headed households. The difference in ATET between the male headed households and female headed households was then tested using the t-test. The results of the differences in ATET are shown in the Table 4.7.

Table 4.7: Distributional Effects of ATET of Microfinance by Gender

Gender	Male (0)	Female (1)	Difference (1-0)	t-test
ATET by Per Capita Expenditure	27,020.19	32,182.54	5,162.35****	3.1073
ATET by Per capita Income	22,113.48	29,005.79	6,892.31***	5.8681

Source: Own Computation from Study Data (2017)

Table 4.7 shows that ATET for both per capita expenditure and per capita income was significantly higher for female headed households than for male-headed households. As a result of participation in microfinance, the per capita expenditure and per capita income were on average, higher among female-headed households than male-headed households by Kshs 5,162 and Kshs 6,892, respectively. This implies, that, on average, women derived higher welfare by participating in microfinance than their male counterparts. The finding is consistent with those of Pitt & Khandker (1998) and Khandker (2005) who found that the impact of group-based credit programmes on household expenditure in Bangladesh was higher for women than for men. This finding suggests that credit is not perfectly fungible within the household as it can yield different household welfare changes across gender.

The finding that microfinance yields higher welfare among women than men may be explained by the view that household improvements on education of children, nutritional uptake, child health, housing conditions and agricultural productivity are associated with women's control of funds (Blumberg, 1989, Khandker, 2005; Corsi *et al.*, 2006). Therefore women headed households are likely to spend more resources on these items thus raising per capita expenditure.

The study further assessed the effects of participation in microfinance of welfare given different wealth quintiles. The results of ESR were used to obtain the ATETs for each of the five wealth quintiles. The differences in ATETs between the groups were tested using Analysis of Variance (ANOVA) as shown in the next table.

Table 4.8: Distributional Effects of ATET of Microfinance by Wealth Quintile

Wealth Quintile	ATET (Per capita Expenditure)	P Values (ANOVA)	ATET (Per capita Income)	P Values (ANOVA)
Poorest	23,049.43	0.000	13,356.36	0.000
Second Poorest	21,397.69	0.000	16,955.83	0.000
Middle	23,311.50	0.000	20,132.90	0.000
Second Wealthiest	30,813.91	0.000	27,367.26	0.000
Wealthiest	40,962.04	0.000	39,788.71	0.000

Source: Own Computation from Study Data (2017)

Table 4.8 shows that both the ATET for per capita expenditure and per capita income generally increased steadily with the level of wealth quintile. This implies that, on average, the wealthier the household, the greater the effect of microfinance on its income or expenditure. This result supports studies of Coleman (2006) in Thailand and Silva (2012) in Sri Lanka who found that participation in microfinance derived greater effects on the richer households than the poorer households. Therefore, this finding implies that households at higher wealth quintiles have more productive assets hence can use these assets to raise more income when borrowing from microfinance (Nghiem *et al.*, 2007). However, this finding is inconsistent with those of Khandker (2005) in Bangladesh and Lensink & Pham (2012) in Vietnam who found that household participation in microfinance resulted in the higher increases in income at lower quintiles than at higher quintiles.

Overall, this finding suggests that participation in microfinance does not necessarily have the greatest effect on poorest households. When poorest households access microfinance credit without augmenting it with other drivers of income, greater

effects may not be anticipated as poorest households face other risks and vulnerabilities that may diminish the effect of participation in microfinance on their incomes and expenditure.

Besides participation in microfinance, other important variables that had an effect on per capita expenditure included wealth index, primary and secondary education, marital status, age, household size, residence and vulnerability level of the household. On wealth index, the coefficients for both participants and non-participants were positive and significant at one percent level. An increase in the wealth index by one unit, increased per capita consumption of participants and non-participants by about 11.24 and 19.91 percent respectively. This finding is supported by the view that wealthier households have more productive assets to augment their income generating capabilities. These households also have a greater stock of wealth to combat transitory shocks hence maintain their desired level of welfare (Coleman, 2006; Nghiem *et al.*, 2007).

On education level of the household head, the coefficients of no education, primary and secondary education were negative and significant at one percent level for both the participants and non-participants. Compared to the households whose head had tertiary education, the per capita expenditure level was about 34 percent and 24 percent lower for households whose highest level was primary and secondary education, respectively. This implies that, on average, the welfare level was higher for households headed by individuals whose highest level was tertiary education than households whose highest level was either primary or secondary education. The finding asserts the view that higher education levels are associated with higher incomes and economic benefits as individuals with more education are compensated

for their skills and competencies. Higher levels of education may also enhance productivity, stabilise income and increase entrepreneurial ability through the skills earned. This finding is consistent with Kiiru (2007) whose study in Kenya, established that the educational level of the household head had a positive and vital effect on household income.

The coefficient of urban residence was negative and significant for participants and but positive and significant for non-participants, both at one percent level. For participants, the per capita expenditure was about 21 percent lower for urban residents than for rural residents. In the case of non-participants, the per capita expenditure was 21 percent higher for urban residents than for rural residents. This finding suggests that there are significant differences between urban and rural households. Moreover, it may imply that use of microfinance by rural households yielded greater welfare when compared to the non-users in the rural households.

The coefficient of marital status was positive and significant at one percent level in both groups. This means that on average, households headed by individuals who were married had higher per capita expenditure than the ones who were not married by about 14 percent and nine percent for the participants and non-participants, respectively. This finding may be due to the fact that households whose heads are married may generate greater income as both spouses may be working or may increase labour for their family production activities thereby generating more income.

The coefficients of age and age squared were significant at one percent level. For age, the study established that an increase in age by a year, decreased per capita

expenditure for participants by 3.36 percent but increased that of non-participants by 3.82 percent. This finding asserts the view that participants of microfinance diminish in their welfare as they age while the non-participants increase their welfare over time. This finding many show that non-participants may have a greater accumulation of wealth and investment than their counterparts. This finding is consistent with Kiiru (2007) who found that an increase in age was associated with higher returns, thus resulting in higher household consumption.

For age squared, the coefficients were positive and negative for participants and non-participants, respectively. This implies that beyond a certain point, the welfare of participants starts to increase while that of non-participants starts to decline. A rising trend may be linked with accumulation of incomes over time while declining welfare may be associated with diminishing incomes due to retirement, increased financial needs by the household or changing health conditions of household members.

The coefficient of household size was negative and significant at one percent for both participants and non-participants. An increase of the household size by one member, reduced the per capita expenditure of participants and non-participants by about nine percent and 23 percent respectively. This implies that an increase in household size diminishes the resources available for consumption. These results are consistent with those of Orbeta (2005) who contended that bigger household sizes in Philippines had lower household income.

Considering the dependency level of the household, the coefficient was negative and significant at five percent level for non-participant households only. An increase in

the number of school going children by one reduced the per capita expenditure by 6.37 percent for non-participants. This implies that a household faced with higher dependency levels will have lower levels of per capita expenditure. This view supports that of Orbeta (2005) whose study in the Philippines found that a large proportion of expenditure in the household allocated was to school going children in form of food, fees and nutrition therefore reducing the overall per capita expenditure in the household.

On vulnerability level, the coefficient was positive and significant for non-participants only. Compared to the vulnerable households, the level of per capita expenditure was 7.72 percent higher for non-vulnerable households. As vulnerability reveals a household's ability to cope with shocks, it was expected that vulnerability reduces a household's ability to generate income to surmount these shocks (Swain, 2010).

On gender of the household head, the coefficient was negative and statistically significant for non-participants only. Therefore, on average, female-headed households had 4.8 percent lower per capita consumption than the male headed households. This difference may be definitive of female headed households having disadvantages of generating more income and spending more resources on the family. These disadvantages include less rights to ownership of productive assets such as land and inheritance, lower wage incomes and less power in decision making. In addition, there are attitudes and biases against women who engage in productive activities (Wawire, 2010).

4.5 Descriptive Statistics for Data on MSE Performance.

Based on the FinAccess dataset (2016), data from the business module was extracted to allow for analysis. The descriptive statistics of the variables that were used to analyse the determinants of MSE participation in microfinance as well as the effect of MSE participation in microfinance on MSE performance are described in Tables 4.9 and 4.10.

Table 4.9: Descriptive Statistics for Count and Continuous Variables: MSEs

Variable	Range		Total Sample N=1827	Participants (1) N=473 (25.88%)	Non-participants (0) N=1354 (74.12%)	Difference (1 – 0)
Variable	Min	Max	Mean (S.D)	Mean (S.D)	Mean (S.D)	
Annual firm income (Kshs)	20,400	792,000	138,495 (137,669)	170,466 (170,134)	127,326 (121,491)	43,140***
Number of business units in firm	1	11	1.09 (0.452)	1.142 (0.620)	1.074 (0.383)	0.759**
Age of firm owner (years)	16	89	37.09 (14.27)	40.14 (12.75)	36.03 (14.62)	4.11***
Age of firm (years)	1	56	7.010 (8.015)	7.746 (8.005)	6.753 (8.006)	0.993**
Number of employees	1	21	1.576 (1.639)	1.909 (2.323)	1.460 (1.300)	0.449***

N=Number of Observations; S.D = Standard deviation in parenthesis; Asterisks ***, **, * denote levels of statistical significance at 1%, 5% and 10%, respectively

Source: Own Computation from Study Data (2017)

From Table 4.9, the total sample for analysis was 1,827 micro and small enterprises (firms). Of the sample firms, 25.88 percent of the firms participated in microfinance while 74.12 percent did not participate. The annual firm income ranged between Kshs 20,400 and 792,000 with the annual income averaging Kshs 138,495. The standard deviation for the annual firm income was Kshs 137, 669 implying that there was moderate variability of the gross income across firms. Among the participants, the average income was 170,866 while that of non-participants was Kshs 127,326. Therefore, on average, participating firms earned Kshs 43,140 more than the non-

participating firms. This significant difference may be associated with the view that firms can increase their profits through more accessible and affordable credit for expansion (Copestake *et al.*, 2001; Tedeschi, 2008).

In terms of the number of business units in the firm, the firm owners reported an average of one business unit per firm with the maximum number of business units being 11. The difference in number of business units between the participants and non-participants was significant at five percent level implying that participants had more business units than non-participants. This difference may allude to participants having more access to capital for purposes of establishing or expanding into different business units within the enterprise.

The age of the firm owner ranged between 16 and 89 years with the average age of the sample being 37 years. Of importance, is that the mean age for participants was higher than that of non-participants by about four years. This implies that firm owners who participate in microfinance are relatively older than those who do not participate. Apart from the age of the firm owner, the age of the firm was also considered. The average age of the firm was seven years with participant firms being marginally older than the non-participant firms. Based on the theory of learning by doing, the age of the firm and firm owner may generate experience in improving firm productivity, accumulating resources and efficiency in financial management thus allowing them to participate more in microfinance (Garnsey, 1998).

The average number of employees for the total sample was 1.56. This means that on average, a typical firm did not employ more than two persons thus most of the firms fitted the description of a micro enterprise. In addition, there were few small

enterprises – businesses whose number of employees was between 10 and 49. Notably, the number of employees for participating firms was higher than that of non-participants. The number of employees represents the scale of business such that, the more the employees, the bigger the firm. Therefore, this difference between participating and non-participants firms may imply that larger firms borrow more from microfinance than smaller firms. To characterise categorical variables used in the model, the summary statistics of the relevant variables are presented in Table 4.10.

Table 4.10: Descriptive Statistics for Categorical Variables: MSEs

Variable	Total Sample N=1827			Participants (1) N=473 (25.88%)		Non- participants (0) N=1354 (74.12%)		Difference (1 – 0)
	Measurement	N	%	N	%	N	%	
Microfinance Participation	Yes	471	25.88					
	No	1354	74.12					
Education level of firm owner	None	181	9.91	11	2.33	170	12.56	10.23**
	Primary	841	46.03	190	40.16	651	48.07	-7.91
	Secondary	593	32.46	199	42.08	394	29.10	12.98**
	Tertiary	212	11.60	73	15.43	139	10.27	5.16
Gender of business owner	Male	1,409	77.12	376	79.49	1,033	76.29	3.20
	Female	418	22.88	97	20.51	321	23.71	3.20
Financial literacy level of owner	Yes	1,383	75.70	957	90.06	426	70.68	19.38***
	No	444	24.30	397	9.94	47	29.32	-19.38***
Numeracy level of owner	Yes	1,276	69.84	899	79.70	455	66.40	13.30**
	No	551	30.16	377	20.30	96	33.60	-13.30**
Ownership of radio by owner	Yes	1,132	61.96	339	71.67	793	58.57	13.1**
	No	695	38.04	134	28.33	561	41.43	-13.1**
Location type of the business	Fixed	1,267	69.35	355	75.05	912	67.36	7.69
	Not Fixed	560	30.65	118	24.95	442	32.64	7.69
Business Permit	Yes	426	23.32	170	35.94	256	18.91	17.03***
	No	1,401	76.68	303	64.06	1098	81.09	-17.03***
Formal Registration	Yes	189	10.34	68	14.38	121	8.93	5.45
	No	1,638	89.66	405	85.62	1233	91.07	5.45
Motorbike	Yes	261	14.29	78	16.50	183	13.52	2.98
	No	1,566	85.71	395	83.50	1171	86.48	2.98
Bicycle	Yes	389	21.29	121	25.58	268	19.80	5.78
	No	1,438	78.71	352	74.42	1086	80.20	-5.78
Credit policy (Outward)	Yes	1,295	70.88	349	73.78	946	69.87	3.91
	No	532	29.12	124	26.22	408	30.13	-3.91
Credit policy (Inward)	Yes	712	38.97	208	43.97	504	37.22	6.75
	No	1,115	61.03	245	56.03	850	66.78	-6.75
Bank finance participation	Yes	114	6.26	56	12.35	58	4.15	8.20
	No	1,707	93.74	412	87.65	595	95.85	8.20

Note: N = Number of Observations; Asterisks ***, **, * denote levels of statistical significance at 1%, 5% and 10%, respectively

Source: Own Computation from Study Data (2017)

Table 4.10 shows that only a quarter of the firms used the microfinance services under consideration. This implies that microfinance credit use is still low among firms. While this level of participation in microfinance is low at 25.88 percent, this value is still higher when compared to commercial bank finance whose level of use was 6.26 percent. Therefore, more firms were thought to use microfinance services

than the formal banking services for their financial needs. This is expected in light of most MSEs being thought to suffer financial exclusion from banks.

Regarding education, most firm owners had primary education as their highest level at 46.03 percent. This was followed by secondary level at 32.46 percent, tertiary level at 11.60 percent and no education at 9.91 percent. In terms of education levels between the participants and non-participants, the differences in proportion, were significant for the no education and secondary levels only.

On gender, 77.12 percent of the firms were male-owned while 22.88 percent were female-owned. This proportion is a pointer to potential disparities between male-owned and female-owned enterprises, where women face greater challenges in establishing enterprises (Kevane & Wydick, 2001). However, the gender differences between the participants and non-participants were statistically insignificant.

The overall financial literacy and numeracy levels of the firm owners were 75.70 and 69.84 percent respectively. This means that most firm owners had good knowledge of financial and numeracy skills necessary for business and financial decision making. The differences in the proportions of these variables between the participants and non-participants were statistically significant. For financial literacy, the proportion of financially literate owners who participated was 19.38 percent higher than that of non-participants. On the numeracy level, the proportion of numerate owners who participated was 13.30 percent higher than that of non-participants.

From the sample, 61.96 percent of the firm owners reported to own a radio. A statistically significant difference was observed where 71.67 percent of the

participants owned a radio compared to 58.57 percent of the non-participants. This gap is critical in light of the radio's role in disseminating business information, creating business networks and advertising products. Other than radio, possession of a motorbike and bicycle by the firm or firm owner were considered. Across the sample, those who reported to own a motorbike and a bicycle were 14.29 and 21.29 percent, respectively. However, the differences in proportions between the two groups was not statistically significant.

The location type of the firm indicated that 69.35 percent of the firms had fixed locations while 30.65 percent of the firms did not have fixed locations. Among the participants, 75.05 percent of the firms reported to be housed in a fixed location while 24.95 percent were in a non-fixed location. For non-participants, 67.36 percent of the firms reported to be a fixed location while 32.64 while the rest reported to operate from a flexible location. The differences in proportions between the two groups were however not significant.

On whether firms were running their business under some trade licence or permit, 23.32 percent of them reported to possess a license while 76.68 did not have any licence. The study further observed that the difference in the proportion of participants and non-participants for the licence holders was statistically significant. This difference may ascribe to why participants had higher incomes than non-participants since business licences can unlock certain opportunities of trading in high traffic areas, accessing more credit opportunities and engaging in formal business contracts.

On registration, only 10.34 percent of the firms had some form of business registration. This means that majority of businesses under survey were informal in nature. Such a proportion is worrying as the undocumented nature of these businesses curtails their opportunities for access to credit and formal business contracts. It may also further affect the overall macroeconomic planning, taxation and provision of incentives by government.

On credit policy, 70.88 percent of the firms reported to have issued credit to their customers compared to 38.97 percent of the firms who reported to have received credit from their suppliers. These proportions point to a huge gap between the credit issued and credit received. As credit is critical in the management of the firm`s working capital and hence the overall liquidity of the firm, its level, may affect the firm`s income. In the sample, though, the difference in credit policy (both inward and outward) was statistically insignificant. Overall, the variables were considered suitable to allow for analysis.

4.6 Determinants of MSE Participation in Microfinance in Kenya.

The third objective of the study sought to establish the determinants of participation in microfinance by MSEs in Kenya. To achieve this objective, a probit regression model was estimated using the maximum likelihood estimation procedure (MLE). The output of the regression is presented in Table A8 in the Appendix. Based on this output, a number of post-estimation diagnostic tests were undertaken to check for validity of the model.

4.6.1 Results of Diagnostic Tests

A multicollinearity test was done using the Variance Inflation Factor (VIF). As shown in Table A9 in the Appendix, the model did not suffer the multicollinearity problem as all the VIFs for all variables were less than 10. To check for model misspecification, the link test was utilized. From Table A10 in the Appendix, the linear predicted value of the model (*hat*) was statistically significant while the square of the linear predicted value of the model (*hatsq*) was statistically insignificant. This result implies that the model was correctly specified and the predictors of the model were considered sufficient to explain the dependent variable.

To prob for goodness of fit, the Hosmer-Lemeshow test was utilised. As shown in Table A11 in the Appendix, the Hosmer-Lemeshow Chi Square was 5.17 with a probability value of 0.7398. Since the P-value was statistically insignificant, the null hypothesis of goodness of fit was not rejected. Therefore the proposed model fitted the data well.

To check for heterokedasticity, the null hypothesis of no heterokedasticity was tested using the Langrage-Multiplier test (LM test). The null hypothesis of the test is that the parameters of the auxiliary regression are jointly equal to zero. From the results in Table A12 in the Appendix, the probability value of the LM statistic was 0.1201 implying that null hypothesis of no heterokedasticity could not be rejected. Overall, the diagnostic tests affirm that the model is suitable for discussion.

4.6.2 Results of Determinants of MSE Participation in Microfinance

To estimate the factors that determine MSE participation in microfinance, the marginal effects of the model were obtained from the output of the probit model in

Table A8 in the Appendix. The results of the marginal effects are presented in Table 4.11.

Table 4.11: Marginal Effects of Determinants of MSE Participation in Microfinance

Model	Probit		
Dependent variable	Dependent variable = 1 if an MSE participated in microfinance and 0 otherwise		
Independent Variables	Marginal effects (dy/dx)	Robust standard errors	P Value
Number of business units in a firm	0.0389**	0.0197	0.049
Age	0.0269***	0.0038	0.000
Age squared	- 0.0002***	0.0004	0.000
Education (No Education)	- 0.1373***	0.0373	0.000
Education (Primary)	- 0.0077	0.0337	0.818
Education (Secondary)	0.0346	0.0338	0.306
Gender of firm owner (male)	0.0273	0.0232	0.240
Financially literacy level (Literate)	0.1237***	0.0236	0.000
Numeracy level (Numerate)	0.0436*	0.0230	0.059
Ownership of radio (Yes)	0.0470**	0.0211	0.026
Age of firm	0.0027**	0.0012	0.033
Number of employees	0.0116*	0.0060	0.056
Location type of firm (Fixed)	0.0267	0.0226	0.238
Permit (Yes)	0.0923***	0.0303	0.002
Registration of firm (Yes)	- 0.0083	0.0354	0.816
Ownership of motorcycle (Yes)	- 0.0067	0.0278	0.810
Ownership of bicycle (Yes)	0.0270	0.0253	0.285
Credit Policy – Inward (Yes)	0.0232	0.0234	0.321
Credit Policy – Outward (Yes)	0.0208	0.0223	0.352
Bank finance participation (Yes)	0.1859***	0.0502	0.000

Note: Tertiary education is the reference level; the asterisks ***, **, * denote level of statistical significance at 1%, 5% and 10%.

Source: Own Computation from Study Data (2017)

Table 4.11 shows the marginal effects of the determinants of MSE participation in microfinance in Kenya. On basis of the significance of the coefficients of the model, it can be deduced that the determinants of MSE participation in microfinance include, number of business units, age, tertiary education level, financial literacy level, numeracy level, ownership of radio, possession of business permit, age of firm, number of employees and bank finance participation. The factors that are not important include, primary and secondary education levels, gender of firm owner,

location type of the firm, registration status of firm, ownership of motorcycle, ownership of bicycle and credit policy.

On the number of business units owned by a firm, the marginal effects revealed that an increase in the number of business units of a firm by one unit, increased the probability of participation in microfinance by 3.89 percent. Such a finding may imply that more business units increase the liquidity needs of the business hence the need to rely on microfinance to augment them. More business units may signify a higher scale of operation and complexity especially among small business owners who often prefer to expand horizontally. Therefore, a higher scale of operation may require more resources thus the need to participate in microfinance more. Another variable that may measure scale of operation is number of employees of the firm. From the study, the coefficient of number of employees was positive and statistically significant at ten percent level. An increase in the number of employees by one person, increased the probability of participation by 1.16 percent. This implies that scale of operation can result in higher participation in microfinance (Shah *et al.*, 2008).

In the case of age of firm owner, the marginal effects were positive and statistically significant at one percent level. An increase in age by one year, increased the probability of participation by 2.69 percent. However, when age squared was introduced in the model, the relationship became negative. This implied that beyond a certain age, the probability of participation started to decline. This means that there exists a threshold age beyond which firm owners decrease their participation in microfinance perhaps due to accumulated incomes over time which reduce their need for participation.

On education of the firm owner, the coefficient of no education was negative and statistically significant. This showed that, on average, the probability of participation of firms whose owners had no education was 13 percent lower than those firms whose owners had tertiary education. Firm owners with higher education levels are more likely to utilise microfinance services than those with no education. A tertiary education level may equip firm owners with a better understanding of microfinance products and hence increase their probability of participation in microfinance.

Considering the financial literacy and numeracy levels of the firm owner, the coefficient of these variables were positive and statistically significant at standard levels. On average, the probability of participation for financially literate owners was 12.37 percent higher than that of the financially illiterate owners. On the other hand, the probability of participation for numerate owners was 4.36 percent higher than that of the owners who did not have the numeracy skills. Higher financial and numeracy levels may increase the firm owner`s knowledge on financial markets and products thereby improving financial decision making ability including participation in microfinance (Miller *et. al.*, 2009).

The coefficient of ownership of radio was positive and significant at five percent level. On average, the probability of participation in microfinance for firm owners who had an operational radio was 4.70 percent higher than those who did not own one. Radio provides a platform for communicating information on financial education, business information on different financial markets, networking and products therefore increasing the firm`s knowledge to participate in microfinance.

With regard to age of the firm, its coefficient was positive and statistically significant at five percent level. An increase in age by one year, increased the probability of MSE participation by 0.27 percent. A higher age of the business denotes business experience and understanding of credit market dynamics. It may denote enterprise stability which may increase demand for microfinance services.

Considering possession of a business permit, the coefficient was positive and statistically significant at one percent level. On average, the probability of participation for firms with a permit was 9.23 percent higher than that of firms without permits. Generally possession of licences and permits unlocks access to more credit and business opportunities. Therefore a focus on potential hindrances on acquisition of business permits for any economy is critical in promoting growth of businesses. Potentially such constraint include - long pre-registration and post-registration procedures, inter-county licencing procedures, and high cost of permits (World Bank, 2016).

The coefficient of bank finance participation was positive and statistically significant at one percent level. On average, the probability of participation in microfinance for MSEs which engaged in bank finance was 18.59 percent higher than those MSEs which did not. This finding points to a potential complementary relationship between microfinance and bank finance.

4.7 Effect of MSE Participation in Microfinance on MSE Performance

The fourth objective of the study was to assess the effect of MSE participation in microfinance on MSE performance in Kenya. To estimate this, the study employed the propensity score matching (PSM) method by Rosebaum and Rubin (1983). The

first step to using PSM was to estimate a binary probit model based on the MSE's probability of participating in a microfinance. Given that the probit model was already fitted in section 4.6, its results were used to generate propensity scores for purposes of matching. The propensity scores were calculated using MSE participation in microfinance as the treatment variable. Once the propensity scores were obtained, a matching process using the nearest neighbour matching (NNM) algorithm was conducted. In the matching process, the propensity scores were compared between the participant and non-participant firms such that the differences in the annual firm income could be attributed to participation in microfinance.

4.7.1 Results of the Diagnostic Tests

To check for robustness of the matching process, the model was subjected to two tests to ensure that the overlap condition was satisfied. First, the density distribution of the propensity scores was generated. As shown in Figure A1 in the Appendix, there was considerable overlap of the propensity scores between the treated and control variables thus matching would be successful. Second, the balancing test was to ensure that the propensity score was an adequate balancing score so that at each value of the propensity score, the covariates had the same distribution for the treatment and comparison groups.

The results from the balancing test in Table A12 in the Appendix show that there were no significant differences of the covariates after matching - as all the p-values of the test for differences in the covariates were statistically insignificant. Therefore on the basis of this balancing test, the estimation of microfinance effects would be admissible.

4.7.2 Results of the Effect of MSE Participation in Microfinance on Performance

To calculate the effect of MSE participation in microfinance on MSE performance, the difference in average firm income between the two matched groups was estimated as shown in the next table.

Table 4.12: PSM Results of the Effect of MSE Participation in Microfinance on MSE Income

Algorithm	Outcome	Effect	Coefficient	AI Robust Standard errors	T-stat
Nearest Neighbour Matching (NNM)	Firm Income	ATET	36, 660.17***	10886.39	3.37

Note: The asterisk *** denote level of statistical significance at 1%; AI Robust Standard errors are used to generate heteroskedastic-robust variance estimators to correct for potential heterokedasticity (Abadie & Imbens, 2002)

Source: Own Computation from Study Data (2017)

Table 4.12 shows that the positive and statistically significant value for ATET was Kshs 36.660. This implies that, on average, the annual firm income increased by Kshs 36.660 when a firm participated in microfinance. The finding of this study is consistent with that of Crepon *et al.*, (2015) who found that microcredit significantly increased firm income in Morocco where, on average, 65 percent of the firms from the sample had their average income increase by 40 percent as result of participation in microfinance.

Tedeschi (2008) whose study was based in Peru, also found that microcredit increased microenterprise income for those micro entrepreneurs who accessed microfinance loans. Their results were robust across both weekly and monthly enterprise income. This study however, contradicts the studies by Tarozzi *et al.* (2015) in Ethiopia and Banerjee *et al.* (2015) in India who did not find any evidence of microfinance effects on entrepreneurial income except at the very top of the profit

quintile. In addition, a study by Augsburg *et al* (2015) in Bosnia and Herzegovina found mixed effects of MSE participation in microfinance on firm income.

The findings of this study propagate the view that microfinance services can help increase entrepreneurial income. As these services are often in relatively small transactions, accessible and affordable, the MSEs can utilize them to meet their business liquidity needs, build technology stock, invest in productive assets, manage their working capital and expand their enterprises (Copestake *et al.*, 2001; Tedeschi, 2008). The microfinance can help some MSEs to overcome the challenges they face including inadequate capital, lack of access to affordable credit, lack of collateral and inadequate managerial and technical skills (Republic of Kenya, 2013a).

To assess the distributional effects of MSE participation in microfinance on performance, the study considered aspects of gender of owner, age of the firm and the age group of owner. The aspect of gender is justified on the premise that microfinance has been promoted as a tool for enhancing entrepreneurship especially among non-collateralized women (Yunus, 1999; Zeller, 1999). The variables age of firm and age group of owner are motivated around the need to understand how government efforts to offer microfinance-type services to the youth enterprises may affect MSE performance (Republic of Kenya, 2011). To obtain these distributional effects, the ATETs were estimated using PSM under each of the sub-categories of the variables of interest. The differences between the participant and non-participant categories were then obtained using a t-test. The results of these effects are presented in the Table 4.13.

Table 4.13: Effects of MSE Participation in Microfinance on MSE Performance on Selected Variables.

Cluster	Class	ATET	AI Robust Errors	Prob value	N
Gender of the owner	Male	24134.76*	12378.84	0.051	1404
	Female	12131.25	20596.15	0.556	417
Age of firm	Quintile 1 (1 - 2 years)	51,565.00**	22208.65	0.020	613
	Quintile 2 (3 - 4 years)	32,432.04*	17402.79	0.062	382
	Quintile 3 (5 - 9 years)	33,420.51*	19713.44	0.090	405
	Quintile 4 (> 10 years)	24,221.54	17761.98	0.173	427
Age group of owner	Quintile 1 (16 – 26 years)	-23,962.5	30374.16	0.430	473
	Quintile 2 (27 – 34 years)	26,094.23	24644.91	0.290	453
	Quintile 3 (35 – 45 years)	51509.09**	23056.31	0.025	470
	Quintile 4 (Over 46 years)	47251.09**	21705.35	0.029	431

Note: The asterisks ** and * denote level of statistical significance at 5% and 10% percent; AI Robust Standard errors are used to generate heteroskedastic-robust variance estimators to correct for potential heterokedasticity (Abadie and Imbens, 2002)

Source: Own Computation from Study Data (2017)

Table 4.13 reveals that on gender of firm owner, the value for ATET was Kshs 24,134 with ten percent level of significance on male owned firms only. This finding suggests that on average, male-owned firms increased their annual income by Kshs 24, 134 when they participated in microfinance. However for the female owned firms, the value of ATET was not significant. This scenario is interesting since microfinance is promoted to support female entrepreneurs more than male entrepreneurs. This result is consistent with that of Karlan & Zinman (2010) whose study in Philippines found out that microfinance had positive effects among male owned firms but not on female owned firms.

De Mel, McKenzie, & Woodruff (2009) also showed that the effects of micro enterprise participation in microfinance were higher among male microenterprise owners than female owners in Sri Lanka. This means that there are possible gender gaps within society that may disadvantage women from achieving greater microfinance effects in their businesses. These gaps may be associated with the patriarchal nature of the society which perpetuates less access to opportunities including financial access, education, training and less ownership of productive assets therefore hindering performance of businesses owned by women (De Mel, McKenzie, & Woodruff, 2009; Wawire, 2010).

On age of the firm, the study established that microfinance had the greatest effects for firms whose ages were up to two years. For these firms, participation in microfinance, on average, increased their income by Kshs 51,565. This finding implies that the youngest firms derived the greater effects from microfinance than the older firms (over 3 years). Therefore, supporting younger firms may be useful in sustaining and growing them, since they have the biggest risk of closing down (Republic of Kenya, 2016b). Some of the reasons cited for closure or non-growth of MSEs in Kenya are lack of operating funds as well as low access to financial services (Berg *et al.*, 2015; Republic of Kenya, 2016b).

From the results, it was also revealed that businesses aged between three and four years had an ATET of Kshs 32,432 while those aged between five and nine had an ATET of 33,420. This implies that the effects of participation in microfinance on firm income diminishes over time. As firms age, they become more stable and sustainable thus reducing the need for liquidity from time to time. This finding is consistent with Garnsey (1998) whose theory of business growth alluded to firms

mobilizing and generating resources during this period so as to become financially stable and therefore diminish the need for liquidity. For firms older than 10 years, the ATET value was not significant implying that participation in microfinance had no effect on firms older than 10 years.

The consideration of age group of owner was important in light of the Government of Kenya's efforts to support the youth entrepreneurship through programmes such as Youth Fund (Republic of Kenya, 2015). From the results, there was no evidence of microfinance effects on income of enterprises owned by individuals aged between 16 and 34 years. The lower bound age was considered in light of some firm owners starting their businesses after they drop out of school or decide to start their business before their majority age. For the age groups of 35 – 45 years and those over 46 years, the ATET was Kshs 51,509 and Kshs 47,251, respectively. This finding implies that the youth business owners (under 35 years) still suffer certain disadvantages that may hinder them from realizing any impacts on their businesses through participation in microfinance. However, for the entrepreneurs aged between 35 and 45 years, microfinance effects were significant and greater than those firms whose owners are over 46 years old.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusions, suggested policy implications from the findings, contribution to knowledge and areas for further research.

5.2 Summary

The microfinance subsector plays an important role in the economy in promoting household welfare and MSE performance especially in developing countries. Microfinance provides services such as microcredit, microsavings and microinsurance mainly to the low-income households and small businesses - many of whom are financially excluded. This is because the nature and innovations of microfinance makes the sub-sector a useful tool of addressing problems of financial exclusion of households and businesses. These innovations include: group lending, joint liability, dynamic incentives, frequent payment schedules, simple application procedures and use of tapered interest rates.

In Kenya, microfinance development has been promoted by various policy interventions. Through the interventions, the subsector has recorded considerable increases in gross lending by microfinance banks, number of licensed microfinance banks and usage of informal microfinance. Despite these developments, households continue to face low levels of welfare as evidenced by high poverty headcount and poverty gap. In addition, many MSEs continue to suffer from high levels of financial exclusion and shortage of operating funds thus leading to closure of many them.

Past studies on Kenya have demonstrated that participation in microfinance may have had a positive effect on household welfare and MSE performance. However, such studies only focused on a small area and did not account for the distributional effects of participation in microfinance on household welfare as MSE performance. Therefore, there was need to conduct a study to consider these distributional effects as well as account for the microfinance developments that have taken place in the period 2006 – 2015. Moreover, the utilization of the nationally representative dataset would improve the generalization of findings for purposes of policy design.

The purpose of this study was to determine the effect of participation in microfinance on household welfare and performance of MSEs in Kenya. Specifically, the study sought to; analyse the determinants of household participation in microfinance; determine the effect of household participation in microfinance on household welfare; analyse the determinants of MSE participation in microfinance; and establish the effect of MSE participation in microfinance on MSE performance. To address these objectives, the study used the 2016 FINACCESS dataset that was collected by CBK, KNBS and FSD-Kenya in the year 2015.

To assess the determinants of household participation in microfinance, the study employed a heteroskedastic probit model that was fitted using the maximum likelihood estimation (MLE) technique. From the regression results, the determinants of participation were ; residence of the household, marital status of the household head, age of the household, household size, dependency level of the household, vulnerability level of the household, financial literacy level of the household head and gender of the household head.

The effect of household participation in microfinance on household welfare, the endogenous switching regression was estimated using Full-Information Maximum Likelihood (FIML) technique. Per capita expenditure and per capita income were used as measures of household welfare. Using the ESR results, the ATETs for both per capita expenditure and per capita income were computed. The results revealed that participation in microfinance by households increased their annual per capita expenditure and per capita income by Kshs 28,713 and Kshs 24,374, respectively. In addition, the study established that, on average, the per capita expenditure and per capita income was higher among female-headed households than male-headed households by Kshs 5,162 and Kshs 6,892, respectively. On wealth quintiles, it was observed that the welfare effects generally increased with increase in wealth quintiles implying that the poorest did not necessarily derive the greatest effects due to participation in microfinance.

The determinants of MSE participation in microfinance were estimated using a probit regression. The regression results revealed that, the number of business units of the firm, age of firm owner, tertiary education level of firm owner, financial literacy level of firm owner, numeracy level of firm owner, ownership of radio by firm owner, possession of business permit by firm, age of firm, number of employees and bank finance participation by firm were the factors that influenced participation in microfinance by MSEs

To establish the effect of MSE participation in microfinance on MSE performance, the propensity score matching method was used. Using the nearest neighbour matching (NNM) algorithm, the relevant ATETs were obtained. The results showed that, on average, annual firm income increased by Kshs 36.660 when a firm

participated in microfinance. When the ATET was estimated on the basis of the gender of firm owner, the results revealed that, on average, participation in microfinance had an increased the firm income of male-owned firms only. In the case age of the firm, the study established that microfinance had the greatest effects for firms whose ages were up to two years. On the age group of the firm owner, the study established that the participation in microfinance had positive effects for firms whose owners were above 35 years.

5.3 Conclusions

Drawing from the findings of the study, the following conclusions can be made. Regarding determinants of household participation in microfinance, the study concludes that households with higher financial literacy levels and higher household sizes are likely to participate more in microfinance. In addition, rural households as well as vulnerable households are likely to participate more in microfinance. Also, women and the married are expected to participate more in microfinance than their counterparts.

The study established that household participation in microfinance had a positive effect on household welfare. The study therefore concludes that increasing participation in microfinance can help improve household welfare. In addition, greater emphasis on participation in microfinance by women would lead to higher household welfare. However, in case of poorest households, the study concludes that microfinance may not be the panacea out of poverty since the poorest households do not derive the greatest effects from participating in microfinance.

On determinants of MSE participation in microfinance, the study concludes that increasing the education levels, financial literacy levels and numeracy levels of the firm owner would increase levels of participation in microfinance by MSEs. Also, MSEs that have a higher scale of operation in terms of number of employees and number of business units or have operating permits and licences are likely to participate more in microfinance.

The study's findings showed that MSE participation in microfinance had a positive effect on MSE performance. It is therefore concluded that participation in microfinance is a catalyst for promoting MSE performance. However, since there was evidence that participation in microfinance did not have any effects on the income of female-owned firms, the study concludes that female-owned firms may be prone to gender-specific constraints which may need to be addressed in order to increase their performance. This case applies also to firms owned by the youth (<35 years). On age of the firm, the study concludes that promoting participation in microfinance among firms whose ages are up to two years is important in promoting their performance since these firms derived the highest effects due to participation in microfinance.

5.4 Policy Implications

Based on the findings of the study, a number of policy implications have been suggested for both households and MSEs. Foremost, the government and microfinance providers should put in place policies that would increase participation in microfinance by households and MSEs. This implication is supported by the finding that participation in microfinance can improve household welfare as well as increase MSE performance.

To encourage greater participation in microfinance by households and firms, it is recommended that government and microfinance providers encourage and upscale financial literacy programmes so as to increase financial literacy levels of both households and firm owners. Such programmes may be rolled out through both academic and non-academic training for both groups.

Since residing in a rural area increased participation in microfinance by households, the government should establish policies that will encourage outreach of microfinance services to the rural population. This may be through giving incentives to providers who wish to set up microfinance services in rural areas. Some of the incentives may include tax breaks, subsidies from government, preferential interest rate and infrastructural support.

Since the results showed that households headed by women derived greater effects from participation in microfinance than in households headed by men, the government should create incentives that encourage greater women participation in microfinance. In addition, microfinance providers should establish financial products that are tailor-made to attract greater women participation in microfinance.

The findings of the study pointed out that the poorest do not necessarily derive the greatest effects from participation in microfinance. Therefore, to ensure that participation in microfinance has greater welfare effects on the poorest in society, the government should introduce complimentary programmes that would augment microfinance.

Possession of permits was found to increase participation in microfinance among firms. In light of this, national and county governments should create incentives that

will increase acquisition of permits and licences by MSEs. These incentives may include, streamlining all pre-registration and post-registration procedures, harmonising inter-county licencing procedures, simplifying application procedures for different businesses and reducing the cost of the permits.

To increase performance of youth-owned MSEs, the government and microfinance providers should address youth-specific barriers that prevent these MSEs from deriving any effects from participation in microfinance. This implication rests on the finding that, on average, participation in microfinance did not have any effects for firms whose owners were below 35 years. Therefore, care should be taken by policy makers and providers to address this challenges even as they work to reach to these two groups through programmes such as Youth Fund and Uwezo Fund.

In view of promoting performance of MSEs, the government should provide incentives that promote participation in microfinance by young MSEs especially those that are up to two years of age. This is because the findings indicated that participation in microfinance had the greatest effects among firms in this age bracket (0-2 years).

In light of the finding that only male-owned firms derived positive and significant from participating in microfinance, the government and microfinance providers should address obstacles that hinder women-owned firms from benefitting from to participation in microfinance. Commonly cited obstacles include less access to financial access opportunities, less ownership of productive assets that may aid access to finance as well as firm performance and lack of business training.

However, a full understanding of the interaction between women specific constraints and participation in microfinance requires a further study.

5.5 Contribution to Knowledge

The study contributes to the existing literature on how microfinance affects household welfare in Kenya especially within the context of the various microfinance developments that have taken place in the last decade. In addition to demonstrating that participation in microfinance has a positive effect on household welfare, the study has shown that the effects are varied across gender and wealth quintiles. On gender, the study has shown that women derive greater microfinance services than men. On wealth quintiles, the study has demonstrated that the poorest do not necessarily derive the greatest effects hence pointing to inherent obstacles that may be preventing the poor from realising the desired benefits of microfinance. Therefore, this study reveals that the design of policies and products should be aligned to the need of different segments of interest in order to maximize the effects of participation in microfinance.

On MSEs, this is the first study in Kenya to provide insights of how MSE participation in microfinance affects MSE performance in the context of the significant microfinance developments and also on different segments in the economy. The study has shown that participation in microfinance has positive effects on firm income. In addition, the study has demonstrated that there is presence of constraints limiting the effect of microfinance in firms owned by the women and youth. Therefore, there is need for policy and product designs to address these hindrances even as participation in microfinance is encouraged. Finally, the study

benefitted from a nationally representative dataset implying that these results can be generalized for purposes of policy and product design in Kenya.

5.6 Areas for Further Research

This study has presented an analysis of how participation in microfinance affects household welfare and performance of micro and small enterprises in Kenya. To further develop an understanding of these relationships, future research may focus on the following areas:

- i) Relative effects of participation in microfinance between consumption smoothing and investment among households in Kenya.
- ii) Factors constraining the effects of participation in microfinance in MSEs owned by youth and women in Kenya.

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APPENDIX

Table A1: Output of the Probit Regression of Determinants of Household Participation in Microfinance.

Dependent variable = 1 if a household participated in microfinance and 0 otherwise				
Independent Variables	Coefficient	Robust Std. Err.	Z value	P Value
Wealth Index	-0.0303615	0.0252948	-1.2	0.230
Education (No education)	-0.0061144	0.0991146	-0.06	0.951
Education (Primary)	0.0678118	0.0785032	0.86	0.388
Education (Secondary)	0.0085742	0.0729155	0.12	0.906
Residence (Urban)	-0.5014675	0.0417977	0.000	0.000
Marital Status (Married)	0.1814679	0.0437407	4.15	0.000
Age	0.0000967	0.0012885	0.08	0.940
Household size	0.1590516	0.0165634	9.6	0.000
Dependency level of the household	-0.1418839	0.0219166	-6.47	0.000
Vulnerability level (Not Vulnerable)	-0.244214	0.0431486	-5.66	0.000
Gender of household head (Female)	0.2390752	0.0441539	5.41	0.000
Financial Literacy level (Financially literate)	0.1922958	0.0526075	3.66	0.000
Cost of Transport to Nearest Provider	0.0001232	0.0002604	0.47	0.636
Internet Use (Yes)	-0.1174754	0.0618909	-1.9	0.058
Constant	-1.056504	0.1212315	-8.71	0.000

Note: Number of Observations = 5048; Wald Chi square (14) = 365.61; Prob > chi2 = 0.0000; Tertiary education is the reference level.

Source: Own Computation from Study Data (2017)

Table A2: Results of the Multicollinearity test for Probit Models of Determinants of Household Participation in Microfinance

Independent Variables	Variance Inflation Factor (VIF)
Wealth Index	1.75
Education (No Education)	3.2
Education (Primary)	3.78
Education (Secondary)	2.74
Residence (Urban)	1.08
Marital Status (Married)	1.05
Age	1.09
Household Size	3.39
Dependency level of the household	3.25
Vulnerability Level (Not Vulnerable)	1.17
Gender of the head (Female)	1.05
Financial Literacy level (Financially Literate)	1.48
Cost of Transport to Nearest Provider	1
Internet Use (Yes)	1.53
Mean VIF	1.97

Note: A VIF >10 denotes presence of the multicollinearity problem

Source: Own Computation from Study Data (2017)

Table A3: Results of the Link Test for Model Specification of the Probit Model for Determinants of Household Participation in Microfinance.

Microfinance Participation	Coefficient	Probability
hat	1.221496	0.000
hatsq	0.1689766	0.118
Constant	0.0478198	0.341

Source: Own Computation from Study Data (2017)

Table A4: Results for goodness of fit test using Hosmer-Lemeshow test of the Probit Model for Determinants of Household Participation in Microfinance.

Number of observations	5048
Number of groups	10
Hosmer-Lemeshow Chi2 (8)	5.90
Prob > Chi2	0.6579

Source: Own Computation from Study Data (2017)

Table A5: Results for test for Heterokedasticity using Langrange Multiplier test for the Probit Model for Determinants of Household Participation in Microfinance.

LM statistic	24.64
Prob > Chi2	0.0549

Source: Own Computation from Study Data (2017)

Table A6: Output of the Heteroskedastic Probit Regression of Determinants of Household participation in Microfinance

Dependent variable = 1 if a household participated in microfinance and 0 otherwise				
Independent Variables	Coefficient	Robust Std. Err.	Z value	P Value
Wealth Index	-0.01185	0.015921	-0.74	0.457
Education (No education)	-0.05284	0.06507	-0.81	0.417
Education (Primary)	-0.05791	0.061496	-0.94	0.346
Education (Secondary)	-0.03902	0.053792	-0.73	0.468
Residence (Urban)	-0.03363	0.02822	-1.19	0.233
Marital Status (Married)	0.03628	0.030291	1.2	0.231
Age	0.008543	0.00243	3.52	0
Household size	0.009487	0.032049	0.3	0.767
Dependency level of the household	-0.01171	0.034597	-0.34	0.735
Vulnerability level (Not Vulnerable)	-0.0238	0.027783	-0.86	0.392
Gender of household head (Female)	0.032918	0.029698	1.11	0.268
Financial Literacy level (Financially literate)	0.004758	0.030547	0.16	0.876
Cost of Transport to Nearest Provider	0.000298	0.000215	1.38	0.166
Internet Use (Yes)	-0.05477	0.048124	-1.14	0.255
Constant	-0.71856	0.147146	-4.88	0
Insignia				
Wealth Index	0.018095	0.052951	0.34	0.733
Education (No education)	0.22586	0.191641	1.18	0.239
Education (Primary)	0.252151	0.161395	1.56	0.118
Education (Secondary)	0.13186	0.146869	0.9	0.369
Residence (Urban)	-0.53799	0.090538	-5.94	0
Marital Status (Married)	0.114068	0.090729	1.26	0.209
Age	-0.029	0.001768	-16.4	0
Household size	0.167197	0.094423	1.77	0.077
Dependency level of the household	-0.13149	0.101551	-1.29	0.195
Vulnerability level (Not Vulnerable)	-0.2517	0.095049	-2.65	0.008
Gender of household head (Female)	0.143887	0.10702	1.34	0.179
Financial Literacy level (Financially literate)	0.273572	0.108973	2.51	0.012
Cost of Transport to Nearest Provider	-0.00077	0.000644	-1.2	0.232
Internet Use (Yes)	0.014381	0.129474	0.11	0.912

Note: Wald test of $\text{Insignia}^2=0$: $\text{Chi}^2(12) = 512.43$ and $\text{Prob} > \text{chi}^2 = 0.0000$ implies that heteroskedasticity exists in the model; Number of observations is 5,048; Wald Chi square (14) = 37.37; $\text{Prob} > \text{chi}^2 = 0.0006$; Tertiary education is the reference level.

Source: Own Computation from Study Data (2017)

Table A7: Endogenous Switching Regression Results for Per Capita Income

Model	Selection (Probit) equation		MFI participation equation		MFI non-participation equation	
Dependent variable	Microfinance participation		Log of Per capita income		Log of Per capita income	
Independent Variables	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Wealth Index	- 0.0329	0.210	0.2639***	0.000	0.2928	0.000
Education (No education)	0.0528	0.610	- 0.7578***	0.000	-0.5782	0.000
Education (Primary)	0.1106	0.171	- 0.7945***	0.000	-0.6189	0.000
Education (Secondary)	0.0386	0.605	- 0.6277***	0.000	-0.4935	0.000
Residence (Urban)	- 0.5109	0.000	- 0.1097	0.297	0.1664	0.000
Marital Status (Married)	0.1949	0.000	0.1404**	0.032	0.2880	0.000
Age	0.0009	0.000	- 0.0064	0.682	0.0267	0.000
Age squared	0.1719	0.000	0.0005	0.662	-0.0003	0.000
Household size	- 0.1308	0.000	- 0.2085***	0.000	-0.2400	0.000
Dependency level of the household	- 0.2407	0.000	0.0821	0.182	-0.0440	0.228
Vulnerability level (Not Vulnerable)	- 0.0923	0.000	0.0382	0.226	0.0443	0.025
Gender (Female)	0.1790	0.000	0.2254***	0.001	0.1913	0.000
Constant	0.5190	0.001	11.5910***	0.000	10.6527	0.000
Financial Literacy level (Financially literate)	0.2377	0.000				
Cost of transport to nearest service provider	0.0003	0.267				
Internet Use (Yes)	- 0.0148	0.827				
Sigma_1		0.8841 (0.0287)	Rho_1		0.1345 (0.2679)	
Sigma_2		0.9883 (0.0218)	Rho_2		- 0.5128 (0.0797)	
Number of observations = 5048						
Wald chi2(12) = 557.05: Prob > chi2 = 0.0000						
LR test of indep. eqns. : chi2(1) = 11.95 Prob > chi2 = 0.0005						

Note: Tertiary education is the reference level; Asterisks *, **, *** denote level of statistical significance at 1%, 5% and 10%.

Source, Own Computation from Study Data (2017)

Table A8: Output of the Probit Regression of Determinants of MSE participation in Microfinance.

Dependent variable (dummy variable)	Dependent variable = 1 if an MSE participated in microfinance and 0 otherwise			
Independent Variables	Coefficient	Robust Std Errors	Z Value	P Value
Number of business units in a firm	0.1319725	0.0669067	1.97	0.049
Age	0.0914926	0.0136269	6.71	0.000
Age squared	- 0.0008756	0.0001531	-5.72	0.000
Education (No Education)	- 0.5709062	0.2039943	-2.8	0.005
Education (Primary)	- 0.0262856	0.1144666	-0.23	0.818
Education (Secondary)	0.1156876	0.1114983	1.04	0.299
Gender	0.0945059	0.0820885	1.15	0.250
Financially literacy level (Financially Literate)	0.4641441	0.1008391	4.6	0.000
Numeracy level (Numerate)	- 0.151356	0.0821514	-1.84	0.065
Ownership of radio (Yes)	0.1620364	0.0740175	2.19	0.029
Age of firm	0.0091025	0.0042798	2.13	0.033
Number of employees	0.0394649	0.0205755	1.92	0.055
Location type of firm (Fixed)	0.091994	0.0793153	1.16	0.246
Permit (Yes)	0.2956008	0.0919879	3.21	0.001
Registration of firm (Yes)	-0.028289	0.1224297	-0.23	0.817
Ownership of motorcycle (Yes)	-0.0228459	0.0957172	-0.24	0.811
Ownership of bicycle (Yes)	0.0899654	0.0826147	1.09	0.276
Credit Policy – Inward (Yes)	0.0797129	0.0814326	0.98	0.328
Credit Policy – Outward (Yes)	0.0700334	0.074838	0.94	0.349
Bank finance participation (Yes)	0.5435744	0.1319776	4.12	0.000
Constant	-3.756364	0.339242	-11.07	0.000

Note: Number of Observations = 1821; Wald Chi square (20) = 227.83; Prob > chi2 = 0.0000; Tertiary education is the reference level.

Source: Own Computation from Study Data (2017)

Table A9: Results of the Multicollinearity test for Probit Model of Determinants of MSE Participation in Microfinance.

Variable	Variance Inflation Factor
Number of business units	1.13
Age	1.03
Education (No Education)	3.04
Education (Primary)	8.48
Education (Secondary)	7.49
Education (Tertiary)	3.50
Gender (Female)	1.02
Financially literacy level (Financially Literate)	1.38
Numeracy level (Numerate)	1.17
Ownership of radio (Yes)	1.09
Age of Business	1.08
Employees	1.14
Location type of business (Fixed)	1.08
Permit (Yes)	1.48
Registration of business (Yes)	1.37
Ownership of motorcycle (Yes)	1.07
Ownership of bicycle (Yes)	1.06
Credit Policy – Inward (Yes)	1.16
Credit Policy – Outward (Yes)	1.18
Bank finance participation (Yes)	1.04
Mean VIF	2.05

Note: A VIF >10 denotes presence of the multicollinearity problem

Source: Own Computation from Study Data (2017)

Table A10: Results of the Link Test for Model Specification of the Probit Model for Determinants of MSE Participation in Microfinance

Microfinance Participation	Coefficient	Probability
hat	0.9858888	0.000
hatsq	- 0.010769	0.901
Constant	- 0.0017877	0.973

Source: Own Computation from Study Data (2017)

Table A11: Results for Goodness of Fit using Hosmer-Lemeshow Test of the Probit Model for Determinants of MSE Participation in Microfinance

Number of observations	1821
Number of groups	10
Hosmer-Lemeshow Chi2(8)	5.17
Prob > Chi2	0.7398

Source: Own Computation from Study Data (2017)

Table A12: Results for test for Heterokedasticity using Langrange Multiplier test for the Probit Model for Determinants of MSE Participation in Microfinance

LM statistic	26.37
Prob > Chi2 (19)	0.1201

Source: Own Computation from Study Data (2017)

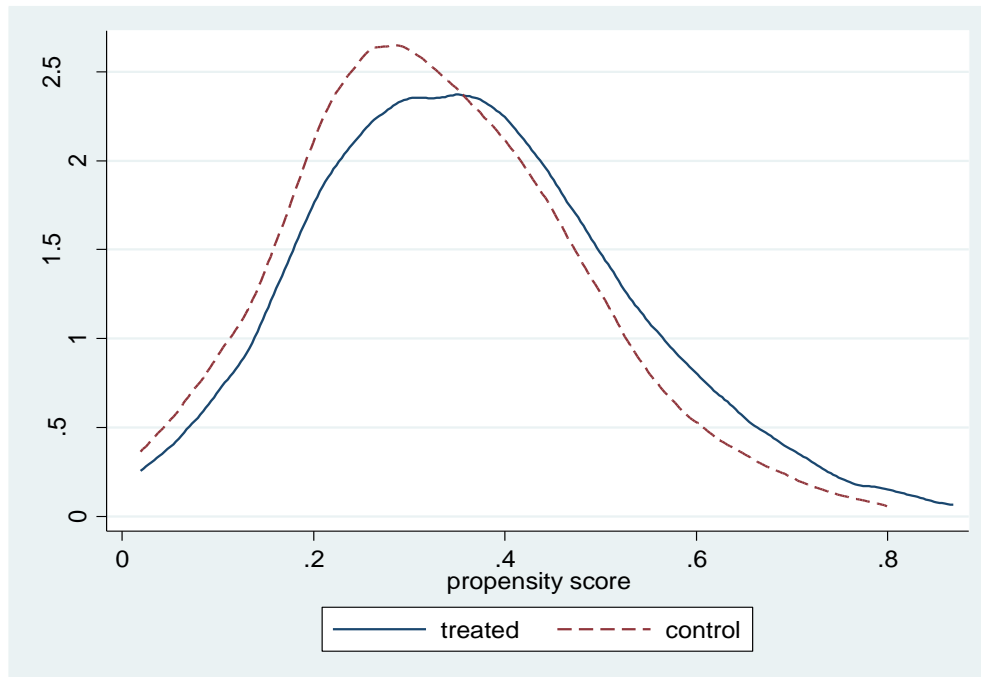


Figure A1: Density distribution of the propensity score for the treated and control variable after matching.

Source: Own Computation from Study Data (2017)

Table A13: Balancing test of Matched Sample for Effects of MSE Participation in Microfinance on MSE Performance

Independent Variables	Mean values		Prob
	Participants	Non-participants	
Number of business units	1.1426	1.1191	0.541
Age	40.179	41.189	0.228
Age squared	1777.2	1862.7	0.260
Education (No Education)	0.0212	0.0234	0.826
Education (Primary)	0.40213	0.40213	1.000
Education (Secondary)	0.4234	0.44255	0.554
Education (Tertiary)	0.15319	0.13191	0.351
Gender	0.79574	0.80851	0.624
Financially literacy level (Financially Literate)	0.90213	0.88936	0.522
Numeracy level (Nurate)	0.20426	0.21489	0.689
Ownership of radio (Yes)	0.71915	0.72979	0.715
Age of Business	7.6702	8.4298	0.120
Employees	1.9149	1.7617	0.243
Location type of business (Fixed)	0.75106	0.71702	0.238
Permit (Yes)	0.3617	0.35532	0.839
Registration of business (Yes)	0.14468	0.14468	1.000
Ownership of motorcycle (Yes)	0.16596	0.14894	0.474
Ownership of bicycle (Yes)	0.25745	0.25319	0.881
Credit Policy – Inward (Yes)	0.7383	0.71702	0.464
Credit Policy – Outward (Yes)	0.44043	0.42766	0.693
Bank finance participation (Yes)	0.1234	0.11277	0.614

Source: Own Computation from Study Data (2017)