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**The determinants of participation in savings groups and the
impact on input investment among smallholder farmers in
Sironko district, Uganda**

By

Bukuwa Nambale Emmanuel

Submitted in partial fulfilment of the Master of Science degree in
Agricultural Economics

in the

Department of Agricultural Economics, Extension & Rural Development

Faculty of Natural and Agricultural Science

University of Pretoria

South Africa

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Declaration of originality

I hereby declare that this dissertation which I submit for the degree of MSc Agric (Agricultural Economics) at the University of Pretoria is my own work and it has not been previously submitted by me for a degree at this or any other institution of higher learning.

Signature.....

Bukuwa Nambale Emmanuel

Date.

Approved by:

Signature.....

Dr. M.N. Makhura



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YUNIBESITHI YA PRETORIA

Dedication

I dedicate this work to my family.



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The determinants of participation in savings groups and the impact on input investment among smallholder farmers in Sironko district, Uganda

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Abstract

To promote savings groups (SGs), which are important in promoting financial inclusion among smallholders, it is imperative to understand the factors that affect participation in these SGs and the associated impact in the context of Uganda. This study determined the factors influencing participation in SGs. The study put particular emphasis on the use of SGs as a form of fully-fledged financial services provision to access agro-inputs. The study, therefore, additionally, determined the impact of these SGs on the expenditure on agro-inputs. The study used data collected through a cross-sectional survey from 249 participants. These participants were drawn from Sironko district, Uganda, East Africa. The study employed a Probit model to investigate the determinants of participation and intensity of participation. To estimate the impact of SGs on expenditure on agro-inputs, average treatment effects on the treated (ATT) were calculated after discounting the selection bias between the SGs' members and non-members.

Averagely, SGs incurred 40% of all expenditure on Agro-inputs by SGs' members. SGs' members were significantly higher than non-members as regards total expenditure on agro-inputs, per capita expenditure on agro-inputs, and proportion of income spent on agro-inputs. ATT was insignificant and tends to be negative.

The main factors that significantly and positively influenced participation included the sex of the head of the household, having a child in secondary school, the number of years in education, the number of dependents, income (in a quadratic form), activity in non-SGs group settings, trusting members in the SGs, and satisfaction with loan amounts accessible from the SGs. The main factors that significantly but negatively influenced participation include agriculture as a

main income source and requirement for support to participate in the SG. Within SGs, being female; number of dependents; receiving a government subsidy; share-out of savings between January and March; and frequency of getting SGs loans the previous year increased the frequency of getting loans. The frequency decreased for participants who were active in RoSCAs and had agriculture as their main source of income. Savings were encouraged by years in education; income and activity in non-SGs group settings. Savings lowered when the participant was female; rented farming land; active in RoSCAs; required support to participate in SGs; share-out of savings between January to March; and the number of loan sources.

Important factors that can be addressed at policy level include support for the SGs in the form of training members in SGs' models, adding to the loans pools; and encouraging activity in any community group setting.

Key words: savings groups, determinants of participation, impact of savings groups, financial inclusion, community groups, smallholder farmers, Uganda



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List of acronyms

ASCAs	Accumulating Savings and Credit Associations
ATE	Average treatment effects
ATT	Average effect of the treatment on the treated
CIA	Conditional independence assumption
CSR	Common support requirement
FAO	Food and Agriculture Organisation
GHI	Global hunger index
IMR	Inverse Mill's ratio
NGO	Non-governmental organizations
O-level	Ordinary level
OLS	Ordinary linear least squares
Profira	Project for financial inclusion in rural areas
PSM	Propensity score matching
RoSCA	Rotating savings and credit association
RoSCAs	Rotating savings and credit associations
SACCO	Savings and credit cooperative
SACCOs	Savings and credit cooperatives
SG	Savings group
SGs	Savings groups
SILC	Savings and internal lending system
SILCs	Savings and internal lending systems
SUTVA	Stable unit treatment value
USD	United states dollar
VSLA	Village savings and loan association
VSLAs	Village savings and loan associations

CHAPTER ONE

INTRODUCTION

1.1 Background

The contribution of Agriculture to Uganda's GDP has greatly reduced over the years to about 23% yet the sector employs nearly 69% of Uganda's population (FAO, 2018a). Ugandan smallholders, on average, own about one hectare of land. These smallholders account for nearly 90% of the agricultural output (FAO, 2018b; Weinberger & Jütting, 2001). The productivity of these farmers is very low and trending towards zero as indicated by the agricultural Gross Per Capita Production Index Number. Uganda's Gross Per Capita Production Index Number for 2016 is only 63 international dollars as compared to the world average of 112 or even East Africa of 103 international dollars (World Bank, 2018b). The low productivity is further evidenced by the cereal yield per hectare. A hectare of land in South East Asia produces more than 5000 kilograms of cereal yield but an average Ugandan hectare produces about 2000 kilograms well below the world average of 4000 kilograms in 2018 (World Bank, 2022). The land does not produce optimally due, largely, to limited use of agro-inputs especially chemical fertilizers (McArthur & McCord, 2017).

Uganda lags in agro-input use, particularly chemical fertilizers as compared to the world average, least developed countries and Sub-Saharan Africa (Veljanoska, 2022; World Bank, 2022). In 2018, Uganda used only 3.3 kilograms of fertilizers per hectare as compared to 293.5 kilograms in East Asia and the Pacific, the region that used the most chemical fertilizers that year. The quantity of fertilizers used per hectare of arable land has been declining over the years even as the demand for food increased exponentially because of population growth. The low agro-input use in part explains the low productivity as measured by cereal yield per hectare which can change if there is an increase in agro-input use, especially chemical fertilizers.

One of the major causes of limited adoption of fertilizer use among smallholders is financial exclusion when the smallholders cannot access institutional credit (Abate, Rashid, Borzaga, & Getnet, 2016; Veljanoska, 2022). However, financial inclusion among these smallholders has improved over the years using alternatives in informal financial services (Figure 1-1). Therefore, nearly 40% of Uganda's population has some access to financial services, at least for savings. If agro-input access and use of 40% of the population is improved through these

financial services, then yield per capita will improve and the increasing prevalence of undernourishment reversed.

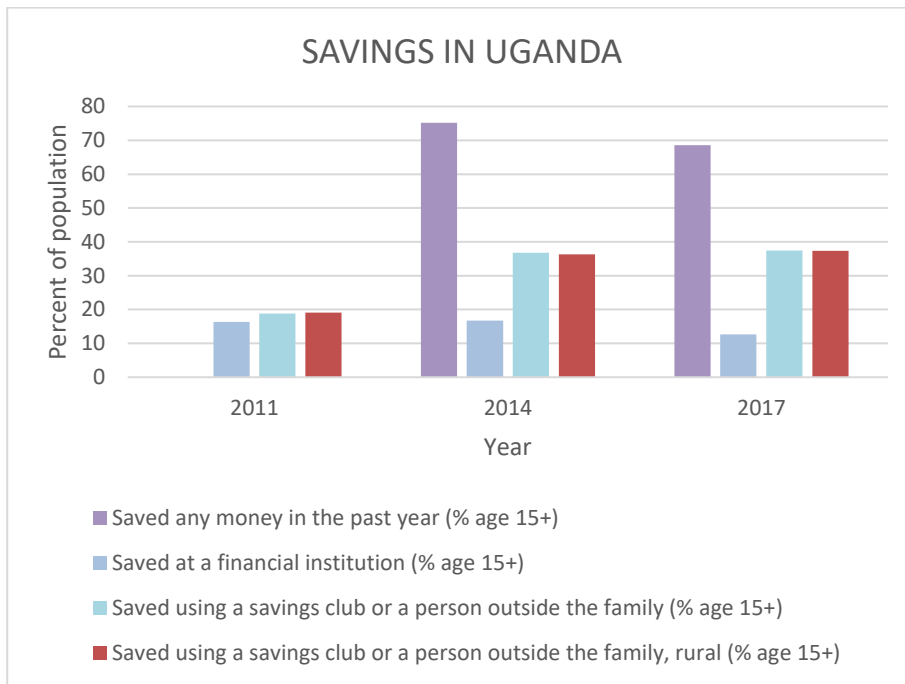


Figure1- 1: Saving in savings club (or a person outside the family) vs financial institution

Source: (World Bank, 2018d)

Among these informal financial services are savings groups including Village Savings and Loan Associations (VSLAs) and Savings and Internal Lending Communities (SILC), which are all modifications of Accumulating Savings and Credit Associations, among others (Meyer, 2015). Throughout Uganda, there has been wide and rapid adoption of these groups, especially among rural households, most of which are self-formed by replicating the guided ones (Mine, Stokes, Lowe, & Zoubek, 2013). SGs in Uganda are composed of between 5 members and 30 members with a few having more than 30 members (Mutebi et al., 2017) and 91% of these SGs save at least once a month and keep their money in a metallic box. Uganda has 26,395 groups with 740,227 members. These groups are composed of 68% women¹, on average (SAVIX, 2018). However, these figures are only for CARE international, Catholic relief services, and other international Non-Governmental Organisations guided savings groups excluding

¹ The number of groups and group members are from SAVIX (2017 fourth quarter) (<http://www.thesavix.org/>). SAVIX an online reporting system that collects and validates financial and operational data from over 214,000 savings groups in all regions of the developing world and the agencies that promote them. The SAVIX is based on a standardised management information system developed by VSL Associates, with support from the Bill & Melinda Gates Foundation, CARE, Catholic Relief Services, Oxfam America and Plan International.

spontaneous replications and other local non-governmental organizations. Therefore, the numbers could be much higher (Meyer, 2015).

With financial exclusion partly solved through these savings groups, it is expected that productivity among the savings group members improves given that access to financial services leads to increased input use (Abate et al., 2016).

1.2 Problem statement

Prevalence of undernourishment in Uganda has been increasing over the past decade and the acceleration is only getting worse (FAO, 2018b). The cause of this is the very low yields per hectare produced by Ugandan farmers which is deteriorating further. These low yields are a result of meagre use of agro-inputs, especially chemical fertilizers. The limited use of agro-inputs is caused by lack of financial services which can enable these smallholders access to credit for the purchase of the agro-inputs at a time when credit is needed (Cicchello, Kazemikhasragh, Monferrá, & Girón, 2021; Langyintuo, 2020). Savings groups are providing the much-needed financial services to the rural smallholders, yet there is limited attention by the government to promote them so that they can be assisted further. Available literature (Carpenter & Jensen, 2002; Evans, Adams, Mohammed & Norris, 1999; Mpiira et al., 2013; Weinberger & Jütting, 2001) focus on participation in RoSCAs and Accumulating Savings and Credit Associations (ASCAs) yet SGs, given their mode of operation, can be affected differently by the same or different factors affecting participation. Additionally, literature (Dawuni, Mabe, & Osman Damba, 2021; Karlan, Savonitto, Thuysbaert, & Udry, 2017; Ksoll, Lilleør, Lønborg, & Rasmussen, 2016; (Karlan, Savonitto, Thuysbaert, & Udry, 2017; Ksoll, Lilleør, Lønborg, & Rasmussen, 2016; Lukwa, 2022) tends to focus only on the impact of VSLAs and ignores the impact of other savings schemes like SILC facilitated by Catholic Relief Services. Other facilitating agencies in Uganda include Plan International, Child Fund, World Vision, Freedom from Hunger, We Effect, Oxfam, and Norwegian Association of Disabled, among others (SAVIX, 2018). Therefore, measuring the joint impact of these groups on the use of agro-input is imperative. There is need for empirical evidence on the determinants of participation and joint impact of all SGs in Uganda.

Therefore, this study seeks to answer the following questions:

1. What factors do smallholders put into consideration when deciding to participate or not participate in the Savings Group?

2. What is the impact of membership or non-membership in a savings group by smallholder farmers on expenditure on agro-inputs?

1.3 Objectives

The main objective of this study is to investigate the determinants of membership in a savings group and their impact on agro-inputs investment by smallholder farmers.

To achieve this objective, the study will:

1. Determine the proportion of expenditure on agriculture from savings groups.
2. Identify the factors that determine participation in a savings group.
3. Determine the impact of membership in a savings group on expenditure on agro-inputs.

1.4 Hypothesis

Credit plays a major role in input access for agricultural productivity and SGs provide this much needed credit among smallholder farmers (Dawuni, Mabe, & Osman Damba, 2021). The specific hypotheses are:

Group members financed at least 35% of agro-inputs using savings groups (savings or loans). Ksoll (2016) shows that borrowing for agricultural productivity increased by 35% due to participation in SGs.

There is a difference in the expenditure on agro-inputs between savings groups members and non-group members. These hypotheses follow from Ksoll (2016) who found that savings group members in Malawi purchased agro-inputs from their SGs savings.

Smallholders are faced with an interplay of factors that influence their decision to participate in savings groups (Some factors determine participation or non-participation in a savings group). These factors include income, household size, sex of household head, age, years of education, having children in secondary school, occupation, income stability, number of community groups active in the group, activity in RoSCAs, ease of trusting other members, SGs having external support, credit amounts being satisfactory, month of share-out, value of weekly savings, land rent and receiving government subsidies. These factors are hypothesised to affect both participation in SGs and intensity of participation in the SGs.

1.5 Delimitations of the study

This study depended on self-reporting of purchases made of agro-inputs and other expenditures which were difficult to verify. The difficulty arose from failure to verify the actual source of funds, whether such a purchase was made or if the quantities reported were actual, that is, inflated or deflated.

The study will estimate the hectareage of the plots used for growing maize and given the distance to the farmers' plots and the irregular nature of the plots, this may give inconsistent measures.

Although the study will be conducted just before the end of season, the respondents may not have a clearer recall of the activities carried out before the study.

Members of the savings groups are self-selected, and, in this process, the very poor may have been side-lined hence the results may not be representative enough.

The research design is cross-sectional in nature hence the study will not report basing on baseline. This implies the study will not measure any changes from before the members joined the savings group. The members could have been at the same level before joining the savings group.

1.6 Organisation of the study

The ensuing part of the dissertation details the literature review in chapter two, research methodology in chapter three, characteristics of the farmers in Sironko in chapter four, empirical results in chapter five, and chapter six presents the summary, conclusion and recommendations. Chapter two entails developments in financial inclusion and discusses the studies of savings groups in relation to agricultural productivity, it also discusses the determinants of participation in SGs. Chapter three gives a brief background of the study area and entails the methods and instruments used to carry out the study. Chapter four presents the characteristics of the sample as observed in the results. Chapter five presents and discusses the findings of the study. Chapter six summarises the study, gives the conclusion and associated recommendations

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature covering the role of financial services in improving agricultural productivity and what savings groups as a form of informal financial services have contributed to the use of agro-inputs. The chapter is organised as follows: Financial services and Agricultural productivity in section 2.2; Determinants of participation in savings group presented in section 2.3; Impact of participation in SGs on agricultural productivity in section 2.4; and section 2.5 presents a summary of the literature review.

2.2 Financial services and Agricultural productivity

Agricultural land productivity results from either conventional inputs, or nonconventional inputs or both (Frisvold & Ingram, 1995). The conventional inputs include labour, fertilizers, livestock as inputs, and tractors. The nonconventional inputs include the inputs that are outside an individual farmer's production decisions. These unconventional inputs may include agricultural research, agricultural export growth, land quality, irrigation technology and infrastructure, calories' availability, and agricultural export instability as detailed by Frisvold and Ingram (1995). The unconventional inputs are outside the boundaries of this study as it is focused on the individual smallholder farmer.

The conventional inputs, which are the individual farmer's decision, are either the traditional inputs (labour and livestock) or the modern inputs like fertilizers. According to Frisvold and Ingram (1995) there is limited contribution to land productivity by modern inputs like fertilizers in most parts of sub-Saharan Africa. In 2018 Uganda used only 3.3 kilograms of fertilizers per hectare as compared to 293.5 kilograms in East Asia and the Pacific, the region that used the most chemical fertilizers that year (World Bank, 2022). Inputs like fertilizers, agro-chemicals, seeds, hired labour, rented land among others, certainly require financial services in the form of savings and or loans to access them (Zakaria, Jun, & Khan, 2019; Veljanoska, 2022).

Financial inclusion is the access to a range of affordable financial services tailored to the financial needs of the financially excluded individuals supplied by a variety of authorized providers (Villarreal, 2017). Financial inclusion is the absence of price and non-price barriers to the financial services utility (Lwanga & Adong, 2016). Under financial inclusion, the

smallholders access financial services which are accessible, affordable and tailored to their needs as they arise (Ledgerwood, Earne, & Nelson, 2013). Villarreal (2017) indicates that financial inclusion leads to improved economic and social welfare and growth in productivity. This is because of leveraging on available assets.

In a study of the adoption of agricultural finance and technology in Ethiopia, Abate et al. (2016) showed that smallholder farmers who have access to credit are more likely to use fertilizers (Veljanoska, 2022). In an empirical investigation of financial inclusion and agricultural commercialization in Ghana, Abu and Haruna (2017) show that previously excluded households sold more output when they were financially included. This was because they were able to produce more as a result of using better technologies like fertilizers (McArthur & McCord, 2017).

VSLAs and SILCs improve financial inclusion since they are located within the community and offer both credit and savings services (Meyer, 2015). If these smallholders are financially included through these savings groups, it is expected that their most important livelihood, that is agriculture, improves as they use more agro-inputs (Claessens & Feijen, 2006).

VSLAs and SILCs are variants of Accumulating Savings and Credit Associations (ASCAs) which are community-based, member-owned and managed groups whose members save money regularly and lend it out amongst themselves for an interest (Meyer, 2015). VSLAs are promoted by CARE international, and SILCs are under Catholic Relief Services (CRS) (Le Polain, Sterck, & Nyssens, 2018).

Under these two modes, members meet usually once a week to make savings towards a common pool in addition to contributing to an emergency fund independent of the savings pool. The savings are lent out to group members who apply for credit for an interest while the emergencies fund is used to aid members in emergencies as an interest-free loan or non-refundable grant (Karlan et al., 2017). The groups are composed of between 15 and 30 self-selected members with an agreed upon constitution to govern their relationships amongst which is a minimum level of savings per member at each meeting and how any money is handled. These members know each other well in terms of strengths and weaknesses, repayment capacity, availability, general financial needs, among others (Ksoll et al., 2016; Vanmeenen, 2010).

The groups operate for a predetermined cycle contained in the constitution, usually 12 months, which end of cycle coincides with the members' average greatest need of the lump-sum savings when all the savings are shared out amongst the members proportionate to the total savings per member. After the cycle, member(s) are free to exit and new ones are welcomed into the group or it is dissolved (Burlando & Canidio, 2017).

Meyer (2015) pointed out some of the strengths of savings groups, among which is their sustainability and social capital which are important elements for supporting the sustained financial inclusion of smallholders (Hansen, Kim, Suffian, & Mehta, 2015). The groups always implement their constitution and group members will always go for the next cycle according to research on post-project implementation of savings groups in Uganda which also reaffirms the sustainability of the savings groups by replicating spontaneously after the end of projects by Non-Governmental organizations (Mine et al., 2013). This characteristic is particularly important for agricultural productivity.

The groups are mainly constituted of women, who at the same time are the most financially excluded as well as least able to purchase agro-inputs to enhance their agricultural productivity (Vanmeenen, 2010).

2.3 Determinants of participation in savings group

Participation in a savings group is not automatic. Smallholders consider various factors before concluding on whether to participate in savings groups. Various scholars have concluded on several factors that influence individuals' participation in community groups. A savings group is multifaceted, serving the purposes of banking services and socialisation. Therefore, the determinants of participation span these services.

2.4 Factors influencing need of a savings account (banking services)

An individual must assess on need and ability to save. This is because the savings groups are like formal bank savings accounts which must be serviced with savings. Mpiira et al. (2013)'s study of "Factors influencing households' participation in the Savings and Credit Cooperative (SACCO) programmes in Uganda" comes in handy in this study. Savings groups, in part, serve the purpose of banking services, that is savings and lending, like the services of the SACCOs. Participation in SACCOs is influenced by income and stability in income, distance from the SACCO, spousal income and dependents in school (Mpiira et al., 2013). SGs are, however,

located within the vicinity of the participants hence distance would be less of a factor influencing participation in them. These and other factors can be grouped into household and individual characteristics.

Individuals live in households whose characteristics affect the individual's interactions in the community. These household characteristics include household size, farm area, disposable assets like livestock, and income. Weinberger and Jütting (2001) found that household size had a positive impact on the likelihood of women's participation in local organizations in Chad and the opposite in Kashmir, the difference in the result of cultural norms. This positive effect, they argued, was due to older children taking care of the young ones and allowing time for the women to attend group meetings. This was opposed to smaller households whose children were probably still young and could not help in taking care of each other, hence such women could not avail time for group meetings. Smaller households' nonparticipation has also been reported by Evans et al. (1999) in their study "Demystifying Nonparticipation in Microcredit: A Population-Based analysis". In this study, small size eligible households were more likely not to participate in BRAC programs. Household size also positively influences membership in RoSCAs Kimuyu (1999).

The farm area and the number of small ruminants (disposable assets) had positive effects on the likelihood of participation in Chad and negative effects in Kashmir. The positive effect has also been reported in Bangladesh in determining participation in BRAC's development programs Evans et al. (1999). The negative effect was reported by Kimuyu (1999). Income had mixed results, negative in Chad and Positive in Kashmir. The negative effect on participation with the argument that higher income brought along higher opportunity cost of participation, especially in terms of time. This is a result of a lot of time being spent in group meetings.

Value given to education of children by the household also positively influences the likelihood of women's participation in community groups. Women in families that sent most of their children to school were more likely to participate in community groups. Relatedly, Mpiira et al. (2013) found that having dependants in secondary school affected participation in SACCOs in Uganda. Kimuyu (1999) also found a positive relationship between participation in RoSCAs and having dependents in school as well as a regular income. Weinberger and Jütting (2001)'s study of "Women's Participation in Local Organisations: Conditions and Constraints" is significant to this study because savings groups are composed more of women than men. Therefore, factors affecting women's participation in community groups are vital in this study.

Kimuyu (1999) and Evans et al. (1999) found positive relationships between participation and households being female headed. Mpiira et al. (2013) found that participation in SACCOs was influenced by, in part, stability in income as measured by spousal income, being a salary earner and receiving a rental income. Other income stability indicators include having more than one source of income or credit, or produce sales as the main source of income. Carpenter and Jensen (2002) found that non-agricultural income significantly influenced participation in “Bissis” (Pakistani RoSCAs) in Pakistan. Uganda is an agriculturally based economy and agricultural income is very important especially to the rural households.

Individual characteristics are important because of differences among individuals even within the same household (Weinberger & Jütting, 2001, p.:1397). Weinberger and Jütting (2001) lists the individual characteristics as age and years of school attendance which together influence the bargaining power of an individual. They found that education and age positively influence the chances of women participation in the community groups. Lower education being associated with lower likelihood of participation was also reported by Evans et al. (1999).

2.5 Social capital factors

Individual members in SGs deposit their hard-earned cash in the SGs with the hope of retrieving it in a nearby future. The deposits are done while the member is aware that there is not any third party mandated to enforce repayment of the deposits in case of failure. An individual should feel confident that the SG will avail the money (given its membership) around the anticipated time. This retrieval should be hassle free and without loss of value. The SGs member gets the confidence of getting the money as anticipated by assessing the prevailing social capital of the SG. Social capital refers to the characteristics of society (especially trust (or distrust), norms of reciprocity and networks) that influence the success of coordinated actions (Putnam, Leonardi & Nanetti, 1994). Okello Candiya Bongomin, Munene, Ntayi Mpeera and Malinga Akol (2017) have detailed how trust, a central element of social capital, promotes financial inclusion in Uganda. Trust is the probability estimate by individual A that individual B will honour her commitments towards A (Ben-Ner & Putterman, 2001; Jøsang & Presti, 2004). In the case of SGs, “A” is an individual member and “B” is the SG considering its composition. Participation in a SG indicates that the member trusts the other SG members enough to deposit her savings with them. She further trusts that if any of the SG members borrowed her savings, they would repay at least the principal amount. This implies that she has assessed that: either the risk of losing her money is minimal, or the risk of saving with the SG

is worthwhile, that is, her risk aversion towards saving with the SG is low. Qualls and Puto (1989) define risk aversion as “preference for a guaranteed outcome over a probabilistic outcome having an equal expected value.” Trust and risk aversion are related in an inverse manner. The more trusting an individual is, the less risk averse (s)he is (Schechter, 2007). This relationship is explicit when the subject has information about the counterparts and is expecting a return on his or her investment (Eckel & Wilson, 2004). Members in SGs know each other’s characteristics well and they expect a return of at least financial services. Guiso (2012) notes that in the aftermath of the great recession there was decreased trust and increased risk aversion towards financial markets and financial intermediaries. According to Jøsang and Presti (2004), a transacting party will risk more of his capital when the probability of success (or reliability trust) of a transaction is high. Therefore, the more one trusts the more one is likely to participate in SGs.

Membership in community groups besides SGs is indicative of a community member’s social capital. The community groups provide the social networks necessary for getting information about community development initiatives (Okten & Osili, 2004) including SGs. Weinberger and Jütting (2001) found that women who were active in other informal community groups were more likely to participate in local development groups. Weinberger and Jütting (2001) attributed this to social capital stock of those active in other community groups. The social networks are important in generating trust and trust intermediation (Karlan, Mobius, Rosenblat, & Szeidl, 2009) necessary in executing transactions in SGs.

2.6 Impact of participation in SGs on agricultural productivity

Karlan *et al.* (2017) in randomized controlled trials of VSLAs in Ghana, Malawi and Uganda reported an insignificant positive relationship between membership in a VSLA and agricultural productivity proxied by food security index but a strong positive relationship between membership in a VSLA and financial inclusion. The lack of significance in agricultural productivity could be a result of the selection criteria causing the individuals in the groups to be more oriented towards non-farming income than participation in agriculture as there was a stronger positive impact in relation to non-farming business operations. If the members are agriculturally oriented, then there should be a positive significant impact on productivity. The same study found increased savings among group members which can be invested in agricultural productivity.

Ksoll *et al.* (2016) also in a cluster randomised trial in northern Malawi indicate that membership in a savings group increases the likelihood of using fertilizers for productivity enhancement in maize production, though they could not find evidence of yield increases pointing to reduction in the area cultivated among these members which could still point to increased yield per hectare. Therefore, there should be a positive correlation between membership in a savings group and agricultural productivity which this study intends to estimate by standardizing the hectarage. Dawuni *et al.* (2021) found a significant difference of 38% in agricultural value productivity between VSLA participants and nonparticipants which points to more use of modern technologies by the VSLA participants.

Any unit increase in fertilizer per hectare has positive significant effects on maize yields per hectare (Hill, Mejia-Mantilla, & Vasilaky, 2021; McArthur & McCord, 2017) therefore it is contradictory for Ksoll *et al.*, (2016) to report that group members used fertilizers but there was no significant difference in yield per hectare of maize. In a cross-sectional survey to establish the impact of micro-credit from VSLAs, Mnimbo, 2013 found that there is no significant increase in maize yield per hectare as a result of membership and activity in a VSLA but found that most of the credit, if used for agricultural related activities, were not for fertilizer purchases but rather to pay for labour which explains the limited yield increase per hectare.

All studies thus far on the impact of savings groups on productivity have been done on VSLAs only. This study will estimate the combined effect of both VSLAs and SILCs on agricultural productivity.

2.7 Summary of Literature Review

Financial services enhance productivity through enabling timely access to agro-inputs. This calls for inclusive financial service provision which SGs achieve among the rural smallholder farmers. SGs are unique from other RoSCAs and ASCAs because they provide savings and credit services as they fall due and credit service is not to the predetermined individual but to the most in need. The SGs overcome the shortcomings of formal financial services of distance and social capital. The factors that significantly influence participation in SGs, include: sex of the household head, income, age, education, distance to the financial facility, asset level (farm area and disposable assets), household size, having dependents in school, and income stability measured in part by spouse earning, agricultural income. SGs impact on productivity through



enabling purchase of agro-inputs. This impact was insignificant in Malawi but the SGs led to a 38% increase in productivity in Ghana.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Study area

This study took place in Uganda in the district of Sironko. This district lies at the foothills of Mount Elgon to the east of Uganda. Sironko has a population of 242241 people with 55865 households of which 91 percent are engaged in crop or animal production (Uganda Bureau of Statistics, 2017, p. 26). Sironko has caught the attention of the Government and International Fund for Agricultural Development through Profira (Project for Financial Inclusion in Rural Areas) to promote SGs and SACCOs to improve financial inclusion in the area. Profira is a project of the government of Uganda with a stated objective of sustainably increasing the access to and use of financial services by the rural poor. Profira operates in four of the twenty-one sub-counties of Sironko district. The four sub-counties include Masaba, Bumalimba, Buteza, and Buwalasi. Figure 2 shows the expanded map showing the sub-counties of Sironko district.

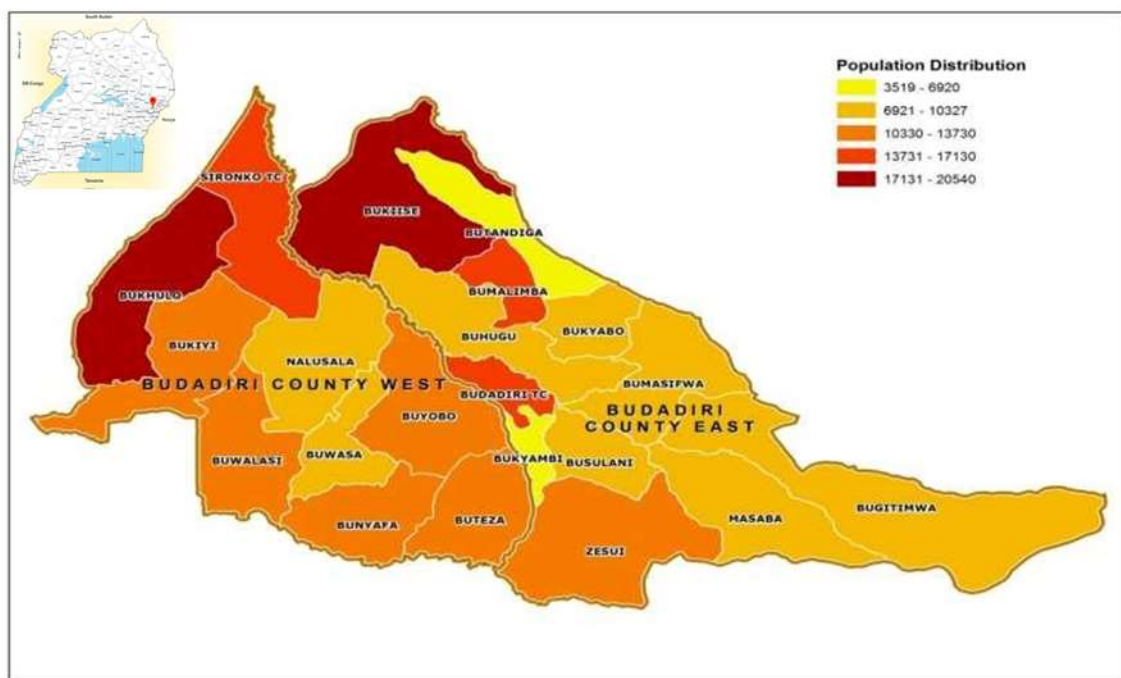


Figure 2: Expanded map showing the sub-counties of Sironko district.

3.2 Research design

This study involved predicting agro-input use and SGs participation. The variables to be measured were known and their corresponding values in the sample can be estimated. According to Leedy and Ormrod (2005), a research project with such characteristics calls for quantitative research methods as opposed to qualitative methods, which mainly describe and explain the purpose of the study. The study was a cross-sectional survey because it involved collecting data from a sample of the population at a single point in time. The target audience for the study are smallholders with limited information of communication technology opportunities as detailed in the National Population and Housing Census 2014 (Uganda Bureau of Statistics, 2017). Therefore, face-to-face interviews using a questionnaire as the instrument was the most feasible option.

3.3 Survey instrument

The study utilised a structured questionnaire. After the first stage of developing the questionnaire, it was pretested by using the social media application of WhatsApp with acquaintances who were prospective respondents in a nonparticipating region in Uganda. These respondents spoke the same language as those in the intended participating region. The questionnaire was pretested for the second time physically with other acquaintances in the same region as the first. The questionnaires were revised with other contracted enumerators carefully ensuring that each statement was understood by each enumerator and alterations made where necessary to suit local dialect. After this rigorous training of the enumerators, the researcher supervised several interviews by each enumerator until perfection. The survey was carried out by five enumerators in different sub-counties (four contracted and the researcher). The four extra enumerators were staff of Profira who were contracted to train community members in the formation and management of savings groups. These individuals were able to navigate the area better and were more welcome to the community as compared to a foreign person. This made data collection faster in terms of locating the respondents and administering the questionnaire.

3.4 Sampling

This study had two population groups, the population of SGs members, and that of non-savings group members. Within the population of SGs members, there were strata, that is, the SGs were each composed of between 4 to 90 individuals. While the population of the non-savings group members was uniform. Within the population of SGs members, stratified random sampling was used to obtain the respondents. Stratification within the SGs' population was to avoid sampling

disproportionate numbers from a single group. This ensured that the study was representative enough and more valid.

A “One stage one name” snowball sampling technique was used to obtain the respondents who were non-savings groups members (Goodman, 1961). The condition for naming was that the person named was a non-savings group member and was in the neighbourhood of the SG member respondent. This was to avoid sampling in villages where savings schemes have not been adopted. This mode of sampling was to eliminate comparisons with respondents who had not had the opportunity to become members of a savings group. The first stage was sampling the SGs members who then named a non SGs member to participate in the study.

All 300 SGs were entered into an excel program in tabular format with the corresponding contact details and addresses. The groups were sampled by simple random sampling using the excel function (=RAND). This function assigns a random number to each row within the table. The table was then put in descending order using the random numbers column. The first 125 groups were picked to be interviewed for the study

3.5 Sample size

To determine the sample, the study employed Yamane (1967:886)’s formula since the population size was not known beforehand. A confidence level of 95% was used, hence alpha level of (precision level) of 0.05. the sample size n was chosen by using the population size N , in the formula below where e is the precision equal to 0.05 $n = \frac{N}{1+N(e^2)}$ (Israel, 1992). The population size was established in the field. The number of groups and the corresponding group size was first established. The established figures were subject to the above formula to determine the sample sizes. Equal numbers of savings group members and non-savings group members were targeted. The sample size of the non-savings groups members was equal to that of the sample size of the savings group members.

While in the field, the number of SGs registered with the district community development office was 300, hence the population size of SGs was 300. Because employing “one stage one name” snowball sampling, the target population of non-savings groups participants was also 300. Therefore, the total target population was 600. Yamane (1967) formula was used to get the sample size of 240 respondents. Actual respondents surveyed was 249. This sample was drawn from twenty of the twenty-one sub-counties in Sironko district, the number of

respondents per subcounty depended on the number of SGs selected randomly from that subcounty.

3.6 Data collection

The study utilised both secondary and primary data. Secondary data was obtained from Sironko district in the form of records of savings groups in the district, and a copy of the 2014 census for Sironko district. The list of savings groups was used to get the sample savings groups from which respondents were chosen. A similar list of SGs was also obtained from Profira and comparisons were made for omissions and repetitions before a final list was compiled for sampling. The lists contained the contact persons of each SG and a community-based facilitator for SGs formed with the assistance of Profira. These community-based facilitators later aided in enumeration of the study participants.

The primary data were obtained through face-to-face interviews by administering a structured questionnaire. The respondents were obtained by randomly selecting a savings group from the groups obtained from the district. Randomness was ensured using Excel by making use of the function “Rand”. The groups from the district were first arranged in alphabetical order using sub-county in a tabular form. After all the materials were ready for field, the Random function was applied to determine the savings groups and sub-counties that were going to participate in the study.

3.7 Data management and analysis

Excel was used to capture the data. All the variables were put as headings in an Excel table while maintaining the chronology of the questionnaire to make it easy for data entry. The entries were made by two people, one reading and the other entering. During the entry, anomalies in the filling of questionnaires were noted on the questionnaires and the corresponding enumerator requested to contact the affected respondent (either by phone or physically, whichever was easier) for clarification and filling of gaps. This was possible because the data were captured within one week of field work and close to the study area. The field work took ten consecutive days. Therefore, the respondents had not yet forgotten about the study. This made it possible to limit missing values as much as possible. The data was checked for inconsistencies and where necessary the questionnaires were checked for verifications. The questionnaires were carried along to the university in case any need arose.

Categorical entries were then coded accordingly before exporting to STATA, the software used for analysis.

The software package Stata was used to summarise the findings of the study to obtain descriptive statistics, correlations and regressions.

To test hypothesis one, the mean expenditure on agro-inputs members using funds from savings groups was used. A t-test was used to test whether this mean was significantly different from zero.

To test hypothesis two, the difference in the means between expenditure by savings group members and non-savings group members was calculated. A t-test was used to test whether the difference was significantly different from zero.

Hypothesis three was tested by running a Probit regression. An F-statistic was used to test for the validity of the regression and t-statistics were used to test for significance of individual independent variables.

3.8 Model specification

3.8.1 Identify the factors that determine participation in a savings group

3.8.1.1 The Probit model

An individual is faced with a choice between participation and non-participation in SGs. Therefore, there are two nominal choices, that is participation or non-participation. Because of the probabilistic nature of the choices, a Probit model was used to estimate the probability of participation. The Probit model was estimated as follows:

Participation (Y) in SGs was defined as:

$$Y = f(X_i)$$

Y is participation in SGs,

X_i is the set of independent variables which include household characteristics, economic characteristics, and social capital characteristics.

However, Y is dichotomous. That is $Y = 1$ (for participants) or $Y = 0$ (for nonparticipants). Therefore, the probability of getting 1 or 0 was estimated hence the Probit model. The Probit model estimates participation through a latent variable of Y .

let the latent variable of Y_i be Y_i^*

$$Y_i^* = \beta_0 + \beta_i X_i + \varepsilon, \varepsilon \sim N(0, \sigma^2)$$

β_0 is the regression constant

β_i is the regression coefficient for independent variable X_i

X_i are the independent variables

ε is the error term assumed to be normally distributed with mean = 0 and variance = σ^2

The observed Y_i is such that

$$Y_i = \begin{cases} 0 & \text{if } Y_i^* \leq 0 \\ 1 & \text{if } Y_i^* > 0 \end{cases}$$

The effect of a unit change in X_i on Y is not constant as it depends on the values of other X 's (O'Halloran & Econometrics, 2013). Therefore, marginal effects were estimated at the means.

3.8.1.2 The independent variables used to estimate the Probit model

Participation in SGs was estimated using the dependent variable “whether active in any SG” labelled SG. This follows the models used by Mpiira et al. (2013); Weinberger and Jütting (2001); and Li, Sarkar, Xia, and Memon (2021). The variables used to estimate the model are presented in Table 3-1. The model below (Equation 1) was specified to identify the factors that influence this probability.

$$\text{Probit}(\text{SG}) = f(\text{HHhead_gender}; \text{Lage}; \text{Lage2}; \text{EDUC}; \text{sqrdependants}; \text{CH2NDRY}; \text{Lincomehat}; \text{Lincomehat2}; \text{FARMINC1}; \text{13VALUES}; \text{No_Inc_sour}; \text{OTHER_EARN}; \text{GPS_1}; \text{01TRUST}; \text{28SUPPORT})$$

1

Table 3-1 Independent variables used to estimate the Probit model

Variable label	Variable description	Expected sign
Household characteristics		
HHhead_gender	Dummy, household head is female	+,-
Lage	Log of age	+
Lage2	Log of age squared	-
EDUC	Number of years in education	+
Sqrdependants	Square root of number of dependents	+
CH2NDRY	Dummy, has a child in secondary school	+
Economic characteristics		
Lincomehat	Predicted income	+
Lincomehat2	Predicted income squared	-
FARMINC1	Dummy, farming is main source of income	-
No_Inc_sour	Number of income sources	+
OTHER_EARN	Dummy, spouse earns	+
Social characteristics		
GPS_1	Number of community groups active in, other than SGs	+
SGs model characteristics		
_01TRUST	Trusts members in SG	+
_28SUPPORT	Requires External support join a SG	-
13VALUES	Loan values from SGs are satisfactory	+

3.8.1.3 Intensity of participation

After estimating participation, two ordinary linear least squares (OLS) models were estimated using a Heckman model. The Heckman model helps to eliminate the sample selection bias as a result of self-selection into participation in SGs. Intensity of participation indicates how much a SGs member is using the services in a SG. This was estimated using the dependent variables:

1. Frequency of getting loans from SGs by the SGs members
2. Total savings in the SGs at share-out by the member.

Equation 2 estimates the frequency of getting loans from SGs by the SGs member while equation 3 estimates total savings in the SGs at share-out by the member.

LFRE_18=f(gender;Lage;Lage2;sqrdependants;Lincomehat;Lincomehat2;FARMINC1;OTHER_EARN;RENT_LAND;WHETHERHAD2018GOVSUBSIDY;ROSCA;_01TRUST;SGP_1_groups;FRE_17;IMR06may252) 2

LSHARE_17=f(gender;EDUC;Lincomehat;Lincomehat2;FARMINC1;No_Inc_sour;RENT_LAND;WHETHERHAD2018GOVSUBSIDY;GPS_1;_28SUPPORT;SGP_1_groups;FRE_17;LMALE_percent;LT_PRICE;sqrtSG_SIZE;No_Loan_sour1;ROSCA;IMR06may252)

3

Frequency of getting loans from the SGs was estimated using the dependent variable “Log of frequency of getting loans in 2018” labelled “LFRE_18”. The independent variables used to estimate this model are presented in Table 3-2. Total savings in the SGs at share-out by the member was estimated using the dependent variable “Log of total share out in 2017” labelled “LSHARE_17”. The independent variables used to estimate this model are presented in Table 3-3.

Table 3-2 : Independent variables used to estimate LFRE_18

Variable labels	Variable description	Expected sign
Household characteristics		
gender	Dummy, respondent is female	+
Lage	Log of age	+
Lage2	Log of age squared	-
sqrdependants	Square root of number of dependents	+
Economic characteristics		
Lincomehat	Predicted income	+
Lincomehat2	Predicted income squared	-
FARMINC1	Dummy, farming is main source of income	+
OTHER_EARN	Dummy, spouse earns	+
RENT_LAND	Dummy, rents some land for farming	+
WHETHERHAD2018GOVSUBSIDY	Dummy, got a government subsidy in 2018	-
Social characteristics		
ROSCA	Dummy, is active in RoSCAs	-
SGs model characteristics		
_01TRUST	Trusts members in SG	+
SGP_1_groups	Dummy, share-out month	+,-
FRE_17	Number of times got loans from SGs in 2017	+
IMR06may252	Inverse Mill's ratio	

Table 3-3 : Independent variables used to estimate LSHARE₁₇

Variable labels	Variable description	Expected sign
Household characteristics		
Gender	Dummy, respondent is female	+
EDUC	Number of years in education	+
Economic characteristics		
Lincomehat	Predicted income	+
Lincomehat2	Predicted income squared	-
FARMINC1	Dummy, farming is main source of income	+
No_Inc_sour	Number of income sources	+
No_Loan_sour1	Number of loan sources other than SGs	-
RENT_LAND	Dummy, rents some land for farming	+
WHETHERHAD2018GOVSUBSIDY	Dummy, got a government subsidy in 2018	+
Social characteristics		
GPS_1	Number of community groups active in, other than SGs	-
ROSCA	Dummy, is active in RoSCAs	-
SGs model characteristics		
_28SUPPORT	Requires External support join a SG	-
SGP_1_groups	Dummy, share-out month	+,-
LT_PRICE	Log of total minimum savings per week	+
sqrtSG_SIZE	Square root of SGs size	+
FRE_17	Number of times got loans from SGs in 2017	+
LMALE_percent	Log of percentage of males in the SGs	+
IMR06may252	Inverse mill's ratio	

3.8.2 To determine the proportion of expenditure on agro-inputs from savings groups.

This objective established whether the SGs participants use any money from SGs to finance their agro-input purchases. To determine this, the study collected data on total expenditure on agro-inputs and total expenditure on agro-inputs using finances from SGs. Ratio of “total agro-input expenditure using SGs finances” to “total expenditure on agro-inputs was computed. This was put in percentage form for ease of comparison.

3.8.3 To determine the impact on expenditure on agro-inputs of membership in a savings group.

To determine the impact, the study first established if the means of the two independent groups, that is SGs participants and SGs non-participants, are significantly different. That is, the

difference between their mean expenditures on agro-inputs was not zero (section 3.8.3.1). The next step was to establish if this mean difference was not due to selection bias (section 3.8.3.2)

3.8.3.1 *Mean difference in expenditure on agro-inputs by SGs participants and non-participants*

The variable “SG” is made up of two independent groups that is SGs participants and SGs non-participants. To test if the difference, if any, in their mean expenditures on agro-inputs and other measures of expenditure on agro-inputs was significantly different, a t-test was used. The t-value is the ratio of the difference between the sample means of the variables in question and their respective standard deviations. The t-value indicates how far the difference of the two means is from zero (no difference). The larger the t-value, the larger the difference and hence the more significant the difference is (Nesselroade Jr & Grimm, 2018).

The t-value was used to test the following hypotheses :

$$H_0 : \mu_{SG} = \mu_0$$

$$H_1 : \mu_{SG} - \mu_0 \neq 0$$

Where:

μ_{SG} is the sample mean of the total expenditure on agro-inputs by SGs participants

μ_0 is the sample mean of the total expenditure on agro-inputs by SGs non-participants

3.8.3.2 *Impact while taking care of the selection bias in participation in SGs.*

The study collected data on SGs whose membership may not have observed proper randomisation due to voluntary participation. As a result, the characteristics of SGs participants might have differed from those of SGs non-participants. Additionally, the study participants were not selected randomly. This is because a list of SGs participants was provided by the Sironko district local government. The SGs participant who participated in the study referred a non-SGs individual to participate in the study. Therefore, selection of all study participants was not as random as it should be in a randomised experiment. Assessing the impact of SGs in such an observational study would be biased. Therefore, the study employed a propensity score matching (PSM) method to care for the bias involved in selection of SGs participants as well as nonparticipants (Bryson, Dorsett, & Purdon, 2002).

Propensity score matching (PSM) pairs treatment and control units with similar values on the propensity score and disregard the unmatched units (Thavaneswaran & Lix, 2008). The

propensity score is the conditional probability of receiving a particular treatment given observed characteristics (Caliendo & Kopeinig, 2008; Rosenbaum & Rubin, 1983; Thavaneswaran & Lix, 2008). In observational studies such as this one, there is no random assignment of treatment (that is participation in SGs) to the subjects, a condition necessary for any inferential causal effects (Thavaneswaran & Lix, 2008). The outcome may be a result of the differences between subjects on their characteristics and not due to the treatment. PSM, therefore, recreates the state in which the treated subject would be if the treatment was not administered but with the untreated subject. PSM is used to eliminate the effect of selection bias caused by self-selection into participation in SGs.

The estimated propensity score $e(x_i) = Pr(G_i=1/x_i)$

Where: x_i is a vector of observed covariates for subject i , $G_i=1$ for treated, $G_i=0$ for the control.

The propensity scores can be calculated using the logistic regression detailed by Thavaneswaran and Lix (2008).

Propensity scores were used to identify SGs participants and nonparticipants whose characteristics or chance of participation in SGs was similar. The average effect of the treatment on the treated (ATT) was preferred over the average treatment effects (ATE). This is because ATT would show the average effect of the SGs on those who participated in SGs. Implementation of SGs would target financially excluded individuals. The impact on such a group is preferred over the population-wise ATE (Bryson et al., 2002).

PSM was made possible under the three assumptions detailed by Bryson et al. (2002, pp. 10-11). Firstly, the Conditional Independence Assumption (CIA). CIA assumes that all the observable differences between the SGs participants and SGs non-participants have been controlled for. This assumption is important to attribute any effect on total agricultural expenditure to membership in a savings group. The second assumption is that of the stable unit treatment value (SUTVA). That is the impact of SGs on one SGs participant is independent of any other participant and how many others in the participant's savings group or SGs. SUTVA helps us to attribute any effects of SGs on total expenditure on agro-inputs to a single SGs participant. The assumption is that there was no peer influence to participate or not to participate in the SGs. That is, the decision to participate is completely independent.

Propensity scores were estimated using the Probit model of STATA software using variables listed in Table 3-4. The propensity scores were estimated with the common support

requirement (CSR). CSR ensured that only SGs participants with a combination of characteristics observed among the SGs non-participants were used in the matching process. After obtaining the propensity scores, the Kernel matching method was used to compare the treated group to the untreated group. Kernel matching method compares each treated observation to the weighted average of the untreated observations. The weights used in this method are inversely proportional to the distance between the treated and the untreated group. The ATT for total expenditure on agro-inputs as the outcome variable was estimated using the equation below:

$$ATT = E(Y1|p(X)) - E(Y0|p(X))$$

3.9 Methods summary

The study used data collected in 2018 through a cross sectional survey from 250 participants. These participants were drawn from Sironko district, eastern Uganda, East Africa. A structured questionnaire was used to conduct the face-to-face interviews. To determine the proportion of agro-inputs financed through the SGs, the study computed the ratio of “total agro-input expenditure using SGs finances” to “total study computed the ratio expenditure on agro-inputs. A t-test was calculated to determine if any difference in expenditure on agro-inputs was significant and ATT to determine if there was a significant difference in the expenditure on agro-inputs due to participation in SGs after discounting for selection bias between participants and non-participants. The study employed a Probit model to investigate the determinants of participation and intensity of participation.

Table 3-4: Baseline variables used in calculation of propensity scores for participation in SGs.

Variable label	Variable description
Individual variables	
Lage	Natural log of age
Gender	Sex of respondent
Status	Marital status, (single, married, divorced, widowed)
Hhhead_gender	Sex of the household head
Hhh	= 1 if household head, 0 otherwise
Educ	Number of years in education
Household size variables	
Sqrdependants	Square root of number of dependents
Ch_pr	Number of children in primary school
Ch_coldummy	= 1 if has any children in college, = 0 otherwise
Ch2ndry	=1 if has any child in secondary school, 0 otherwise
Depend_sch	percent of dependents going to school
Income variables	
No_inc_sour	Number of income sources
Wk_inc	= 1 if has an income at least once every week, 0 otherwise
Farminc1	1 if farm income is most important income source, zero Otherwise
Saveusedstar	Main expenditure item of savings from the list: emergencies like illness, education, business capitalization, agro-inputs, home assets like land
No_loan_sour1	Number of loan sources less one for SGs members.
Other_earn	= 1 presence of another earner in the hh
Rent_land	= 1 if rents land, = 0 if does not rent land
Cereals	Maize (mainly), but also millet, rice
Cattle	Cows and bulls
Shipgot	Sheep and goats
Poultry	Chickens, ducks
Othermammal	Pigs, rabbits
Social variables	
Leaderpost	Number of community groups with leadership positions

CHAPTER FOUR

CHARACTERISTICS OF THE FARMERS OF SIRONKO DISTRICT

4.1 Introduction

This chapter characterises the sample. Understanding the characteristics of the sample gives attributes of a typical individual in the study. The chapter will discuss the characteristics of the general sample in section 4.2 followed by savings groups (SGs) participation in section 4.3, respondents' characteristics while contrasting SGs participants and nonparticipants in section 4.4, and lastly, a summary of the chapter in section 4.5.

4.2 General characteristics of the sample

In this section, the sample is characterized by social demographic and economic characteristics in subsection 4.2.1, social relationships of the individuals in the family are detailed in subsection 4.2.2, and lastly, expenditure levels on agro-inputs in subsection 4.2.3.

4.2.1 Social demographic and economic characteristics

The characteristics of the households influence the household's behaviour and response to development challenges or agricultural technologies interventions. This section details both household characteristics, such as household size and household head sex and individual characteristics of the respondent such as education, age, and marital status. This section also discusses economic characteristics of the respondents. These characteristics are important in resilience to economic stresses and the ability to take up opportunities that households come across. The economic characteristics discussed include the income and how the income is received by the respondent, how savings are made and loan avenues of the respondents.

4.2.1.1 *Household size and number of children in school*

Household size is especially important to the availability of the adults for participation in community groups or even available funds for savings or expenditure on agro-inputs. Respondents in Sironko district live typically in households with seven (7) members (Table 4-1).

Children in secondary school demand school fees and other school-related materials. Their number in a household, influences education expenditure. Typically, households have about one child in secondary school (Table 4-1). A closer look shows that nearly two-thirds of the households have no child in secondary school. These households with no children in secondary

may be composed of young parents whose children are yet to attain the age of thirteen (13 years). Thirteen is the official age at which children join secondary school in Uganda. However, only 35 percent of children between 13 and 18 years are enrolled in secondary schools in Sironko district in contrast to the national average of 44 percent (Uganda Bureau of Statistics, 2017). This figure gives an indication of why so many households do not have children in secondary school. Of those with children in secondary school, only a quarter of the respondents have three and above children in secondary schools.

Table 4.1: Demographic characteristic of the respondents

Characteristic	N	Mean	Sd	Min	Max	Median	75 th percentile
Household size	248	6.95	3.09	1	16	7	9
Number of children in secondary school	249	0.74	1.13	0	5	0	1
Years of education	249	8.22	3.71	0	16	7	11
Age	249	40.39	12.68	18	81	39	48

4.2.1.2 Respondent age and education

The age influences individuals' decisions and preferences and it reflects experience. The typical respondent in the sample was about 40 years old with the oldest being 81 years (Table 4-1). Most of the respondents were between 34 and 60 years followed by early adults of 24 to 34 years old (Figure 4-1). These two age groups are the most economically active.

Education of an individual is especially important as it brings along the level of numeracy, which is especially important in the SGs. A typical respondent has just completed one year in ordinary level (O-level), and an equivalent of 8 years of education by the Ugandan education system (Table 4-1). When grouped (Figure 4-2), about half of the sample has had between one and seven years of education (that is primary education) followed by those with O-level making about one third of the sample and 16 percent attaining higher education levels. The 16 percent include those who have attained college education after O-level. The achievement of this level of education in Uganda is due to education getting more expensive at each higher level. Therefore, those who cannot afford the education costs at higher levels drop out.

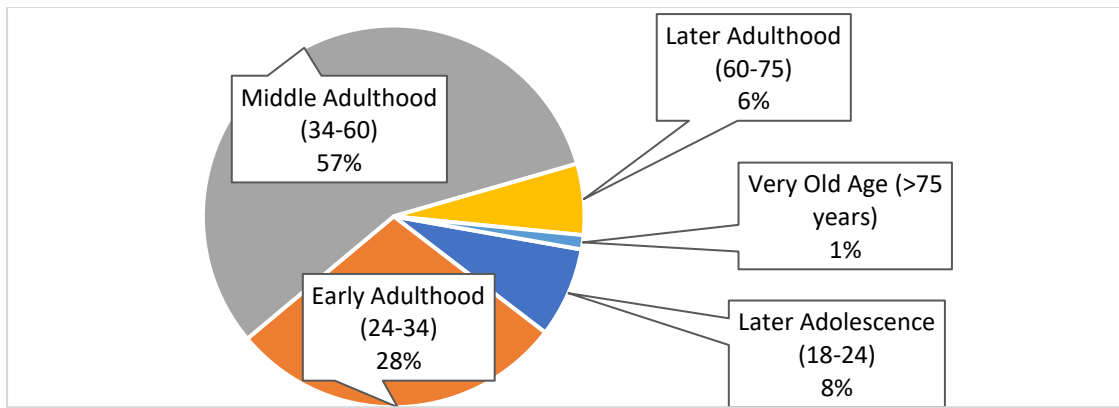


Figure 4-1 Respondents by age groups

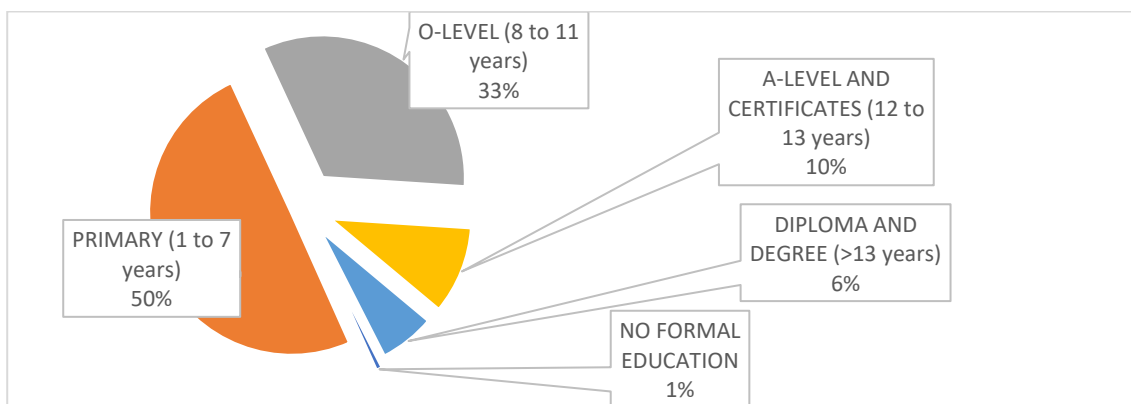


Figure 4-2 Respondents by education level

4.2.1.3 Respondent sex, marital status, and relationship to household head

Respondent sex is important to this study because differences in sex may result in differences in preferences and availability. Sex also leads to differences in predisposition to important household assets.

More males participated in the study as respondents (Table 4-2). This is because males are more involved in the leadership of SGs. The methodology of getting the respondents was such that the district headquarters provided the list of SGs. This list had only the contacts of the group leaders. This list had more males than females. The SGs members who participated in the study were requested to refer an acquaintance who was not a SGs member to participate in the study. Acquaintances are usually of the same sex, this led to the more males in the whole study.

Household head sex is important in savings groups participation. A typical household where the head is male, may require that the female (wife) consults the husband on whether to participate. In female-headed households, who may be usually single, divorced, or widowed may decide independently to participate in SGs. Less than 12 percent of the households were female-headed in contrast to 21 percent for the district reported in the national population and housing census 2014. In Uganda, husbands are the *de-facto* heads of the household, especially when both the husband and wife are living in the same household. The wives are *de-facto* household heads in cases where the husbands have migrated to the cities for employment opportunities. Females are household heads when they are unmarried, divorced, or widowed. Since most respondents were living in households as married couples (Table 4-2), most of the respondents reported were males as household heads in addition to males living in unmarried, divorced, or widowed households. This led to the difference between the district average and the sample.

Table 4.2: Sex-related characteristics of the respondent and household head

Characteristic	N	Freq.	Percent
Sex of respondent	249		
Male		134	53.82
Female		115	46.18
Sex of the household head	211		
Male		204	88.31
Female		27	11.69
Relationship of respondent with the household head	249		
Household head		153	61.45
Wife		78	31.33
Child or relative		18	7.23
Marital status	249		
Married		204	81.93
Divorced or widowed		20	8.03
Single		25	10.04

The relationship of the individuals to the household head is important in the decision cycle regarding participation or expenditure on agro-inputs as well as predisposition to household resources. Less than 40 percent of the respondents were not the heads of their households. Of these, more than 80 percent were wives in the households. Therefore, almost all the respondents were empowered to provide information about the household.

Marital status of individuals is important both in the decision-making cycle and predisposition to household resources like land. This is especially so for females as they may have limited rights on land ownership. In the sample, all respondents were married with only 18 percent largely not yet married (Table 4-2).

4.2.1.4 Monthly income and income per capita

Monthly income determines the living conditions of the household as some amenities or needs may be determined by how much one earns. Some respondents had no income while others had as much as 4.6 million Uganda shillings (Table 4-3). However, 50 percent of the respondents earn under 300 thousand Uganda shillings and 75 percent earn under 500 thousand Uganda shillings.

The income per capita removes the biases of household size on the incomes of individuals. The income per capita is the respondent income divided by the household size. The income per capita is how much the respondent earns per household member. Larger households require higher incomes for basic needs which reduces disposable income for development projects or investments. Three quarters of the respondents earn under 81 thousand Uganda shillings per household member (Table 4-3).

Table 4-3: Monthly income and monthly income per capita, Uganda shillings

Variable	N	Mean	Std. Dev.	Min	Max	Median	75 th percentile
Monthly Income	249	428200.8 (114.71)	524762.5 (140.58)	0	4600000 (1232.32)	300000 (80.37)	500000 (133.95)
Monthly Income per capita	248	74889.37 (20.06)	126518.4 (33.89)	0	1333333 (357.19)	42857.14 (11.48)	80625 (21.60)

Equivalent United States Dollars in parentheses below the corresponding figure

4.2.1.5 Sources of income and regularity of earning

Income sources together with regularity of earning are important factors in income stability which is very important in SGs participation. SGs lead to financial commitments, usually weekly, that must be honoured.

Respondents ranked their sources of income from the least important to the most important. Table 4-4 shows the most important source of income to the respondents. Farm sales is the most important source of income to more respondents than any other source of income. Farm



sales is the income from sale of produce and other farm products like dairy and cereal. Farm sales is expected to be more important than other income sources to most households because agriculture is the main activity in this district and Uganda as a whole. Small businesses involve trading in produce and farm supplies and household goods. Small businesses are important in the community to facilitate the exchange of goods. The small businesses are most important to the second largest proportion of respondents. Formal employment provides income to a small proportion of the respondents. This is especially so as Sironko district is largely rural. Most formally employed individuals are employed as schoolteachers. Part time employment serves to provide agricultural labour to households that require it. Nearly 22 percent of the respondents derive their income from part time employment.

More income sources help to diversify income. Respondents in the sample have diversified by having more than two income sources (Table 4-4). Only 30 percent of the respondents have less than three income sources. More income sources also help to stabilize income. Income from different sources may be earned in different frequencies hence having income throughout a month or year. More than one income source is common in Sironko district because smallholders supplement their farm incomes with small businesses or hiring out their labour during peak season when labour is in high demand.

How often an individual earns influences the financial commitments. It may be difficult to commit to daily schedules of payments if your income is monthly or irregular. Largely, all respondents have at least a daily or weekly income. Less than 12 percent of the respondents have a monthly income and 38 percent of the respondents have incomes that come in irregularly (Table 4-4). Considering the earliest income of the respondents, only 16 percent of the respondents do not have a known income at least once a week.

Availability of another earner provides both a fallback position and increase in household income. This significantly increases disposable income of individuals as household expenses are shared among the earners. The importance of any income is enhanced by the frequency of earning it. This is especially so depending on the schedule of the financial commitments. To the respondents, if the other household earners' frequency of earning is within the schedules of the respondent's financial commitments, then this provides an insurance especially when there are repercussions for not honouring the commitments. Three quarters of the respondents' spouses had a form of income. In Table 4-4, only 75 percent of respondents' spouses earned,

25 percent of the respondents did not have anyone earning in the household. Almost all the respondents' spouses earn either weekly or irregularly.

Table 4-4: Income source and regularity of earning

Characteristic	N	Frequency	Percent
Main source of income	247		
Small business		69	27.94
Farm sales		108	43.72
Formal employment.		16	6.48
Part time employment		54	21.86
Number of income sources	247		
One income source		7	2.83
Two income sources		68	27.53
Three income sources		78	31.58
Four to five income sources		94	38.06
Regularity of earning			
Daily or weekly income	249	206	82.73
Monthly income	249	29	11.65
Irregular income	249	95	38.15
Regularity of earliest income	247		
Daily or weekly		206	83.4
Monthly		2	0.81
Irregular		39	15.79
Regularity of earliest income by spouse	186		
Daily or weekly		121	65.05
Monthly		3	1.61
Irregular		62	33.33

4.2.1.6 Importance of agricultural income to the household and frequency of agricultural sales

The importance of agriculture as a source of income, let alone food, influences the commitment to invest in it, in the form of purchased agro-inputs, especially variable inputs. Most of the respondents consider agricultural income as either their most important source of income or their second most important source of income. A few, with many sources of income, hardly find any importance in agricultural income placing it as either fourth or fifth in their income sources (Table 4-5).

Agricultural income may be used to solve day-to-day small financial commitments or bigger commitments like land purchase or school fees. The frequency of the agricultural income is of

particular importance to those whose most important source of income is agriculture. Table 4-5 shows nearly three-quarters of the respondents make their sales at least weekly with another good fraction selling irregularly or have not monitored how often they make their sales.

Table 4-5: Importance of farm income and regularity of farm sales

Characteristic	N	Frequency	Percent
Level of importance of farm sales	249		
Most important		110	44.18
Second most important		88	35.34
Third most important or lower		40	16.06
Do not sale any produce		11	4.42
Regularity farm sales	238		
Daily or weekly		174	73.11
Fortnight or monthly		6	2.52
Irregular		40	16.81
Biannual, annual		18	7.56

4.2.1.7 How the respondents save their money and sources of loans

Saving for the future, for both emergencies and planned expenses like school fees is paramount to any one individual. Like the savings, the form of saving is important as it influences liquidity and ease of access to make the savings. It may also influence your sources of loans. Table 4-6 details the preferences of forms of saving by the respondents.

SGs, physical assets at home, and cash are the most important form for saving by the respondents. Physical assets and cash are the second most important form of saving. The bank is the least preferred form of saving. Preference for the SGs, cash and physical assets is partly due to ease of saving and access to the savings in time of need. Some respondents reported not making any savings or having a second or third choice to save money.

Loans are used to solve emergent issues among the households when the savings are depleted or difficult to access. The loans are also important to solve current challenges against future income. The ease of access and availability of the loans from different sources differs from individual to individual. From Table 4-6, SGs are the most important source of loans to about 41 percent of respondents, surpassing by far any other source of loans. Generally, the respondents are well diversified in their sources for loans. Shops and friends are the most preferred as a second source of loans to most of the respondents.

Table 4-6: Forms in which respondents save their money and sources of loans.

Characteristic	N	Freq.	Percent
Most important form of saving	237		
Savings groups		76	32.07
Physical assets		65	27.43
Cash, mobile money		62	26.16
RoSCAs, festivals groups		19	8.02
Bank		15	6.33
Second most important form of saving	213		
Savings groups		24	11.27
Physical assets		71	33.33
Cash, mobile money		76	35.68
RoSCAs, festivals groups		38	17.84
Bank		4	1.88
Third most important form of saving	184		
Savings groups		14	7.61
Physical assets		55	29.89
Cash, mobile money		71	38.59
RoSCAs, festivals groups		39	21.20
Bank		5	2.72
Most important source of loans	217		
Savings groups		101	46.54
RoSCAs		34	15.67
Bank, saccos, money lenders		40	18.43
Shops, friends		42	19.35
Second most important source of loans	211		
Savings groups		18	8.53
RoSCAs		47	22.27
Bank, saccos, money lenders		23	10.90
Shops, friends		123	58.29
Third most important source of loans	175		
Savings groups		5	2.86
RoSCAs		15	8.57
Bank, saccos, money lenders		14	8.00
Shops, friends		141	80.57

4.2.2 Social relations

4.2.2.1 *Participation in community*

Community groups are a common way in which community members aggregate to solve social problems, foster community ties, or celebrate an achievement. This study identified SGs,

rotating savings and credit associations (RoSCAs), burial groups, prayer groups, festivals groups, political groups, drinking groups, and savings and credit cooperatives (SACCOs) as the predominant community groups in Sironko district. In festivals groups, individuals save money purposely to afford otherwise expensive food items during annual religious related festivals. The drinking groups involve individuals pooling resources to afford local brews that community members consume in group settings. Prayer groups were groups formed for members to congregate to pray together outside church or mosque hours. Burial groups included those groups that come to the aid of a believed household or member in form of providing funeral related services.

Individuals participate in different community groups to achieving different objectives, depending on the objective of participation in each community group. Therefore, individuals attach varying levels of importance to each community group they are active in. This level of importance influences the commitment level individuals accord to the activities of such groups. Respondents were asked to rank order the community groups that they were active in, indicating the most important to the least important. Nearly 85 percent of the respondents find financial service-related community groups as their most important group. Only about 15 percent of the respondents report non-financial groups as their most important community groups. Financial services groups included SGs, RoSCAs, SACCOs, and festivals groups. The non-financial groups included burial groups, prayer groups, political groups and drinking groups. The financial services groups are most important to most individuals because these groups involve individuals' savings (Table 4-7).

The respondents were active in more than one type of community group. The number of different types of groups indicate how crosscutting individuals are in the community and how sociable they are. A typical respondent was active in 2.5 community groups. However, 22 percent of the respondents were not active in any community group. 78 percent of the respondents are active in at least one type of community group (Table 4-7).

The number of leadership positions in different types of community groups indicates how much the community trusts such individuals. Up to 66 percent of the respondents have been entrusted with a leadership position in the community with some entrusted in up to six different community groups (Table 4-7)

4.2.2.2 *Trust in SGs*

SGs take deposits from members and either loan the cash immediately to interested members or hold the cash for safe custody. The cash is stored in a locked cash box with one of the members. Individuals feel insecure due to robbery or non-payment of loaned money or even sharing of the proceeds.

Table 4-7: Community groups in which respondents are active.

Characteristic	N	Freq.	Percent
Number of community groups of which the respondent is a participant	249		
0 (not active in any community group)		55	22.09
1		25	10.04
2		40	16.06
3		63	25.3
4		40	16.06
More than 4		26	10.44
Type of community groups	194		
Savings groups		118	60.82
Other financial services groups		47	23.71
Non-financial services groups		29	14.95
Number of leadership positions	194		
0		65	33.51
1		56	28.87
2		39	20.1
3 to 6 positions		34	17.53

These cases of robbery and non-payment impact directly on individual participants. Depending on the risk attitude of individuals, different levels of trust occur (Table 4-8). Only six percent of respondents disagree that members in SGs trust each other in contrast to 80 percent that agree.

4.2.2.3 *Value of loan accessed in the SGs*

The SGs on-lend the savings within the savings period. The value of credit accessed by a borrower is determined by the size of the loan pool and the number of borrowers each time. The loan pool is at most the total savings of the members if no savings have been available before. A borrower may need more money to borrow than the SG loan pool can offer, taking into consideration other borrowers at the same time. Because of these limitations, SGs satisfy community members to different levels shown in Table 4-8.

4.2.2.4 *Support to SGs*

SGs as a financial service was pioneered by Care International. It is introduced in a community when a person knowledgeable in the way SGs work introduces it to a target population. It is important for prospective members to understand how the SG model functions and the benefits and demands of the SGs before joining. This is because the success of the SGs depends on proper bookkeeping and adhering to byelaws. The training in the mode of operation of the SGs is usually done by NGOs or government extensionists trained in the models. In Uganda, the government extensionists are facilitated by Profira operational in a few select districts, including Sironko. The SGs model easily self-replicates in the community after it is introduced by a knowledgeable person. This is achieved when a member from a supported group forms another SG with untrained members or new untrained members seek the services of a community trainer (which may be at a cost).

Table 4-8: Trust in SGs, loan values, and external support

Characteristic	N	Freq.	Percent
There is trust in SGs	249		
Strongly agree		150	60.24
Agree		55	22.09
Neutral		29	11.65
Disagree		11	4.42
Strongly disagree		4	1.61
Loan values in SGs are adequate	249		
Strongly agree		101	40.56
Agree		66	26.51
Neutral		53	21.29
Disagree		19	7.63
Strongly disagree		10	4.02
Requires external support	249		
Strongly agree		17	6.83
Agree		19	7.63
Neutral		18	7.23
Disagree		58	23.29
Strongly disagree		137	55.02

Some community members are not easily convinced by fellow community members and require listening to an external trainer especially from NGOs to understand and join a SG. The NGOs sometimes use the SGs to reach out to the needy, so some community members join SGs anticipating this. Therefore, community members will require external support for either

training or subsidies but at different levels as shown in Table 4-8. The respondents were asked the question “do you require external support before joining a SG?”

4.2.3 Agricultural enterprises and agro-input expenditure

Agriculture provides income besides food to households in Sironko. The expenditure that households commit to it may determine the yields or productivity of the household’s different sectors of farming. This section details the gross amount of expenditure first in total terms and then the percentage of the households’ annual income committed to agro-inputs annually. It also explores the percentage contribution of individual agro-inputs to the total expenditure on agro-inputs.

4.2.3.1 Farming enterprises

Crops of different types, provide both food and supplement the incomes of households. The respondents grow a variety of crops. Nearly all of them grow legumes, cereals (usually maize), and bananas (mainly cooking bananas but also plantains). Nearly 80 percent of the respondents also grow coffee (arabica) which is a cash crop. More than 45 percent of the respondents are involved in vegetable growing and there hardly any taking on the roots and tubers (Table 4-9). The legumes are composed mainly of field beans, peanuts, field peas and soy. The cereals also include, to a very small extent, rice and millet. The vegetables include leafy vegetables (like kale and cabbages), tomatoes, bitter tomatoes, onions, potatoes, climbing beans and eggplants. The roots and tubers include cassava, sweet potatoes, and yams.

Table 4-9: Farming enterprises that the respondents participate in

Enterprise	N	Freq.	Percent
Crops			
Legumes	248	235	94.76
Cereals	248	234	94.35
Bananas	248	222	89.52
Coffee	248	194	78.23
Vegetables	248	116	46.77
Roots and tubers	248	6	2.42
Animals			
Poultry	248	214	86.29
Cattle	248	161	64.92
Small ruminants	248	121	48.79
Pigs, rabbits	248	8	3.23

Animals act as physical assets to households besides providing a source of animal protein and income. Poultry is the most reared by the respondents ahead of cattle and small ruminants. The small ruminants include goats and sheep. The pigs and rabbits are reared by a marginal percentage of the respondents (Table 4-9).

4.2.3.2 *Expenditure on agro-inputs*

Some households do not spend anything on agro-inputs while others spend up to 7.12 million Uganda shillings (Table 4-10). A typical household spends 848 thousand Uganda shillings on agro-inputs. More than half of the households spend less than the mean expenditure on agro-input.

The per capita expenditure on agro-inputs shows how much the household spends on agro-inputs relative to the size of the household. A typical household member spends 123761 Uganda shillings on agro-inputs. At least 50 percent of the households have per capita expenditure on agro-inputs below the mean value of 123761 Uganda shillings (Table 4-10).

A typical respondent spends about 21 percent of their annual income on agro-inputs. There is a large spread between the lowest and the highest spenders on agro-inputs (Table 4-10) but 75 percent of the respondents spend under 26 percent of their annual income on agro-inputs. The percentages higher than 100 percent are a result of working with the income of the respondent alone and not the household. Therefore, some of the money spent on agro-inputs should have come from other household members.

Table 4-10: Expenditure on agro-inputs

Characteristic	N	Mean	Sd	Min	Max	Median	75 th percentile
Total expenditure on agro-inputs	249	848020 (227.18)	1142928 (306.19)	0 (0.00)	7120000 (1907.42)	540000 (144.66)	992000 (265.75)
Per capita expenditure on agro-inputs	248	123761 (33.15)	147512 (39.52)	0 (0.00)	1017143 (272.49)	89000 (23.84)	140175 (37.55)
Total expenditure on agro-inputs as a percentage of annual income	247	20.77	23.76	0.00	192.08	14.36	25.42

Equivalent United States Dollars in parentheses below the corresponding figure

4.2.3.3 *Percentage contribution of individual agro-inputs to total expenditure on agro-inputs*

Labour accounts for the largest proportion of expenditure on agro-inputs among the households. Labour accounts for 30 percent of the expenditure on agro-inputs for a typical household. Labour accounts for up to 87 percent of the expenditure on agro-inputs for some households. However, labour accounts for less than 42 percent of the expenditure on agro-inputs for up to 75 percent of the households.

Seed is the only agro-input that, to some households, stands out as the only expenditure on agro-inputs. Seed and fertilizers stand out as the most important agro-inputs by virtue of the maximum proportion of the total expense on agro-inputs (Table 4-11).

Table 4-11: Percentage contribution of each agro-input item to total expenditure on agro-inputs

Variable	N	Mean	Sd	Min	Max	75 th percentile
Labour	236	30	19	0	87	42
Seed	236	18	17	0	100	20
Fertilizers	236	15	14	0	94	8
Land rent	236	10	13	0	71	23
Animal feeds and treatment	236	9	12	0	75	4
Crop pesticides and fungicides	236	5	7	0	67	10
Animal shades	236	5	11	0	72	3
Farming related communication, transport, and marketing.	236	4	5	0	31	5
Equipment	236	3	6	0	63	18
Staking vegetables	236	2	5	0	25	2

4.3 Savings groups participation

SGs provide a platform for community association, mobilization of funds, and loaning of the funds to those that require them. This section explores some of the characteristics of the SGs in which the respondents are active.

4.3.1 SGs size and support

The Profira recommended SGs size is 15 to 30 members. Due to differences in associational ties between and among individuals, availability of members, and understanding of the SGs models, SGs end up with variant group sizes. Usually, groups are composed of more females than males. The sum of the SG sizes of the different SGs a respondent is active in divided by the total number of SGs the respondent is active in, gives the average SGs size discussed here.

Likewise, the average male composition. This section explores the SGs sizes that respondents are active in with their composition and if these SGs are receiving any support.

Average SG's size is within the recommended size of between 15 and 30 members (Table 4-12). About 80 percent of the SGs surveyed observe the recommended SGs size. There are, however, oversize, under size, and sizes that do not follow the VSLA or SILC models (Table 4-13). Bigger SGs sizes pool together more money for on-lending. However, beyond 30 members the SG becomes unmanageable. Therefore, SGs within the recommended size are more sustainable. The high percentage of SGs being within the recommended size is because most of the SGs receive support during formation. This support comes from different organizations including Profira.

SGs are typically composed of women, therefore, male composition will be discussed here. SGs are typically composed of 34 percent males (Table 4-12). However, there is a wide distribution between zero percent to 80 percent of the SGs being male. This very high male composition is observed in undersized SGs. More than three quarters of the respondents' SGs have a male composition below 48 percent.

Table 4-12: Savings group size and male composition

Variable	N	Mean	Sd	Min	Max	Median	75 th percentile
Average SG size	124	29.56	11.31	4.00	90.00	30.00	30.00
Average number of males in SG	124	9.54	5.63	0.00	33.50	9.00	11.75
Percent of males in SGs	124	33.89	17.46	0.00	80.00	31.95	42.88

SGs receive support in form of, usually, training in the model but also material. The support is once off or continued over some period. Profira, a government of Uganda initiative to promote financial inclusion in rural areas is also operational in Sironko district besides other NGOs and the sub-county local governments. Nearly 89 percent of the SGs have received support. More than 55 percent of the SGs received support from Profira. Only 11 percent of the SGs have formed without any support from any organization. This is possible due to replication of the SGs formed with support. Replication is when individuals observe the functioning of an existing SG and form one (SG) without the guidance of an established organization.

Table 4-13: Savings groups size by classification

Characteristic	N	Freq	Percent
SGs average size group	124		
● Recommended size (15-30 members)		100	80.65
● Oversize (31 to 61 members)		16	12.90
● 4 to 14 members (undersized)		5	4.03
● Non-vsla/silc models (more than 61 members)		3	2.42
Support to the SGs			
Support from any organization.	126	112	88.89
Support from PROFIRA	126	70	55.56

4.3.2 Share price and Savings share-out at the end of the cycle

Members of SGs deposit a minimum amount at every meeting called the share price and any member able to deposit more usually pays in multiples of the share price but also can pay any amount above the share price. The average price here is the average of the price among the different SGs an individual is active in. The mean price is about 2000 Uganda shillings with some SGs managing a share price of up to 5000 Uganda shillings (Table 4-14). The share price is largely uniform between individuals or SGs.

SGs operate in cycles of usually one year and less. Those that have had a share out indicate they have participated in SGs for at least one year and those that have not yet had a share out are those that are yet to make a year or at least complete the respective SG cycle. About 80 percent of the respondents have had a share out at least once. The rest (less than 20 percent) are yet to complete a cycle and enjoy the benefits of the savings from the SGs.

Share outs at the end of the SG cycle are highly anticipated as the members have a lot to do with it. As much as it is anticipated, how much is achieved with the share out depends on the amount one gets. This amount varies from individual to individual within SGs and between SGs. Both the means and minimums of both years (2017 and 2018) are nearly the same (Table 4-14). An in depth look into the share-outs reveals that both the 25th and 50th percentiles of both years are similar in value (Table 4-14). In 2018, 75 percent of the respondents got share outs below the mean value. This is because the year has not yet ended, and others are yet to end their cycles.

Table 4-14: Share price and total share-out per member

Share-out year	N	Mean	Sd	Min	Max	25 th percentile	median	75 th percentile
Average price per share	126	2123.9 (0.57)	728.13 (0.2)	1000 (0.27)	5000 (1.34)	2000 (0.54)	2000 (0.54)	2000 (0.54)
2017 share out	97	592119 (158.63)	629387 (168.61)	50000 (13.39)	3540000 (948.35)	200000 (53.58)	370000 (99.12)	774000 (207.35)
2018 share out	35	502851 (134.71)	624353 (167.26)	66000 (17.68)	3030000 (811.72)	170000 (45.54)	320000 (85.73)	500000 (133.95)
Number of SGs	124	1.62	0.76	1	4	1	1	2
Meetings per week	126	1.58	0.76	0.25	4	1	1	2

Equivalent united states dollars in parentheses below the corresponding figure

SGs are used to save and borrow money. The number that one is active in influences the opportunities for loans but also the ability to sustain with weekly savings or as the agreed frequency of saving dictates. The number of SGs also dictates the number of meetings (hence avail such time) one attends. More than 50 percent of the SGs' respondents are active in only one SG (Table 4-14). Those who can afford more than one (or who need more than one), most of them chose to participate in two SGs with hardly any going beyond three SGs.

SGs meet at predetermined times, that is; weekly, fortnightly, or monthly. This is depending on the availability of members or availability of funds amongst the members. The number of meetings per week per individual corresponds with the number of SGs an individual is active in. This same number affects how much one ought to save per week. Every respondent attends at least one and a half meetings per week with some individuals attending four meetings of four different SGs in which they are active (Table 4-14). At least 50 percent of the respondents attend only one meeting per week corresponding with 50 percent active in only one SG.

4.3.3 Month of share out per SG

Month of share out is of particular importance in SGs as it influences what the share outs are used for. If the members are in the same geographic area and months of working and saving, then months of expenditure will be similar across groups.

For those participating in more than one SG, the months of share out are such that share outs from different SGs are received in different months (Table 4-15).

Table 4-15: Month of share out

Month of share out	Earliest month (One SG)	Second earliest (Two SGs)	Third earliest (Three SGs)
January	17 (13.49%)	2 (3.39%)	1 (5.56%)
February	10 (7.94%)	2 (3.39%)	0 (0%)
March	5 (3.97%)	1 (1.69%)	0 (0%)
April	5 (3.97%)	1 (1.69%)	0 (0%)
May	2 (1.59%)	0 (0%)	0 (0%)
June	3 (2.38%)	0 (0%)	0 (0%)
July	3 (2.38%)	1 (1.69%)	0 (0%)
August	7 (5.56%)	1 (1.69%)	2 (11.11%)
September	8 (6.35%)	4 (6.78%)	0 (0%)
October	19 (15.08%)	8 (13.56%)	1 (5.56%)
November	16 (12.7%)	10 (16.95%)	5 (27.78%)
December	31 (24.6%)	29 (49.15%)	9 (50%)
Number of SGs	126 (100%)	59 (100%)	18 (100%)

Most groups share out between October and February peaking in December. The number of SGs sharing out dips to near zero between May and July before gradually climbing to peak in December. May to July coincides well with the harvest period where most households will have enough food and spare cash from agricultural sales for saving (Table 4-15, Figure 4-3). The households also have enough cash from farm sales to care for the expenditures.

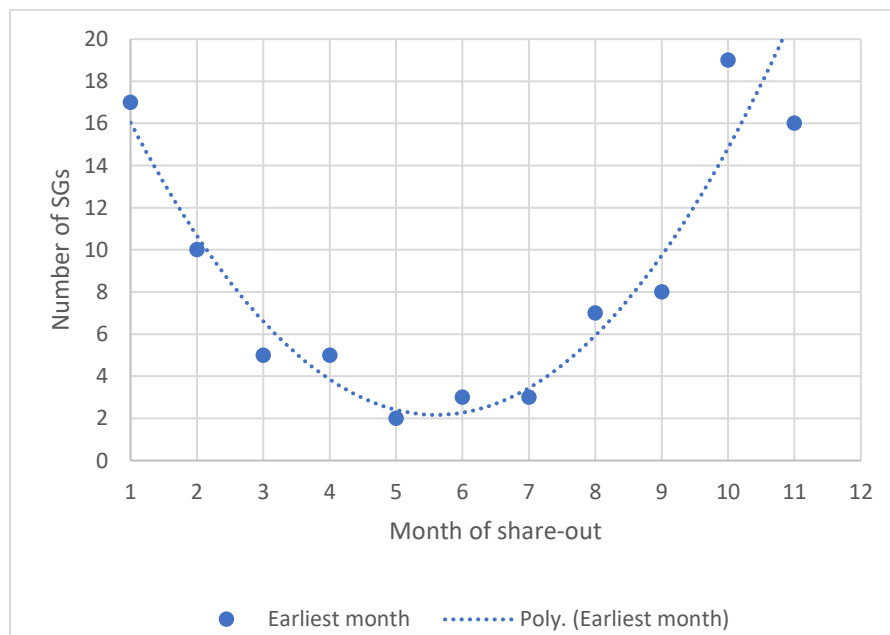


Figure 4-3: Distribution of months of share out, (earliest month for those participating in more than one SG)

4.3.4 SGs loan provision

Besides the service of accepting savings from the members, SGs lend out the savings to those in need of loans. SGs' members decide whether to get the loans or not depending on need of the money. For those that get the loans, the frequency of getting may be dictated by both the need for the money and the constitution of the SG.

Different individuals get loans with different frequencies depending on how one satisfies the conditions. By August 2018, under 17 percent of the respondents had not received any loan from the SGs for that year. For the whole year of 2017, up to 83 percent of the respondents got loans from the SGs with most of them getting either twice or thrice (Table 4-16).

4.3.5 Contribution of SGs credit to agro-inputs expenditure

SGs provide both savings and loans to the members. These lines of credit are instrumental in agro-input purchase like they are in consumption and assets purchase. The members turn to the SGs to access these funds to aid in purchasing agro-inputs.

Table 4-16: Frequency of getting loans from SGs.

Characteristic	N	Freq.	Percent
Ever got a loan from SGs	126	122	96.83
Number of times got a loan in year 2017	126		
None		21	16.67
Once		14	11.11
Twice		31	24.60
Thrice		31	24.60
More than thrice		29	23.01
Number of times got loan in year 2018	126		
None		21	16.67
Once		34	26.98
Twice		44	34.92
Thrice		15	11.90
More than thrice		12	9.53

As a percentage of the total expenditure on agro-inputs SGs member households typically finance 40 percent of their expenditure on agro-inputs using funds from SGs. The funds are either in the form of loans or their savings at share-out (Table 4-17). However, some households get up to 100 percent of their expenditure on agro-inputs from SGs while others do

not get any from the SGs. Seventy-five percent of the households finance up to 57 percent of their agro-input requirements using funds from SGs.

Labour, seed and fertilizers are presented here instead of all the agro-inputs because they compose most of the agro-inputs expenditure. Labour most of the expenditure on agro-inputs using SGs credit and closely followed by fertilizers. A typical SGs member household uses SGs to finance 47 percent of labour, 36 percent of seed and 46 percent of fertilizer expenses (Table 4-17).

Table 4-17: Percentage of total expenditure on agro-inputs received from SGs

Characteristic	N	Mean	Sd	Min	Max	Median	75 th percentile
SGs agro-inputs to total agro-inputs	122	39.52	27.08	0.00	100	34.48	57.06
SGs Labor to Labor	116	46.92	39.51	0.00	120	44.76	100.00
SGs seed to seed	118	35.55	42.70	0.00	100	0	83.33
SGs fertilizer to fertilizer	103	45.80	104.20	0.00	1000	0	100.0

4.4 Respondents' characteristics by participation in SGs

In Sironko district, some farmers are active in SGs while others are not active. In this section, the characteristics of the respondents are presented while contrasting participants and non-participants in SGs. The section will discuss household characteristics, social economic characteristics, and farming characteristics.

4.4.1 Household characteristics

4.4.1.1 *Age, education, household size and schooling household members*

SGs participants are typically older and more educated than SGs non-participants (Table 4-18). Participation in SGs requires time to attend meetings outside home. The older individuals have older children who can assist in household chores allowing the parents the required time to attend group meetings. Younger parents do not have anybody to entrust the young children with. These young parents are therefore deprived of the required time to attend largely compulsory group meetings. Higher education comes with better numeracy necessary in understanding the accounts in SGs. SGs require understanding how much one has saved so far, how much interest one is paying for the loan obtained, how much one has paid so far and how much is due, how much one has earned or should earn on the savings. All these require numeracy which comes with more years in school. Those with lesser education find it difficult to understand the numbers involved in SGs hence the non-participation.

The SGs’ participants have more members living in their households than SGs non-participants (Table 4-18). This is so as the participants are typically older, hence they have more children than the younger non-participants. The larger household size also comes with more labour for home chores hence allowing a household member the required time for group meetings.

The SGs’ participants have more secondary children in school than the non-participants (Table 4-18). Secondary education in Uganda requires a lot of money for both school fees and school related requirements. SGs provide the financial services necessary to meet the demands of secondary school children, hence the participation of those parents or guardians with more children in secondary schools. Those with no or less children in secondary schools do not have high school related demands hence the non-participation.

The percentage of the household that goes to school indicates the value that a house attaches to education. The SGs’ participants attach more value to education than non-participants (Table 4-18). The participants seek financial services from SGs to meet the financial demands of school children unlike the non-participants with lower school related demands.

Table 4-18: Age, education, household size, children in school, and income

Characteristic	Participant			Non-participant			T value
	N	Mean	Sd	N	Mean	Sd	
Age of respondent	126	43.10	12.29	123	37.62	12.52	-3.49***
Number of years of education	126	8.87	3.38	123	7.55	3.93	-2.84***
Household size	125	7.77	3.03	123	6.12	2.93	-4.35***
Number of children in secondary school	126	1.03	1.26	123	0.45	0.89	-4.23***
Percent of the household that goes to school	124	49.47	22.65	122	37.05	25.31	-4.06***

Significance level: *** = less than 1%, ** = less than 5%, * = less than 10%

4.4.1.2 Sex and marital status

The sex of participants and non-participants is a result of the selection criteria. Even then, the males are more in non-participants because females are more likely to participate in SGs, hence it is more difficult to encounter a female that is a non-participant other than the males.

In both cases, the respondents’ households are largely headed by males. However, non-participants have more households headed by females as compared to participant respondents. SGs require consistent income for saving or repaying loans weekly or as agreed in the SG.

Households headed by females are associated with lower income and may be inconsistent. This makes such households unable to participate in SGs.

Typically, participants are married, nearly 90 percent of them. Marriage comes along with stability of income necessary in SGs to pay compulsory periodic savings or loans. Marriage, especially when having older children helping in chores with the spouse, avails an individual with time to attend mandatory meetings which are a backbone in SGs' structure. The single (never married) individuals are typically much younger with little and erratic income. This is the reason they find it difficult to participate in SGs as observed in Table 4-19.

Table 4-19: Sex, marital status, and household head

Characteristic	Participants			Non-participants			X ² p-value
	N	Freq	percent	N	Freq	percent	
Respondent sex	126			123			0.48
Male		65	51.59		69	56.1	
Female		61	48.41		54	43.9	
Household head sex	123			108			0.79
Male		110	89.43		94	87.04	
Female		13	10.57		14	12.96	
Marital status of respondent	126			123			0.00***
Never married		4	3.17		21	17.07	
Married		113	89.68		91	73.98	
Divorced		3	2.38		5	4.07	
Widowed		6	4.76		6	4.88	
Relationship of respondent with household head	126			123			0.01**
Household head		77	61.11		76	61.79	
Wife		46	36.51		32	26.02	
Child		3	2.38		13	10.57	
Relative		0	0		2	1.63	

Significance level: *** = less than 1%, ** = less than 5%, * = less than 10%

The divorced individuals are usually females who usually lose property rights as they divorce hence they have reduced incomes. This hampers their opportunities for participation in SGs even if they are willing since it requires stable incomes. The widowed are also largely females (because the males easily remarry and do not report as widowed). These may have better property rights than the divorced. However, some find it difficult to stabilize in income hence non-participation. Those who stabilize in income using the better property rights participate in

SGs. This is how the widowed frequency for participants equals nonparticipants observed in Table 4-19 arises.

The participants are largely household heads or wives. This is important because participation in SGs requires income. The children in the household may not have stable income as they are still dependent on their parents. Children’s participation may require consultation with their parents who may not grant such permission as the permission may require backing up the child’s income. Therefore, children and relatives in the households end up not participating in SGs as observed in Table 4-19.

4.4.3 Social relations

4.4.2.1 Participation in community groups and community leadership

The number of community groups of the SGs participants has been lessened by one. This is to control any instances when the non-participants genuinely are unable to participate in SGs but there is no other alternative for them to be active in.

Even with this control in place, the participants are active in more community groups than the non-participants (Table 4-20). This points to the fact that the participants socialize more than the non-participants hence there is a higher degree of social capital. This fact is underscored when the community entrusts the SGs participants more with leadership positions observed in Table 4-20.

Table 4-20 : Community groups and community leadership

Characteristic	Participants			Non-participants			T value
	N	Mean	Sd	N	Mean	Sd	
Number of community groups	126	2.43	1.34	123	1.33	1.41	-6.34***
Number of types of groups with leadership posts	126	1.63	1.37	68	0.74	0.97	-4.77***

Significance level: *** = less than 1%, ** = less than 5%, * = less than 10%

4.4.2.2 Most important community groups

The non-participants are less those respondents that do not participate in any community group. Financial services groups are composed of SGs (largely), RoSCAs, SACCOs, and festivals groups. Festivals groups provide a financial service because individuals save for a future planned expenditure in such groups, especially religious related festivals. Non-financial or expenditure related groups include burial groups, drinking (where members contribute funds to buy local brews and drink in a group setting), religious related groups, and political groups.

SGs participants almost entirely find financial services groups as their most important group to participate in unlike the non-participants who also find expenditure groups as important (Table 4-21).

Table 4-21: Most important type of community group, trust in SGs loan values, and SGs support

Characteristic	Participants			Non-participants			X ² p-value
	N	Freq	percent	N	Freq	percent	
Type of community group	126			68			0.00
Financial services related		122	96.82		43	63.23	
Non-financial services		4	3.17		25	36.77	
Level of agreement with trust in SGs	126			123			0.00
Disagree		1	0.79		14	11.38	
Neutral		1	0.79		28	22.76	
Agree		124	98.41		81	65.85	
Level of agreement with loan values in SGs	126			123			0.00
Disagree		4	3.17		25	20.33	
Neutral		6	4.76		47	38.21	
Agree		116	92.06		51	41.46	
Level of agreement with support for SGs	126			123			0.00
Disagree		119	94.44		76	61.79	
Neutral		3	2.38		15	12.20	
Agree		4	3.17		32	26.02	

A SG is much more of a financial service than a socialization service. Financial services are certainly preferred because such groups are holding an individual's money. However, the higher percentage of non-financial service groups observed among the non-participants is the result of such individuals not participating in any financial service-related group because of lower incomes. This is because financial services will require disposable income for saving

which the younger individuals or divorced females observed among the non-participants may not have. The small percentage of participants who find non-financial services groups as most important is because such individuals are probably leaders in such groups.

4.4.2.3 Trust in SGs

Respondents were asked about whether members in SGs can be trusted and the responses were recorded on a Likert scale. Nearly all the SGs' participants find that there is general trust amongst SGs members as opposed to only about 66 percent among the non-participants (Table 4-21). The participants select themselves according to how they trust each other. Those who think that other members cannot be entrusted with funds or there is a risk of losing funds when borrowers fail to pay back the loans, decide not to participate in the SGs.

4.4.3 Economic characteristics

4.4.3.1 Income and income per capita

The participants have a higher mean income than the non-participants (Table 4-22). To participate in a SG, one must have enough disposable income for saving and repayment of loans. Individuals with little or no income fail to participate in SGs. The per capita income is uniform across the two groups because the larger households of the participants level off their higher income to the level of the non-participants (Table 4-22). The uniform per capita income does not imply equal disposable income between participants and non-participants. Participants can have more disposable income despite their larger household sizes because of fixed costs in the homes. Such expenditures are met equally by the non-participants despite their household size.

Table 4-22: Income of the respondents, Uganda shillings

Characteristic	Participants			Non-participants			T-value
	N	mean	Sd	N	mean	Sd	
Monthly income	126	506198 (135.61)	611275 (163.76)	123	348301 (93.31)	405234 (108.56)	-2.4***
Monthly income per capita	125	74677 (20.01)	126038 (33.77)	123	75105 (20.12)	127520 (34.16)	0.03

Equivalent United States dollars in parentheses below the corresponding figure
Significance level: *** = less than 1%, ** = less than 5%, * = less than 10%

4.4.3.2 Frequency of earning

Most SGs meet weekly and make savings weekly. Therefore, individuals or households having a form of income weekly or daily find it easier to participate in SGs. Nearly 90 percent of the

participants are earning at least once per week as contrasted to only 77 percent of the non-participants (Table 4-23). The weekly earning guarantees the mandatory savings among the participants. The mandatory savings lead to the self-selection of largely those who are assured of income weekly.

Presence of another earner in the household helps to mitigate the hard times when cash income does not flow as expected or when emergencies set in. This characteristic is of particular importance to sustainability of participation in SGs. About 80 percent of the participants have other earners in their households as opposed to just 70 percent which factor brings about participation and non-participation (Table 4-23).

Table 4-23: Earliest stable interval of earning and another earner.

Characteristic	Participant			Non-participant			X ² p-value
	N	Freq	Percent	N	Freq	Percent	
Frequency of earning	126			121			0.02
Daily or weekly		113	89.68		93	76.86	
Monthly		0	0		2	1.65	
Irregular		13	10.32		26	21.49	
Presence of another earner	126			123			0.06
Spouse earns.			80.16		86	69.92	

4.4.3.3 Why save and where to save?

How much money individuals save is influenced by the purpose of saving. This may also influence decisions on where the money is saved.

The most important reason for saving amongst SGs participants is for school fees while the non-participants save more for agro-inputs (Table 4-24). The participants have more children in secondary school and need savings to pay for school related expenses. Paying school fees is only important to 19 percent of the non-participants.

Most SGs participants prefer saving their money in SGs which account for nearly 60 percent of the savings channels. The non-participants on the other hand save their money in cash or cash equivalents like mobile money (Table 4-24). Because of the security of the deposits, the participants prefer the SGs to cash and cash equivalents. Saving in SGs also comes along with the opportunity of getting loans hence the preference. The non-participants prefer saving in the form of cash because of the liquidity as compared to physical assets.

Table 4-24: Purpose of saving and where the money is saved.

Characteristic	Participant			Non-participant			X ² p-value
	N	Freq	percent	N	Freq	percent	
Purpose of saving the money	126			115			0.16
School fees		39	30.95		22	19.13	
Agro-inputs		38	30.16		42	36.52	
Business capitalization, home assets		32	25.40		29	25.22	
Emergencies, food		14	11.11		14	12.17	
Home improvement		3	2.38		8	6.96	
Where is the money saved?	124			113			0.00
Savings groups		74	59.68		2	1.77	
Physical assets		28	22.58		37	32.74	
Cash, mobile money		15	12.10		47	41.59	
RoSCAs		4	3.23		15	13.27	
Bank		3	2.42		12	10.62	

4.4.3.4 Sources of loans

Loans help to smooth expenditures, particularly on food, medication, or school fees. Nearly 80 percent of participants get their loans from the SGs (Table 4-25).

Table 4-25: Preferences for loans sources

Characteristic	Participant			Non-participant			X ² p-value
	N	Freq	percent	N	Freq	percent	
Most important Source of loan	125			92			0.00
Savings groups		99	79.20		2	2.17	
Banks, SACCOs, Money lenders		16	12.80		24	26.09	
RoSCAs		6	4.80		28	30.43	
Friends/shops		4	3.20		38	41.30	
Second most important Source of loan	125			86			0.00
Savings groups		18	14.40		0	0.00	
Banks, SACCOs, Money lenders		13	10.40		10	11.63	
RoSCAs		39	31.20		8	9.30	
Friends/shops		55	44.00		68	79.07	

Non-participants get their loans from, largely, interest free sources like RoSCAs and shops though these may be unreliable. The participants seek reliability and the opportunity to determine how much to borrow in SGs as a source of loans. The participants only seek the services of interest free sources as an alternative to SGs because such loans have limited opportunities of deciding how much to borrow for how long. The non-participants do not have any better alternatives to shops and friends. Interest bearing loans require stability in incomes which the non-participants are lacking (Table 4-25).

4.4.3.5 *Number of income sources and loan sources*

More income sources provide higher income stability while more loan sources provide better income smoothing. The SGs’ participants have more income sources and loan sources than the SGs non-participants. The higher number of income sources give the SGs members greater income stability. This enables them to participate more easily in SGs unlike those with fewer income sources. Even after controlling for participation in SGs, the participants still have more loan sources than the non-participants (Table 4-26). This is a result of higher incomes of the participants which comes with greater opportunities for loans. Alternatively, the participants’ higher community association (Table 4-20) enables them to get loans from friends, shops, RoSCAs, and money lenders more easily than the non-participants.

Table 4-26: Loan and income sources

Characteristic	Participant			Non-participant			T value
	N	Mean	Sd	N	Mean	Sd	
Number of income sources	126	3.18	0.85	123	2.88	0.98	-2.62***
Number of loan sources	126	3.60	0.85	123	2.09	1.42	-10.18***
Number of loan sources minus one for SGs participants	126	2.60	0.85	123	2.09	1.42	-3.42***

Significance level: *** = less than 1%, ** = less than 5%, * = less than 10%

4.4.3.6 *Importance of agriculture as a source of income*

Agricultural income is erratic yet SGs’ participation demands more regular incomes. The most important source of income is also where an individual earns the highest amount of income. About 50 percent of the non-participants earn their most income from agricultural sales as compared to less than 40 percent of the participants (Table 4-28).

Table 4.27: Importance of agriculture as a source of income

Characteristic	Participants			Non-participants			X ² p-value
	N	Freq	percent	N	Freq	percent	
Importance of agricultural income	126			123			0.02
Most important		50	39.68		61	49.59	
Second most important		50	39.68		38	30.89	
Third most important		26	20.63		24	19.52	

4.4.4 Agricultural enterprises and agro-input expenditure

4.4.4.1 Agro-input expenditure

In gross terms, the participants spend more on agro-inputs than the non-participant (Table 4-28). This difference is due to the higher incomes of the SGs' participants, and the financial services offered by the SGs during the peak demand for agro-inputs. The non-participants find it difficult to access credit during the peak demand for agro-inputs and end up spending less on agro-inputs.

Despite the participants having lower per capita income (Table 4-22), their per capita expenditure on agro-inputs is more than that of the non-participants (Table 4-28) the SGs offer financial services that are necessary in accessing agro-inputs at peak demand. The non-participants depend on interest free loan sources which offer little or no credit during that time. The participants who receive their savings during this demand for agro-inputs also spend some money on the inputs further increasing their expenditure on agro-inputs. The participants spend a higher percentage of their income on agro-inputs as compared to the non-participants (Table 4-28). This is indicated through the percentage of annual income spent on agro-inputs. The non-participants spend two percent less on agro-inputs than the participants.

Table 4-28: Expenditure on agro-inputs (Uganda Shillings)

Characteristic	Participant			Non-participant			T value
	N	Mean	Sd	N	Mean	Sd	
Total agro-input expenditure	126	1041683 (279.06)	1191443 (319.18)	123	649633.3 (174.03)	1059501 (283.84)	-2.74***
Per capita agro-inputs expenditure	125	140787 (37.72)	135675 (36.35)	123	106458 (28.52)	157309 (42.14)	-1.84**
Percentage of annual income spent on agro-inputs	126	22.34	23.50	121	19.14	24.00	-1.06

Equivalent United States dollars in parentheses below the corresponding figure
Significance level: *** = less than 1%, ** = less than 5%, * = less than 10%

4.4.4.2 Crops and animal enterprises that the farmers are involved in.

Table 4-29: Participation in the crop and animal enterprises

Enterprise	Participant			Non-participant			X ² p-value
	N	Freq	percent	N	Freq	percent	
Crops							
Cereal	126	124	98.41	122	110	90.16	0.00
Legumes	126	124	98.41	122	111	90.98	0.01
Bananas	126	119	94.44	122	103	84.43	0.01
Coffee	126	106	84.13	122	88	72.13	0.02
Vegetables	126	68	53.97	122	48	39.34	0.02
Roots and tubers	126	4	3.17	122	2	1.64	0.43
Animal							
Poultry	126	120	95.24	122	94	77.05	0.00
Cattle	126	99	78.57	122	62	50.82	0.00
Small ruminants	126	68	53.97	122	53	43.44	0.10
Other mammals	126	7	5.56	122	1	0.82	0.04

The participants are more diversified than the non-participants in both the crops enterprises and the animal enterprises (Table 4-29). This has the impact of smoothing income necessary for the mandatory savings in SGs. The greater diversification also demands more inputs. This makes the participants spend more on agro-inputs as compared to the non-participants. To care for all these enterprises especially during the peak crop season, the members utilize the financial services offered by the SGs. The non-participants would find it difficult to sustain all the enterprises if they are to indulge in all of them.

4.5 Chapter Summary

The chapter looked at the characteristics of the respondents in the study. Men, who were the majority of the respondents, were also mostly the household heads. The chapter also showed that the majority of the respondents were either household heads or wives in the households.

Most of the respondents participate in and are active in community groups, particularly financial service-related community groups. Further, most of the respondents trust or would trust group members when in a SG.

Agricultural sales represent the main source of income to 44% of the respondents while 66% derive their main incomes from off-farm activities. The respondents prioritize saving in SGs, physical assets and cash at home while they preferred credit from SGs (47%), and shops or friends (19%). A typical respondent spends 227 USD annually on agro-inputs, spends 21% of income annually on agro-inputs and spends 33 USD on agro-inputs per capita annually.

In a typical SG of 30 members, 10 are male. Different organizations rendered support to 89% of the SGs, with 56% of the SGs receiving support from Profira.

CHAPTER FIVE

EMPIRICAL RESULTS

5.1 Introduction

This section presents the econometric results of the study. The section is laid out according to the objectives of the study. Section 5.2 presents the objective of determining the proportion of expenditure on agro-inputs from savings groups. Section 5.3 presents the objective of determining the impact on expenditure on agro-inputs of membership in a savings group. Section 5.4 presents the objective of identifying the factors that determine participation in a savings group. The summary of the empirical results is presented in section 5.5.

5.2 The proportion of expenditure on agro-inputs from savings groups

SGs members averagely spend 1041683 Uganda shillings on agro-inputs annually. Of this total expenditure on agro-inputs, 336726 Uganda shillings is received from SGs in the form of either loans or savings withdrawn at the time of share out. Typically, 40% of total expenditure on agro-inputs is financed through the SGs (Table 5-1). SGs are a financial service for both loans and savings. The members make savings in these groups during off-season and access the money during the farming season for expenditure on agro-inputs. This money would have been used elsewhere if the financial service was not available, hence boosting agricultural output. The savings are paid out at a predetermined time as a lumpsum enabling the savers to purchase agro-inputs that require larger amounts of money than the member is able to raise at the time it is needed. Such agro-inputs may include land rent and equipment.

Table 5-1: Expenditure on Agro-inputs by SGs members

Variable	N	Mean	Std. Dev.	Min	Max
Total expenditure on agro-inputs (UGX)	126	1041683 (279.01)	1191443 (319.18)	0	3510000 (1659.61)
Total SGs contribution to total agro-input expenditure (UGX)	125	336725.6 (90.21)	396171.8 (106.13)	0	2800000 (750.10)
Ratio of SGs total to total agro-input expenditure (%)	122	39.52	27.08	0	100

Equivalent United States Dollars in parentheses below the corresponding figure

5.3 The impact of SGs participation on agro-inputs expenditure .

This section analyses the annual agro-input expenditure while contrasting the SGs participants and non-participants. The analysis involves three outcome variables which include the total annual expenditure on agro-inputs, total annual expenditure on agro-inputs per capita, and ratio of “total annual expenditure on agro-inputs” to annual income. The total annual expenditure on agro-inputs per capita is the total annual expenditure on agro-inputs divided by the household family size. “Total annual expenditure on agro-inputs” to annual income is the total annual expenditure on agro-inputs as a percentage of annual income of an individual. A t-test is used to establish if any difference between SGs participants and non-participants is significant. Propensity score matching using two different matching methods is done to establish if the difference in expenditure on agro-inputs is due to participation in SGs or differences in the baseline characteristics.

5.3.1 Comparison of annual agro-input expenditure of SGs participants and non-participants

SGs participants’ total annual expenditure on agro-inputs is significantly higher than that of non-participants ($t(224) = 4.658, p < 0.01$). The difference between their means translates to 44775 Uganda shillings (12.00 USD). As a percentage, the SGs participants spend 34.01% more on agro-inputs annually than the SGs’ non-participants. Additionally, SGs’ participants spend significantly more per capita, than the SGs non-participants ($t(214) = 3.231, p < 0.01$). The participants’ mean per capita expenditure is 42.548% more. The SGs participants spend significantly more of their income on agro-inputs than the non-participants ($t(224) = 2.165, p < 0.05$). This difference is 5% more for the SGs participants. On a fourth measure, the SGs participants earn significantly more than the non-participants ($t(224) = 4.658, p < 0.01$). The participants’ annual income is 20.442% more than the non-participants.

The SGs’ participants earn more than the non-participants therefore, it is not surprising that the participants spend more on agro-inputs. The SGs participants and non-participants earn similar incomes per capita (Table 4-22). The significantly higher per capita expenditure on agro-inputs is a result of the financial services accessed by participation in SGs. The participants can spend more on agro-inputs because they are able to get the money for the agro-input related expenditures whenever need be, enabling them to purchase more inputs than the

nonparticipants. The higher percentage of the participants’ income spent on agro-inputs shows the effect of financial services on agro-input expenditure.

5.3.2 Impact of SGs’ participation on agro-input expenditure

Propensity score matching (PSM) was used to ensure that the compared individuals had similar chances of participating in SGs but for some reasons, some did not participate and others participated. “Pscore” command was used to estimate the propensity scores. Two matching methods of kernel and nearest neighbour were used to estimate the treatment effects on the treated. Figure 5-1 shows the distribution of the propensity scores of the treated and control groups.

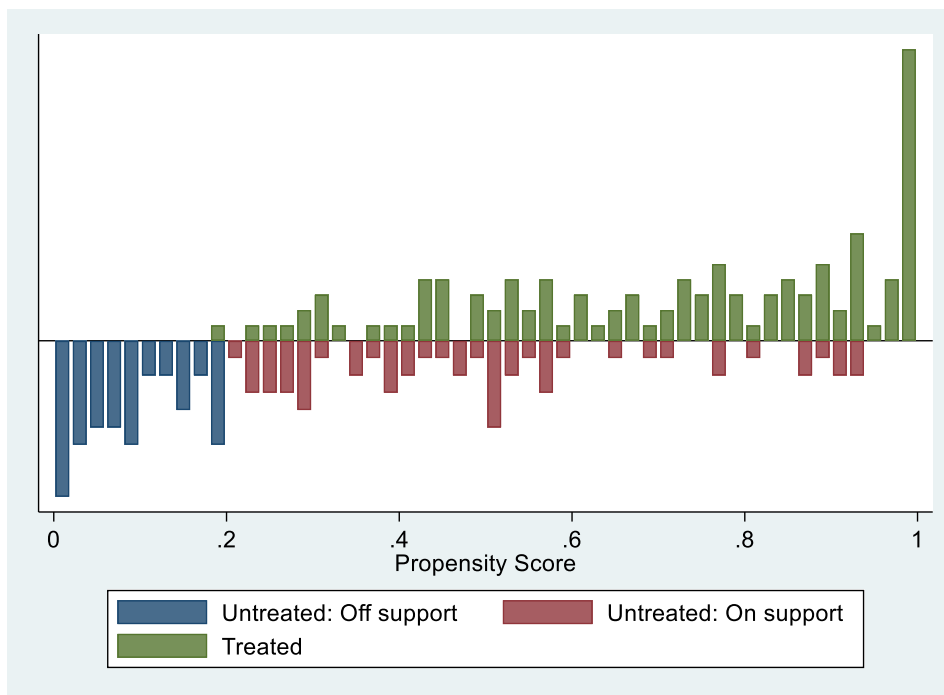


Figure 5-1: Propensity scores distribution of the treated and untreated

Table 5-2: Average treatment effects on the treated (ATT) of treated and control groups of the outcome variable “square root of total expenditure on agro-inputs”

	Number Treated	Number Control	ATT	Std. Err.	T-value
Kernel matching	113	58	-88.766	96.678	-0.918
Nearest neighbor	113	29	-20.431	121.517	-0.168

Both Kernel and nearest neighbour matching methods indicate that SGs have a negative but insignificant effect on total annual expenditure on agro-inputs (Table 5-2). The insignificance of the result is consistent with Karlan *et al.* (2017) who did not find any significant effect on agricultural activities as a whole. Ksoll *et al.* (2016) did not find significant evidence in increased maize yields which would have been a direct result of increased expenditure on agro-inputs. SGs enable the participants to access lump-sum money in form of savings at the end of the cycle or loans in cycle. This lump-sum money enables the participants to prioritize education related expenses over agro-inputs hence reducing how much is dedicated to agro-inputs.

5.4 Factors that determine participation in a savings group

The econometric results of the equations of participation and intensity of participation are presented in Table 5-3. Before estimation of the models, the independent variables were tested for multicollinearity amongst themselves. The result showed that there was acceptable multicollinearity between the independent variables. This was done using both pairwise correlation matrix, Pearson's Chi square, and variance inflation factors. The variance inflation factors were between 1.01 and 1.63 for the first and second model respectively which were below the threshold of 10 recommended by Black and Anderson (2014, p. 200). The variance inflation factor was higher than normal for the third model due to the square term on Predicted income (Lincomehat). STATA software program was used to estimate the three models. The significant Chi2 and F-statistics showed that the variables used in the models were jointly significant. Table 5-3 shows the regression results.

Table 5-3: Regression results for factors affecting participation in SGs and intensity of participation.

Labels	Model 1 SGs participation	Marginal effects for model 1	Model 2 Log of frequency of getting loans in 2018.	Model 3 Log of total share out in 2017
Constant	-557.408*** (153.631)		-60.657 (103.298)	-431.960** (164.129)
Household characteristics				
Dummy, respondent is female			0.296** (0.119)	-0.432** (0.209)
Dummy, household head is female	0.912** (0.435)	0.154** (0.067)		
Log of age	-7.891 (8.160)	-1.424 (1.472)	-7.492 (5.715)	
Log of age squared	1.104 (1.111)	0.199 (0.201)	1.044 (0.766)	
Number of years in education	0.117*** (0.034)	0.021*** (0.006)		0.061** (0.030)
Square root of number of dependents	0.420** (0.203)	0.076** (0.035)	0.227* (0.133)	
Dummy, has a child in secondary school	0.508* (0.266)	0.092* (0.048)		
Economic characteristics				
Predicted income	74.428*** (20.154)	13.434*** (3.583)	9.430 (13.547)	57.598** (21.557)
Predicted income squared	-2.462*** (0.663)	-0.444*** (0.118)	-0.304 (0.445)	-1.873** (0.707)
Dummy, farming is main source of income	-0.497* (0.260)	-0.092* (0.049)	-0.271** (0.113)	-0.203 (0.186)
Number of income sources	0.150 (0.168)	0.027 (0.030)		0.150 (0.102)
Number of loan sources other than SGs				-0.290** (0.111)
Dummy, spouse earns	0.393 (0.290)	0.071 (0.052)	-0.156 (0.151)	
Dummy, rents some land for farming			0.123 (0.112)	-0.537*** (0.186)
Dummy, got a government subsidy in 2018			0.204* (0.113)	0.248 (0.188)
Social characteristics				
Number of community groups active in, other than SGs	0.317*** (0.112)	0.057*** (0.018)		0.272*** (0.081)
Dummy, is active in RoSCAs			-0.232* (0.117)	-0.328* (0.195)
SGs model characteristics				
Trusts members in SG	0.893*** (0.193)	0.161*** (0.034)	0.071 (0.118)	



Requires External support join a SG	-0.385*** (0.126)	-0.070*** (0.022)	-0.417*** (0.136)
Loan values from SGs are satisfactory	0.534*** (0.135)	0.096*** (0.021)	
Dummy, share-out month (7 to 9 is base)			
1 to 3		0.412** (0.171)	-0.480* (0.281)
4 to 6		0.264 (0.249)	-0.673 (0.406)
10 to 12		0.199 (0.144)	-0.270 (0.250)
Log of total minimum savings per week			0.318 (0.232)
Square root of SGs size			0.051 (0.066)
Number of times got loans from SGs in 2017		0.179*** (0.036)	0.096 (0.058)
Log of percentage of males in the SGs			-0.161 (0.201)
Inverse Mill's ratio		0.303* (0.155)	0.600** (0.284)
Observations	229	229	71
Pseudal R-squared	0.528	0.528	78
Chi2	113.6***	113.6	
R-squared			0.516
Adjusted R-squared			0.361
F-statistic			3.32***
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1			

Model 1 identified factors determining decision to participate in SGs. After the Probit model was estimated, a Linktest was performed, and the result showed that the model was well specified. The Probit model correctly predicts 84.7% of the observations with a chi-square of 113.6 significant at 1% level. Only 229 observations of the 249 were used in estimating the Probit model because of missing values. The results indicate eleven variables have coefficients that are significantly different from zero. Of the significant variables, only agriculture as a main source of income and the requirement for external support discourage participation in SGs while the other nine encouraged participation. The variables that encouraged participation in SGs include sex of household head, level of education, number of dependents, having children in secondary school, predicted income, number of community groups one is active in other than SGs, trust in the group, and SGs serving the loan needs. Nine of the ten significant variables have expected signs.

The OLS models were checked for omitted variables bias using a Ramsey RESET, which indicated that the models were well specified with no omitted variables. Heteroskedasticity tests were run, and the models showed constant variances.

The OLS models had significant inverse Mill's ratios. This means that there would have been selection bias in the OLS models if the decision to participate in the SGs was not accounted for.

Model 2 estimating the frequency of getting loans from SGs in 2018 explained 36.1% of the variance in the frequency of getting loans from SGs. Only 71 observations were used in this analysis due to transformation to logs of zeros, treatment of outliers, and other missing values. Only seven of the thirteen variables were significantly different from zero. These variables included sex of the respondent, square root of number of dependents, farm income as a main source of income, got a government subsidy in 2018, being active in RoSCAs, month of share-out of savings, and number of times respondent got loans in 2017.

Model 3 for estimating the total share-out at the end of the cycle in 2017 explained 43.8% of variance in the log of the total share-out in 2017. Only 78 of the 97 possible observations were used in this analysis due to transformations of values and treatment of outliers. Only nine variables were significantly different from zero, three of which influenced the share-out positively.

5.4.1 Household factors

A member in a female headed household is 15.4% more likely to participate in SGs than a member of a male-headed household. Female-headed households are particularly prone to financial exclusion. Therefore, such households adopt more easily to more affordable and easier to access financial services such as SGs than the male-headed households who have better access to more formal financial services. The members of these female-headed households seek savings and loans services that the SGs provide. The household heads in male headed households have greater access to other financial services especially banks due to the males having better property rights within the household. The sex of the household head is not an important factor in the intensity of participation in SGs. However, the sex of the SGs member is a significant factor in SGs utility significant at less than 5%. Females in the SGs are 29.6% more likely to get loans than their male counterparts. This is a result of females being more prone to financial exclusion hence they may have fewer sources of loans. They, therefore, find the SGs loan services more accessible. However, the females save 43.2% less than males.

This is a result of the females having less property rights and end up having less disposable income for saving. Because they get more loans from the SGs, it is possible that if they fail to repay, their savings are deducted at share-out, so they have less lump sum to take home.

Having a child in secondary school increases the probability of participating in SGs by 9.2%, which is significantly at less than 10%. School related dues increase when children join secondary school. A parent will require financial services to be able to raise such school dues on time. These financial services are provided when such a parent participates in SGs, especially when such a parent does not have access to formal financial services. This result has been reported by Mpiira *et al.* (2013) in the study “Factors influencing households’ participation in the Savings and Credit Cooperative (SACCO) programs in Uganda”.

A unit increase in the square root of the number of dependents per household increases the likelihood of participating in SGs by 7.6% significant at less than 5%. A unit increase in this factor leads to a 22.8% increase in the demand for loans from the SGs. Dependents may be school going children who need money for education purposes. As the number of dependents increases, the number of schooling children (especially secondary school children) also increases. This increases the requirement for education related dues. Education related expenses are especially higher with secondary school going dependents. The need for timely school dues forces individuals to seek financial services especially loans for which SGs come in handy. Although the main purpose of participating in SGs is to access financial services, the larger household size provides an enabling environment for individuals to participate in the SGs. The larger household size provides the labour necessary to free a household member to attend the mandatory SGs meetings. This view about labour is shared by Weinberger and Jütting (2001).

SGs, being a financial service managed by the owners, require numeracy. This is to enable each participant to understand the accounts especially in the calculation of interest payable and how the money is shared at the end of the cycle. This is partly the reason why less educated individuals shun participating in the SGs. Education in this model is positive and significant at less than 1%. An extra year in school increases the likelihood of participating in SGs by 2.1%. Number of years in education is also important for the intensity of participation through the amount saved per cycle. A unit increase in number of years in education increases the total share-out at the end of the cycle by 6.1% significant at less than 5%. The higher savings is a result of higher income attributed to the education level of the participants.



5.4.2 Economic factors

SGs as a financial service requires income. The income has a significant effect on both the probability of participation and total savings at share-out in SGs of 13.434 and 57.598 respectively. This implies a percentage increase in predicted annual income results in a 13.434% increase in the probability of participating in SGs, while a percentage increase in predicted income leads to a 57.598% increase in total share-out savings. The main objective of SGs is to provide banking services. Savings is the main banking service provided by these SGs. Individuals with higher incomes have more disposable incomes. It is this disposable income that can be saved in the SGs. Increasing disposable income increases the likelihood of saving hence the increased probability of participating in SGs. This result has been reported by Mpiira *et al.* (2013, p. 5287) in Uganda and Weinberger and Jütting (2001, p. 1401) in Kashmir, Pakistan. The negative sign on “square of natural log of predicted annual income means that the probability of participation in SGs starts to decline with increase in “natural log of predicted annual income.” This happens after natural log of predicted annual income reaches 15.114 (equivalent to 3663758 Uganda Shillings or 981.5 USD). Individuals earning beyond this amount become attracted to formal financial services so they can get loans to supplement their incomes. This turning point amount is equivalent to some of the entry level civil servants in Uganda. For example, entry level “Special Police Constable” earns an annual salary of 3302400 Uganda shillings (885 USD) (Service, 2018). This implies formal employment starts or is near this wage. Largely, formally employed individuals earn monthly and get their salaries through formal financial services like commercial banks. This argument is supported by the findings of Mpiira *et al.* (2013). The income turning point for share-out money is 4757344 (1274.5 USD). Income is however insignificant in the intensity of participation models for frequency of taking loans.

Income stability is especially important in scheduled savings like it is in SGs. SGs usually need mandatory savings at each meeting. Farm sales as a main source of income is erratic due to the rainfed nature of agriculture in Uganda. This makes one unable to guarantee the mandatory savings needed at every sitting of the SGs hence the 9.2% reduction in probability of participation. This is significant at the 10% level. SGs participants whose main source of income is farm sales get loans from SGs at a rate 27.1% lower than participants who have main sources of income other than farm sales. This is significant at less than 5%. This group of members have erratic incomes and are unable to guarantee repayment of their loans. They are therefore not advanced loans by the SGs. Though insignificant, the positive signs on “spouse

earns” and “number of income sources” further highlights the importance of income stability in SGs participation. This is because individuals from households whose spouses earn, can rely on their partners for the mandatory savings or loan repayments in case they fail to raise the money for the meeting. Having more than one income source comes with the assurance of money needed for the savings or loan repayments needed at every sitting. An individual can look to another income source when one income source disappoints or is depleted, hence the increased chances of participation with increase in income sources. A unit increase in number of loans sources decreases savings by 29.0% significant at less than 5% level. This is a result of the would-be savings being committed to repayment of loans from the other loan sources.

Land for rent in this region is usually distant from dwelling areas. The land is rented by people who need the land for commercial farming which calls for more use of agro-inputs especially transport and labour. The members therefore have less disposable income to save in the SGs. The amount that they have saved is also deducted due to the more loans they have to repay. Therefore, renting land leads to 53.7% less savings than when not renting. Though insignificant, land rent causes members to borrow 12.3% more.

Government subsidies are in the form of agro-inputs which the member would have bought. The subsidy frees up resources that are used to save or guarantee loans. Members who received subsidies got 20.4% more loans than members who did not receive loans significant at less than 10%. Though insignificant, the factor increases savings for receivers of the subsidies by 24.8%, about the same as for the loans.

5.4.3 Social factors

The number of community groups that an individual is active in shows how outgoing one is. Those that are active in many community groups more easily enrol into another group that forms in the community. They also have information about new groups through their networks unlike those that are either active in limited networks or in none. The number of types of community groups an individual is active in in this model, is positive and significant at less than 1% level. An extra community group that an individual is active in adds 5.7% to chances of such an individual participating in SGs. A similar result was noted by Weinberger and Jütting (2001, p. 1399) in Chad. A unit increase in the number of community groups that a SGs member is active in leads to a 27.2% increase in the total share-out at the end of the cycle. This is because those who participate in more community groups interact more with the same people who the members understand more regarding their incomes and financial management. This

enables the SGs member to waive off the risk associated with entrusting such members with his/her money. This, therefore, enables such members to save more with the SGs. This is in line with Jøsang and Presti (2004) who demonstrated that with higher probability of success, an individual is more willing to commit a higher fraction of his or her capital to a venture (SG).

RoSCAs participation is significant (at less than 10% level) and an important factor in intensity of participation. Members in RoSCAs get 23.2% less loans and save 32.8% less money in SGs as compared to SGs members who are not active in RoSCAs. This is because RoSCAs are an alternative to SGs competing for the same scarce savings of the members. The members distribute the savings between the RoSCAs and SGs to optimize their own utility from the two financial services providers. Likewise, the SGs members get loan advances from RoSCAs which they are committed to repay hence minimise extra burden from SGs loans.

5.4.4 SGs model characteristics

SGs as a financial service involves cash mobilization from members which is later loaned to the same members on request. The member must meet the minimum standards set by the SG. The SGs also hold cash that has not yet been lent out. Individuals whose risk aversion is high find it difficult to entrust their money to be stored in a cashbox or even be loaned to other members. Therefore, only members who are risk seeking have more courage to participate in SGs. Such members have a higher trust in the SG and its members. Trust in the SG and its members is very important. A unit increase in trust on a Likert scale of zero to five increases the likelihood of participation in SGs by 16.1% significant at less than 1% significance level. This factor is not important within the SGs because members already trust each other enough.

A unit increase in the need for external support reduces the likelihood of participating in SGs by 7% significant at less than 1% level. SGs use accounting models that the members need to understand. Those that find it difficult to understand the model will require external support in the form of training so as to understand and participate in SGs. This requirement is especially necessary at lower education levels of the target individuals. This implies that with organisational support of SGs, more individuals can decide to participate. The need for external support has an even greater impact on total savings. A unit increase in need for support decreases the total savings (total share-out) at the end of cycle by 41.7%, significant at less than 1%. This is because individuals have not understood the accounts and find it risky to entrust their savings with the SGs members. This factor is not important for frequency of getting loans from SGs.

Adequacy of loan values from SGs contributes 9.6% to the chances of participation or conversely nonparticipation significant at less than 1%. Besides the financial service of savings, SGs offer loans to members. Such loans are proportionate with the member's actual savings and the loan pool available at the time of borrowing. The loan pool is solely composed of the member savings. Depending on individual loan needs, the loan amounts may be inadequate. Individuals that are benefiting from other financial services especially more formal financial services, will find SGs unattractive as the loans are tied to the current value of savings and the small loan pool available.

Members who share their savings in the first quarter of the year (January to March) needed 41.2% more loans and saved 48% less as compared to those that shared in July to September. Certainly, if they got more loans then they were preoccupied with loan repayment including the 10% interest hence the much less savings. These first quarter members use up their savings early in the year for both education related dues and agro-inputs. They require the savings to kickstart the year. They are then forced to borrow to sustain these needs within the year until their next share-out.

A good experience with the SGs loans the previous year(s) compels the SGs member to get more loans from SGs in place of other loan sources. This is shown in this model as a unit increase in the frequency of getting loans in year 2017 enabled a member to increase the frequency of getting loans in year 2018 by 17.9%. This means that a SGs member derives more utility from getting loans from SGs than from other loan sources. This compelled the members to save more (but insignificantly) in the SGs to secure more frequent and larger loans.

5.5 Summary of the empirical results

A significant difference was observed between SGs members and non-members as regards total expenditure on agro-inputs, per capita expenditure on agro-inputs, and the proportion of income spent on agro-inputs with the SGs members being higher than the non-members. SGs' participants spent 34.01% more on agro-inputs annually than the SGs of non-participants.

The participants' mean per capita expenditure on agro-inputs was more than for the non-participants by 42.548%. The participants spent 5% more of their income on agro-inputs than the non-participants. The impact of SGs on total expenditure on agro-inputs was insignificant and negative.

The main factors that significantly and positively influenced participation in SGs include the sex of household head, number of years in education, number of dependants, having children in secondary school, annual income (in a quadratic form), being active in other community groups, and being satisfied with the loan amounts received from the SGs. The factors that negatively and significantly influenced participation include agriculture as a main source of income, and external support as a requirement to join a SG.

Intensity of participation in the SGs was estimated using variables “frequency of getting loans from the SGs” and “total savings received at the end of the cycle.” Being female, ending the savings cycle between January and March, receiving a government subsidy, number of dependents, and frequency of getting loans in the previous cycle all increased the frequency of getting loans in the current savings cycle. Agricultural sales as a main source of income and participation in RoSCAs decreased the frequency of getting loans in the current savings cycle.

Number of years in education, income, and number of other community groups that an individual is active in all increased savings at the end of a cycle. While being female, the number of other loan sources, renting land for farming, participation in RoSCAs, ending a savings cycle between January and March, and requirements for external support to join a SG all resulted in lower savings at the end of a cycle.

CHAPTER SIX

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

6.1 Summary

This study determined the factors influencing participation in SGs. The study put particular emphasis on use of SGs (as a form of a fully-fledged financial services provision) to access agro-inputs. The study, therefore, additionally, determined the impact the SGs have had on members in terms of expenditure on agro-inputs.

According to the literature, SGs impact on productivity through enabling purchase of agro-inputs. This impact was insignificant in Malawi but the SGs led to a 38% increase in productivity in Ghana. The factors that significantly influence participation in SGs included: sex of household head, income age, education, distance to the financial facility, asset level (farm area and disposable assets), household size, having dependents in school, and income stability measured in part by spouse earning, agricultural income.

The study used data collected through a cross-sectional survey from 250 participants. These participants were drawn from Sironko district, eastern Uganda, East Africa. The study employed a Probit model to investigate the determinants of participation and intensity of participation. ATT was calculated after discounting the selection bias between the SGs members and non-members. This was done to estimate the impact of SGs on expenditure on agro-inputs. A t-test was done to determine whether there was any significant difference between SGs members and non-members in terms of expenditure on agro-inputs.

6.2 Findings and Conclusions

Averagely, SGs contributed 40% of all expenditure on agro-inputs by SGs members. A significant difference was observed between SGs members and non-members as regards total expenditure on agro-inputs, per capita expenditure on agro-inputs, and proportion of income spent on agro-inputs with the SGs members being higher than the non-members. There was no significant impact of SGs on total expenditure on agro-inputs, but the impact tends to be negative. This result either means that participation in SGs leads to reallocation of the meagre cash resources to other priorities like education but not agro-inputs. Or the investment in agro-inputs due to SGs is too small to have an impact.

The main factors that significantly and positively influenced participation include sex of household head, number of years in education, number of dependants, having children in secondary school, annual income (in a quadratic form), being active in other community groups, and being satisfied with the loan amounts received from the SGs. The factors that negatively and significantly influenced participation include agriculture as a main source of income, and external support as a requirement to joining a SG. Therefore, programs that seek participation in SGs will be more successful when they are targeted to female headed households, more educated people, households with more dependents and with secondary school going children, and those already active in other community groups. Income generating activities that supplement farm income will also lead to more participation in SGs. Supporting SGs in the form of loans and training will also encourage participation.

Intensity of participation in SGs was estimated using the variables “frequency of getting loans from SGs” and “total amount saved in SGs at the end of a cycle”. Females got loans more frequently than males, members in larger families got more loans, members whose main source of income is agriculture got less loans than those who agriculture is minor as a source of income, receiving a government subsidy led to more utility of the SG by getting more loans, participation in RoSCAs reduced use of SGs loans, ending the year between January and March led to getting more loans as compared to those in the third quarter of the year (July to September), and those who got loans in a previous cycle proportionately get more loans in a current cycle. This implies that the SGs members who should be targeted with credit facilities even within the SGs are females, larger households, those active in SGs for more than a year, and those that end their savings cycle in the first quarter of the year. Those whose main occupation is agriculture should be targeted with income generating activities to induce credit use. The government should continue the subsidy program which induces economic activity. Members should be encouraged to use SGs instead of RoSCAs because SGs enable borrowing as the need arises.

SGs members who saved more were those that were more educated, who had higher incomes but only up to an annual income of 1274.5 USD beyond which they declined in savings, and those that were more active in the community in terms of participating in community groups. Factors that reduced savings included being female, having many loan sources, renting land (reduced by about 54%), participation in RoSCAs, requirement of external support to

participate in SGs, and share out being in the first quarter of the year (January to March) instead of the third quarter of the year.

Although the impact of SGs on agro-input expenditure is insignificant and negative, with some extension services focused on agro-inputs use will trigger SGs members to save for agro-inputs, especially the under used chemical fertilisers that are key to increased yields. This will in turn change the trend, for the better, of key welfare indicators such as prevalence of undernourishment, the global hunger index, and the gross per capita production number in agriculture for Uganda. This is possible because the study shows that SGs members devote some of their SGs withdrawals or loans to agricultural productivity, though insufficient to cause an impact now. Therefore, with more sensitization on agro-input use and how smallholders can use the SGs to finance the agro-inputs access, wide and sustainable use of agro-inputs can be achieved in Uganda.

6.3 Policy implications and recommendations

Factors influencing participation in SGs have been profiled and can be used by SGs promoters to better target SGs interventions, thereby better achieving financial inclusion.

Important factors that can be addressed at policy level have been identified in this study. These include support for the SGs, loan values, and to a lesser extent, activity in community groups. Support for SGs is in the form of facilitating trainings in implementation of the SGs models. This gives the prospective members confidence in the mode of operation of SGs and highlight the possible benefits of SGs. This in turn encourages participation. The loans pool of SGs is limited to the small savings that members make yet members may need loans at about the same time. Members who predict that the SGs will not serve their credit needs are discouraged from participation. Therefore, external support in the form of adding to the loans pool would greatly encourage participation in SGs. This can be achieved by providing soft loans to the SGs.

Female headed households are more disposed to participate in SGs. Therefore, programs intended to address the plight of these households can best be done through these SGs. There is a need to target female farmers or female headed households. At the same time, special attention should be given to women in the male headed households so that their share of financial benefits is realised.

Encouraging community members to participate in community groups (including political groups) increases a member's social capital and affinity for participation in group settings. The member will acquire the needed information about SGs and hence participate at will. This is achieved by educating community members about the benefits of participating in community groups for example, distributing agro-inputs to group members of different community groups.

SGs are a good avenue for financing access for agro-inputs. However, not enough of the money is channelled to the purchase of agro-inputs. With more sensitization on agro-input use and how smallholders can use the SGs to finance the agro-inputs access, wide and sustainable use of agro-inputs can be achieved in Uganda. This will be achieved by carrying out a pilot project of SGs in which members save with the objective of using the savings for agro-inputs. The SGs patrons will then ensure that the objective is achieved.

6.4 Recommendations for further research

Impact of SGs on agricultural productivity can be better investigated through randomized studies as opposed to the cross-sectional observational studies that this study employed. This would do more in reducing selection bias that is inherent with this study. Besides records of participants would be better kept and more informative deductions made.

The study should be replicated in other regions of the country or other countries where SGs are operational. This is to further check the validity of this study.

There should be a randomized trial for SGs being used to aid access to agro-inputs. This can be done by providing a byelaw that requires members to save an agreed amount at each sitting specific for purchase of agro-inputs and other productivity related inputs during the farming season. This would be like the small amounts already adopted by SGs for emergencies. It would however differ in a way that such savings would be accessed during the farming season, and everyone gets the amount that he saved, which is not repayable. The study can further test the supply of the agro-inputs equivalent to the savings instead of hard cash to minimise reallocation of the money for agro-inputs for other urgent needs. This study would be an attempt to partly lead to input use awareness and market-led sustainable access of agro-inputs by smallholders.

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APPENDIX

A. Variables collected.

Table 0-1 variables used and hypothesized effect participation.

Variable name	Description	Type of variable	Expected Sign
OTHER EARNERS	Presence of another earner in the household, (yes or no)	Independent	+
SG	Whether active in sg, yes or no	Dependent	
COFFEE	Arabica coffee (yes_no)	Independent	-
BANANA	Green bananas and plantains (yes_no)	Independent	-
CEREALS	Maize (mainly), but also millet, rice (yes_no)	Independent	+
LEGUMES	Field beans, soy, peanuts, peas (yes_no)	Independent	-
VEGETABLES	Leafy vegetables, tomatoes, climbing beans, onions, potatoes, bitter tomatoes (yes_no)	Independent	+
CATTLE	Cows and bulls (yes_no)	Independent	+
POULTRY	Chickens, ducks (yes_no)	Independent	-
FARMING	If farm income is most important income source, zero otherwise	Independent	-
AG_TOTAL	Total expenditure on agriculture	Dependent	
AGE	Age of the respondent	Independent	+
EDUCATION	Number of years in education	Independent	+



CHILDREN IN SECONDARY	Number of children studying in secondary schools within the household of respondent	Independent	+
HOUSEHOLD SIZE	Number of people living in the respondent's household	Independent	+
NO OF_GROUPS	No. of community groups active in	Independent	+
NO OF INCOME_SOURCES	Number of income sources	Independent	+
AVERAGE_INCOME	Average monthly income	Independent	+
NUMBER OF LOAN SOURCES	Number of loan sources	Independent	-
01 TRUST2	Level of agreement with SGs members being trustworthy.	Independent	+
13 VALUES	Level of agreement with loan values from SGs being adequate	Independent	+
28 SUPPORT	Level of agreement with need of external support as requirement for joining SGs.	Independent	-
GENDER	Sex of respondent (female or male)	Independent	Male or female
STATUS	Marital status, (single, married, divorced, widowed)	Independent	-
INCOME_SOURCE	Most important source of income of the respondent (business, farm sales, formal employment, part time employment)	Independent	+, -
EXPENSES SAVED_MONEY	Most important expense using saved money (emergencies, education, business capitalization, agro-inputs, home assets)	Independent	+, -
POST_IN SG	Sg member has any leadership post in at least one sg (yes_no)	Independent	
SG_SIZE	Sum of the different SGs sizes that an individual is active in	Independent	+



SGP_MALE	Total males in gr	Independent	+
NO_SG	Number of SGs active in	Dependent	
SG_SHARE	Whether had a share out (yes_no)	Independent	+
SHARE_18	Total 2018 share out	Dependent	
SHARE_17	Total 2017 share out	Dependent	
TOTAL_PRICE	Total price per share per week for all the SGs	Independent	+
TOTAL_MONTHS	Total months of share out	Independent	
SGP_1	Savings group 1 (i. e. First (earliest) share out month)	Independent	+
SGP_2	Savings group 2 (i. e. Second earliest share out month)	Independent	
SGP_3	Savings group 3, (third earliest month of share-out)	Independent	
SGP_4	Fourth savings group (i. e. Fourth earliest month of share-out)	Independent	
PROFIRA_S	Profira support (yes_no)	Independent	
NGO_S	Ngo support (yes_no)	Independent	
SC_S	S/c support (yes_no)	Independent	
SG support	Any sg support (yes_no)	Independent	
FRE_18	Times got SGs loans in 2018	Dependent	
FRE_17	Times got SGs loans in 2017	Independent	+



B Questionnaire



SURVEY QUESTIONNAIRE

THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE IN SIRONKO DISTRICT, UGANDA

1 Demographic information:

1.1 Location (fill in)			
Questionnaire Code		Date (dd-mm-yyyy)	
Sub-county	Parish	Village	

1.2 Personal information (tick applicable)			
1.2.1 Respondent gender	Male	Female	
1.2.2 How old are you?			
1.2.3 Marital status	Married	Widowed	Single divorced
1.2.4 What is your highest level of Educational level			
1.2.5 How many are you in this family?			
1.2.6 How many children in this family go school?	Primary	Secondary	College
1.2.7 Are you the household Head?	Yes		No
1.2.8 If no, what is your relationship to the household head?	Wife	Husband	Child Other (specify)

1.3 Community relations			
1.3.1 Are you an active member of any community group?		Yes	No
1.3.2 If yes, please fill in 1.3.3 and 1.3.4			
	1.3.3 What is your position in the group ¹	1.3.4 Please indicate the order of importance (to you) of the groups that you belong to ²	
1	Religious e.g prayer groups		
2	Savings group e.g VSLA, SILC		
3	ROSCAs e.g KASALE, POOL, mery-go-round		
4	Burial		
5	Political e.g registered political party		
6	Drinking e.g evening drinking groups		
7	Festivals groups e.g meat for Christmas festivals		
8	Other (specify)		

¹ Please fill: chairperson=1, secretary=2, treasurer=3, member=4, money counter=5, key holder=6, publicity=7, vice-chairperson=8, speaker=9

² Order of importance is from 1=most important through to 5=least important

SURVEY QUESTIONNAIRE for THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE IN SIRONKO DISTRICT, UGANDA

1.4 If savings groups is ticked in 1.3.1 above, please fill in this table											
1.4.1 How many savings groups are you active in? (fill in number)											
1.4.2 Fill in the details of the savings groups you are active in below											
Group name	group size ³	How many Males in the Group	Group model (VSLA=1, SILC=2, other=3(specify))	How much was your total savings at share-out?		Minimum amount Per share ⁴	How often do you meet	Month of share out ⁵	Group support		
				2018	2017				PROFIRA (tick if yes, dash if non)	NGO (indicate name e.g CARE, UWESO, CRS) (write NGO name if yes, dash if non)	Sub county (tick if yes, dash if non)
1.											
2.											
3											
Totals											
Averages											
1.4.3 What do you use your group savings for? (fill in 1=most important, through to 5=least important) ^{6, 7}											
Agricultural activities (crop related and animal treatment and feeding, animal shades)	Small business (e.g agribusiness, other businesses)	School fees	Home assets (e.g purchase of: land, poultry, livestock)	food	Home improvement (e.g house construction/improvement, furniture, utensils, clothing)	Saved in another group	Medical expenses	Other (specify)			

³ What is the total number of members in the Group?

⁴ What is the minimum savings/share at each meeting?

⁵ Which month of the year does your group share their savings? (fill in month in figures)

⁶ If the member has not had a share-out yet, please indicate what the priorities would be if the respondent were to have a share-out

⁷ If a respondent spent the share-out on less than five priorities, please indicate which other priorities the respondent would spend on if the share out were to be more than what he/she got, or would get.



SURVEY QUESTIONNAIRE for THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE
IN SIRONKO DISTRICT, UGANDA

2 To determine the proportion of group savings spent on agro-inputs by group members

2.1 Expenditure on agricultural related activities										
2.1.1 Which crops have you grown in this year (2018)?, please tick in box										
coffee	Bananas	Maize	Beans	Climbing beans	Onions	Cabbages	Tomatoes	Others (specify)		
2.1.2 Which animals have you had this year (2018)?, please tick in box										
Cattle	Sheep	Goats	Poultry	Other (specify)						
2.1.3 Have you spent any of your income on agricultural related activities this year, 2018?							Yes	No		
2.1.4 If yes, how much money was spent on it according to the breakdown below: (please relate to 2.1.1 and 2.1.2 and indicate total expenditure including income from sources other than the savings groups)							2018 Total expenditure on agro-inputs		2018 Expenditure from savings group(s) ⁸	
							Qty ⁹	Value (UGX)	Qty	Value (UGX)
i.	Labour (land opening, planting, weeding, harvesting, pest and disease control)									
ii.	Fertilizers (KG)/manure									
iii.	Pesticides									
iv.	Seed									
v.	Equipment (hoes, sprayers, pangas, filers, tumpline)									
vi.	Expenditure on livestock and poultry (treatment and feeding)									
vii.	Cattle or poultry shades									
viii.	Transport, Marketing, extension, communication									
ix.	Land rent									
x.	Stakes for tomatoes or beans									
xi.	Others (specify)									
Totals										

⁸ Please fill in this section if "savings groups" is ticked in 1.3.1 above, that is respondent belongs to a savings group.

⁹ QTY=Quantity, is filled in only to aid the respondent evaluate the monetary value of the expenditure.



SURVEY QUESTIONNAIRE for THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE
IN SIRONKO DISTRICT, UGANDA

3 To identify factors determining the level of spending on agro-inputs¹⁰

3.1 History of expenditure on agro-inputs			
3.1.1	How many years have spent participating in savings groups		
3.1.2	Before joining the savings groups, were you spending any money on agricultural related activities	Yes	No
3.1.3	If yes, are you spending more now or less, as compared to before joining the savings group?	More	Same
			Less

3.2 Expenditure of loans from the savings groups									
3.2.1	Have you ever received a loan from the savings group			Yes		No			
3.2.2	How many times have you received loans from the group?			2018		2017			
3.2.3	What do you spend your loan money from the group on? (fill in 1=most important, through to 5=least important, please indicate at least 5 choices)								
	Agricultural activities (crop related and animal treatment and feeding, animal shades)	Small business (e.g agribusiness, other businesses)	School fees	Home assets (e.g purchase of: land, poultry, livestock)	food	Home improvement (e.g house construction /improvement, furniture, utensils)	Saved in another group, or same group	Medical expenses	Other (specify)

3.3 Objectives of joining the savings group				
3.3.1 Why did you join the savings group (can choose more than one) Circle the corresponding number				
A. Banking services i.e keep savings safe, Accrue savings, Borrow Money		D. Insurance services Access social-fund, Pay for medical expenses		
B. Agricultural activities Seed, fertilizers, pesticides, labour		E. Socialisation gain knowledge from other members, network or make friends, Be active in the community, Political reasons, Social capital		
C. investment Start or grow a business, Develop or help self or family, improve living conditions, Acquire an asset, Educate Children, Earn a profit at share-out		F. As prerequisite Access government services, Benefit from NGO services		
		G. Other (specify)		
3.3.2 Please rank the above (a, b, c, d, e, f) according to most likely cause of you joining the savings group. Fill in a, b, ..., f (1=most likely, 5=least likely)				
1	2	3	4	5

¹⁰ This section is only for respondents who belong to savings group



SURVEY QUESTIONNAIRE for THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE
IN SIRONKO DISTRICT, UGANDA

3.3.3 what are the objectives of the group? (can choose more than one) Circle the corresponding number								
A. Banking services i.e keep savings safe, Accrue savings, Borrow Money			D. Insurance services Access social-fund Pay for medical expenses					
B. Agricultural activities Seed, fertilizers, pesticides, labour			E. Socialisation gain knowledge from other members, network or make friends, Be active in the community, Political reasons, Social capital					
C. investment Start or grow a business, Develop or help self or family, improve living conditions, Acquire an asset, Educate Children, Earn a profit at share-out,			F. As prerequisite Access government services, Benefit from NGO services					
			G. Other (specify)					
3.3.4 Please rank the above (a, b, c, d, e, f) according to most likely cause of you forming the savings group. Fill in a, b, ..., f (1=most likely, 5=least likely)								
1	2	3	4	5				
3.3.5 Did you use the money from the group as per your initial objective of joining the group?							Yes	No
3.3.6 Do group members monitor your implementation of the objectives of saving or getting the loan?							Yes	No
3.4 Source of funds for group savings:								
3.4.1 Where do you get the money that you save in the group? (fill in 1=most important, through to 5=least important, please indicate at least 5 choices)								
Formal employment	Small business and agri business	Remittances (non refundable money from relatives)	agricultural sales from your harvests	Group savings (after share out)	Group loan (get loan to pay a share)	Money lender (borrow from outside the group)	Off Farm work	Other (specify)
3.5 Receipt of government subsidy								
3.5.1 Do you receive any agro-inputs from the government							Yes	No
3.5.2 If yes, what agro-inputs did you get from the government (state UGX equivalentents)			Inputs	2018	2017	2016		
			Seed/seedlings					
			Pesticides					
			Equipment					
			Fertilizer					
3.6 Hectares requiring fertilizer and pesticides								
How much of your land (Acres) is under? (fill in figures)			Coffee	Maize	Vegetables	Climbing beans	Others (specify)	
Are fertilizers/manures used on these crops (tick if yes, dash if no)								
Are pesticides used on these crops (tick if yes, dash if no)								



SURVEY QUESTIONNAIRE for THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE
IN SIRONKO DISTRICT, UGANDA

4 To determine the factors that influence group membership

4.1 Income							
4.1.1 What is your main source of income? (fill in 1=most important, to 8=least important) Identify at least 3 (three) sources of income							
Business, Agri-business	off-farm labour	formal employment	pension	remittances	Produce/farm sales	Other (specify)	
4.1.2 How often do you receive your income? (can choose more than one)							
Daily	Weekly	Fortnight	Monthly	Biannual	Annual	Irregular	Other (specify)
4.1.3 If produce sales is ticked in 4.11 above, how often do you make your sales? (can choose more than one)							
Daily	Weekly	Fortnight	Monthly	Biannual	Annual	Irregular	Other (specify)
4.1.4 In which ways do you receive your income?							
mobile money		bank account		Sacco	Cash	Other (specify)	
4.1.5 Do you save any money for future events? Yes No.							
4.1.6 If yes, in which ways do you save your money for future events (rank from 1=most important, through to 9=least important), identify at least 3 ways							
bank account		mobile money		Savings group		purchased produce	
Sacco		In house		ROSCAs, KASALE POOL		Assets (e.g Livestock, poultry, land)	
		With friends		Festivals groups		Other (specify)	
4.1.7 What do you normally save your money for? (rank from 1=most important, through to 6=least important), identify at 4 reasons							
Medical emergencies		Business		Home assets		Other (specify)	
School fees		Agricultural productivity		Home improvement			
pension				dowry			
4.1.8 Other than you, how many people in the household earn any form of income?							
			Individual 1	Individual 2	Individual 3	Individual 4	None.
Frequency of earning (daily=1, weekly=2, monthly=4, irregular=4)							
Age group of the individual. (adult =1, below 18 =2)							
4.1.9 What is your average total monthly income? (write figure)							
4.1.10 Do you get any loans to supplement your income? (tick) Yes No							
4.1.11 If yes, what are your sources of loans? (rank from 1=most important, through to 8=least important), identify at least 3 sources							
Bank	Money lenders	Savings groups	ROSCAs	SACCOs	Friends	Shops	Other (specify)



SURVEY QUESTIONNAIRE for THE ROLE OF SAVINGS GROUPS ON SMALLHOLDER AGRO-INPUT USE
IN SIRONKO DISTRICT, UGANDA

4.2 Please indicate how much you agree with the following statements					
Item	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
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25					
26					
27					
28					