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The impacts of community-based cash management tools on smallholder rural farmers' access to livelihood assets

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Abstract

Smallholder rural farmers are exposed to diverse idiosyncratic and covariate shocks that lead to high income and consumption volatility. Formal cash management tools, which are important for managing risk and volatility, often break down due to high information asymmetries and the transaction costs of operating in rural areas. Given this, community-based cash management tools have continued to be a dominant means of managing risk in rural areas. Community-based cash management tools can be home grown or externally induced, e.g. NGO-initiated savings groups. This study finds that participation in such savings groups significantly expands access to the financial resources that can be used to purchase goods and services, as well as to the social networks that are needed to support smallholder farmer livelihoods. However, the impact on access to physical and natural capital (at least in the short to medium term) is not significant, thus calling for complementary development interventions to reduce smallholder farmers' vulnerability.

Key words: community-based; vulnerability; risk management; livelihood asset; cash

1. Introduction

Given the heavy reliance of smallholder farmers in sub-Saharan Africa on rain-fed agriculture, their livelihoods, i.e. means of living, are hugely under the threat of climate variability and change (Alexandratos & Bruinsma 2012). The Intergovernmental Panel on Climate Change (IPCC) projected that global temperatures will rise by between 1.8°C and 4.0°C in the next century and, with rising global temperatures, a greater incidence of droughts, desertification and flooding is anticipated (Hendrix & Glaser 2007). In addition to the complexity of the natural environment, missing or failed markets for key inputs and services, as well as low investment in pivotal economic sectors such as

agriculture and infrastructure, limit the ability of smallholder rural farmers to manage risk and adapt to change (Porter 2012). The extent to which smallholder rural farmers can adapt to a changing environment and manage household-specific idiosyncratic shocks (such as illness) and community-wide covariate shocks (such as drought and floods) depends on their adaptive capacity, which is intrinsically linked to their livelihood asset base (Cooper *et al.* 2008).

Access to high-productivity livelihood assets (i.e. natural, physical, financial, human and social capital), as well as access to a balanced portfolio of these assets, enables smallholder rural farmers to better manage changes and shocks and maintain or transform their living standards without compromising their long-term prospects: a phenomenon referred to as resilience (Jones & Tanner 2015). There is an increasing body of knowledge on the role of community-based risk management arrangements, specifically community-based cash management tools, for managing both idiosyncratic and covariate risks through facilitating consumption smoothing and building up the livelihood asset base (Günther & Harttgen 2008; Hammill *et al.* 2008; Collins *et al.* 2009; Barrett & Bhattamishra 2010; Porter 2012). The first line of evidence reveals that cash management has always been an important and well-understood aspect of rural life and a key determinant of the extent to which rural households succeed in managing risks and shocks and improving their own lives (Collins *et al.* 2009). Second, formal financial service providers have enjoyed limited success in providing effective cash management options for the rural populace due to high information asymmetry and transaction costs (Porter 2012). This has provided an avenue for diverse community-based cash management tools to be effective sources of precautionary savings/consumption credit (for smoothing consumption in times of shocks) and sources of production/investment credit (for building up the livelihood asset base and hence the future capacity to self-insure) (Barrett & Bhattamishra 2010).

In sub-Saharan Africa, there are a number of community-based cash management tools, which include savings clubs, rotating savings and credit associations (ROSCAs), accumulating savings and credit associations (ASCAs) and savings and credit cooperatives (SACCOs) (Collins *et al.* 2009; Brannen 2010). Savings clubs and ROSCAs are groups of individuals within a particular community who make frequent savings and, in some cases, take out or rotate interest-free loans among themselves (Brannen 2010). Additionally, members of savings clubs and ROSCAs do not earn any interest on their savings. Accumulating savings and credit associations (ASCAs) are relatively more sophisticated saving and lending groups that have been promoted in sub-Saharan Africa by some non-governmental organisations (NGOs) as an adaptive measure against diverse livelihood challenges such as drought (Allen 2002; Hendricks 2011). ASCAs vary across countries and contexts, but often consist of members who deposit regularly to accumulate their fund and, only when required, lend it out at an agreed interest rate to one or more of their members (Allen & Staehle 2015). Furthermore, all earnings generated by ASCAs from loan interest are pooled into the group's fund and then shared proportionately to each member's savings at the end of a cycle, which usually lasts for a year (Allen & Staehle 2015).

SACCOs are legally recognised ASCAs that are often registered with the relevant government ministries (Brannen 2010). In Zimbabwe, SACCOs are registered under the Ministry of Small and Medium Enterprises and Cooperative Development (MSMECD) (Government of Zimbabwe [GoZ] 2017). Relatively speaking, ASCAs and SACCOs are the more sophisticated form of rural community-based cash management tools. ASCAs and SACCOs require members to be more financially literate and organised relative to their traditional savings group and ROSCA counterparts. ASCA members are often technically supported by government and NGO staff in their local communities (Barrett & Bhattamishra 2010). Community-based cash management tools, i.e. those that are close at hand and flexible, have continued to meet a large proportion of rural financial service needs (Collins *et al.* 2009). In 2014, the number of adults in sub-Saharan Africa who saved in the form of community-based cash management tools was 50% higher than the number of people who saved at a formally regulated financial institution (World Bank 2014). If understanding the sources

and types of risk and vulnerability among smallholder farmers is important for development policy and practice, then understanding the means employed by the poor to manage these risks is equally, if not even more, important (Barrett & Bhattamishra 2010).

The main objective of this study was to investigate the role played by village savings and loans associations (an ASCA model for community-based cash management) in reducing the vulnerability of smallholder farmers in the drought-prone district of Chiredzi in Zimbabwe. This study adopts the capability approach to poverty analysis that defines poverty or vulnerability in terms of the skills, resources and entitlements accessed to respond to shocks and stresses. The capability approach defines the mix of capabilities in terms of five assets that are important for making a living, viz. natural, physical, social, financial and human capital. Principal component analysis (PCA), a dimension-reduction technique, was used to create a livelihood asset index based on individual farmers' perceptions of their access to the five basic capitals. The index was used to compare the differences in access to livelihood assets between smallholder farmers who participated in village savings and loans associations (VSLAs) and those farmers who did not. Propensity score matching (PSM) was applied to control for selection or endogeneity bias by comparing the differences in access to livelihood assets only between smallholder farmers who were statistically proven to be identical based on a set of observable characteristics.

2. Literature review

2. Livelihood assets, risk and vulnerability

The appreciation of poverty as a multi-dimensional phenomenon is embedded in the capabilities approach to poverty analysis, which in turn originated from the sustainable livelihoods framework (Ashley & Carney 1999). Livelihoods have been defined as the “capabilities, assets (stores, resources, claims and access) and activities required for a means of living” (Chambers & Conway 1991:6). In the capabilities approach to poverty analysis, the livelihood asset base is further divided into five classes of livelihood assets, which are discussed by Hellin *et al.* (2010) as:

1. Natural capital – The natural resource stocks, which include land, water, vegetation and biodiversity, among other things.
2. Physical capital – This refers to the assets that can be produced by or through economic production processes and includes, among other things, farm implements, irrigation and other agricultural equipment.
3. Human capital – Refers to the educational level and health status of individuals, households and communities.
4. Financial capital – Refers to the financial resources that can be used for the purchase of goods and services.
5. Social capital – This refers to the social networks in which people participate and from which support for livelihoods can be obtained.

The poverty of an individual, household or community can therefore be defined in terms of the person's/people's vulnerability to the external influences on livelihoods (in the form of shocks or trends) that affect the livelihood asset base. Cooper *et al.* (2008) supplement this view by asserting that the stronger and more varied the livelihood asset base, the greater the people's adaptive capacity and the level of security and sustainability of future livelihoods. Risk is also generally defined as the future uncertainty about deviation from expected outcomes, and is one of the key defining elements of poverty (Barrett & Bhattamishra 2010). In the context of livelihoods, a deviation from expected earnings or outcomes is often the result of shocks to the livelihood system (Winderl 2014). Therefore, the type of risk can be defined in terms of the type of shock associated with the risk. Shocks can either be individual-/household-specific idiosyncratic shocks, such as family illness, death, theft and

predators, or community-wide covariate shocks that include severe rainfall shortages, floods, political instability, disease outbreaks and inflation (Porter 2012).

2.2 Community-based risk management and cash management tools

Community-based cash management tools fall under the broad subject of community-based risk management arrangements (CBRMAs). CBRMAs include “all coordinated strategies used and managed by social groupings of individuals for the purpose of protection against the adverse effects of different types of risk” (Barrett & Bhattamishra 2010:924). The fact that CBRMAs are community managed does not imply that all are home grown. Some CBRMAs are externally induced or initiated by governments or NGOs but are managed by the community, e.g. VSLAs. Gunther and Harttgen (2008) reveal that the different types of risks to which households are exposed result in high income and consumption volatility. One of the ways in which rural communities manage income shocks is through community-based cash management options (Porter 2012). Community-based cash management tools have also served as an effective means of insuring against idiosyncratic shocks, such as death and illness (Collins *et al.* 2009).

Ritchie (2007) defines community-based cash management tools as those that: (1) succeed in membership and savings mobilisation; (2) provide flexible, simplified and appropriate credit and insurance policies and procedures; (3) promote pledged but manageable savings; (4) have an organisational structure that facilitates management and clear ownership by members; and (5) have internal regulations and controls that guarantee accountability. Collins *et al.* (2009) define community-based cash management tools on the basis of two desirable traits that they possess, which are flexibility and accessibility. Brannen (2010) presents a categorisation of community-based cash management tools that summarises the variety of methods used by the poor to manage their money. The author describes them as follows: (1) borrowing from moneylenders; (2) participating in rotating savings and credit associations (ROSCAs); (3) participating in accumulating savings and credit associations (ASCAs); (4) saving at home; and (5) reciprocal lending among friends and/or relatives. Barrett & Bhattamishra (2010) also present their categorisation of common community-based cash management tools, which include (1) informal mutual insurance; and (2) savings and credit arrangements (including cereal banks, grain banks, ROSCAs, ASCAs and microfinance as examples).

While the categorisations provided by Barrett and Bhattamishra (2010) and Brannen (2010) are not exhaustive, they do provide an entry point for analysing the strengths and weaknesses of diverse community-based cash management tools and why poor households might prefer one tool over the other. The different community-based cash management tools vary in their degree of flexibility (with respect to entry barriers), exposure to risk, as well as their efficiency as a means of investment. For instance, rural households tend to save and borrow in groups and there are two main types of savings and credit groups, viz. ROSCAs and ASCAs. ASCAs, such as village saving and lending associations (VSLAs), which are the focus of this study, are relatively advanced compared to ROSCAs in that VSLAs are made up of regularly depositing members who accumulate their funds and lend them out, only when required, to one or more of their members at an agreed interest rate (Ksoll *et al.* 2016). ROSCAs, on the other hand, simply rotate interest-free loans, regardless of whether or not the member needs the money. ASCAs therefore require a higher degree of financial literacy and group management processes, which are often provided by humanitarian organisations or non-governmental organisations (NGOs) promoting the ASCAs (Barrett & Bhattamishra 2010). Therefore, ASCAs can be more precisely referred to as externally induced, but community-based, cash management tools.

2.3 Livelihood impacts of community-based cash management tools

Brannen (2010) investigated the social and economic impacts of a household participating in a village savings and loans association (VSLA). The VSLA was similar to the community-based cash

management tool examined in this study. Brannen's (2010) study was based in Tanzania and some of the economic impacts of VSLA participation included changes in income, accumulation of household assets, and development of income-generating activities. Social impacts included changes in nutrition levels, housing quality and access to health services.

Odokonyero (2009) also conducted a study investigating the impacts of VSLAs in Uganda. The author applied a research design almost similar to the one applied by Brannen (2010), particularly distinguishing between treated and untreated groups and between early and relatively older participants. However, Odokonyero (2009) also included non-participants in addition to the early participants in constructing the control group. The author's analysis finds that the average monthly income and asset ownership levels of VSLA participants were significantly higher than those of non-participants and new participants.

Ksoll *et al.* (2016) provide one of the most recent and most robust analyses of the impact of VSLAs using a cluster randomised trial that mimics the design of a pure experiment. The study was conducted over a two-year period in Northern Malawi and estimated intention to treat (ITT) effects. However, ITT estimation is conservative and should be interpreted with caution, since ITT estimation ignores non-compliance, protocol deviations, withdrawal, spontaneous spill-overs and anything else that happens after randomisation (Gupta 2011). This study seeks to build on the study of Ksoll *et al.* (2016) by estimating the average treatment effects on the treated (ATT) instead. The ATT is the average gain in outcomes of participants relative to non-participants as though non-participants also participated.

Ksoll *et al.* (2016) observe a positive and significant impact of participation in VSLAs on: food consumption frequency; household expenditure (*viz.* an increase of about 4.2%); and the number of rooms per dwelling. However, while Brannen (2010) observed increased income diversification among VSLA participants in Tanzania, Ksoll *et al.* (2016) observed reduced income diversification, but rather increased specialisation, in Malawi. While Ksoll *et al.* (2016) control for endogeneity bias, other studies, such as those by Odokonyero (2009) and Brannen (2010), do not deal with this methodological challenge.

3. Methodology

3.1 Research design

The study was carried out in the semi-arid district of Chiredzi in the south-eastern lowveld of Zimbabwe. Zimbabwe is demarcated according to rainfall into five natural regions (NR), numbered from one (I) to five (V), with NR I receiving the highest amount of rainfall – of above 1 000 mm/annum, and NR V receiving the least amount of rainfall – of less than 450 mm/annum. The study area constitutes the NR IV and NR V areas in the southern lowveld of the country. The population of Chiredzi District is 64 865 rural households, with an average household size of approximately four members (ZimStat 2012). Livelihoods in Chiredzi are constrained by huge pressure on natural resources, specifically land, as is evident in the severe erosion and high rate of contamination of natural water bodies (Oxfam-UNDP/GEF, 2015). Most households rely on rain-fed crop production, gardening and livestock rearing (Oxfam-UNDP/GEF, 2015). Primary data was collected through a household survey of 201 households. Multistage sampling was used to select the respondents. The treatment group consisted of 39 VSLA participants and the untreated group consisted of 162 non-participants.

3.2 Data analysis

Principal component analysis was used to create a livelihood asset access index. The index was derived from multiple variables, shown in Table 1, of household's perceived access to social, physical, financial, natural and human capital, i.e. the basic set of livelihood assets (Tyler & Marcus 2012). The responses were either given on a four-point Likert rating of 1 = poor access, 2 = moderate access, 3 = secure access, and 4 = very secure access, or a five-point Likert rating of 1 = not at all, 2 = a little, 3 = average, 4 = very much, and 5 = completely. A subjective/perceived indicator was used over observed/static indicators, such as income or the number of assets owned, because such cross-sectional static analyses fail to account for the dynamics of poverty over time, as well as the soft variables relating to individuals' capacity to respond to shocks (Gunther & Harttgen 2008).

Table 1: Variables on perceived access to livelihood assets

| Livelihood asset category | Measurement |
|---------------------------|---|
| Human capital | Perceived access to health and education services |
| Social capital | Perceived degree of community trust and cooperation Perceived access to input and output markets Perceived access to information on output markets and investments Perceived adequacy of accessible social capital |
| Physical capital | Perceived adequacy of accessible physical assets |
| Natural capital | Perceived adequacy of accessible crop land Perceived adequacy of accessible grazing land/pasture Perceived adequacy of accessible trees and forest products |
| Financial capital | Perceived access to off-farm income sources and other financial services such as savings and credit |

Source: Adapted from Choptiany *et al.* (2015); GEF (2016)

According to d'Errico (2014), an index constructed using dimension-reduction techniques, such as PCA, can be used in the impact evaluation of a particular programme or intervention. While PCA provides the advantage of reducing data dimensionality by using statistically computed weights instead of subjective weights, such a data-driven process has its limitations (Brooks *et al.* 2014). For instance, some principal components or factors that explain only a small proportion of the variation in the overall dataset are dropped during the reduction process, yet they might contain some important information (Vyas & Kumaranayake 2006; Brooks *et al.* 2014). In addition, the index – in this case the livelihood asset access index – is highly context specific (d'Errico 2014).

To compare the VSLA participants and non-participants, propensity score matching (PSM) was used. PSM utilises an n -dimensional vector of observable covariates, X_i , to match the participant with relatively similar non-participating individuals before any comparison of outcomes can be made. The vector of covariates, X_i , consists of variables that simultaneously influence treatment assignment (participation) and potential outcomes (livelihood asset access) and, in addition, can be observed either before treatment or are relatively fixed over time (Caliendo & Kopeinig 2005). The observable covariates used in the impact analysis are shown in Table 2. Participation in VSLAs is to a large extent not random. Individuals self-select into or out of participation. Factors that drive this selection include both observable and unobservable social, economic and geographical factors. Economic factors may include the ability to purchase shares in the group (i.e. the ability to save at the agreed level and frequency). Social factors may include whether or not the individual has a cooperative personality, and geographical factors may include the distance of the individual's location from other community members (Allen & Staehle 2015).

Table 2: Observable variables (confounding factors) assumed to jointly determine treatment (participation in ISALs) and outcome (livelihood options)

| Variable | Source |
|---|--|
| Asset-based socioeconomic status proxy | Sarma & Pais (2011); Allen & Staehle (2015) |
| Distance to nearest output market in km | Sarma (2010); Choptiany <i>et al.</i> (2015) |
| Distance to nearest source of agricultural inputs in km | |
| Distance to nearest police officer who can authorise livestock sales in km | |
| Distance to nearest extension officer (who is also a VSLA trainer and support person) in km | Sarma & Pais (2011) |

Source: Author

After matching the participant and comparison groups, PSM then estimates the average treatment effects on the treated (ATT). ATT is basically the average gain in outcomes of participants relative to non-participants, as though the non-participants had also participated. If Y_{1i} and Y_{0i} denote potential outcomes on treated and untreated individuals respectively and D is the binary treatment variable, which is 1 when the individual is a VSLA member and 0 otherwise, then ATT can be expressed as:

$$ATT = [E\{Y_{1i} - Y_{0i} | D = 1, p(X_i)\}] = [E\{Y_{1i} | D = 1, p(X_i)\} - E\{Y_{0i} | D = 0, p(X_i)\} | D = 1] \quad (1)$$

where $E[Y_{0i} | D = 1]$ is the expected outcome on a non-participant as though he or she were a participant. This is referred to as the counterfactual outcome, and the propensity score, $p(X)$, is simply the probability of an individual being in the participant group given the set of characteristics captured by X_i . Under certain assumptions, individuals with similar propensity scores have been statistically proven to be observationally identical. Equation (1) shows that the mean outcomes on untreated (non-participating) individuals who are similar to treated (participating) individuals based on similar propensity scores, $p(X)$, are a substitute for the counterfactual mean, i.e. the outcome on participants had the programme not been implemented. Hence PSM mimics random assignment to a treatment (VSLA participation) by matching participants and non-participants who have similar propensity scores, and then estimating the average gains in outcomes for only the similar individuals. Non-similar untreated observations are dropped in the matching analysis.

Since the PSM technique accounts for the observable characteristics that might confound impact estimation, the sensitivity of the model's results to unobserved characteristics that might introduce hidden bias needs to be tested. The presence of unobserved characteristics that simultaneously affect treatment assignment and outcomes of interest violate the assumptions of PSM, such as the assumption of unconfoundedness (Becker & Caliendo 2007). Since the magnitude of hidden bias cannot be estimated with non-experimental data, the Rosenbaum Bounding Approach was applied to estimate how strongly an unmeasured variable must influence the selection process to undermine the results of the matching analysis (DiPrete & Gangl 2004).

4. Results and discussion

4.1 Descriptive statistics

The households sampled were divided into four categories based on their participation in VSLAs. The first group consisted of 39 households that had participated in VSLAs for three years or more. These were considered to have been involved in VSLAs as a community-based cash management tool for long enough to have allowed any potential impact on their livelihoods. The second group consisted of 40 households that had participated in VSLAs for two years or more, but for less than three years. The third group consisted of 16 VSLA-participating households that had participated in

VSLAs for a few months to just over a year. The fourth group consisted of households that had never participated in a VSLA. A summary of these four categories of respondents is presented in Table 3.

Table 3: Respondents by number of years of participation in VSLAs

| Number of years of participation in VSLAs | Frequency | Percent |
|---|-----------|---------|
| 3+ | 39 | 19.4 |
| 2 | 40 | 19.9 |
| 1 | 16 | 8.0 |
| 0 | 106 | 52.7 |
| Total | 201 | 100.0 |

Source: Survey results

4.2 Computation of livelihood asset index

Diagnostic tests were performed for using PCA to construct the livelihood asset index, specifically testing for multicollinearity, and for computing the Kaiser-Meyer-Olkin (KMO statistic). The test for multicollinearity proved that there was some degree of correlation between perceived access to physical, social, natural, financial and human capital. Furthermore, the KMO statistic was above 0.6, thereby warranting the need to reduce the livelihood asset access variables to composite scores using PCA. The data was also manipulated through oblique Promax rotation to give higher absolute values of the factor loadings. As shown in Table 4, two components/composite scores were derived, with component 1 strongly related to access to social and financial capital, while component 2 is strongly related to access to physical and natural assets.

Table 4: Relationship between derived and actual variables

| Actual variables | Principal components/derived variables | |
|-----------------------------|--|-------------|
| | Component 1 | Component 2 |
| Access to human capital | | |
| Access to social capital | 0.72 | |
| Access to physical capital | | 0.46 |
| Access to natural capital | | 0.80 |
| Access to financial capital | 0.55 | |

Source: Survey results

NB: values indicate correlations

The dimension-reduction process, however, results in the omission of human capital from the further analysis, as none of the extracted components satisfactorily explain the data in terms of variation in access to human capital.

4.3 Impacts of village savings and loans associations on livelihood assets

Table 5 presents the main results of the analysis, showing the impact of participation in VSLAs on perceived access to livelihood assets. The table presents the average treatment effects on the treated (ATT), i.e. the difference in perceived livelihood asset scores between VSLA participants and non-participants as though the non-participants are also participants. The ATTs enable the identification of any possible impact that is independent of other factors.

Households that participated in VSLAs had a significantly higher livelihood asset score based on the first principal component, which is strongly related to perceived social and financial capital access relative to the non-participants. This difference is significant at the 1% level and is based on a comparison of participants and non-participants who are statistically identical. However, there is no significant relationship between participation in VSLAs and the livelihood asset score based on the second component, the one strongly related to access to natural and physical assets. Further variation in human capital was not well explained by the extracted components, hence the relationship between

participation in VSLAs and access to human capital could not be ascertained. These results are consistent for two different estimators of the propensity score, the main tool used to eliminate endogeneity bias.

Table 5: Average treatment effects on the treated (ATT)

| Variable | Matching estimator | ATT | Standard error | T-stat |
|--|--------------------|---------|----------------|--------|
| PC1 (indicator of access to natural and physical assets) | KBM ^a | 0.20 | 0.28 | 0.74 |
| | NNM ^b | 0.24 | 0.28 | 0.85 |
| PC2 (indicator of access to social and financial assets) | KBM ^a | 0.81*** | 0.24 | 3.42 |
| | NNM ^b | 0.93*** | 0.23 | 4.04 |

Source: Survey results

* Significant at the 10% level; *** Significant at the 1% level

^a Kernel-based matching using the Espanechnikov estimator with 0.06 bandwidth

^b Nearest to neighbour matching using three neighbours and with the bottom 2% trimmed

4.4 Sensitivity analysis and robustness checks

While the PSM technique accounts for and attempts to minimise self-selection/endogeneity bias based on observable factors, there is a need to test the sensitivity of the model to any unobserved factors that might still introduce hidden bias. The Rosenbaum bounds test was applied to evaluate the sensitivity of the impact estimates (ATTs) to unobserved factors that might still bias the impact estimation by simultaneously affecting treatment assignment and the outcomes of interest (DiPrete & Gangl 2004).

Sensitivity analysis evaluates how the changing values of a parameter gamma, Γ , would influence the significance of the results obtained from the matching analysis (Becker & Caliendo 2007). Γ is the log of the odds of differential assignment due to unobservable factors. It reflects the probability of two observations being differentially assigned to a treatment, despite these observations having been matched according to observable factors. If $\Gamma = 1$, then there are no unobservable factors that may still cause differential assignment for matched observations, i.e. hidden bias is zero. However, if $\Gamma = 2$, then the odds for the differential assignment of matched observations due to unobservable factors is doubled. Γ is thus the degree of departure from no hidden bias. If the ATT estimates remain significant after changing the gamma parameter, then the estimates are robust to unobserved heterogeneity bias. However, if the significance of the estimates is sensitive to changes in the gamma, then the estimates are not robust. The results of the sensitivity analysis are shown in Table 6. Evidently, the computed ATTs are relatively insensitive to unobservable factors that might introduce hidden bias. The significance of the estimates changes from 1% to 5% only after increasing gamma by 2.5, i.e. more than doubling the odds of differential assignment due to hidden factors.

Table 6: Sensitivity analysis and robustness checks

| Impact of VSLAs on the social-financial livelihood asset access index | | | | |
|--|----------------|----------------|--------------|--------------|
| Gamma | sig+ | sig- | t-hat+ | t-hat- |
| 1 | 0.00000 | 0.00000 | 0.281 | 0.281 |
| 1.25 | 0.00000 | 0.00000 | 0.237 | 0.320 |
| 1.5 | 0.00000 | 0.00000 | 0.206 | 0.361 |
| 1.75 | 0.00009 | 0.00000 | 0.178 | 0.396 |
| 2 | 0.00071 | 0.00000 | 0.158 | 0.428 |
| 2.25 | 0.00347 | 0.00000 | 0.132 | 0.451 |
| 2.5 | 0.01162 | 0.00000 | 0.110 | 0.472 |
| 2.75 | 0.02966 | 0.00000 | 0.097 | 0.493 |

Gamma is the log odds of differential assignment due to unobserved factors. It also represents the degree of departure from no hidden bias.

sig+ is the upper bound significance level

sig- is the lower bound significance level

t-hat+ is the upper bound Hodges-Lehmann point estimate (i.e. overestimation of ATT)

t-hat- is the lower bound Hodges-Lehmann point estimate (i.e. under estimation of ATT)

5. Conclusion and policy recommendations

This study is based on the premise that rural poverty and vulnerability call for scalable and sustainable solutions that enable households to effectively manage risk on the basis of a strengthened livelihood asset base. Community-based risk management arrangements, particularly community-based cash management tools such as village savings and loans associations (VSLA), are increasingly becoming common livelihood-adaptation strategies promoted by non-governmental organisations (NGOs). However, such interventions have not received much research attention. Community-based interventions are perceived to be more effective in building risk management capacity relative to formal arrangements, as they (community-based options) increase information flows and reduce the transaction costs of enforcing contracts through repeated interactions between the same people, and effective social sanctions and peer monitoring.

This study borrowed from the capability approach of poverty analysis to analyse poverty or vulnerability to risk in terms of access to a set of livelihood assets (social, natural, physical, financial and physical capital). Based on the capability approach, the effectiveness of VSLAs in risk management was evaluated by the impact of participation in VSLAs on access to the five livelihood assets. The study also presented methodological innovation by creating a perception-based livelihood asset index to substitute other measures of poverty (e.g. monetary measures) that might not be participatory in the analysis of poverty and vulnerability.

5.1 Impacts of participation in VSLAs on livelihood assets

The study finds that there is a significant and positive relationship between participation in VSLAs and access to social and financial capital. However, there is no significant relationship between participation in VSLAs and access to natural and physical capital. Furthermore, the relationship between participation in VSLAs and access to human capital could not be ascertained, as the variation in human capital access was not well explained in the livelihood asset index.

The important finding from this analysis is that participation in VSLAs provides rural households with better access to financial resources that can be used to purchase goods and services, as well as better access to the social networks from which support for livelihoods can be obtained. However, within the time frame of this study, of just more than three years of participating in VSLAs, there is no indication that VSLA participants will have better access to physical assets such as agricultural equipment, even though these could be purchased using financial resources. Therefore, a household might have better access to financial resources through participating in VSLAs, but this does not

mean that it has access to the full set of assets that are needed to sustain a livelihood – at least in the short to medium term.

Therefore, to facilitate effective community-based risk management, it is not prudent to rely on a single aspect such as cash management; there is an evident need for complementary interventions to guarantee access to the basic forms of capital at all times. While externally induced community-based cash management tools significantly increase access to financial and social capital, they do not contribute to increased physical and natural capital in the short to medium term.

5.2 Areas for further research

There is a need for further research, specifically longitudinal studies on how households participating in community-based cash management tools utilise their increased savings and credit. There is a need to validate to what extent the increased savings are precautionary, investment or production savings. There is also a need for panel studies across different countries and contexts to triangulate the findings on the impacts of externally induced community-based cash management tools.

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