What determines membership to farmer groups in Uganda: Evidence from the Uganda Census of Agriculture 2008/09

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Abstract

Farmer groups have returned to the policy agenda of many developing countries because of their attractiveness as facilitators and accelerators of technical and economic change in rural areas and as potential avenues for mobilizing farmers around a common objective especially in the delivery of services and formulation of policies that support agriculture development. In Uganda, the government and development agencies are targeting farmer groups as the vehicle for agricultural development in the country. Despite this significance of farmer groups in the policy agenda little is known on the level of membership and the factors influencing the decision of farmers to join these groups. Using the Uganda Census of Agriculture 2008/9 data, the study reveals that nationally, membership to groups is low at 9 and 16 percent amongst individual farmers and agriculture households respectively. Northern Uganda had the highest level of membership followed by Western Uganda. The Central region had the least membership. Farmer characteristics that influenced membership to groups were found to be: age, gender, marital status, major activity and education achievement. Distance to extension services was a major factor influencing membership to groups in addition to distances to the to all year gravel road for some regions. To increase membership to farmer groups, government and development agencies need to provide more time and resources to group formation with targeting directed towards illiterate farmers and those far away from extension workers. The use of the local language in publicity materials is also important in ensuring participation among the illiterate. Overall, there is a need for concerted efforts by all institutions supporting groups to ensure that groups' approach succeeds in improving access to agricultural technologies and ensuring that noticeable outcomes are achieved for them to attract more farmers like the out grower schemes in Ghana. Other groups based factors including governance, capacity in knowledge, resources and sustainability should be enhanced as it will motivate the more risk-averse farmers to join the groups.

Key words: Farmer groups, Membership, Uganda Census of Agriculture,

1.0 Introduction

Following the structural adjustment programmes of the mid 1980s, in which several Sub-Saharan Africa (SSA) governments relinquished support to state controlled co-operatives, farmer groups have emerged in the policy agenda to fill the institution vacuum (FAO, 2010). They are avenues in which small scale farmers can be reached by the government, the private sector and the development partners to improve agriculture productivity and achieve food security. Currently, farmer groups are variously known as producer organizations, farmer organizations and groups of co-operative action. Others are organised as private co-operatives organisations. This paper refers to them as farmer groups for as long as there was an element of co-operative action on any agricultural activity along the value-chain.

Overall, farmer groups are important avenues through which farmers can access market and credit information as well as other important agricultural information like new agriculture technologies. They also form important avenues for mobilizing farmers around a common objective especially in delivery of services and formulation of policies that support agriculture development. In countries such as Tanzania and Ghana, farmer groups are at the centre of the poverty reduction strategy, extension delivery and crop marketing (Uliwa and Fischer, 2004; Salifu et al., 2010).

In Uganda, the use of farmer groups remains Central to the agriculture transformation process. The Agriculture Sector Development Strategy and Investment Plan (DSIP) which is the sectoral plan for the next 5 years has four major programmes of focus namely: enhancing production and productivity, improving market access and value addition, improving the enabling environment for agricultural sector and lastly institutional strengthening in the sector (MAAIF, 2010). Within these programmes particularly in the first and second programmes, the existing farmer groups are envisioned to play a key role in promoting some of the activities. It is envisioned that these groups will be important in improving produce marketing, increasing access to financing and produce value addition and ultimately leading to agricultural transformation (MAAIF, 2010). The National Agricultural Advisory Services (NAADS) for example has its implementation strategy based on the farmer group concept. Farmers are supposed to join existing groups or form new groups within the village and then merge to form the village farmer forum upon which recruitment, selection of food security enterprise and farmer and distribution of multiplied planting and stocking materials is done.

Overall, there is heavy emphasis of farmer groups by the policy framework within the Ministry of Agriculture in Uganda yet little is known about the factors contributing to farmer participation in these groups. Given the importance of groups for loan access, input access and access to information on marketing and new agriculture technologies, some farmers choose not to join farmer groups. Farmers will take several factors into consideration before making the

decision to join a farmer group just like in the case of technology adoption. A complete understanding of factors influencing membership to farmer group could go a long way in informing policy, researchers and development practitioners on how membership can enhanced and be relied on as channels for agriculture development. Research examining the matter has tended to target particular programmes particularly NAAD groups and farmer field school (FFS) groups. Benin et al., (2008) for example examined the factors that affect household decision to join the NAADS farmer groups. Davis et al., (2010) on the other hand examined the factors that influence the household's decision to participate in farmer field school (FFS) groups in East Africa including Uganda. However, besides the NAADS groups and the FFS, other groups run by other organizations and programmes do exist. The Uganda National Farmers Federation and the Uganda Cooperative Alliance for example also have farmer groups at the grassroots levels that coordinate farmers. Thus this paper addresses all these groups using nationally representative data of the Uganda Agriculture Census of 2008/9. The main objective is to establish which factors determine membership to farmer groups in Uganda.

The rest of the paper is organized as follows: The next sub section gives an overview of farmer groups in Uganda. Review of related studies relevant to this study is presented in section 2. The data and methods used in the study are presented in section 3. The results and discussions are provided in section 4 while section 5 looks at the conclusions and policy recommendations.

1.1 Overview of farmer groups in Uganda

Farmer group participation in Uganda can be traced way back to 1900 when Uganda was one of the few British colonies that advocated for the establishment of co-operatives (Kyazze, 2010). Subsequently, the co-operative ordinance of 1946 and the co-operative societies Act of 1962 formalised the existence of co-operatives in the country. However, in 1987 following the structural adjustment programmes that led to market liberalisation, government control of co-operatives ceased on the argument that they were monopolistic and liberalization of the sector would ensure farmers benefit from the competitive prices offered by private organizations. Subsequently, various competitors emerged to trade directly with the farmers offering higher farmer prices than before. On the other hand, Government support to farmers such as extension service provision ceased and production ultimately reduced (DENIVA, 2005a).

Currently, there are various organizations and programmes that are involved in supporting the formation of farmer groups. The government through the DSIP has prioritized farmer organizations in their five year plan with the overall objective of increasing capacity of existing farmers' organizations in management, entrepreneurship and group dynamics to more effectively engage in value chain activities especially collective marketing (MAAIF, 2010).

One of the programmes in Uganda largely supporting farmer groups is the NAADS programme. NAADS is a 25 year programme under the Plan for the Modernization of Agriculture (PMA) charged with commercialization of agriculture through provision of extension services to farmers in the country. Implementation of NAADS lies on the farmer group approach. Farmers in the village are supposed to get into existing farmer groups or form new ones. Other categories of farmers such as food security farmers are then chosen from within these groups. Table 1 below shows the number of NAADS groups that have been formed over the years. Overall, the number of groups that belong to NAADs has been increasing over the financial years from 2006 in 2001/2 to as high as 55,000 in 2008/9.

Table 1: Membership in NAADS groups over the past financial years

Financial year	No. of groups	Total number of members
2001/02	206	4,120
2002/03	4,911	98,220
2003/04	10989	219,780
2004/05	15,900	318,000
2005/06	25,000	500,000
2006/07	38,515	770,300
2007/08	42,000	840,000
2008/09	55,000	1,100,000

Source: NAADS secretariat

Uganda National Farmers Federation (UNFFE) which is the largest Non-governmental Farmer's organization (NGO) in Uganda is also another organization supporting farmer groups in Uganda. It was founded in 1992 as an avenue to help farmers market their produce, get access to agricultural extension and also provide trainings in leadership and financial management. In 2002, it became a federation in order to embrace various commodity associations and service providers. Currently UNFE covers 66 districts in the country with different categories of groups/associations. Such groups/associations include: commodity specific farmer organizations and include coffee farmers association, the Uganda Seed Producers Association (USPA), the oilseed producers' organization (UOSPA) and dairy farmers association.
Other commodity specific organizations like coffee, input companies and many others are also part of UNFFE. UNFFE lobbies and provides advocacy on behalf of its members and it also helps members to form village savings and loan associations.

The Uganda Cooperative Alliance (UCA) which is also another organization supporting farmer groups emerged to resuscitate agricultural cooperatives that had been destroyed by

liberalization policies. It supports farmer organizations as Rural Producer Organizations (RPOs) who are registered by local authorities. Under the guidance of UCA, approximately ten primary agricultural co-operatives are grouped into a "mini union" known as Area Co-operative Enterprise (ACE) for collective marketing of produce. They are also a mechanism for mobilizing resources to supply farmers with quality seeds on credit.

Complementing NAADS, the Government of Uganda has initiated the Rural Development Strategy (RDS) under the Ministry of Finance, Planning and Economic Development (MFPED) to increase agrarian productivity in order to alleviate poverty and stamp it out subsequently. One of the key implementation components is the provision of support to farmer groups in order to build their capacity.

Lastly, Uganda Civil Society Organizations (CSOs) are also working with farmer groups to help them improve their knowledge on their rights such as the right to share in national resource allocation and its accountability, the right to participate in decisions that affect the farming community (e.g. formulation of policies, design of projects and programmes and decision making regarding new innovations and initiatives).

2.0 Review of related studies

Farmer groups have been formed to facilitate access to better agricultural technologies (Gibson et al. 2008); to improve access to better earning markets for produce (Aliguma, et al. 2007); facilitate produce transport to markets (Mwaura, *et. al.* 2012); for financial security and household investments (Mutoro, 1997); access credit where groups members acts as collateral for each other (Loevinsohn, et al. 1994); to invest in agricultural value addition and milk processing plants (Mbowa *et. al.* 2012); in infrastructural development e.g. rural roads, small power generation projects, schools and health facilities (UN, 2010) and also in natural resources management and conservation (Nyakaana and Edroma, 2008).

In other developing countries, farmer groups in Senegal represent one of the success stories mainly because of the existence of an organized institutional framework with the existence of several federations such as Federation of NGOs in Senegal (FONGS) and National Council for Rural Dialogue and Cooperation (CNCR) (Roddot, 2001). By 2000, FONGS had 24 regionally based associations made up of about 2000 village groups with a membership of 400,000. About 20 percent of the national population was directly affected by the grass route activities of FONGS. Both FONGS and CNCR support farmers through providing technical support and credit from farmer savings. One of key programmes that boost these farmer groups are long term learning by doing programmes which involves a union of Senegalese rural leaders of farmer

organization. It involves the leaders meeting three or four times a year to discuss their experiences and receive feedback as a way of improving the performance of their groups. Rural leaders in the community are more likely to have a significant influence in encouraging participation in farmer groups even in the absence of external support ensuring that these groups are long lived and independent (Salifu et al., 2010).

Ghana is also one of those countries where farmer groups are widely used in agriculture development under the Ministry of Food and Agriculture. In 2007, there were over 10,000 farmer groups although most were short lived with the average existence of 4.5 years (Salifu et al., 2010). Registration of farmer groups is developed at grassroots level and these are registered at the local, district, and regional levels to a national apex. In addition, there exist the millennium development authority (MiDA); a public agency that provides training to farmer groups and facilitates investments in business opportunities with farmer based organizations (Asante et al., 2011). Salifu et al., (2010) found that membership in farmer groups in Ghana appeared greatly homogenous in terms of income and assets and most appeared to have emerged from a preexisting and well defined social cluster or network. Participation by farmers in these groups was mainly in anticipation for government and nongovernmental support rather than an initiative of the community. Their major conclusion was the need to introduce long term learning by doing programmes involving actual rural leaders as is the case in Senegal. In determining the factors that affect small scale farmers to join farmer based organizations in Ghana, Asante et al., (2011) found that farm size, farming as a major occupation, access to credit to loan and access to machinery services influenced farmers' decisions to join farmer based organizations in the Eastern Region of Ghana. Their major conclusion was the need to increase the availability of credit and the timely provision of machinery services to increase membership to farmer groups.

In Tanzania, an assessment of producer organizations in the country established that there were over 6000 active farmer organizations with over 250,000 members as of 2003 (Uliwa and Fisher, 2004). This figure could have doubled over the years given the favorable policy environment including a Ministry of marketing and co-operatives that is intended to guide the activities of farmer groups. Farmer groups are used as avenues for which small holder farmers can market their produce, access inputs and get extension advice and are characterized by a higher proportion of male members and those producing export crops with high income. Various government and nongovernmental organizations support these groups. Successful interventions have been those that encourage participation by identifying markets and then recruiting groups of farmers to produce those commodities, usually in out-grower schemes like that implemented by FAIDA MaLi under the USAID fund (Uliwa and Fisher, 2004). A combination of such out-grower schemes and interventions that are aimed at building stronger

farmer groups through training of farmers on financial management and leadership would go a long way in encouraging participation and retaining farmers in the groups.

Literature reviewed identifies education levels of the household head, participation in nonfarm activities, age, gender, household size, distance to tarmac road, farm size and legislation and regulation as some of the potential factors that would influence the decision of households or individual to participate in farmer groups (Davis et al., 2010; Benin et al., 2008 ; Sabates-Wheeler, 2006; Towo, 2004).

With regards to gender, findings have varied with others showing that women participation is still lower than that of men while others have found otherwise (Towo, 2004; Benin et al., 2008). Towo's (2004) work on the relationship between gender and farmer groups in Tanzania found that women participated less in farmer groups than their male counterparts. He attributed this to several reasons. First, he attributes this to lack of sensitization on gender issues and the heavy domestic workload that women have to do which makes them unable to attend the group formation meetings. Secondly, the fact that the primary focus of many of these groups is on export crops in which women involvement is less because they lack control to key production inputs necessary for production like land. Lastly, the lack of deliberate efforts to mainstream gender in rural farmer groups through the formulation of pro gender policies.

On the other hand, the DENIVA (2005b) on the assessment of the effectiveness of farmer groups as viable institutions for farmer empowerment and poverty reduction found that, there were more female members to some of the NAADs groups than their male counterparts mainly because of the initial anticipations of free inputs by males who then subsequently dropped off on finding out that there were no free inputs. The same reason was attributed in the report as explaining the low proportion of groups in Uganda. The impact evaluation of NAADS in Uganda by Benin et al., (2008) did not find any significant differences in participation in NAADS groups between male and female headed households. Davis et al., (2010) in looking at the impact of farmer field schools on agriculture productivity and poverty in East Africa found a 50 percent probability of women being members in the farmer field school groups in Uganda.

With regards to education levels, Davis et al., (2010) found that household heads in Kenya with primary and secondary education were more likely to participate in groups (farmer field schools (FFS)) than their counterparts who did not have the above education. The same study in Uganda, found contrasting results. Household heads with primary or secondary education were less likely to participate compared to those that had no formal education. Benin et al., (2008) in looking at the factors that influence the decision for households to join NAADs groups found that farmers with some post-primary education, are more likely to participate in NAADS groups, suggesting that efforts to build capacity of farmers to demand advisory services should be supported by programs that help farmers to improve their education. Overall, the role of

education in influencing farmer group participation in Uganda still has mixed findings given that it could enhance participation or discourage participation in groups.

With regards to age, younger farmers were more likely to participate in farmer field school groups than the older farmers in Uganda, Tanzania and Kenya (Davis et al., 2010). Benin et al., (2008) found insignificant results of the influence of age on the decision of a farmer to participate in a NAADS farmer group. The effect of the life cycle of an individual (represented by age squared) is equally an important factor that may affect membership to a farmer group. Morgan (1988) in a study on age differences in social network participation found that after controlling for resources such as education and health, the network size of an individual increases initially with increase in age, remains relatively constant at ages 35-39 and then declines at an increasing rate after 75.

The asset value (equipment and land) of the household or farmer is also an important factor that may influence the decision of a farmer to participate in a farmer group. Sabates-Wheeler (2006) in her study on local strategies for survival and growth in Romania and Kyrgyz Republic found that households with less land, labour, arable area owned and equipment were more likely to join groups than their counterparts who owned more land, labour and equipment. Participation in groups was an avenue for these less endowed households and individuals to be able to achieve higher levels of production and manage risk. This is contrary to the findings by Davis et al., (2010) in Uganda. They found that land size was positively related to the propensity to participate in FFS.

Access to infrastructures such as the tarmac road and the market has also been shown to influence membership to farmer groups. Davis et ., (2010) for example found that distance to tarmac roads was negatively related with the propensity to participate in a FFS in Kenya and for all three East African countries combined, suggesting that farmers in remote areas are less likely to take part in the FFS. In Uganda, however, the further the distance to the tarmac road the more likely an individual will participate in a FFS while in Tanzania distance to tarmac roads had no significant impact on the likelihood of participation. Regarding the distance to the market or urban area, the same study found that distance to nearest market/urban area was positively related to the propensity to participate in FFS in all countries combined and for Kenya and Tanzania. The case for Uganda was contrary - that is, farmers closer to urban areas were more likely to participate in an FFS than those in remote areas.

Considering household size as a likely factor that would influence membership to a farmer group, Davis et al., (2010) found that larger household sizes in Kenya were less likely to participate than smaller household. In Uganda and Kenya, the impact was not significant. The dependency ratio (the ratio of the number of dependents divided by the number of working adults) was negatively associated with participation in FFS groups in Uganda; households with a

large dependency ratio were less likely to participate. Given that households with a higher dependency ratio are more likely to be poor than those with a lower dependency ratio, the results showed that these groups excluded the poor in Uganda.

Similarly, Friis-Hansen et al., (2004) in studying small holder technology development in Soroti: a synergy between NAADS and farmer field schools (FFS) found that although members of NAADS and farmer field schools had a significantly higher technology adoption and use, they were not inclusive of the poor farmers and adoption was significantly higher for well off farmers. He found that the poverty level of non members of FFS was three times that of members of the group and attributed this to the self selection process that was common during FFS group formations. Also noted in the same study was that NAADS groups were formed hurriedly with an external impetus and that mobilization through local government elites seemed to appeal to the progressive, elite leaders while the poorer section of the population such as female headed households were excluded.

3.0 Methods and Data Sources

3.1 Data Sources
This study employed data from the Uganda Agricultural Census (UCA) of 2008/09 collected by Uganda Bureau of Statistics in collaboration with the Ministry of Agriculture, Animal Fisheries and Industries (MAAIF). The survey was conducted between the months of September 2008 to September, 2009 covering 80 districts in the country and it focused on only agricultural households. A two stage sampling technique was used to identify households. The first stage involved choosing 3606 Enumeration Areas (EA) from the four geographical regions namely the Northern, Eastern, Central and Western Uganda. The second stage then involved choosing 10 households from the listing of all the households in the selected enumeration areas. In total, approximately, 31,340 households were sampled.

Data used in the study was sourced from three modules, namely: (i) The Agricultural Household and Holding Characteristics Module; which was used to collect data on the demographic characteristics of household members as well as structural type of data on the agricultural holding; (ii) Crop area module captured information on holding parcel and crop plot areas; and (iii) Crop Production Module; which collected data on crop production. Households were visited twice during the survey period (UBoS, 2008)

Missing data is a potential source of bias in the analysis, especially if the variable which has missing data is essential in the results outcome (The European Agency for the Evaluation of Medicinal Products, 2001). One of the options is to drop respondents with missing information

on the key variables in the analysis and adjust the weighting process, while the other is to impute or substitute a valid response for the missing value (Carson *et al.,* 1995). Engels and Diehr (2003) and Kalton (1995) provide thorough discussions of approaches for inputting missing values in longitudinal data and cross-sectional survey data, including deterministic (e.g. mean, median or modal values) and stochastic (e.g. random regressions) approaches. Of all the approaches, the deterministic approaches are rather common. Given that missing data in some of the variables in this paper were many and dropping the respondents could cause bias, median values were calculated (see lower section of Appendix 1) and substituted for missing data.

3.2 Model specification and estimation:

This paper postulates that the ith individual's decision to be a member or a non member of a farmer group (Y_i) is influenced by individual and household characteristics of the farmer (X_i), and infrastructural access (Z_i) that may promote or impede access to information on group formation. This relationship in a linear form is specified as in (1)

$$Y_i = \alpha + \beta X_i + \gamma Z_i + \varphi R_i + \varepsilon_i \qquad (1)$$

The X_i vector includes such characteristics as sex, age, marital status, and household size, share of adults in the household, education level and major economic activity. The Z_i vector includes distances to the local produce market, district produce market, local input shop, extension, nurseries, feeder road and all year gravel roads , while R_i is a vector of sub regional location dummies in Uganda. The error term (ε) is included in the equation to take care of any other factors that might have not been included in the model but may influence farmer's decision to join a farmer group or not join. The variables used in the model are described further below.

The probit model was used to estimate the coefficients of the factors that influence the farmer's decision to be a member of a farmer's group in Uganda. The decision to join a farmer group is a binary response of whether one joins the group or not. To estimate the determinants of binary responses, researchers have used either the logit or probit model which are different in terms of the distribution function but give rise to quite similar results (Gujarati, 2003).

Subsequent estimation of the probit model was by maximum likelihood which is indispensible for limited independent variables given that it automatically accounts for heteroskedasticity (Wooldridge, 2009). Subsequently, marginal effects were obtained after the estimation of the coefficients to obtain the partial effects of the different independent variables on the dependent variable.

To ensure that the normality assumption was maintained, explanatory variables with continuous values were checked for normality and transformed appropriately. Specifically, values of the following variables: Distance to local inputs shop, distance to local produce market, distance to district produce market, distance to feeder road, distance to all-year gravel road, distance to nurseries , distance to the extension service provider and land size were transformed into natural logarithms.

Variables used in the Analysis

The summary statistics showing the means, the unit of measurement, the minimum and the corresponding maximum values of the variables used in the analysis are presented in Appendix 2**.**

  a) Dependent variable

The dependent variable in the model is the binary choice variable of whether an individual within the household was a member of a farmer group or not. Only individual members in the household who were aged over 15 years were considered

  b) Individual and household characteristics

Individual farmer characteristics include: age, age squared, and gender, the level of education attainment, marital status and major economic activities of the individual farmer. The square of the age variable was included to account for the effects of the life cycle course on participation in such social networks such as farmer groups. Morgan (1988) in a study on age differences in social network participation found that after controlling for resources such as education and health, the network size of an individual increases initially with increase in age, remains relatively constant at ages 35-39 and then declines at an increasing rate after 75.

The household characteristics considered include: share of adults above 18 years, total land holding, and household size.

  c) Infrastructural access (z_i)

Access to Infrastructure variables included in the model were; distance to the local produce market, district produce market, local input shop, extension provider, nurseries, distance to feeder road, distance to all-year gravel road, and distance to extension service provider. Descriptive statistics of these variables are also provided in Appendix 2.

d) Sub regional dummies

To ensure equity in development across region, government often takes on policies and programmes to support particular regions or sub regions because they are at a disadvantaged. An example is the Peace Recovery Development Programme (PRDP) that is being implemented in the regions of North which were affected by the 20 year old war and some parts of Eastern Uganda. Such Government actions bring variations between regions and sub regions and so it is important that they are included in the estimation. Including them in the estimation also accounts for any differences that might arise due to geography, soil types, crop patterns, culture, and socio-economic status.

4.0 Results and Discussions

4.1 Descriptive results

This section presents descriptions of membership to farmer groups at both individual and household level. Further disaggregation is also done by sub regions, marital status and major economic activities of the individual or household head. Comparisons are made between some characteristics of individuals and households who are members of a farmer group and those not members to any farmer group. Generally, a household is said to be a member of a farmer group when at least one of its household members belongs to any farmer group at the time of the survey.

Membership to farmer groups in Uganda

Table 2 shows individual membership to a farmer group by gender in the survey period. Nationally, only 9 percent of all farmers reported to be members of any farmer group in Uganda and there was no significant difference in membership between female and male farmers.

At regional level, Northern Uganda had the highest percentage of membership to a farmer group at about 12 percent with males reporting a higher percentage of membership than female farmers. The Western region follows with a membership of about 9 percent, followed closely by the Eastern region at about 8 percent. Central Uganda had the least percentage of households reporting membership to a farmer groups at only 6 percent with only a slight percentage difference between male and female membership. At sub regional level, the North East region had the highest percentage of membership at 15 percent followed by the mid North at 14 percent, then the South-western region at 10 percent. The sub region with the least

membership to farmer group was Central 2 at 5 percent lower than that of even Kampala which is at 6 percent.

Considering marital status, married people have the highest membership to farmer groups at 13 percent with married male farmers having a higher membership than married female farmers. The least membership to these groups is by the never married farmers at only 2 percent. In addition, divorced, separated or widowed female farmers have a higher membership to these groups than their male counterparts. Lastly, in considering the major economic activity of the individual farmer, those in non crop agriculture have a higher membership followed by those in crop agriculture. Specifically those in non crop agriculture have a percentage membership of 12 percent compared to 14 percent by those in non crop agriculture.

Household membership was also found to be low registering about 16 percent. The results on household membership to groups based on regions, sub-regions, major economic activity of the household head, and gender of the household head can be found in Appendix 3. Overall, male household heads are more likely to belong to farmer groups compared to female household heads. Specifically, 17 percent of male household heads reported to have at least one household member in a farmer group compared to 14 percent reported by their female counterparts. Also household heads whose major economic activity is non crop agriculture have a higher affinity to belong to famer groups than their counterparts in the crop agriculture. Finally, like at individual membership, household membership to farmer groups is highest in Northern Uganda at 21 percent, followed by Western Uganda at 17 percent, then Eastern Uganda at 15 percent and lastly Central Uganda at only 11 percent. At sub regional level, the same trend follows as at individual membership; highest in North East sub region at 24 percent followed by mid North at 23.5 percent, South-western at 19 percent and the least membership in Central 2 sub region at only 10.0 percent.

Table 2: Individual membership to farmer groups by gender

Sub-group	All	Female	Male
National			
Uganda	8.6	8.4	8.8
Marital status			
Never married	2.1	2.1	2.1
Married	12.6	11.3	14.0
Divorced/Separated/Widow	8.6	9.7	5.6
No stated	6.2	7.1	5.3
Major activity of household head			
Crop agriculture	11.8	11.2	12.5
Non-crop agriculture	13.9	13.2	14.3
Trader/artisan	9.6	8.7	10.0
Paid employment	7.5	8.0	7.3
No activity	2.2	1.9	2.4
Household work	5.4	5.8	4.2
Sub-regions			
Central:	5.8	5.6	6.0
Kampala	6.0	8.0	4.1
Central 1	6.7	6.4	7.0
Central 2	4.9	4.6	5.2
Eastern:	7.8	7.7	7.9
East Central	5.6	5.6	5.7
Eastern	9.1	9.0	9.2
Northern:	11.8	11.0	12.5
Mid-North	13.5	13.1	13.9
North East	14.7	13.3	16.2
West Nile	8.0	7.1	9.0
Western:	8.6	8.8	8.4
Mid-West	7.3	7.0	7.6
South-Western	9.6	10.1	9.0

Source: Authors calculation based on UCA 2008/09

The above results reveal that membership to farmer groups in Uganda is low raising concerns on the effectiveness of the recruitment efforts of Government programmes such as NAADS and Northern Uganda Social Action Fund (NUSAF) which directly target farmers organised in groups. In trying to establish why some farmers do not join such groups particularly FFS in Uganda, Davis et al., (2010) found that lack of information was the major limitation, followed by lack of time and commitments elsewhere. DENIVA (2005)'s assessment on the effectiveness of farmer groups as viable institutions for farmer empowerment and poverty reduction in Uganda

pointed out that farmer institutional development by the NAADS programme was given a low budget. At the beginning of the NAADS program in 2001, spending was concentrated on management and coordination (e.g. 39 percent in 2001-02), advisory and information services to farmers (35 percent in 2001-02) and farmer institutional development (16 percent in 2001-02). Over the years, spending has tended to focus more on technology development and monitoring and evaluation compared to farmer institution development (Benin et al., 2008). Membership to groups may also be restricted by some requirements needed before a farmer joins a group. Benin et al., (2008) found that at least 91 percent of the entire farmer groups reported that membership fees was a group eligibility requirement. The same study also found that non NAADS groups considered education and gender as important factors in meeting the membership requirement to groups.

Lapple and Van Rensburg (2011) note that acceptance to participate in farmer's group and adoption of any other agricultural technologies have similarity in that both follow roger's innovation adoption curve. According to roger's adoption curve, adoption of any new idea is gradual with five categories of adopters. In case of a new idea, the first to adopt are the innovators representing 2.5 percent of the population. They are followed by early adopters, early majority, late majority and laggards each representing 12.5, 34, 34 and 16 percent respectively of the population (Roger, 2003). Based on this adoption curve, membership to farmers group is at an early stage with only innovators and early adopters having enrolled. The challenge remains to ensure that the institution of farmer group effectively attracts the early majority, late majority and the laggards.

Northern region and sub regions had high membership to farmer groups in Uganda yet this region was highly affected by the 20 year old insurgency. This could be attributed to the surge of government programmes and international development agency support that emerged in the pre and post conflict era in the region. The Government of Uganda embarked on several programmes in an attempt to try to rebuild and empower communities. These programmes some of which are still being implemented include Northern Uganda Reconstruction Programme (NURP), Northern Uganda Social Action Fund (NUSAF), Acholi Programme, Restocking Programme and Karamoja Development Programmes targeting the Karamoja districts of Kotido, Moroto and Kaabong. Other humanitarian organizations such as UNICEF and World Food Organization have emerged to provide services to these people. The overall strategy for most of these programmes particularly in providing livelihood support and protection was to target the vulnerable people organized in groups. Northern Uganda Social Action Fund (NUSAF) for example directs support to organized groups that are implementing income generating activities such as apiary, zero-grazing, poultry, vegetable growing and marketing and grain milling.

Lastly, membership by non crop agriculture farmers and household is higher than that of crop agriculture farmers and households. This could be explained by two reasons. Either farmer find it more fulfilling to join farmer groups whose intention is directed towards non crop activities or it could also be that available government programmes or NGOs have their priorities directed towards non crop activity. A study by Okoboi et al., (2011) on the economic and institutional efficiency of the NAADS programme revealed that longer term enterprises like dairy cattle, piggery and poultry were given priority and dictated upon to the NAADS farmers.

Characteristics of individuals and households who are members of farmer groups

Table 3 reveals that individuals who are members of a farmer group are older and therefore associated with more experience regarding agriculture than their counterparts who are not in groups. The number of years of schooling is not different for the two categories although literacy rates for those in groups are higher. The difference is however not statistically different. Table 3 also reveals that those who are members to a farmer group own more cattle, access credit more and most are managers of the plot. Specifically, 19 percent of those who are members of a farmer group reported to have accessed credit compared to only 4 percent reported by those who are not members to any groups. Kasirye (2007) in his study on rural credit markets in Uganda found that households with no access to credit had a poverty incidence twice that of households with access to credit in urban areas. The poverty incidence for those households which do not have access to credit was higher in rural areas (40.7 percent) compared to a poverty incidence of having access to credit (18.5 percent). Therefore, households not in farmer groups may be associated with a lower welfare status than their counterparts in groups.

In looking at household characteristics such as total land size and household composition, those in groups have a larger land sizes, a higher composition of adults above 18 years. These are associated with a higher labor force. Lastly, there are no significant gender differences in membership between male and female farmers meaning that barriers to women farmers entering these groups are minimal.

Table 3: Characteristics of Individuals by membership to a farmer group.

	Membership to a farmer group		
	Non-member	Member	t-statistic
Individual characteristics:			
Age	36.0	40.5	16.7
% males	48.6	49.9	2.1
Years of schooling	5.5	5.5	0.2
Literacy rate, %	67.2	70.9	3.0
Manages a plot, %	58.8	83.2	26.7
Owns livestock, %	36.4	69.2	26.6
Access to credit, %	3.6	19.4	15.3
HH characteristics:			
Household size	6.3	6.6	2.8
Total land size cultivated	0.9	1.2	3.6
Share of:			
Children <=5 yrs	12.1	12.5	0.9
Children 6-17 yrs	29.9	34.2	7.0
Adults 18-59 yrs	49.7	47.7	-2.6
Male headed, %	82.9	84.0	1.2

Source: Authors calculation based on UCA 2008/09

Comparing characteristics of household heads whose households have at least one member in a farmer group with their counterparts whose households have no member in a group, we find that the age, years of schooling and literacy rate for household heads with members in a group is higher than for those households head with no member in a group as shown in table 4. Specifically, household heads with membership to groups have 76 percent literacy rate higher than the national average of 68 percent while their counterparts who have no membership to groups have literacy rate of 66 percent. Also households who are members to farmer groups have on average 6 years of schooling compared to 5 years of schooling for those households with no members in groups. In the earlier descriptions, we established that female farmers were as likely to participate as male farmers in farmer groups. With regards to the gender of the household head, table 4 shows that 81 percent of those households with membership to

farmer groups are male headed compared to 78 percent of those households who are not members to farmer groups. Overall, female headed households seem to be participating less in these farmer groups and efforts to increase their membership should be key by all institutions with interest in group formation.

Table 4: Characteristics of household head by membership to farmer group

	Membership		
	Without	With	All
Age, years	44.8	45.3	44.8
Years of schooling	5.1	5.8	5.2
Literacy rate, %	66.2	75.8	67.8
Male headed	78.3	80.8	78.7
HH size	5.2	6.4	5.4

Source: Authors calculation based on UCA 2008/09

Information access by households

Access to information is important to agricultural households if they are to improve on their farming practices, access markets for both inputs and their outputs as well as adopt new technologies that will ensure productivity increments. Table 5 shows the main source of information related to agriculture by presence of membership to farmer group in the household. For weather related information, the major information source was through radio for all households irrespective of whether they were members to a farmer's group or not. More than 80 percent of all households reported using the radio to get information on the weather. Interestingly, farmer to farmer as a major source of information followed the radio source with those households not in groups reporting a higher use (12 percent) compared to their counterparts with members to a group (10 percent).

With regard to information on crop varieties, farmer to farmer interaction was the main channel through which such information was conveyed especially for those households with no member in the farmer group. At least 45 percent of them reported to have used this mechanism to obtain information related to crop varieties compared to 31 percent reported by those households with at least a member in the farmer group. NAADS was also an important source of crop variety information to those households in groups compared to their counterparts not in groups. Specifically, 26 percent of those households in groups reported NAADs as a major information source on crop varieties compared to only 5 percent reported by

those not in groups. In addition, extension workers were a more important source of information on crop varieties to those in groups than those not in groups.

In relation to information on new agriculture practices, farmer to farmer interactions was majorly important to households not in groups whereas NAADS was majorly important to households in groups. Regarding information related to farm machinery and the presence of credit facilities, radio was still the major information source for all households followed by farmer to farmer.

With regards to information on pest and diseases and then marketing, farmer to farmer interactions was a major information source for all households followed by radio. Nevertheless like in the previous cases, NAADS and extension workers were reported more by those in groups compared to their counterpart households that are not in groups. Particularly, 21 percent of households with a member in a group reported NAADS as a major information source on pest and diseases compared to only 5 percent reported by those not in groups. Similarly, 11 percent of those in groups reported NAADS as a major information source on marketing information compared to only 2 percent reported by their counterparts not in groups. Regarding the use of extension workers, 15 percent of households in groups reported them as a major information source on pest and diseases compared to only 4 percent reported by those not in groups. Also at least 13 percent of those households in groups reported extension workers as the major information source on new agriculture practices compared to only 4 percent reported by their counterparts not in groups.

Overall, farmer to farmer was used more by those households not in groups compared to those in groups implying that informal networks are still strong within farming households and attempts to improve on them could go a long way in promoting growth within the agriculture sector. On the other hand, NAADS and the use of extension workers were used more by those households with membership to farmers groups. This serves to show that Government programmes such as NAADs and extension workers extensively use farmers organized in groups to extend Government services to the farmers.

Table 5: Main source of information related to agriculture by presence of membership to farmer group

Source	Weather			Crop varieties			New agric. Practices			Farm machinery		
	Without	With	All	Without	With	All	Without	With	All	Without	With	All
Radio	84.8	86.6	85.1	41.2	27.9	39.0	38.7	22.2	35.8	46.2	31.8	43.7
Modern ICT	1.0	0.9	0.9	1.0	1.4	1.0	1.0	1.3	1.1	1.2	0.7	1.1
Farmer to farmer	12.3	10.0	11.9	45.4	30.9	43.0	42.3	26.1	39.5	33.5	26.2	32.3
NAADs	0.2	1.1	0.4	5.9	25.5	9.3	9.3	32.8	13.4	4.5	19.4	7.1
Extension worker	0.3	0.6	0.3	3.1	10.8	4.4	4.3	13.4	5.9	2.8	9.3	3.9
Others	0.6	0.2	0.5	1.8	2.4	1.9	3.0	2.8	2.9	6.5	8.0	6.7
Not stated	0.9	0.5	0.8	1.5	1.1	1.4	1.5	1.3	1.4	5.3	4.6	5.2
Est. HHHs '000	2,723.3	526.0	3,249.3	2,598.3	528.6	3,126.9	2,312.9	488.4	2,801.2	1,660.7	341.8	2,002.5

Source	Credit facilities			Plant diseases/pests			Marketing		
	Without	With	All	Without	With	All	Without	With	All
Radio	51.8	42.6	50.2	39.7	27.6	37.7	38.7	35.0	38.1
Modern ICT	0.7	0.5	0.7	0.5	0.3	0.5	1.4	1.2	1.4
Farmer to farmer	36.5	29.5	35.3	47.9	33.0	45.4	52.3	42.7	50.8
NAADs	3.4	11.8	4.9	5.1	20.5	7.7	2.0	11.0	3.5
Extension worker	1.6	8.2	2.7	3.5	15.0	5.4	1.4	5.9	2.1
Others	1.8	2.5	1.9	2.2	2.4	2.2	1.6	1.5	1.6
Not stated	4.3	4.9	4.4	1.1	1.2	1.1	2.5	2.7	2.6
Est. HHHs '000	1,896.6	397.2	2,293.8	2,535.9	502.3	3,038.2	2,423.7	459.4	2,883.1

Source: Authors calculation based on UCA 2008/09

Use of agriculture inputs

The use of agricultural inputs is important if productivity is to be enhanced. Farmer groups are known to be avenues that facilitate and link farmers to new technologies and production practises. Table 6 shows the use of agricultural inputs during the past 12 months by households having atleast one household member in a farmer group and those not having any member in a farmer group. Overall, households with a member in a group used improved seeds, organic fertilizer, inorganic fertilizer, pesticides, commercially prepared animal feeds, veterinary and artificial insemination more than their counterparts who did not have any member belonging to a farmer group.

Table 6: Use of agriculture inputs during the past 12 months by presence of at least a member in household

	Membership to groups (%)		
	Without	With	All
Local seeds	93.5	94.2	93.3
Improved/Hybrid seeds	30.2	45.8	31.7
Organic fertilizer	24.1	35.7	25.3
Inorganic fertilizer	7.7	13.0	8.2
Pesticides: Herbicides	9.1	15.4	9.3
Fungicides	5.4	10.9	6.0
Pesticides	17.0	28.7	18.3
Other pesticides	6.7	11.2	7.3
Commercially prepared Animal feeds	3.4	6.0	3.7
Veterinary drugs	28.3	47.1	30.0
Insemination	1.9	2.8	1.9

Source: Authors calculation based on UCA 2008/09

Specifically, 46 percent of those households with a member in a group used improved seeds compared to 30 percent of those households with no member in a group and the difference was statistically significant. Also 36 percent and 13 percent of households with at least a member in a group used organic and inorganic fertilizer respectively. On the other hand, only 24 percent and 8 percent of those households with no member in a farmer group used organic and inorganic fertilizer respectively. Membership to farmer groups is thus associated with a higher use of agriculture inputs.

4.2 Econometrics model

Determinants of membership to a farmer group

Table 7 presents the probit model estimates for the factors influencing an individual farmer's decision to be a member of a farmer group. Amongst the individual farmer characteristics: age, gender of the farmer, marital status and education are factors that influence a farmer's decision to be a member of a group. Specifically, older farmers are more likely to join farmer groups compared to the younger farmers by a 0.9 percent probability nationally, 0.8 percent probability in Central region, 0.8 percent probability in Eastern Uganda, 1.1 percent probability in Northern region and by 0.8 percent probability in Eastern Uganda.

Male farmers are less likely to be members of the group by a 0.8 percent probability when compared to the female farmers nationally. In Central Uganda, male farmers are less likely to be members of the groups by a 0.4 percent probability. In Eastern region, the probability of membership is less for male farmers than female farmers by a probability of 1.1 percent. Similar observations were made by the DENIVA (2005) who noted that male participation in NAADS groups was less than for females. The report attributed this to the possibility that most men dropped out of the groups after realizing that there were no free inputs being distributed in these NAADS.

Education comes in as a very important factor influencing the farmer's decision to be a member of a farmer group. The higher the education level, the higher the probability of being a member for all the regions. For Western region for example, an individual who has attended some primary has about 5 percent probability of joining a group compared to the farmer without any formal education. An individual who has completed some education has a 4 percent probability of being a member of a farmer group. An individual with some secondary education has even a higher percent of 7 when compared to a farmer with no education and lastly, the highest percentage probability of being a member of a group is by those individuals with an advanced secondary education (A level) at 10 percent when compared to no education at all. This builds on Benin et al., (2008) findings which showed that some post- primary education positively influences a farmer's decision to be a member of a group particularly a NAADS groups in their study. Subsequently, this study serves to re-emphasize their recommendation that efforts to build capacity of farmers to demand advisory services should be supported by programs that help farmers to improve their education.

Table 7: Probit model estimates of factors influencing the decision of a farmer to join a farmer group

Variables	National	Regions			
		Central	Eastern	Northern	Western
Individual characteristics					
Age	0.009***	0.009***	0.008***	0.011***	0.008***
Agesq	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Farmer is male	-0.008***	-0.004	-0.011***	-0.008	-0.004
Marital status of the farmer (cf: Never married)					
Married	0.045***	0.018*	0.042***	0.048***	0.061***
Widowed and not remarried	0.050***	0.016	0.042**	0.041	0.089***
Divorced and not remarried	0.023*	-0.003	0.009	0.033	0.027
Married but separated	-0.010	-0.021*	0.001	-0.030	0.002
Education level of the farmer (cf: No education)					
Some primary	0.035***	0.024**	0.019**	0.034**	0.029***
Completed primary	0.064***	0.055***	0.065***	0.070***	0.037***
Some secondary	0.098***	0.068***	0.077***	0.125***	0.071***
A level and higher	0.137***	0.087***	0.146***	0.146***	0.102***
Main economic activity (cf: crop agriculture)					
Non crop agriculture	0.026*	0.015	-0.001	0.104***	-0.009
Trader/Artisan	-0.005	-0.009	-0.001	0.011	-0.018
Paid employment	-0.004	-0.014	0.007	-0.016	-0.009
No major activity	-0.059***	0.009	-0.059***	-0.121***	-0.031
Household characteristics					
Share of Adults> 18 years	0.031***	0.028**	0.014	0.024	0.046***
Household size	0.001	0.002**	0.001	0.001	0.004***
Log of Land size	0.021***	0.009	0.036***	0.015	0.007
Infrastructure access					
Logarithm of Distances (km)					
Local produce market	-0.002	-0.008	0.006	0.013	-0.005
District produce market	0.010***	0.002	-0.007	0.013	0.015**
Local input shop	-0.005	-0.010*	0.003	-0.013	-0.016**
Extension worker	-0.011**	0.015**	-0.020***	-0.007	-0.013
Nurseries	0.002	-0.013**	-0.010*	0.030***	0.001
Feeder road	0.005	0.003	0.003	0.025*	-0.010
All year gravel road	0.018***	-0.008	0.037***	0.010	0.020***
Sub regions (cf: Kampala and Central1)					
Central 2	-0.031***				
East Central	-0.032***				
Eastern	0.026*				
Mid North	0.083***				
North East	0.211***				
West Nile	0.018				
Mid West	0.011				
South Western	0.038***				
Number of Observations	68,378	11,202	21,258	16,595	19,323

Source: Authors calculation based on UCA 2008/09, ***, **, and * indicate statistical significance at 1, 5 and 10% level

Farmers whose main economic activity is non crop agriculture have close to a 3 percent higher likelihood of being in groups than their counterparts who are in crop agriculture. This may be attributed to the fact that the available programmes prioritize non agricultural enterprises more than crop agricultural enterprises following findings by Okoboi et al., (2011).

The share of adults above 18 years of age is also a propelling factor to join the farmer groups. Households with a larger share of adults above 18 years have a 3 percent likelihood of being in groups compared to those with a smaller share at National level. In Central Uganda, the percentage likelihood is also at 3 percent and is higher in Western Uganda at 5 percent.

The total land owned is also an important factor influencing membership to the farmer group at National level and for Eastern Uganda. It is an insignificant factor in influencing membership in Central, Northern and Western Uganda. In Eastern region, those farmers with larger land sizes had 3 percent more likely chance to be members of a group compared to their counterparts with small land sizes cultivated on average.

Infrastructural access in terms of distance to extension worker also affects the decision to join the groups at National level but varies amongst regions. At National level, those far away from an extension worker have a 1.1 percent less likely chance of joining a farmer group compared to those close to the extension worker. In Eastern Uganda, those far away from the extension worker are almost 2 percent less likely to be members of a group compared to a 2 percent probability in Central Uganda contrary to expectations. The case for Northern and Eastern Uganda is insignificant. The distances to all year gravel road and the district produce markets show that the further away a farmer is from them, the more likely that they will join groups contrary to expectations. Davis et al., (2010) also finds contrasting results in terms of distances to urban areas and membership in FFS in Uganda.

Finally, there also exist sub regional differences in the probability of farmers being members of the group within the different regions when compared to Central 1 and Kampala sub regions. Generally, farmers in Eastern, Mid North, North East, and South Western Uganda are more likely to be in groups than their counterparts in Kampala and Central 1 sub regions. For example farmers in mid Northern sub region have a 7.1 percent probability of being members in a farmer group when compared to farmers in Kampala and Central 1 sub regions. The presence of government programmes such as PRDP and NUSAF and the sprouting up of Non Governmental organizations following post conflict period may explain the variation and significance of farmer group membership in these sub regions when compared to Central 1 and Kampala. The low

membership of farmer groups in Kampala and Central 1 region may also be associated to the fact that these sub regions have easy access to services which makes farmers relunctant to join the groups.

5.0 Conclusions and Policy recommendations

Conclusion

Farmer groups have become important in the policy agenda in Uganda given the role that they play in promoting marketing and value addition of agriculture commodities. The results of the paper reveal that households with atleast a member in a farmer group used agricultural inputs more than their counterparts with no member in a farmer group implying that membership to farmer groups' increases access and therefore use of agriculture inputs. The results further reveal that there is low membership to farmer groups at only 9 percent and 16 percent at individual and household levels respectively. The highest membership to groups was in the Northern region and sub regions followed by the Western region. The Central region and sub regions had the lowest membership to farmer groups. The low membership to groups questions the effectiveness of the approaches used by both Government and Non Governmental Organisations to lure farmers to join and be retained in groups. The challenge is to ensure that this institution effectively attracts the early majority, late majority and the laggards.

The results also show that there are a number of factors influencing the decision of farmers to join farmer groups in Uganda. The key factors include age, gender of the farmer, education level, major economic activity, land and distance to the extension worker and sub regional differences. Particularly, more educated farmers are more likely to join farmer groups than less educated ones given the fact that they could be more knowledgeable on the importance of joining farmer groups. Given the high illiteracy rates in Uganda, what emerges are concerns on the appropriateness of the recruitment efforts used during the process of group formation. Although NAADS implementation guideline clearly stipulates a stepwise strategy that allows farmers to be mobilised and educated on the importance of farmers groups, it has been observed that group formation has often been done in a hurry denying would be participants' time to understand and enrol (Friis-Hansen et al., 2004). This observation calls for well organized and planned recruitments that considers the level of literacy among farmers to ensure more participation.

Policy Recommendations

Given the low participation in farmer groups in Uganda, there is a need for concerted efforts by all institutions (NAADS, UNFFE, World food programme and UCA etc) supporting groups to ensure that groups' approach succeeds in improving access to agricultural technologies and ensuring that noticeable outcomes are achieved for them to attract more farmers. Supporting out grower schemes like that of Ghana could be one such avenue. Other groups based factors including governance, capacity in knowledge, resources and sustainability should be enhanced as it will motivate the more risk-averse farmers to join the groups.

Additionally, publicity and farmer education on group formation should be given more adequate time and resources with targeting directed towards illiterate farmers and those far away from extension workers. The use of the local language in publicity materials educating farmers on the importance of joining groups is also important in ensuring participation among the illiterate.

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Annex 1 : Variables with missing information, the proportion and the corresponding median

Variable	Proportion	Median
Age	0.03	16.42
Years of schooling	0.5	4
Marital status	0.06	0.5
Distances to (km)		
local produce market	0.08	3
District produce market	0.2	15
Local input dealer	0.18	5
Extension services	0.21	6
Nurseries	0.32	7
Agriculture research centre	0.3	45
Public transport	0.16	3
Feeder roads	0.17	1
All year gravel road	0.25	2
Tarmac road	0.18	15

Annex 2: Descriptive statistics of variables used in the model

Variable	Unit of measurement	Mean	Minimum	Maximum	Interval
Age	Years	36.13	0.14	35.86	36.41
Agesquared	Years	1570.67	11.33	1548.41	1592.92
Sex	Male=1 Female =0	0.48	0.00	0.47	0.48
Marital status					
Never married	Yes=1, No=0	0.66	0.00	0.65	0.67
Married	Yes=1, No=0	0.07	0.00	0.07	0.08
Separated/divorced/widowed	Yes=1, No=0	0.03	0.00	0.03	0.03
No status	Yes=1, No=0	0.03	0.00	0.03	0.03
Log years of schooling	Years	1.50	0.01	1.47	1.52
Share of adults above 18 years	Ratio of adults >18 years/household size	0.32	0.00	0.31	0.32
Household size	Number	6.33	0.06	6.21	6.44
Log of total land owned	Hectares	0.63	0.01	0.61	0.64
Logarithms of distances					
Local produce market	Kilometres	1.54	0.01	1.52	1.57
District produce market	Kilometres	2.76	0.02	2.73	2.79
Local input dealer	Kilometres	1.81	0.02	1.78	1.84
Extension services	Kilometres	2.00	0.01	1.97	2.03
Nurseries	Kilometres	2.15	0.02	2.12	2.18
Feeder roads	Kilometres	1.01	0.01	0.98	1.03
All year gravel road	Kilometres	1.27	0.01	1.24	1.30
Main activity					
Non crop agriculture	Yes=1, No=0	0.03	0.00	0.03	0.04
Trader/Artisan	Yes=1, No=0	0.03	0.00	0.03	0.04
Paid employment	Yes=1, No=0	0.04	0.00	0.04	0.05
No activity	Yes=1, No=0	0.04	0.00	0.03	0.04
Sub regions					
Central 2	Yes=1, No=0	0.08	0.01	0.07	0.10
East Central	Yes=1, No=0	0.11	0.01	0.09	0.13
Eastern	Yes=1, No=0	0.19	0.01	0.17	0.21
Mid North	Yes=1, No=0	0.12	0.01	0.10	0.14
North East	Yes=1, No=0	0.04	0.01	0.03	0.05
West Nile	Yes=1, No=0	0.09	0.01	0.07	0.10
Mid Western	Yes=1, No=0	0.13	0.01	0.11	0.15
South western	Yes=1, No=0	0.16	0.01	0.14	0.19

Annex 3: Household membership to farmer groups in Uganda

	Proportion(%)	Average Household number
National		
Uganda	16.2	1.6
Household head		
Female head	14.0	1.4
Male head	16.8	1.6
Marital status		
Never married	12.2	1.6
Married	17.9	1.6
Div/Sep/Wid	11.5	1.3
No stated	17.6	1.5
Major activity		
Crop Agric	16.4	1.6
Non-crop agric.	25.3	1.7
Trader/artisan	14.9	1.4
Paid employ	14.9	1.4
No activity	5.9	1.6
HH work	11.3	1.3
Not stated	15.6	1.4
Sub regions		
Central	11.4	1.3
Kampala	11.5	1.4
Central 1	12.9	1.3
Central 2	10.0	1.3
Eastern:	15.1	1.6
East Central	11.8	1.6
Eastern	17.1	1.7
Northern:	21.1	1.8
Mid-North	23.5	1.7
North East	24.4	2.4
West Nile	16.1	1.6
Western:	17.2	1.5
Mid-West	14.7	1.5
South-Western	19.4	1.6