Impact of Integrated Programmes for Households Consumption Expenditure: Empirical Evidence from Northern Ethiopia

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Abstract

We examine factors that drive households' decision to participate in Village Saving and Loan Association (VSLA), driving forces that determine consumption expenditure, and evaluate the impact of integrated programmes on households' consumption expenditure. Endogenous switching regression model is fitted to account for the heterogeneity in the decision to participate or not, and for unobserved characteristics of households. Saving, borrowing and asset holdings are the main drivers behind participation in VSLA. Participant's consumption expenditure is positively and significantly determined by asset holdings, income, male-headedness of the household and highland dwellers; while for non-participant's labour and income are significant and positive determinants. Participation in the integrated programmes increases consumption expenditure, and participated households benefit the most even the non-participated were to participate.

Keywords: Endogenous switching regression, Integrate Programmes, Heterogeneity, Village Saving and Loan Association, Ethiopia.

1. Introduction

For decades, recurrent drought and famine have devastated the living conditions of most rural dwellers in Ethiopia. A blend of man-made and natural factors resulted in a severe and growing food insecurity problem, which exposed five to six million people to chronic and transitory food insecurity (FAO, 2006). As well, it also makes ten million people vulnerable with weak resilience every year. This chronic food insecurity is a signal of the extreme state of poverty that the greater proportions of rural poor households are confronting within their daily life. The policy response to this recurring famine has been to avert mass starvation through emergency food aid. However, this did not either stop the depletion of victims' assets or meet their sustained food needs (Gilligan et al., 2009). Temporary emergency aid was not integrated with economic development activities in Ethiopia until 2005.

There is a debate on whether support for the poor should be credit only or credit plus. The 'minimalist' side of the debate would argue that the poor need only financial support. They perceive credit as a magic bullet to do away with rampant poverty (Woller and Woodworth, 2001). However, poverty is not the same across borders, and ultimately the same kind of credit treatment might not solve all kinds of poverty. There are in fact ultra-poor who are in need of credit plus services such as food aid because credit alone can only be used for tempting consumption rather than for triggering productivity (Bateman, 2010).

The 'integrative' side would argue that the poor needs credit plus supports if the aim is to pull them out of abject poverty (Woller and Woodworth, 2001). This approach provides a range of social intermediaries, enterprise developments and social services, combined with financial services (Ledgerwood, 1998). 'Integrative' approach fosters rural microfinance (Bastiaensen and Marchetti, 2010). They have previously argued that, without compounding financial services with non-financial services, one should not expect a miracle out of any credit services alone (Bastiaensen and Marchetti, 2007). The use of credit only service makes the poor channel 50% to 90% of their credit to tempting consumption (Bateman, 2010).

The poor in rural areas and in urban slums do not get access to formal financial service at all (DemirgüçeKunt and Klapper 2012; Daley-Harris, 2009), because microfinance institutes (MFI) mainly focus on the transaction cost and profitability to operate their business (Allen, 2006). In addition to credit service delivery gap, there is also a mismatch between what the poor want and services being delivered (Allen, 2006). For instance, most MFI's are not licensed to keep financial deposits, although few have started recently to offer insurance. However, the poor prefer to beef-up and protect their asset holdings through savings (Allen, 2006). Conspicuously, it became evident to search for an alternative model that can fill in gaps stated to reach out both to the rural poor and to the urban slum dwellers.

In response to those challenges CARE has been working for more than a decade on an alternative model, namely the Village Saving and Loan Association (VSLA). This study mainly focuses on the VSLA model after it was integrated with Productive Safety Net Programme (PSNP), and provides support to ease the food insecurity problem that rural households face in Ethiopia.

A cross-sectional study from Zimbabwe found that membership in VSLA increases households productive and non-productive asset levels, improves quality of housing, and leads to an increase in the number of income-generating activities (Allen and Hobane, 2004). In Malawi a similar study shown that participation in VSLA improves the livelihoods of its members, alleviates poverty for women, and increases the number and magnitude of economic activities (Anyango, 2005). A study conducted in Tanzania by Anyango et al. (2007) have depicted that participation in VSLA improves the standard of living (by 22%) and housing (by 21%) and increases income (by 20%). A before and after design study without control group from North Ghana illustrated that 4.2% and 62% of the VSLA beneficiaries invests their loans and savings respectively in income generating activities (Adams et al., 2014). However, these studies suffer from methodological weakness for they lack proper control group to account the inherent self-selection bias and biases that steam form unobserved characteristics in VSLA.

In recent years, however, there are two studies conducted using a randomized trial to minimize the threat of selection bias in the VSLA. A cluster-randomized trial impact evaluation from Malawi shown positive and significant for the participants of VSLA on food security, household consumption and number of rooms compared to the non-participants (Ksoll et al., 2013). A randomized impact evaluation from Burundi found that the monthly expenditures of VSLA beneficiary households increased by USD 40.6 and poverty reduced by 14% compare with non-beneficiaries (Annan et al., 2013).

Empirical studies on 'integrative' approach (VSLA+PSNP) are scanty and inconclusive. The Rural Maintenance Programme in Bangladesh has brought a positive change to it beneficiaries - 87% of poor clients who graduated from the Rural Maintenance Programme became self-employed in just three years after the program's completion (Hashemi and Rosenberg, 2006). Another success story has also been documented in

Bangladesh, where two-thirds of the participants who graduated from Income Generation for Vulnerable Groups Development became full members of formal microfinance institutions and increased their income and assets (Hashemi, 2001). However, the attempt to duplicate a similar program in Malawi, or the Central Regional Infrastructure Maintenance Program, did not bring about the same level of improvement to its participants (Hashemi and Rosenberg, 2006).

Gilligan et al. (2009) have indicated that the Other Food Security Program in Ethiopia, which seeks to integrate food aid with credit, soil and water conservation and other activities, did not provide a significant impact on household consumption expenditure. Using the same dataset, but focusing on the Amhara region of Ethiopia, Andersson et al. (2009) have concluded that PSNP alone shows no changes on livestock holdings, but it had a positive impact on livestock holdings when the PSNP is integrated with the Other Food Security Program.

This paper makes an attempt to fill gaps in literature by (1) comparing the integrated programmes (VSLA+PSNP) with the PSNP on household consumption expenditure; (2) adopting endogenous switching regression method to account heterogeneity and threats of unobserved characteristics of households; (3) giving a glimpse of driving factors that determine households' decision to participate in VSLA; and (4) showing the genuine attempt made in the context of rural Ethiopia, which indicates how VSLA supports households graduation from food aid .

The rest of the paper is structured as follows: section 2, 3 and 4 discuss the survey design, study area and study population and sample, respectively; section 5 discusses the model specification with the estimation results in section 6 and section 7 discusses the concluding remarks.

2. Village Saving and Loan Association and Productive Safety Net Programs

2.1 The Principle of VSLA

CARE International developed the VSLA model about two decades ago, with several testing and modifications done in 1991 in Niger. Currently it is being implemented in over 21 countries around the world. Different organization such as USAID, Save the Children UK and Catholic Relief Society have adopted CARE's model, while PACT International has developed its own version of the model that targets women and focus on literacy to support the poor.

All VSLA models, regardless of the agency implementing it, generally follow three basic principles. First principle is members self-select into the program to save money to form a pool, or an aggregate source of loan capital from which they can borrow, with the aim of providing an opportunity for household savings and insurance to the poor, who are usually excluded from the formal finical services. Second principle, it should be autonomous and self-managed because it aims at creating institutional and financial independence, and every kind of financial transaction and decision-making would need to be carried out in front of every members to ensure transparency and accountability. Third principle is that the cycle of savings and lending is usually time bound, which means members agree to save and to borrow for a specified period of time. At the end of the agreed period, members share the money in proportion to the amount of their accumulated savings, interest earnings and earnings generated from other economic activities by the group.

2.2 Productive Safety-Net Program

In 2005 the government of Ethiopia with a consortium of donors started to implement the PSNP and was started with the aim of shifting the trend from meeting short term food needs, through emergency relief, to addressing the underlying causes of food insecurity, through a predictable food transfer (Gilligan et al., 2009). The program has been run in two phases. The phase one run from 2005-09 and phase two started in 2010 and expected to end in 2014. The first phase started with 4.84 million food insecure people and scaled up to 7.57 million people in two years' time. The second phase builds on the efforts of the first phase, thereby stressing means to maximize linkages with other elements of Food Security Program to attain sustainable food security.

The underlining principles and objectives of PSNP is: to assure food consumption and prevent asset depletion for food insecure households in chronically food insecure districts, thereby stimulating markets, improving access to services and natural resources, and rehabilitating and enhancing the natural environment.

The program has two components, direct support and public works. The public work component aims at building community assets and prevents asset depletion. It has short-term and long-term objectives. The short-term objective is to protect households from distressed selling of their assets holdings to fill the consumption gap they face. Accordingly, they will be paid for the time they spent for public work activities. This helps households to have a smooth consumption while at the same time they are protected from distressed sell of their asset.

However, the long-term objective, attempts to give long-term solutions to the underline causes of the recurrent food insecurity problem, thereby rehabilitating natural (physical) resources. There are six natural (physical) resources rehabilitation activities. These are: i) Soil and water conservation; ii) Rural feeder roads, bridges and fords construction; iii) Water supply for animal and human use; iv) Social infrastructures (schools, health and animal posts); v) Small scale irrigation and dams; and vi) Agricultural activities related to composting and farmers training.

2.3 Integrated Programmes

VSLA launched with the aim of fostering household's graduation from food aid, promoting the culture of saving in ultra-poor households, fostering graduation from PSNP and gradually to prepare the poor to be a member of formal microfinance beneficiary. Membership to VSLA is open to both participants and non-participants of the PSNP, but the remaining packages of PSNP-plus program are restricted only to the participants of PSNP.

The VSLA model can be implemented in an array of institutional settings ranging from multi-sector rural development projects to stand-alone financial service projects (Allen, 2006). The model is based on traditional saving and lending methods that exist in different African countries, but it requires a small external investment needs in the form of training and other supports (Burns and Bogale, 2010). Adopting CARE's model, Save the Children UK has been implementing VSLA in the Sekota District since 2008. Accordingly, Save the Children UK includes VSLA as one component of its overall PSNP-plus program, which includes: VSLA, livestock fattening and honey value chains combined PSNP, and linking VSLA participants with formal MFI's graduates.

3. Survey design and data

Empirical studies on the impact of microcredit services are controversial. It is partly because of the methodological challenges. For example, Pitt and Khandker (1998), Morduch (1998), Chemin (2008), McKernan (2002), Khandker (2005), Menon (2006b) and Roodman and Morduch (2009) have all analysed the same data, collected from Bangladesh from 1991 to 92, except Khandker (2005), who included an additional data from 1998 to 99. The results from these studies are divergent and inconclusive. These discrepancies are attributed to lack of managing selection biases, unobserved characteristics, heterogeneity effect, different assumption and the differences in the estimation technique.

One of the best viable measures to spurn selection bias is to conduct randomized experimental designs. Researchers have faced challenges in establishing causality through non-experimental designs (Roodman and Morduch, 2009). Nonetheless, it is extremely expensive to employ a randomized approach to every developmental evaluation. The challenges of non-experimental designs stem from factors such as unobserved variables, non-programme placement bias, self-selection and attrition biases.

Selection bias comes from two sources: self-selection and programme placement biases (Pitt and Khandker, 1998; Coleman, 1999; Ravallion, 2001). Self-selection is particularly problematic in VSLA studies. This is because individual members of the VSLA are self-selected and members pool together their savings. Although membership to the VSLA is based on the principle of self-selection - can also contribute to heterogeneity effect - most impact studies in VSLA conducted have not accounted for the potential self-selection bias (see, for instance, Allen and Hobane, 2004; Anyango, 2005 and Anyango et al, 2007).

Participants in the VSLA program are systematically different from the general population for two main reasons. Firstly, the participants are self-selected, which implies that they might have some entrepreneurial skills. Secondly, a conjecture can be made such that the ultra-poor are systematically eliminated from the VSLA because they cannot contribute their own finances. But as we shall see later on we made an attempt to minimize this selection problem during our sample selection. As indicted above membership to the VSLA is open to both the non-participants and participants of the PSNP households. Therefore, non-participants of PSNP are better compared to the participants of the PSNP households even though the former do not have access to formal financial services. The inclusion of the non-participants of the PSNP households into the study sample would thus introduce selection bias.

Selection bias can be overcome in three ways: using instrumental variables, using panel data, or by assuming normality in the error distribution of the outcome variable before the treatment happens (Moffitt, 1991). The third way, however, is inherently problematic approach (Coleman, 1999). To minimize selection bias, non-participants of PSNP were not included in our sample. Yet, this counter measure does not fully resolve selection bias. Holvoet (2005) recommended minimizing selection bias by gaining a good understanding of the subject under study and potential selection processes, which can help identify the persistent matching characteristics of participants and non-participants and controlling of other differences statistically. As a result, we looked at characteristics related to households, such as socioeconomic status and whether the household is a PSNP beneficiary or not; and whether programme placement strategies is non-random or random. In this study, the

endogenous switching regression model is used to minimize the problems of self-selection bias, heterogeneity effects and unobserved characteristics.

4. Survey area

The study area, Sekota district, is located in the eastern part of Waghimra Administration Zone (WAZ) of the Amhara National Regional State (ANRS) of Ethiopia. WAZ, which is one of the 11 administrative zones in ANRS, comprises of six districts: Sekota, Dehana, Gazgibla, Abergelle, Sihala and Ziquala. The major ethnic group in the Sekota is Agew, which accounts for more than 95% of the total district population. The local language is Agewegna (Himtigna). Orthodox Christianity is the dominant religion in the region, up to 99.5 %, and the rest are Islam, Protestant Christians and other religions (SERA, 2001).

Sekota district's agro-ecological zone is characterized by tepid to cool sub moist mid highland and hot to warm sub moist lowland (MOA, 1998). The topography of the district is characterized by rugged and chained mountain terrains most of which could be covered by patchy grasses during the small rainy seasons. For the remaining season the terrain is covered by bare rock. Certain areas in Sekota district's agro-ecological zone are not suitable for agriculture. Only a quarter of the district topography has a slope less than 2% while 37% of the topography has a slope more than 30% (SERA, 2001). Agriculture is the major livelihood enterprise for the rural population; more than 99 % of rural households dwell on subsistence farming on the hills, which rarely provides sufficient amount of grain even during a good rainy season. The remaining of the rural population lives on non-agricultural activities, such as handicraft, trade and as a daily labour.

Sekota is classified as one of the most food insecure districts in Ethiopia (Adefress et al., 2000). The main sources of food are: relief, labour, purchase, livestock production and own crop. Crop production in the area is not a promising enterprise due to shortage of farmland, depletion of soil fertility and moisture stress. As a result, the people are suffering from continuous food shortage. Furthermore, according to Kabeta et al.'s (2004) need assessment, the source of food differs considerably by the economic status of households in the district. High livestock holdings in the area serves as a prime buffering strategy for crop failure and minimize the risk of vulnerability due to recurrent drought (SERA, 2001). The average livestock holdings are high, particularly, small ruminants. In rural Sekota, ownership of oxen is a chief indicator of wealth and prestige of households (Kabeta et al., 2004).

Households in Sekota are categorized as 'poor' or 'better-off' based on their ownership of paired oxen. Households with none or fewer oxen usually plough their land through a labour sharing arrangement. Sometimes, these extraordinary poor households who do not have any agricultural inputs other than owning their land usually make a sort of 'contractual agreement' called sharecropping with the better-off households.

The major crops that are grown are barley, *Teff* (the most popular staple in Ethiopia), wheat, sorghum, beans, lentils and peas. Based on the local wealth indicator ranking 15-25% are considered better-off, 25-35% are surveyed as medium in wealth and 35-55% are labelled as poor (Kabeta et al., 2004). However, had the international standard been used in place of local wealth indicator ranking, the result would have been much different.

5. Study population and sample

For a long time, the policy direction in Ethiopia towards famine and food insecurity problems triggered by drought was to curb hunger using food relief. This policy did not change much the structural problems the poor faces in the Sekota district as with problems those in other drought prone areas in the country.

At the end of the PSNP program, or the phase-out period, all PSNP recipients are expected to graduate; some have already graduated while others still looking for an additional support in order to graduate. PSNP households who have not yet graduates received one or more of the PSNP-plus programmes (VSLA, honey and fattening value chains) to facilitate their graduation. Except the VSLA, which is open to both the participants and non-participants in the PSNP households, the other PSNP-plus programmes are restricted only to the PSNP beneficiaries. Non-participants of the PSNP households were not considered in either the treatment or control group because non-participants are relatively better-off economically compared to participants of the PSNP households, and the inclusion of the non- participants of the PSNP might further exacerbate selection bias, which has already been introduced by self-selection principles of the VSLA. VSLA participants who benefitted from honey and fattening value chains are also excluded from the sample.

Our treatment group specifically targets those poor households who only benefitted from the integrated programmes, namely the PSNP and VSLA, while the control group targets the households who benefitted from the PSNP only. In other words, the two groups are similar in all aspects except that the treatment group benefitted additionally from VSLA.

For this study, the plan was to interview 500 randomly selected households from a list provided by the Sekota District agriculture office. However, 51 households declined to fully cooperate for the interview. As a result, responses were collected from 449 households only (89.8% response rate). Of the 449 sampled households, 188 were participants ("treatment group") and 261 were non-participants ("control group") of the VSLA. The survey was conducted from February 2011 to April 2011.

In order for the VSLA to return on investment it requires one year (Allen, 2006). For the treatment group we considered only mature VSLAs, which have been operational in 13 Peasant Associations (PAs) for one year since the beginning of the intervention, (i.e. from April 2008 to April 2009). In these 13 PAs there are about 153 VSLAs. We randomly selected one household from each VSLA, which gives a total of 153 households, and for the remaining 35 households, we again randomly selected 35 VSLAs to get a total of 188 households as the treatment group.

The control groups are those households who are identified by a team of experts in the Sekota district Agricultural bureau as future beneficiaries of the PSNP-plus components. The households are also located in 20 PAs, and to avoid a possible contamination effect, we excluded 9 PAs, which were in the process of starting VSLAs. Accordingly, using the list that we obtained from the district's agriculture office, we randomly selected 261 PSNP beneficiaries that did not receive the PSNP-plus components but identified as future potential beneficiaries of VSLA intervention.

6. Modelling Impact Evaluation Using Endogenous Switching Regression

Switching regression modelling is an extension of the classic Heckman selection model. It is often employed for programme evaluation purposes because it minimizes biases in the form of self-selection, heterogeneity effect that can happen as a result of unobserved characteristics and estimate treatment effect when there is a non-random allocation of individuals to treatment and control groups which is the case in this study (see Fuglie and Bosch, 1995; Maddala, 1983). Besides, it allows constructing a counterfactual group that would help to minimize the heterogeneity effect.

Let Y be an outcome variable - consumption expenditure. Assume I to be the programme variable, then the usual programme evaluation would be:

$$Y = \partial + Z\beta + \delta I + \varepsilon_{it} \tag{1}$$

where Z is a vector of exogenous variables that may include the household demographic characteristics, such as socio-economic status, and village conditions, -agro-ecological zoning. I is a dummy variable which indicates either participation in the programme (VSLA + PSNP) when $I = 1$ or not participation in the programme (PSNP) when $I = 0$, hence the programme impact is measured by estimating δ.

However, the decision to participate in the VSLA programme for an individual might be based on the expected utility or benefit obtained because of participation. In other words, participants self-select themselves in the VSLA programme. Therefore, the dummy variable of participating in the VSLA programme, cannot be treated as the same as the exogenous variable. Therefore, estimating equation (1) using OLS definitely bias the results.

To adjust for self-selection into the VSLA programme, let us assume that I_i be a criterion function, which is determined by whichever regime the agent is facing. That means households will either decide to participate or not to participate in the VSLA programme. Let β_1, β_2 and γ be the vectors of parameters. Consider also that u_i, ε_{1i} and ε_{2i} are idiosyncratic error terms having trivariate nominal distribution with mean zero and covariance matrix.

$$I_i^* = \gamma Z_i + u_i \begin{cases} I_i = 1, if\ I_i^* > \\ I_i = 0, otherwise \end{cases} \text{(Decision function)} \tag{2}$$

Regime1: $Y_{1i} = \partial_1 + \beta_1 X_i + \varepsilon_{1i}$ if $I_i = 1$ (For the participants) $\tag{3}$

Regime 2: $Y_{2i} = \partial_2 + \beta_2 X_i + \varepsilon_{2i}$ if $I_i = 0$ (For the non-participants) $\tag{4}$

Here equations (3) and (4) portray the relationship among the exogenous explanatory variables in the respective regimes - that means for the participants and the non-participants, respectively - while equation (2) shows the probability that individuals would decide on either of the two regimes (Lokahin and Sajaia, 2004).

$$\Omega = \begin{pmatrix} \sigma_u^2 & \sigma_{1u} & \sigma_{2u} \\ \sigma_{1u} & \sigma_1^2 & . \\ \sigma_{2u} & . & \sigma_2^2 \end{pmatrix}$$

where $\sigma_u{}^2$ is a variance of the error term in the criterion function (decision function) while $\sigma_1{}^2$ and $\sigma_2{}^2$ are the variance of the error term in the respective equation (3) and (4). σ_{1u} is a covariance of u_i and ε_{1i}, whereas σ_{2u} is a covariance of u_i and ε_{2i} However, the covariance between the error term ε_{1i} and ε_{2i} do not appear because Y_{1i} and Y_{2i} will not be observed simultaneously (i.e. Y_{1i} is observed only when $I_i^* > 0$ and Y_{2i} is also observed only when $I_i^* \leq 0$) (Lokahin and Sajaia, 2004; Maddala, 1983). Following the conditional of normal distribution the log likelihood maximization is given as below.

$$lnL = \sum_{i=1}^{n} \left\{ (1 - I_i) \left[ln\phi \left(\frac{u_{2i}}{\sigma_2} \right) - ln(\sigma_2) + ln \left\{ 1 - \Phi \left(\frac{W_{i\alpha} - \rho_2 \frac{u_{2i}}{\sigma_2}}{\sqrt{1 - \rho_2^2}} \right) \right\} \right] \right.$$
$$\left. + I_i \left[ln\phi \left(\frac{u_{1i}}{\sigma_1} \right) - +ln\Phi \left(\frac{W_{i\alpha} - \rho_1 \frac{u_{1i}}{\sigma_1}}{\sqrt{1 - \rho_1^2}} \right) \right] \right\}$$

where $\rho_1 = \frac{\sigma_{1u}^2}{\sigma_u \sigma_1}$ is the correlation coefficient between ε_{1i} and u_i and $\rho_2 = \frac{\sigma_{2u}^2}{\sigma_u \sigma_2}$ is the correlation coefficient between ε_{2i} and u_i. The magnitude and significance of the estimated ρ_1 and ρ_2 that tell us whether there is selectivity bias or not.

Consider that Y_{1i} is expected outcome or expected benefit of consumption expenditure when household choose to participate in the VSLA. Let Y_{2i} be expected outcome (for the same outcome variable as in the case of participants) for those who choose not to participate in the VSLA. Suppose that X_i's are vectors of exogenous variables, including household demographic characteristics, such as head of household's education status, socio-economic status, and district characteristics, such as agro-ecological zones, means of food source, saving and lending rates for both participants and non-participants.

Let Z_i be another vector of explanatory variables, which describes the probability of decision to participate in VSLA programme intervention. Since, the model is recursive there is a need to include at least one identifier variable in Z_i. We have, thus, included an additional four variables in Z_i's (which are not in X_i's), and that do not directly affected the expected outcome - these are livestock death, husband/wife death, ill husband/wife and food aid intervention[1]. The variables in Z_i include household demographic, household head education status, socio-economic characteristics, agro- ecological zones, means of food source, saving and borrowing.

Considering the outcome of equation (3) where the conditional expectation to consumption expenditure of participants in the VSLA programme is:

$$E(Y_{1i}|I_i = 1) = E(Y_{1i}|I_i^* > 0) = E(Y_{1i}|\gamma Z_i + u_i > 0) = E(Y_{1i}|u_i > \gamma Z_i)$$
$$= \partial_1 + \beta_1 X_i + E(\varepsilon_{1i}|u_i < \gamma Z_i)$$
$$= \partial_1 + \beta_1 X_i + \sigma_{1u} \left[\frac{\phi(\gamma Z_i)}{\Phi(\gamma Z_i)} \right] \qquad (5)$$

Similarly, the conditional expectation for the non-participants in the VSLA programme is expressed as:

$$E(Y_{2i}|I_i = 1) = E(Y_{2i}|I_i^* < 0) = E(Y_{2i}|\gamma Z_i + u_i < 0) = E(Y_{2i}|u_i < -\gamma Z_i)$$

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[1] In the variable food aid intervention-all participants and non-participants are recipient of food aid. However, it only indicates the recentness of reception.

$$= \partial_2 + \beta_2 X_i + E(\varepsilon_{2i}|u_i > \gamma Z_i)$$

$$= \partial_2 + \beta_2 X_i - \sigma_{2u}\left[\frac{\phi(\gamma Z_i)}{\Phi(\gamma Z_i)}\right] \tag{6}$$

where $\left[\frac{\phi(\gamma Z_i)}{\Phi(\gamma Z_i)}\right]$ and $\left[\frac{\phi(\gamma Z_i)}{1-\Phi(\gamma Z_i)}\right]$ refer to the inverse miller ratio for participants and non-participants in the VSLA programme, and $\phi(.)$ and $\Phi(.)$ refer to probability density and cumulative distribution function for the standard normal distribution, respectively, and both equation (5) and (6) show selectivity in the sample.

Most prior studies that employed the endogenous switching regression fitted their models with either two-step least squares or maximum likelihood estimation. Lokshin and Sajaia (2004) have warned that both of these estimation methods suffer from inefficiency and demands of cumbersome correction even though they yield consistent standard errors. We have thus employed the Full- information Maximum Likelihood Method (FMLM), which simultaneously fits both the binary and continuous equations (2), (3) and (4) that gives a consistent standard error (Lokshin and Sajaia, 2004). We can measure the possibility of both observed outcome in equations (5) and (6) and the hypothetical outcome condition.

6.1 Conditional Expectations, Treatment, and Heterogeneity Effects

The endogenous switching regression model can be used to compare the expected consumption expenditure of the households who participated in VSLA 7(a) with respect to the households who did not participate in VSLA 7(b), with the counterfactual hypothetical cases 7(c) when the participated households granted that they did not themselves participate, and 7(d) with a set of third hypothetical cases when non-participated household participated. The conditional expectations for consumption expenditure in the four cases are presented in table 1 and defined as follows:

$$E(Y_{1i}|I_i = 1) = \beta_1 X_{1i} + \sigma_{1u}\lambda_{1i} \qquad\qquad 7(a)$$
$$E(Y_{2i}|I_i = 0) = \beta_2 X_{2i} + \sigma_{2u}\lambda_{2i} \qquad\qquad 7(b)$$
$$E(Y_{2i}|I_i = 1) = \beta_2 X_{1i} + \sigma_{2u}\lambda_{1i} \qquad\qquad 7(c)$$
$$E(Y_{1i}|I_i = 0) = \beta_1 X_{2i} + \sigma_{2u}\lambda_{2i} \qquad\qquad 7(d)$$

Equation 7(a) to 7(d) derived from equation 5 and 6 above and where

$\lambda_{1i} = \left[\frac{\phi(\gamma Z_i)}{\Phi(\gamma Z_i)}\right]$ and $\lambda_{2i} = \left[\frac{\phi(\gamma Z_i)}{1-\Phi(\gamma Z_i)}\right]$ are miller ratios.

Table 1: Conditional expectations, Treatment, and Heterogeneity Effects

Subsamples	Decision Stage		Treatment
	To Participate	Not to Participate	Effects
Households that participated	$(a)E(Y_{1i}\mid I_i = 1)$	$(c)E(Y_{2i}\mid I_i = 1)$	TT
Households that did not participate	$(d)E(Y_{1i}\mid I_i = 0)$	$(b)E(Y_{2i}\mid I_i = 0)$	TU
Heterogeneity effects	H_1	H_2	TH

Note: (a) and (b) represent observed expected consumption expenditure; (c) and (d)

represent counterfactual expected consumption expenditure.

$I_i = 1$ if households participated in VSLA; $I_i = 0$ if households did not participate in VSLA;

Y_{1i}: Consumption expenditure if households participated;

Y_{2i}: Consumption expenditure if households did not participate;

TT: the effect of the treatment on the treated;

TU: the effect of the treatment on the untreated;

H_i the effect of base heterogeneity for households that participated (i =1), and did not participate (i =2);

TH= *(*TT - TU*)*, i.e., transitional heterogeneity.

To attribute measured benefit to the participants, we need to net out the potential outcome to the non-participants of the VSLA programme. Therefore, a Heckman et al. (2001) step was taken to calculate the effect of the treatment "to participate" on the treated (TT) as the difference between (a) and (c),

$$TT = E(Y_{1i}|I_i = 1) - E(Y_{2i}|I_i = 1) = X_{1i}(\beta_1 - \beta_2) + (\sigma_{1u} - \sigma_{2u})\lambda_{1i} \qquad (8)$$

It represents the effect of participation in VSLA on the consumption expenditure of households among those that actually participated in VSLA. By the same intuition, the effect of the treatment on the untreated (TU) for households that actually did not participate in VSLA is given by the difference between (d) and (b),

$$TU = E(Y_{1i}|I_i = 0) - E(Y_{2i}|I_i = 0) = X_{2i}(\beta_1 - \beta_2) + (\sigma_{1u} - \sigma_{2u})\lambda_{2i} \qquad (9)$$

To calculate the heterogeneity effects, we use the expected outcomes described in equations (7a), (7b), 7(c) and (7d). For instance, households who participated in VSLA may have more consumption expenditure than households who did not participate in VSLA - irrespective of participants' decision to participate in VSLA - due to unobserved characteristics. In order to adjust this challenge, we followed Carter and Milon's (2005) recommendation. They suggested that the "effect of base heterogeneity" for those households who decided to participate in VSLA and is reflected in the difference between 7(a) and 7(d).

$$H_1 = E(Y_{1i}|I_i = 1) - E(Y_{1i}|I_i = 0) = (X_{1i} - X_{2i})\beta_{1i} + \sigma_{1u}(\lambda_{1i} - \lambda_{2i})$$

Similarly, for the households who decided not to participate in VSLA their "effect of base heterogeneity" is given by the difference between 7(c) and 7(b).

$$H_2 = E(Y_{2i}|I_i = 1) - E(Y_{2i}|I_i = 0) = (X_{1i} - X_{2i})\beta_{2i} + \sigma_{2u}(\lambda_{1i} - \lambda_{2i})$$

"Transitional heterogeneity" (TH) tells us whether the effect of participating in the VSLA is larger or smaller for households who participated in VSLA than those that did not, or for households who did not participate in the counterfactual case if non-participants did participate. To investigate TH, we took the difference between equations (8) and (9).

$$TU = TT - TH = [(X_{1i} - X_{2i})\beta_{1i} + \sigma_{1u}(\lambda_{1i} - \lambda_{2i})] - [(X_{1i} - X_{2i})\beta_{2i} + \sigma_{2u}(\lambda_{1i} - \lambda_{2i})]$$
$$= (X_{1i} - X_{2i})(\beta_1 - \beta_2) + (\sigma_{1u} - \sigma_{2u})(\lambda_{1i} - \lambda_{2i})$$

6.2 Descriptions of the results

The proportions of the sample that participated and did not participant in the integrated programmes are indicated in table 2 below. The participants have, on average, greater consumption expenditure per month compared to non-participants.

Selected results of the descriptive statistics are also indicated in table 2. Male-headed households are dominant in the sample: 65% of the participants and 74% of the non-participants are male. In both categories, the average education status of the household is considerably very low. Moreover, the participants have more productive and non-productive assets compared to the non-participants. This finding supports the result of Allen and Hobane (2004) and Anyago (2005) that the VSLA participants have better asset holdings than the non-participants.

Table 2: Mean and Standard Deviation of Dependent variables and Explanatory variables

Variables Name	VSLA+PSNP Participant		PSNP Non-participant	
	Mean	SD	Mean	SD
Dependent Variable				
Ln(Consumption)	6.47	1.07	5.23	1.34
Explanatory Variables				
Age	41.03	1.52	42.63	13.19
Age^2	1815.6	1045.3	199.6	1259.1
Male(%)	0.65	0.48	0.74	0.44
Year of Schooling of HH	1.04	2.37	1.19	2.67
Labour(Adult Equivalent)	2.19	1.14	1.98	1.12
Land Size(timad)^2	2.72	1.48	2.83	2.11
Ln(Asset)	6.89	0.80	5.92	1.13
Ln(Income)	7.54	1.71	6.33	2.69
Saving (ETB)	309.49	572.87	9.69	59.02
Borrowing (ETB)	731.77	951.86	4	32.5
Household Shock				
Animal Death (%)	0.61	0.49	0.54	0.50
Husband/Wife death (%)	0.35	0.48	0.27	0.44
Food aid receive (%)	0.76	0.43	0.61	0.49
Distress Selling (%)	0.34	0.47	0.45	0.50
Illness Husband/ Wife within 5 years (%)	0.51	0.50	0.47	0.50
Source of food Consumption				
Own production (%)	34.10	16.77	34.54	24.04
Asset Selling (%)	16.86	12.45	14.70	25.78
Purchase (%)	13.58	10.13	14.39	40.24
Non-farm activity (%)	23.92	13.40	24.31	20.10
Transfer (%)	11.49	12.78	12.05	20.43
Number of Obs.	188		261	

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[2] Timad is a local unit used to measure the size of land. One Timad is equal to a quarter of a hectare.

The participants' average saving is nearly 32 fold higher than the non-participants, yet there is a huge disparity in saving both within the participants and the non-participants groups. Similarly, the average participants borrowing are approximately 182 fold of the non-participants' borrowing, demonstrating large borrowing disparities between participants and the non-participants.

As to the household economic shocks, 35% of the participants and 27% of the non-participants disclosed to us that they have experienced death of a spouse within the last five years. In addition, 61% of the participants and 54% of the non-participants indicated that they have suffered from death of their livestock. The majority of both participants (76%) and non-participants (61%) have recently received food aid. Since almost everyone received food aid, we only differentiated between those who received aid in the recent-past versus recipients who did not. Notwithstanding, 34% of the participants and 45% of the non-participants covered their food consumption through distress selling, or selling of livestock and productive or non-productive assets.

6.3 Estimation Results

Table 3 portrays the estimates of the endogenous switching regression model as outlined in equation (2), (3) and (4). The first column represents the decision to participate in the VSLA programme or not; whereas the second and the third columns are for those participated and did not participate in VSLA, respectively[3].

The results of the estimation from equation (2) indicate key drivers of the decision for households to participate in the VSLA. Saving and borrowing experience of households increase the chance of the households' decision to participate in microfinance services (Kifle et al., 2013). Our finding also suggested that households who are already saving and borrowing more, and holding more asset are more likely decide to participate in VSLA. This finding is consistent with other previous study findings (Kifle et al., 2013, Muhammed et al., 2012; Anjugam and Ramasamy, 2007; and Eshetu, 2007). However, households who afford to cover their food source through purchasing and producing are less likely to decide participating in the VSLA. This is because households who are already afforded to buy and/or able to produce enough of their consumable foods have the capacity to smooth their consumption, and as a result of which they might not be interested to join VSLA. We also find that households with the experience of shock, such as livestock death have less likely to adopt VSLA. Similarly, households from highland areas are less probable to participate in the VSLA compared to households from the low land areas.

The estimates depicted in column (2) and (3) of table 3 shows the endogenous switching in the participation function. The significant value of the estimated correction coefficient ρ_i shows absence of selectivity bias, though in the beginning we were anticipating incidence of selectivity bias. Yet, the differences in the coefficients of the participation equations between those who participated and those who did not participate exemplify the presence of some source of heterogeneity effect in the sample. Later we present how we can handle this heterogeneity effect.

Household consumption is expected to increase with income and endowment of household asset, which was confirmed from both the participant and the non-participant households, and the rate at which consumption

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[3] We used the "*movestay*" command of STATA to estimate the endogenous switching regression model by FIML (Lokshin and Sajaia 2004).

expenditure increase with income is higher for the participants compared to the non-participants. For example, average participant's consumption expenditure increased by 19.44% with income, while for the non-participant it increased by 15.4%. Similarly, assets endowment of the household is positively affected consumption expenditure. This finding portrays that endowment of assets in the household increased the consumption expenditure by 0.01% and 0.04% both for those who decide to participate and those who decide not to participate in the VSLA, respectively (see Table 3).

Among the participants, male-headed household consumption expenditure is significantly greater than that of female-headed households; the estimated consumption expenditure of male-headed households is 41.76% more than female-headed households. It may be because in most rural parts of Ethiopia females do not have access to essential assets such as land, which are crucial components for the betterment of consumption expenditure. Nevertheless, gender of the head of household was found insignificantly affecting consumption expenditure for the non-participants (see Table 3).

Table 3: Estimation Results of Switching Regression Model for Consumption

Variables	Decision 1/0 (1)	VSLA+PSNP Participants (2) β(Z-value)	PSNP Non-participants (3) β(Z-value)
Ln(Income)	-0.0258 (-0.5600)	0.1944 (5.2400)***	0.1542 (5.2200)***
Source of food			
Purchase	-0.0165 (-2.8100)***	-0.0101 (-0.7600)	0.0033 (0.9900)
Non-farm	-0.0037 (-0.3600)	-0.0062 (-0.4700)	-0.0059 (-1.420)
Transfer	-0.0139 (-1.5300)	-0.0204 (-1.5500)	0.0034 (0.8500)
Distress selling	-0.0084 (-0.8400)	0.0056 (0.4100)	0.0158 (3.8200)***
Own production	-0.0173 (-2.3200)**	-0.0147 (-1.1100)	0.0029 (0.9100)
Asset	0.0004 (2.4700)**	0.0001 (2.8600)***	0.0005 (3.4100)***
Male	-0.3666 (-1.5500)	0.4176 (3.6800)***	0.1120 (0.6600)
Highland (Ref=lowland)	-0.8454 (-1.5800)	1.0085 (2.5800)***	-0.5910 (-1.690)*
Mid highland (Ref=lowland)	-0.4451 (-2.0300)**	-0.2039 (-1.4700)	0.1262 (0.7900)
Age	0.0643 (1.0900)	0.0025 (0.0900)	-0.0400 (-1.210)
Age square	-0.0008 (-1.2800)	0.0000 (-0.0500)	0.0002 (0.7000)
Year of schooling of the HH	0.0228 (0.6300)	-0.0401(-1.6400)	0.0213 (0.8600)
Labour	-0.0284 (-0.3000)	0.0686 (1.3300)	0.2504 (3.6900)***

Saving	0.0033 (3.9300)***	-0.0001 (-1.4200)	-0.0020 (-1.600)
Borrowing	0.0098 (5.4800)***	0.0001 (0.7400)	-0.0025 (-0.970)
Livestock death	-0.5784 (-2.5400)***		
Husband/wife death	-0.2727 (-1.2200)		
Recently food aid received	-0.3753 (-1.6200)		
Ill Husband/Wife	-0.1939 (-0.9900)		
Constant	1.8717 (1.2100)	5.8499 (4.0900)***	5.1412 (6.9400)***
σ_i		0.3697 (-6.900)***	0.0130 (0.2300)
ρ_i		-0.3086 (-1.9100)*	0.5485 (2.3100)**
Wald test ρ =0 [p value]	Chi2= 40.42 [0.0000]		

Note: * Significance at the 10%, ** Significant at 5% & *** Significant at 1%.

The participants who are living in the highlands have 100% more consumption expenditure compared to those participants living in the lowlands (see in table 3). This is partly related to the sparse population in lowlands, which makes it difficult for VSLA to operate effectively. On the contrary, the non-participants who are living in the highlands have 59.10% less consumption expenditure compared to the non-participants who are dwelling in the lowlands. This can be explained by households' preference to live in highlands to in lowlands, in most rural parts of Ethiopia; as a result of which farm lands in highlands areas are small, fragmented and highly degraded that negatively affect the productivity of land in highlands - in turn affects household's consumption directly. Households in lowland areas, however, mainly rely on livestock as their chief source of livelihood.

Labour availability increases consumption expenditure of non-participants by 25.04%. However, this factor did not significantly affect participant's consumption expenditure (see in Table 3). Non-participant's consumption expenditure increased with labour endowment because they migrated to the nearest towns to work as a daily labourer in order to generate additional income, which in turn could be reflected in their consumption expenditures. Participants, however, have alternative ways of generating income. For instance, they can start income generating activities with the loans they obtain from VSLA without having to sell manual labour like their counterparts. This corroborates the findings of Allen and Hobane (2004) and Adams et al (2014) that VSLA intervention enable households to engage in a more income generating activities.

Interestingly, non-participant's sale of asset holdings has a significant and positive contribution to their consumption expenditure. Accordingly, for each distress asset-holding sale for non-participants increased monthly household consumption expenditure by 1.58% whereas for the participants distress asset-holding sale has insignificant contribution (see table 3). This seems to suggest that non-participants are still in relatively worse condition in terms of how they meet their consumption expenditure.

Table 4 presents the expected consumption expenditure under actual and counterfactual conditions. The expected consumption expenditure of households that participated in integrated programmes is about Birr 645

per month (6.47), while it is about Birr 721 per month (6.58) for the households that did not participate in VSLA if they were to participate. This simple comparison, however, is misleading unless the counterfactual comparison is taken into account. In what follows below, we present the comparison with counterfactual cases.

Table 4: Average Expected Consumption Expenditure; Treatment and Heterogeneity Effects

Subsamples	Decision Stage		Treatment
	VSLA+PSNP	PSNP	Effects
	(SE)	(SE)	
Households that participated	(a) 6.47	(c)4.13	2.34***
	(0.05)	(0.21)	
Households that did not participate	(d) 6.58	(b)5.23	0.35*
	(0.07)	(0.05)	
Heterogeneity effects	-0.11***	-1.10 ***	0.99***
	(0.09)	(0.19)	

Note: Values in the bracket are standard errors. *** & * Significance at the 1% and 10% levels, respectively. All expected mean values are transformed to log. Birr18= $1US

Cells (a) and (b) are actual cases, while cells (c) and (d) are counterfactual cases as we have discussed in the methodology section. The last column represents the treatment effect for participation in integrated programmes. In the counterfactual case (c), households who actually participated would have consumed about 36.2% (2.34) less if they did not participate. In the counterfactual case (d) for households that did not participate had participated in VSLA they would have consumed about 20.5% (1.35) more. The results highlight that participation in the joint programmes enable participant households to increase their consumption expenditure significantly. Similarly, households who did not participate can also increase their consumption expenditure significantly had they participated. To this effect, the positive sign of the transitional heterogeneity effect shows the significantly bigger consumption expenditure benefit for those participated households than to those that did not participate had even the non-participated households were to participate. This is might be due to unobserved skills of the participated households. Our finding is also corroborating other studies findings (Annan et al., 2013 and Ksoll et al, 2012).

7. Concluding remarks

Growing empirical evidences suggest that credit is not a panacea that eradicates complex, structural and intertwined challenges of fragile households. There is a rising acceptance that the positive impacts of credit are not as big as they once were touted to be, but rather they are minimal (Roodman and Modurch, 2009; Bastiaensen and Marchetti, 2007). The minimalist perspective that once dominated credit service delivery, also concentrated in urban areas for profit, is now starting to fade-away. Consequently, new alternative models are

being initiated to fill the gaps through a more integrative and cost-effective way, an example of which is the VSLA that was developed by CARE.

This paper attempts to evaluate the impact of integrated programmes, identify factors that drive household's decision to join VSLA and affect household consumption expenditure other than the intervened programme, and investigate whether the intervention assist households graduation from food aid through smoothing household's consumption expenditure, or not.

We can draw three main conclusions from the results of this study. First, the analysis of the determinants of decision to participate in VSLA indicated very interesting result. Prior experience on both saving and borrowings positively affect the probability of households participation in VSLA. Asset holdings are also found to play positive role in determining households' decisions to participate. However, households who afford to purchase and produce their own foods, experience shock such as death of livestock and dwells in the highland are less likely decide to participate in the VSLA.

Second, participant households are systematically different from the non-participant households in a way how their consumption expenditure is determined, which signals the presence of heterogeneity among households. Participant's monthly consumption expenditure is positively and significantly determined by asset holding, income, male-headed households and highland dwellers; while for non-participant's labour and income are significant and positive determinants. This seems to suggest for dual interventions to establish enabling conditions for the VSLA to be effective in the lowlands, and diversify income generating activities and asset holdings.

Third, though participation increases household's consumption expenditure for both groups, households who actually participated would benefit most from the integrated programmes. Interesting result came to light when we analysis the effect of participation on the two distinct groups. The net benefit that goes to households who actually participated is more than non-participated households in the counterfactual case that non-participated households did participate. This highlights the presences of some unobserved skills that make participant households to benefit more than non-participants even when non-participated households were to participate. This difference might directly be linked with the first and second conclusions we have made above that show the clear distinction between the groups, though we are not sure of factors that contribute to this heterogeneity effect. This finding seems to suggest that participation in the integrated programmes supports the process of household's graduation from food aid through smoothing their consumption. Our study also suggests the need for further research to fully understand the effect of other factors that impact integrated programmes contribution by controlling unobservable factors such as entrepreneur skill and financial literacy education provided to the participants.

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