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Village saving and loan associations and their contribution to employment creation: Evidence from smallholder farmers from eights districts in Uganda

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The Village Savings and Loan Associations (VSLAs) are among the many innovations that can improve the prevalence of financial inclusion, especially among the rural population. The main objective of this study was to determine whether participation in Village Savings and Loan Associations (VSLAs) can influence the creation of employment opportunities among smallholder farmers in Uganda. This study relied on secondary data collected from 653 smallholder farmers between July and August 2022 from beneficiaries and non-beneficiaries of aBi-supported projects engaged in maize, coffee, and beans production value chains. A student t-test was conducted using STATA to characterize the smallholder farmers, while regression analysis was used to address the second and third objectives. The study findings indicate that the gender of the household head, gross margins received from the crop enterprise, average monthly savings, and total annual loan volume, but not membership in a VSLA, are significant predictors of the number of jobs created by smallholder farmers. This study finds that an increase in average monthly savings by Ush 1 million per smallholder farmer increased employment by 2.3 FTEs per household. Similarly, an increase in the volume of loans received per annum by Ush 10 million per smallholder farmer increases jobs by 1.1 FTEs per household. Therefore, VSLAs with ample and attractive saving and loan portfolios may be sufficient prerequisites to create more jobs. However, since most smallholder farmers are already resource-constrained, these findings suggest that promoting a conducive macroeconomic environment for formal financial institutions to provide credit to VSLAs is the most viable policy intervention governments and their development partners can undertake in developing economies.

Key words: Village Savings and Loan Associations (VSLAs), credit, ordinary least squares, employment, full-time equivalent (FTE), jobs.

INTRODUCTION

Recent evidence from organizations like the International Labour Organization (ILO) (2024) and The World Bank (2023) affirms that the global unemployment situation is not improving. The ILO (2024) indicates that the global

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unemployment rate in 2023 was estimated at about 5.1%, compared to 5.3% in 2022. Conversely, The World Bank (2023) estimated that about 6% of the global total labor force was unemployed in 2022, up from 5% in 1991. Furthermore, current evidence, such as The World Bank (2023), suggests that the highest unemployment burden exists in sub-Saharan Africa (SSA) rather than in developed countries. According to The World Bank (2023), the rate of unemployment is highest in South Africa, where 30% of the total labor force was unemployed in 2022, followed by Djibouti (28%), West Bank and Gaza (26%), Eswatini (24%), Congo Republic (22%), Gabon (22%), Namibia (21%), Botswana (21%), Libya (21%), and Somalia (20%). Unfortunately, even where employment exists in an economy, the poor quality of the jobs limits the standard of living of the population. Therefore, to curb unemployment, various economies have adopted different prescriptions targeting to increase the quantity and quality of jobs. The most common prescriptions to address unemployment include industrialization, modernization of agriculture, and development of the service industry, among others. Given that agriculture is central and the primary source of employment in most developing countries, it remains one of the most important sectors in such economies, especially in Sub-Saharan Africa (SSA). About 58% of the population in SSA inhabit rural areas, with almost 60% of the population comprising smallholder farmers (Goedde et al., 2019). Like the rest of SSA, about 68% of the population of Uganda derive their livelihood from agriculture (Uganda Bureau of Statistics (UBOS), 2021). Interestingly, agriculture remains a critical sector for employing women and youths in Uganda, with about 55% of women and 47% of youths employed in agriculture (UBOS, 2021).

The agricultural sector's contribution to Uganda's Gross Domestic Product (GDP) has remained stable over the last decade. The sector has maintained the third position among Uganda's most important production sectors, after services as the leading sector, followed by industry. Overall, the agricultural sector contributed 24% of the GDP in 2019/20 compared to 23% in 2018/19 (World Bank, 2018). Similarly, the agricultural sector remains a significant source of exports for the country, contributing about 33% of the total exports in Uganda.Unfortunately, relative to other developing regions, the development of the agricultural sector in Sub-Saharan African (SSA) economies, including Uganda, still needs improvement. This is because the productivity of most smallholder farms is increasingly declining, and agricultural output growth needs to be in tandem with population growth.

According to the World Bank (2018), the total factor productivity of the agricultural sector in Uganda for the last two decades has been negative. Although the country's population grows at about 3% per annum, agricultural output grows at a lower rate of 2% per annum. This is unfortunate because the growth in agricultural productivity in other East African countries has been higher (5%) compared to the 2% recorded in Uganda. In this paper, we focus on analyzing how financial inclusion can support employment creation through agricultural development, acknowledging that the subsistence and smallholder nature of agriculture partly explains this quagmire. Additionally, the development of agriculture is constrained by limited access to purchased agricultural inputs, credit, and functional markets; limited investment in critical infrastructure by the government; poor quality of labor, and environmental factors such as climate change-related shocks (Bjornlunda et al., 2020). These challenges are even more pronounced among people experiencing poverty, most of whom live in rural areas.

Agricultural financing mechanisms among smallholder farmers in Uganda

Given the significance of agriculture to the livelihoods and economy of the country in general, the Government of Uganda is focusing on transforming from subsistence to commercial farming (National Planning Authority (NPA), 2013).

This transformation is being pursued in part through enhancing the financing of agriculture among smallholder farmers. Like elsewhere, smallholder farmers in Uganda rely on several mechanisms to finance agriculture. Yi et al. (2021) found that smallholders from developing economies who are credit-constrained rely on traditional banks, creditworthy intermediary platforms, and guarantor financing to finance agricultural production. Appiah-Twumasi et al. (2020), on the other hand, found smallholder farmers to rely on credit and hiring out of labor on-farm and off-farm.

Mersha and Ayenew (2018) found that smallholder farmers from Ethiopia relied on informal sources, including credit from traders, family members, friends, and rotating savings and credit associations (ROSCAs), to finance agricultural production.

Current evidence suggests that financing agriculture, such as through credit, has a positive effect on agricultural development. Nakazi and Sunday (2020) found that long-run credit extended to smallholder farmers in Uganda had a significant positive impact on agricultural output, with larger effects observed when the credit is used in production. In Pakistan, for example, Chandio et al. (2018) found agricultural credit to have a positive and highly significant effect on agricultural productivity, with short-term loans having a stronger effect on wheat productivity than long-term loans. In Ghana, Dawuni et al. (2021) found that members of Village Savings and Loan Associations (VSLAs) obtained 38% higher agricultural value productivity than non-members. Bannor et al. (2020) found VSLAs to have a significant impact on off-farm income among smallholder

farmers in Ghana. Alhassan et al. (2023) also found that participation in VSLAs improved the adoption of good agricultural practices among smallholder farmers in Ghana.

Even though current evidence suggests a global improvement in financial inclusion, disparities still exist. Demirgüç-Kunt et al. (2021) show that account ownership increased by 8 to 71% of adults between 2017 and 2021 in developing economies. They also found the share of adults using digital payments to have grown from 35% in 2014 to 57% in 2021.

Despite the significant potential effect of improved access to credit on improving employment through agricultural development, the situation still remains grim, especially in rural areas. In Uganda, about 48% of adults had access to formal financial services, while 21% had access to informal financial services, and 43% had no access to financial services (UBOS, 2021).[1] On one hand, the majority of adults in Uganda who had access to formal financial services relied on mobile money (47%) and formal banking services (10%). On the other hand, of those who had access to informal financial services, about 21% relied on informal groups including VSLAs. Interestingly, about 51% of adults from Uganda who participated in the UBOS (2021) study reported keeping money at home or in a secret place as the main modality for saving, followed by VSLAs (27%), and 12% relied on commercial banks. Similarly, 57% of adults in Uganda who had acquired credit reported sourcing it from informal sources.

Despite the general global improvement in financial inclusion, smallholder farmers in sub-Saharan Africa, including Uganda, still face challenges and constraints in accessing financial services. These challenges include high transaction costs, lack of usable collateral, and high illiteracy rates, among others. First and foremost, the high transaction costs, such as the cost of opening and maintaining a bank account, and the lengthy procedures involved in lending, hinder many smallholder farmers, especially those from rural areas, from accessing formal financial services. Similarly, Ojo and Baiyegunhi (2020) and Mersha and Ayenew (2018) found that high interest rates, which are functions of transaction costs for extending credit, limit farmers from accessing credit. According to Balana and Oyeyemi (2022), most smallholder farmers in rural areas have limited access to usable collateral, which is required by financial institutions. The small volume of loans demanded by smallholder farmers, coupled with the dispersion of the demand for financial services, demotivates formal financial service providers from extending their services to rural areas. Additionally, most smallholders are exposed to a high level of idiosyncratic risk, which lowers the appetite for formal financial institutions to extend their services to such clients. Elsewhere, Mukasa et al. (2017) found that around 67% of smallholder farmers in Ethiopia were credit-constrained, with risk factors being the main reason (72%), followed by transaction costs (14%). Interestingly, the level of risk increases with the old age of the smallholder farmer (Ojo and Baiyegunhi, 2020). According to Chikalipah (2017), high illiteracy rates among the populace in sub-Saharan Africa also hinder financial inclusion, a finding consistent with the situation in Uganda (UBOS, 2021).

Various efforts have been made to improve access to financial services among the rural population. Among these, VSLAs, digital platforms such as mobile money, and bank agents are some of the innovations being promoted to increase the prevalence of financial inclusion among the underserved, the majority of whom are the rural poor. In this paper, we focus on VSLAs because they are among the most used informal financial services. According to the UN Capital Development Fund (UNCDF) (2021), VSLAs are self-managed financial groups characterized by members who are self-selected and self-finance the group through regular saving contributions to the fund. The innovation of VSLAs was founded and first launched in 1991 in Niger by CARE Denmark, after which it spread to many developing economies (Amars and Arffmann, 2019). In VSLAs, members are offered a safe way to save money and access loans, which they repay with interest. Under this innovation, no outside capital is needed in most cases – only a lockbox, three keys, and some basic financial training are often provided. In Uganda, VSLAs have been found to increase the effectiveness of mobilizing savings among people experiencing poverty, who are predominantly smallholder farmers. Most rural poor currently appreciate VSLAs because they tend to reduce transaction costs involved in saving, making it possible to save even when household incomes are meager. This is crucial because it helps smallholder farmers to build their capital, which is much needed in financing agricultural production. Indeed, VSLAs have been found to impact household income for group members positively. For example, in Uganda, VSLA members were found to have experienced an increase in income ranging from USD 32.1 to USD 48.4 within the first year of a program providing financial interventions to the members (Hendricks and Chidiac, 2011). Karlan et al. (2017) found a positive effect on monthly household business profits earned by participants in VSLAs in Ghana, Malawi, and Uganda. Ksoll et al. (2016) also found VSLAs to improve household welfare in a very short time (like two years) without any external funding.

LITERATURE REVIEW ON THE IMPACT OF VSLAS ON EMPLOYMENT

Globally, empirical evidence about the effect of VSLAs on employment creation among smallholder farmers is scarce. Most studies on informal financial institutions,

[1] The sum of these percentages is greater than 100% because some adults have access to both formal and informal financial services.

such as those by Gassama et al. (2023), Ullah et al. (2020), and Karlan et al. (2017), have focused on determining the factors that influence access to credit, while others have concentrated on estimating changes in household welfare but not employment. Moreover, even the limited available empirical evidence about the effect of VSLAs on employment has been documented elsewhere. In Nigeria, Odunayo (2020) and Odunayo (2019) relied on both Ordinary Least Squares (OLS) and ordered logit regression methods to study the effect of VSLAs on the Economic Performance of Small Businesses. The findings showed that the financial services of VSLAs had a positive effect on the income performance of small businesses. They also found a positive and significant effect of the length of participation of members with VSLAs on the level of employment created by small businesses.

Gelan and Seifu (2017) studied the determinants of employment creation among smallholder farmers engaged in urban agriculture in Ethiopia. Their study relied on both descriptive and inferential analytical techniques applied to both secondary and primary data. The findings showed that the average number of full-time workers hired by the smallholder farmers increased significantly when the farmer had a better perception about credit and inputs access, land access and ownership, holding a diploma and above educational level, better farm income, and engagement in poultry and dairy farms. Thus, it is important to develop evidence within the Ugandan context. The novelty of our study is twofold. First, to the best of our knowledge, we are the first to empirically estimate the effects of loans, savings, and participation in VSLAs on employment creation among smallholder farmers. Second, we estimate employment as full-time equivalent (FTE), where we aggregate both permanent and temporary hired labor into one metric. Thus, the article introduces new perspectives to the existing literature on financial inclusion and its impact on rural livelihoods. The main objective of the current study is to determine the effect of participation in VSLAs on the creation of employment among smallholder farmers in Uganda. The study's specific objectives include: (1) Characterize the smallholder farmers. (2) Determinants of participation in VSLAs among smallholder farmers; and (3) Assess the factors determining the number of jobs created at the smallholder farmer level.

MATERIALS AND METHODS

Study area

The analysis used to develop this paper relied on secondary data elicited from smallholder farmers drawn from eight purposively selected districts in Uganda, including Kikuube and Masindi from the South-western sub-region; Jinja, Iganga, and Bugiri from the Eastern sub-region; Nakaseke and Kayunga from the Central sub-region; and Omoro from the Northern sub-region of Uganda. These smallholder farmers were engaged in the production of maize, coffee, and beans. According to UBOS (2020), maize is the most grown crop in terms of the prevalence of smallholder households engaged in its production, with 55% of agricultural households in Uganda reporting producing maize, followed by beans (54%), banana food (47%), cassava (29%), and coffee (17%). On the contrary, banana food leads in terms of volumes produced, with about 6.5 million tonnes produced in 2018, followed by 3.4 million tonnes of maize, cassava (4.4 million tonnes), beans (0.73 million tonnes), and coffee (0.31 million tonnes) (UBOS, 2020).

Research design

This paper relies on secondary data drawn from five baseline studies conducted by The Agricultural Business Initiative (aBi) between July and August 2022. We preferred secondary data sources because resource constraints hindered us from collecting primary data. Fortunately, the secondary data were readily available and had adequate data from which the study variables were extracted. The baseline studies were a cross-section of a quasi-experimental research design where data was collected at one point in time from smallholder farmers engaged in the maize, coffee, and bean value chains before interventions would be implemented. According to Wang and Cheng (2020), cross-sectional studies are observational studies used to measure outcomes, understand determinants, and describe population features through data analysis from a population at a single point in time. Cross-sectional datasets and associated methods have been widely used to study various determinants of different development outcomes. Examples include Andegiorgish et al. (2022), Chidimbah et al. (2022), Li and Liang. (2021), Atube et al. (2021), and Alesane et al. (2019). Andegiorgish et al. (2022) used cross-sectional data to study the determinants of antenatal care use in nine sub-Saharan African countries. Munthali et al. (2022) relied on cross-sectional data from Malawi and Sub-Saharan Africa to investigate the Sustainability of VSLAs amidst COVID-19 and its impact on household income levels. Li and Liang (2021) used cross-sectional data to find the determinants of the Fiscal Support of Governments in Response to the COVID-19 Pandemic.

Atube et al. (2021) used cross-sectional data from Northern Uganda to find the determinants of smallholder farmers' adaptation strategies to the effects of climate change. Alesane et al. (2019) used cross-sectional data to investigate the determinants of VSLA membership and savings amounts in Awutu Senya West District of Ghana.

The smallholder farmers participating in the baseline studies included potential beneficiaries of aBi-supported interventions and non-beneficiaries participating in the maize, coffee, and bean value chains. For this study, we do not disaggregate the findings between beneficiaries and non-beneficiaries. This is because the smallholder farmers categorized as potential beneficiaries had not received any interventions from the aBi-supported projects by the time of the survey. Hence, it was assumed that at baseline, both the smallholder farmers categorized as beneficiaries and non-beneficiaries were not statistically different.

Sample size and sampling strategy

This study relies on secondary data elicited from 653 of the 738 smallholder farmers engaged in maize, coffee, and beans production who were targeted by aBi at baseline data collection. The computation of the sample sizes for the baseline studies from which the current secondary data was drawn relied on a 95% confidence level, a confidence interval of 10%, and assumed a 50% chance of success or failure of an intervention in the population. The study draws secondary data from five baseline projects (each

project had a computed sample ranging between 210 and 212 households; with half of the sample as beneficiaries and the other as non-beneficiaries); where a total of 738 smallholder farmers had responded to a semi-structured household data collection tool. Because the baseline studies relied on a quasi-experimental research design, the aggregated sample size of 738 was 10% higher than the actual computed sample size because of the need to account for potential future attrition and the potential for dropping of households that do not match at baseline. The five projects were purposively selected to be included in this study because they had readily available baseline data elicited from smallholder farmers. During the collection of baseline data for each of the five projects, the study adopted the list of profiled smallholder farmers as sampling frames. Before the baseline studies were conducted, aBi and partners had profiled all smallholder farmers belonging to different farmer groups in purposively selected districts where aBi-supported projects were to be implemented. In each district, farmer groups had been purposively selected by aBi and partners to belong to the potential beneficiary group or non-beneficiary group. Thus, a total of 10 smallholder farmers were drawn randomly from each of the selected farmer groups and subjected to a face-to-face interview using a semi-structured data collection tool.

Analytical methods

The study relied on various analytical methods to distill the findings for each objective. A student t-test was conducted during the characterization of the smallholder farmers, while regression analysis was used to answer the second and third objectives of the study. Even though data was elicited from both targeted beneficiaries and non-beneficiaries, we do not attempt to disaggregate the findings between beneficiaries and non-beneficiaries. The details of the analytical methods are presented in the sub-sections that follow.

Characterize the smallholder farmers.

The study relied on descriptive statistics (frequencies, means, and percentages) to address the first objective. Additionally, a two-sample t-test was employed to analyze the first study objective. Two alternatives for student t-tests exist, namely, one sample and two sample t-tests, which are described in detail elsewhere, such as Dekking et al. (2005). This study adopted the two-sample t-test, which involved testing for the significance of the difference in the socio-economic and demographic characteristics of the smallholder farmers who were drawn from households that had a member who belonged to a VSLA and their counterparts who did not have a member belonging to a VSLA.

Determinants of participation in VSLAs among smallholder farmers

A binary logistic regression analysis, whose econometric description is discussed elsewhere, such as by Cameron and Trivedi (2005), was relied on to address the second objective of this study. Participation in VSLAs is conceptualized as a binary outcome, where smallholder farmers decide to either participate or not participate in VSLAs, conditioned on their socio-economic and demographic characteristics. Let Y be a latent variable (the dependent variable) with a logistic distribution, where Y=0 if a smallholder farmer decides not to participate in VSLAs and Y=1 if a smallholder farmer decides to participate in the innovation.

$$Y = \begin{cases} 0 & \text{Does not participate in VSLAs} \\ 1 & \text{Participate in VSLA} \end{cases}$$

Thus,

$$Y = X\beta + \varepsilon$$

Where Y is the dependent variable, X are covariates, β are coefficients, and ε are disturbance terms assumed to be normally distributed (Cameron and Trivedi, 2005). Hence, the empirical binary logit model for the i^{th} household which was used in this study is specified as follows:

$$\begin{aligned} Y_i = \beta_{0i} + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \beta_{3i}X_{3i} + \beta_{4i}X_{4i} + \beta_{5i}X_{5i} + \beta_{6i}X_{6i} \\ + \beta_{7i}X_{7i} + \beta_{8i}X_{8i} + \beta_{9i}X_{9i} + \beta_{10i}X_{10i} \\ + \beta_{11i}X_{11i} + \beta_{12i}X_{12i} + \beta_{13i}X_{13i} + \beta_{14i}X_{14i} \\ + \beta_{15i}X_{15i} + \beta_{16i}X_{16i} + \varepsilon_i \end{aligned}$$

Table 1 provides the details of the covariates included in the model. The choice of covariates included in the model was informed by previous studies such as Alesane et al. (2019) and Gelan and Seifu (2017). Alesane et al. (2019) found that the likelihood for smallholder farmers to join a VSLA was positively related to household size and the male respondent but negatively associated with the respondent's age and educational status. Gelan and Seifu (2017) found that an optimistic perception about credit and inputs access, land access and ownership, educational level, farm income, and engagement in poultry and dairy farms significantly influenced the average number of full-time workers used by the smallholder farmer.

Assess the factors that determine the number of jobs created at the smallholder farmer level

An Ordinary Least Squares (OLS) regression analysis, whose econometric description is also discussed in Cameron and Trivedi (2005), was employed to address the third objective of this study.

The quantity of jobs created among smallholder farmers is conceptualized as a continuous outcome in this study, where the number of jobs created ranges from zero to positive infinity, conditioned on the socio-economic and demographic characteristics of the smallholder farmers. In this study, the quantity of jobs is measured as Full-Time Equivalents (FTEs). According to Welch and Smith (2020) and The White House (2018), one FTE is defined as 2080 worked hours in one year or 80 worked hours in a 14-day pay period. Welch and Smith (2020) and The White House (2018) followed to customize FTEs to the context of agricultural production in a developing economy. The FTE of jobs was measured as the sum of full-time employment and the FTE from temporary workers. The FTE for temporary workers was computed as follows.

$$FTE\_temporary = \frac{x_1 \cdot x_2 \cdot x_3 \cdot x_4}{240 * 8hrs}$$

Where: x_1 = Total number of temporal workers used in a season, x_2 = Total number of hours worked per day, x_3 = Total number of days worked in a week, x_4 = Total number of weeks worked per year.

Let Y be the dependent variable (FTE) with a normal distribution among the smallholder farmers. Thus,

$$Y = X\beta + \varepsilon$$

Where: Y is the dependent variable with values ranging from zero to positive infinity, X are covariates, β are coefficients, and ε are disturbance terms assumed to be normally distributed (Cameron & Trivedi, 2005). Hence, the empirical OLS model for the i^{th} household which was used in this study is specified as follows:

Table 1. Explanatory variables used in the empirical model.

	Explanatory variable	Expected sign	Literature source for variable
X_1	Sex of farmer measured as a dummy with 1=Male and 0=Otherwise	+/-	Odunayo (2020), Odunayo (2019), Alesane et al. (2019)
X_2	Age of household head in compelete years measured as a continuous variable	-	Odunayo (2020), Odunayo (2019), Alesane et al. (2019), Gelan and Seifu (2017), Mukasa et al. (2017)
X_3	Age of spouse in compelete years measured as a continuous variable	-	Odunayo (2020), Odunayo (2019), Alesane et al. (2019), Gelan and Seifu (2017)
X_4	Household heads who attained formal education measured as a dummy variable with 1=Yes and 0=Otherwise.	-/+	Odunayo (2020), Odunayo (2019), Alesane et al. (2019) and Gelan and Seifu (2017)
X_5	Household Size measured as the number of members of the household in the last six months	+/-	Odunayo (2020), Odunayo (2019), Alesane et al. (2019), Mukasa et al. (2017)
X_6	Dependency ratio measured as the ratio of the sum of children below 18 years and adults above 60 years to household size	+	Odunayo (2020), Odunayo (2019), Mukasa et al. (2017)
X_7	Size of land owned measured in acres	+	Gelan and Seifu (2017), Mukasa et al. (2017)
X_8	Ratio of size of targeted crop plot to land size	+	Gelan and Seifu (2017), Mukasa et al. (2017)
X_9	Households that used inorganic fertilizer measured as a dummy with 1=Yes, 0=Otherwise	-/+	Gelan and Seifu (2017), Mukasa et al. (2017)
X_{10}	The production cost of targeted crop measured in Uganda Shillings (Ush.) per kg.		
X_{11}	Value of harvest for targeted crop measured in thousands of Ush.	+	Odunayo (2020), Odunayo (2019), Gelan and Seifu (2017)
X_{12}	The value of targeted crop sold measured in thousands of Ush.	+	Odunayo (2020), Odunayo (2019), Gelan and Seifu (2017)
X_{13}	Market Participation Ratio measured as a ration of quantity of targeted crop sold to quantity of the targeted crop harvested.	+	Gelan and Seifu (2017)
X_{14}	Households that attained positive gross margins measured as a dummy with 1=Yes, 0=Otherwise	+	Odunayo (2020), Odunayo (2019), Gelan and Seifu (2017)
X_{15}	Average monthly savings in 2021 measured in Ush.	+	Odunayo (2020), Odunayo (2019)
X_{16}	Total volume of loans received in 2021 measured in Ush.	+	Odunayo (2020), Odunayo (2019), Gelan and Seifu (2017)

$$Y_i = \beta_{0i} + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \beta_{3i}X_{3i} + \beta_{4i}X_{4i} + \beta_{5i}X_{5i} + \beta_{6i}X_{6i} + \beta_{7i}X_{7i} + \beta_{8i}X_{8i} + \beta_{9i}X_{9i} + \beta_{10i}X_{10i} + \beta_{11i}X_{11i} + \beta_{12i}X_{12i} + \beta_{13i}X_{13i} + \beta_{14i}X_{14i} + \beta_{15i}X_{15i} + \beta_{16i}X_{16i} + \varepsilon_i$$

Where the covariates are defined as before in Sub-section 3.2, and ε are disturbance terms for the i^{th} household.

RESULTS

Socio-economic characteristics of the smallholder farmers

The current findings reveal that approximately half of the smallholder farmers who participated in this study were members of a VSLA. Specifically, about 48% of the smallholder farmers in the study were affiliated with a VSLA. These findings indicate a lower prevalence of VSLA utilization among smallholder farmers. Table 2 presents the socio-economic characteristics of the smallholder farmers participating in this study, disaggregated by whether the farmer was a member of a VSLA or not. Overall, 53% of the smallholder farmers who participated were female, with the remainder being male. We observed a significant difference (P≥0.01) in the proportion of female study participants between households with a VSLA member and those without.

Among those with no members in the VSLA, approximately 44% of the smallholder farmers who participated in this study were female, compared to 61% among their counterparts from households with a VSLA member. These findings suggest that women are more likely to be active in VSLAs than their male counterparts. These findings contradict the national demographics, where almost three-quarters (75%) of smallholder farmers in Uganda were found to be from male-headed households (UBOS, 2020). However, the current findings corroborate those of Gassama et al. (2023), who found women to be more active in VSLAs

Table 2. Socio-economic characteristics of the smallholder farmers who participated in the study.

Parameter	Overall		Non-member of VSLA		Member of VSLA		P-value
	Obs	Mean	Obs	Mean	Obs	Mean	
Sex of farmer (1=Male, 0=Otherwise)	630	0.47	324	0.56	306	0.39	0.000*
Age of household head (Years)	600	47.26	293	48.90	307	45.70	0.006*
Age of spouse (Years)	496	39.13	247	40.29	249	37.98	0.041**
Household heads who attained formal education (1=Yes, 0=Otherwise)	653	0.94	338	0.95	315	0.92	0.233
Household Size	589	6.06	283	6.10	306	6.02	0.696
Dependency ratio	589	0.30	283	0.27	306	0.32	0.033**
Size of land owned (acres)	474	4.55	247	4.35	227	4.76	0.499
Size of targeted crop plot to land size ratio	446	1.51	225	2.20	221	0.82	0.371
Households that used inorganic fertilizer (1=Yes, 0=Otherwise)	624	0.36	319	0.34	305	0.38	0.277
Households conducted a soil test (1=Yes, 0=Otherwise)	624	0.02	319	0.03	305	0.01	0.015**
Production cost of targeted (Ush / kg)	630	2.197.72	324	3.626.43	306	684.97	0.146
Productivity of targeted crop (kg/acre)	608	1.441.47	303	2.365.44	305	523.56	0.146
Market Participation Ratio	610	0.55	312	0.61	298	0.48	0.069***
Value of targeted crop sold (,000 Ush)	630	1020.97	324	1210.05	306	820.78	0.007*
Households that attained positive gross margins (1=Yes, 0=Otherwise)	630	0.81	324	0.79	306	0.83	0.238
Total volume of loan received in 2021 (Ush)	365	656.439.50	78	1.338.737.00	287	471.006.70	0.000*
Average monthly savings in 2021 (Ush)	533	59.243.47	227	79.287.49	306	44.374.21	0.013**
Households that hired labor in 2021 (1=Yes, 0=Otherwise)	653	0.60	338	0.63	315	0.56	0.063***
Households that hired permanent labor in 2021 (1=Yes, 0=Otherwise)	389	0.05	213	0.06	176	0.03	0.300
Households that hired temporary labor in 2021 (1=Yes, 0=Otherwise)	389	0.91	213	0.84	176	0.99	0.000*
Fulltime Equivalent Jobs for males	653	0.15	338	0.16	315	0.15	0.718
Fulltime Equivalent Jobs for females	653	0.10	338	0.09	315	0.12	0.570
Total Fulltime Equivalent Jobs (both males and females)	653	0.26	338	0.25	315	0.27	0.894

*Significant at P≥0.01, **significant at P≥0.5 and *** significant at P≥0.1.

than men.

Overall, the average age of the heads of the households from which the smallholder farmers who participated in this study were drawn was 47 years. A significant difference (P≥0.01) was observed in the age of the household heads between households that had a member in a VSLA and their counterparts who had no member. The average age of the household head for households with a member in a VSLA was 46 years, while the average age for their counterparts from households with no member in a VSLA was 49 years. These findings are consistent with those of Gassama et al. (2023), who found the age for VSLA members from Sierra Leone to range between 41 and 45.

Similarly, the average age of the spouse for the heads of the households from which the smallholder farmers who participated in this study were drawn was 39 years. A significant difference (P≥0.05) was found in the age of the spouses between those from households with a member in a VSLA and their counterparts who had no member in the VSLA. The average age of the

spouses from households with a member in a VSLA was 38 years,while the average age for their counterparts from households with no member in a VSLA was 40 years.

The average dependence ratio among the households from which the smallholder farmers who participated in this study were drawn was 30%. We observed a significant difference (P≥0.05) in the dependency ratio between households with a member in a VSLA and their counterparts with no members in the VSLA. The average dependence ratio for households with a member in a VSLA was 32%, while the average dependence ratio for households with no member in VSLAs was 27%.

Only two percent of the smallholder farmers reported conducting soil tests in the last two seasons before the survey. This study found a significant difference (P≥0.05) in the prevalence of soil testing utilization between households that had a member in a VSLA and their counterparts who had no member in the VSLA. One percent of the smallholder farmers from households with a member in a VSLA applied soil testing in their gardens, compared to three percent of their counterparts from households with no member in VSLAs.

Overall, the average Market Participation Ratio (MPR) for the smallholder farmers participating in this study was 55%. A significant difference (P≥0.05) was observed in the MPR between households with a member in a VSLA and their counterparts who did not have a member in the VSLA. The MPR for households with a member in a VSLA was found to be 48%, while the MPR for their counterparts who did not have a member in the VSLA was 61%.

This study found the average monthly savings of the smallholder farmers who participated to be Ush 59,243. Additionally, a significant difference (P≥0.05) was found in the average monthly savings between households with a member in a VSLA and their counterparts who did not have a member in the VSLA. The average savings for households with a member in a VSLA was Ush 44,374, while for their counterparts without a VSLA member, it was Ush 79,287.

The study also found the annual amount of money received as credit by the smallholder farmers to be Ush 656,440. Upon disaggregation, a significant difference (P≥0.05) was found in the annual amount of money received as credit between households with a member in a VSLA and their counterparts who did not have a member in the VSLA. The average annual amount of money received as credit by households with a VSLA member was Ush 471,007, while for their counterparts without a VSLA member, it was Ush 1,338,737.

The findings reveal that 60% of the smallholder farmers in this study utilized hired labor. We observed a significant difference (P≥0.1) in the prevalence of hired labor utilization between households with a member in a VSLA and their counterparts who did not have a member in the VSLA. Specifically, about 56% of the smallholder farmers from households with a VSLA member used hired labor, compared to 63% of their counterparts who did not have a VSLA member.

Furthermore, 91% of the smallholder farmers who hired labor used temporary labor. This study found a significant difference (P≥0.01) in the prevalence of utilizing hired temporary labor between households with a member in a VSLA and their counterparts who did not have a member in the VSLA. Approximately 99% of the smallholder farmers from households with a VSLA member utilized hired temporary labor, compared to 84% of their counterparts who did not have a member in the VSLA. These findings align with the national prevalence, where 39% of smallholder farmers reported using hired labor in These findings align with the national prevalence, where 39% of smallholder farmers reported using hired labor in crop production (UBOS, 2020).

Determinants of participation in VSLAs among smallholder farmers

Table 3 presents the factors determining whether smallholder farmers become members of VSLAs or not. The most significant factors identified by this study were the age of the household head, the age of the spouse, the size of land owned, the ratio of the size of the plot for the targeted crop to the size of land owned by the household, and annual loan amount. The coefficient for the age of the household head was found to be positive and significant (P≥0.05), while that for the age of the spouse for the household head was negative and significant (P≥0.01). The coefficient for the age of the household head was unexpected, whereas that for the age of the spouse was expected.

These findings contradict those of Sienso et al. (2021) and Alesane et al. (2019), who found a negative association between the age of the respondent and their likelihood of becoming a VSLA member. The current findings suggest that the likelihood of smallholder farmers becoming members of a VSLA increases as the household heads age. However, the likelihood of the smallholder farmer becoming a member of a VSLA reduces when the spouse of the household head becomes older. This can be explained by the fact that commercial banks have a lower appetite for older smallholder farmers. According to Ojo and Baiyegunhi (2020), older smallholder farmers are less productive and riskier. Thus, as household heads become older, they tend to resort to informal sources of credit, including VSLAs, which can tolerate higher levels of risk than commercial banks.

Both the coefficient for the size of land owned by the household and the ratio of the plot size of the targeted crop to the size of land owned by the household were found to be positive as expected and significant (P≥0.05). These findings suggest that households with larger land endowments and those who primarily operate their land with the targeted crops are more likely to have

Table 3. The factors determining whether smallholder farmers become members of VSLAs.

Explanatory variable	Coef.	Std. Err	z	p<z
Sex of farmer (1=Male, 0=Otherwise)	-0.07	0.29	-0.25	0.81
Age of household head (Years)	0.05**	0.02	2.01	0.04
Age of spouse (Years)	-0.07*	0.03	-2.82	0.01
Household heads who attained formal education (1=Yes, 0=Otherwise)	0.78	0.62	1.26	0.21
Household Size	-0.04	0.06	-0.73	0.47
Dependency ratio	0.37	0.64	0.58	0.56
Size of land owned (acres)	0.16**	0.07	2.11	0.04
Size of targeted crop plot to land size ratio	0.68**	0.29	2.34	0.02
Households that used inorganic fertilizer (1=Yes, 0=Otherwise)	-0.44	0.28	-1.58	0.12
The production cost of targeted (Ush / kg)	0.00	0.00	-0.86	0.39
Value of harvest for targeted crop sold (,000 Ush)	0.00	0.00	0.37	0.72
Value of targeted crop sold (,000 Ush)	0.00	0.00	0.01	0.99
Market Participation Ratio	-0.32	0.61	-0.52	0.61
Households that attained positive gross margins (1=Yes, 0=Otherwise)	0.23	0.50	0.45	0.65
Average monthly savings in 2021 (Ush)	0.00	0.00	-1.27	0.20
Total volume of loans received in 2021 (Ush)	0.00	0.00	-3.66	0.00
Constant	0.61	1.10	0.56	0.58
Number of observations	188			
LR chi2(16)	49.98			
Prob > chi2	0.00			
Pseudo R2 (%)	30			
Log-likelihood	-59.17			

*Significant at P≥0.01, **significant at P≥0.5 and *** significant at P≥0.1.

smallholder farmers who become members of VSLAs. These findings imply that individuals experiencing poverty, particularly those with limited land endowments, are less likely to have smallholder farmers who join VSLAs. This is unfortunate because VSLAs, by design, target people experiencing poverty, who often have restricted access to formal financial services.

Lastly, the coefficient for the annual volume of loans the smallholder farmers received was negative and significant (P≥0.01). This finding suggests that households that receive larger loan volumes are less likely to become members of VSLAs. This finding is expected because VSLAs usually have small loan portfolios and cannot extend large volumes of loans to their members, who often have idiosyncratic demands for credit simultaneously.

Determinants of the number of jobs created among smallholder farmers

The authors investigated the factors determining the number of jobs created among smallholder farmers, and the findings are presented in Table 4. The most significant factors identified by this study were the gender of the household head, gross margins received by the smallholder farmer, average monthly savings, and the total annual volume of loans. Unfortunately, the current findings suggest that membership in VSLAs is not a sufficient precondition for stimulating job creation among smallholder farmers in Uganda.

The coefficient of the gender of the household head was positive as expected and significant (P≥0.05). This finding implies that being a male household head increases the number of jobs created by 0.21 FTEs. This finding is explained by the fact that male-headed households tend to access more resources for agricultural production and are often more productive than their female-headed counterparts.

Unexpectedly, the coefficient of gross margins was negative and significant (P≥0.01). This finding implies that smallholder farmers who earn positive gross margins tend to create fewer jobs. Specifically, when a smallholder farmer earns positive gross margins from crop production, the findings show that 0.68 FTEs decrease the jobs created.

Although unexpected, this finding can be explained by the fact that most smallholder farmers operate small-scale farms, which may not be economically viable when hired labor is used. Thus, profitability on small-scale farms can often be driven by preferring family labor over hired labor.

Gelan and Seifu (2017) found the average number of full-time workers employed by smallholder farmers to

Table 4. The factors that determine the number of jobs created among smallholder farmers.

Explanatory variable	Coef.	Std. Err	t	p>z
Sex of farmer (1=Male, 0=Otherwise)	0.21**	0.09	2.31	0.02
Age of household head (Years)	0.00	0.01	0.62	0.53
Age of spouse (Years)	0.00	0.01	0.04	0.97
Household heads who attained formal education (1=Yes, 0=Otherwise)	0.25	0.22	1.12	0.26
Household Size	0.02	0.02	-1.24	0.22
Dependency ratio	-0.30	0.19	-1.57	0.12
Size of land owned (acres)	-0.01	0.01	-1.65	0.10
Size of targeted crop plot to land size ratio	0.03	0.04	0.90	0.37
Households that used inorganic fertilizer (1=Yes, 0=Otherwise)	-0.07	0.09	-0.81	0.42
The production cost of targeted (Ush / kg)	0.00	0.00	0.06	0.95
Value of harvest for targeted crop sold (,000 Ush)	-0.00	0.00	-0.29	0.77
Value of targeted crop sold (,000 Ush)	0.00	0.00	0.21	0.83
Market Participation Ratio	-0.00	0.04	-0.09	0.93
Households that attained positive gross margins (1=Yes, 0=Otherwise)	-0.68*	0.15	-4.62	0.00
Households that had a member in VSLA (1=Yes, 0=Otherwise)	-0.07	0.13	-0.55	0.58
Average monthly savings in 2021 (Ush)	0.00**	0.00	2.38	0.02
Total volume of loans received in 2021 (Ush)	0.00	0.00	2.74	0.01
Average monthly savings in 2021 * Total amount of loan received in 2021 (Ush^2)	-0.00	0.00	-1.45	0.15
Constant	0.46	0.36	1.28	0.20
Number of obs	188			
F(18, 169)	5.28			
Prob > F	0.00			
R-squared (%)	35.99			
Adj R-squared (%)	29.17			
Root MSE	0.57			

*Significant at P≥0.01, **significant at P≥0.5, and *** significant at P≥0.1. + Variable is a log.

have a positive and significant association with better farm income.

As expected, the coefficient for the average monthly savings was found to be positive and significant (P≥0.05). An increase in average monthly savings of Ush one million per smallholder farmer resulted in an increase in jobs by 2.3 FTEs per household. This finding loosely suggests that when a VSLA has a portfolio of Ush one million in savings from its members, this savings portfolio can create about two FTEs in aggregate among its members. This finding can be explained by the high cost required to sustain the creation of decent agricultural jobs. Moreover, this suggests that farmers must operate at optimal economies of scale where hired labor can be paid for its marginal product.

The coefficient for the volume of loans received per annum was found to be positive as expected and significant (P≥0.01). An increase in the volume of loans received per annum by Ush 10 million per smallholder farmer increases jobs by 1.1 FTEs per household. This finding also loosely suggests that when a VSLA receives Ush 10 million in credit from a formal financial institution, this loan can create about one FTE in aggregate among the members who benefit from this loan. Regardless of the source of credit, this finding can be explained by the fact that loans given to smallholder farmers in Uganda are costly.

DISCUSSION

This study aimed to determine whether participation in VSLAs can influence the creation of employment opportunities among smallholder farmers in Uganda. However, the findings suggest that while factors such as the gender of the household head, gross margins received from the crop enterprise, average monthly savings, and total annual loan volume are significant predictors of the number of jobs created by smallholder farmers, membership in a VSLA is not.

The findings emphasize that credit is the most critical factor for creating employment opportunities. Creating a single job at the smallholder farmer level using loans is costly compared to using savings. An increase in jobs by 1.1 FTEs per household resulted from an increase in the volume of loans received per annum by Ush 10 million

per smallholder farmer. Similarly, an increase in average monthly savings of one million Ush per smallholder farmer resulted in an increase in jobs created by 2.3 FTEs per household.

Given that most smallholder farmers are already resource-constrained, driving savings in VSLAs as an innovation to promote job creation among farming households may only have long-term outcomes. Thus, loans disbursed through VSLAs remain the low-hanging fruit to foster the creation of jobs among smallholder farmers. Therefore, VSLAs without ample and attractive loan portfolios may hamper the creation of employment among smallholder farmers in Uganda.

These findings align with those of Odunayo (2020), Odunayo (2019), and Gelan and Seifu (2017). In Nigeria, Odunayo (2020) and Odunayo (2019) found VSLAs to have a positive and significant effect on the level of employment created by small businesses. Gelan and Seifu (2017) also found an optimistic perception about credit access to significantly influence the average number of full-time workers employed by smallholder farmers in Ethiopia.

Conclusion

Based on the findings of this study, it was concluded that the gender of the household head, positive gross margins, average monthly savings, and annual loan volume, rather than membership in a VSLA, are essential predictors of the number of jobs created by smallholder farmers. Only positive gross margins were found to have a negative relationship with the number of jobs created, while the other predictors (gender of the household head, total monthly savings, and annual loan amount) were found to have a positive relationship. Therefore, VSLAs with ample and attractive loan portfolios may be sufficient prerequisites to create more jobs.

Given that most smallholder farmers are already resource-constrained, driving savings as an innovation to promote job creation may only yield outcomes in the long run. Therefore, loans remain the low-hanging fruit to foster the creation of decent jobs. These findings suggest that promoting a conducive macroeconomic environment for formal financial institutions to provide credit to VSLAs is the most viable policy intervention that the Ugandan government and their development partners can undertake. Among other measures, there is a need to reduce the transaction costs involved in accessing credit from formal financial institutions. One option could be digitizing and registering VSLAs at the local government level. Similarly, there should be a deliberate effort by the Government of Uganda and its development partners to subsidize loans provided to smallholder farmers.

Limitations of the study

Despite the robustness of this study, the findings may not be generalized to smallholder farmers from all 135 districts of Uganda. Firstly, the study did not rely on a sampling frame that was representative of all 135 districts. Instead, the sampling frame was limited to the eight districts where aBi had new projects in 2022, targeting smallholder farmers and agribusinesses engaged in the maize, coffee, and bean value chains. To improve the validity of future studies, researchers should aim to increase the sample distribution by utilizing sampling frames drawn from all 135 districts in Uganda and include smallholder farmers engaged in other agricultural value chains besides maize, coffee, and beans.

Secondly, the data used in this study was self-reported by smallholder farmers who often did not keep records, increasing the likelihood of bias due to recall bias. However, before conducting the baseline data collection, enumerators were carefully trained and equipped with the capacity to probe respondents to aid in reporting data with minimal error.

Similarly, data cleaning procedures were implemented by contacting smallholder farmers with outliers to confirm the accuracy of data entry. If an error was detected, data for the affected smallholder farmer were re-entered. However, if the smallholder farmer confirmed the accuracy of the entry, the household was excluded from the analysis.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Before baseline data collection, clearance was obtained from the different district administrative structures, including the Chief Administrative Officer and Resident District Commissioner. Additionally, written consent was sought from all study participants. All secondary data used in this manuscript was treated as confidential and anonymous, with access restricted to the author and the data collection team.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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