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Wealth Effects of an Asset-Building Intervention among Rural Households in Sub-Saharan Africa

Gina A.N. Chowa
University of North Carolina at Chapel Hill

Michael Sherraden
Center for Social Development

Subsequent publication: Chowa, G. A., Masa, R. D., & Sherraden, M. (2012). Wealth effects of an asset-building intervention among rural households in Sub-Saharan Africa. *Journal of the Society for Social Work and Research*, 3(4), 329–345. doi:10.5243/jsswr.2012.20

2009

CSD Working Papers
No. 09-57

Campus Box 1196 One Brookings Drive St. Louis, MO 63130-9906 • (314) 935.7433 • csd.wustl.edu



Washington University in St. Louis

Wealth Effects of an Asset-Building Intervention among Rural Households in Sub-Saharan Africa

Asset development is a key strategy to promote economic and social development in Sub-Saharan Africa. Research has found associations between asset ownership and household well-being. However, to date there has been little rigorous research on impacts of asset-building interventions for families in SSA. In this study, we analyze wealth outcomes of a matched savings intervention among rural households in Masindi, Uganda. Using propensity score matching and difference-in-differences, significant differences are found on the adjusted means for financial assets (\$1,323.01), total wealth (\$1,672.18), and net worth (\$2,048.20). Overall, results show that asset-building interventions have potential utility as a policy solution for improving the economic well-being of poor households in SSA.

Key words: *Sub-Saharan Africa, Uganda, asset-building intervention, difference-in-differences, wealth-effects, household well-being, propensity score matching*

Asset development is a key strategy to promote economic and social development. Over the last decade, interest in asset-building policies has grown under the premise that, compared to income, assets may have a more sustainable impact on well-being (Moser, 1998; Sherraden, 1991). This policy push has been driven by both theoretical and empirical motivations. Theoretical models suggest that asset ownership may lead to better economic, psychological, social, civic, political, and intergenerational outcomes (Sherraden, 1991). Empirical research, discussed below, has provided some evidence to support these theoretical models.

Empirical research has found associations between asset ownership and several positive outcomes, including increased wealth (Schreiner, et al., 2003), future orientation (Shobe & Page-Adams, 2001; Yadama & Sherraden, 1996), political participation (McBride, Lombe, & Beverly, 2003), educational attainment (Filmer, 2002; Filmer & Pritchett, 2001), and health (Thomas, et al., 2002; Woelk & Chikuse, 2000). For women, control and ownership of assets increases their bargaining power in the household (Agarwal, 1997; Beegle, et al., 2001; Breza, 2005; Doss, 2006; Fafchamps & Quisumbing, 2002); provides better prospects for their education and employment (Fawe, 2000); and increases female autonomy and empowerment (Panda, 2002; Panda & Agrawal, 2005). Child well-being in general is improved among children whose parents own assets, as reflected in lower rates of child mortality among asset-owning families (Armstrong Schellenberg, et al., 2003; Thomas, et al., 2002; Woelk & Chikuse, 2000). Particularly when mothers own assets, children have better outcomes because their nutrition is better and they benefit from increased spending on education and clothing (Katz & Chamorro, 2002; Quisumbing & Briere, 2000).

Sherraden (1991) has proposed an asset-based theory of welfare in which he suggests that assets have psychological, social, and economic effects. He argues that assets improve household stability, create an orientation toward the future, stimulate development of other assets, increase civic participation, and enhance the well-being of children.

Asset Development in Sub-Saharan Africa

Asset-building strategies have been at the helm of much of the development in Sub-Saharan Africa (SSA) (Economic Commission for Africa, 2002; McPeak, 2004). Assets can generate income for families, provide nutrition, and build capital for investment in the next generation through improved education and health. A growing body of research has demonstrated how assets may contribute to the well-being of families in SSA (Barrett & Reardon, 2000; Moser, 1998). Given these research findings, many development interventions have focused on helping families build assets as a way of enhancing household well-being.

Using the framework of assets to analyze the well-being of SSA households shows that these households have a limited capacity to confront development challenges because they lack pathways to asset accumulation. Accessibility barriers include gender-biased inheritance and traditional laws, lack of employment, lack of access to credit and saving services, and lack of education.

Assets may be tangible in the form of dwellings, farmland, livestock, and equipment, or intangible in the form of knowledge, skills, and social capital (Sherraden, 1991; World Bank, 2003). Assets provide the means to generate livelihoods and buffer the impact of the all too common disasters of drought, flooding, and disease that afflict most African countries (McPeak, 2004). Households with assets in various forms are better able to provide for basic needs and to make investments in future generations through health care, education, and training (see Fafchamps, Udry, & Czukas, 1998; Lombe, Nebbitt, & Buerlein, 2007; Sherraden, 1991; Zhan & Sherraden, 2003). Those lacking assets are more vulnerable to poverty and less able to recover from periodic disasters.

Increased recognition of the critical role assets play in enhancing the well-being of households has spurred efforts to enhance assets of African individuals, households, and communities. In addition, international social development programs and policies are beginning to address asset ownership as a vehicle for household development and well-being. However, to date there has been little rigorous research on impacts of asset-building interventions for families in SSA.

Asset accumulation pathways in SSA

Throughout the SSA region, savings and inheritance are the two main pathways to asset accumulation. Savings, defined as either the postponement of consumption or moving resources through time (Schreiner, 2004), are one of the main ways in which assets are accumulated. In addition to formal financial institutions, SSA has several avenues for informal savings, which have emerged at the local level to meet the saving needs of those without access to formal institutions. Informal savings groups include Rotating Savings and Credit Associations (ROSCAs); Accumulating Savings and Credit Associations (ASCrAs); reciprocal lending; and burial funds. ROSCAs are pooled savings given to each member of a group at equal savings periods, and ASCrAs are pooled savings that members may accumulate over time until such time that one or more members are willing to take those funds on loan. Burial societies function similarly to ASCrAs, except the money is made available to a member when there is a death in the family.

The informal savings groups provide an opportunity for members to access a lump sum when needed to respond to emergencies, disasters, or life cycle events (e.g., deaths, births, and weddings). These informal savings groups have received considerable attention in academic research, and have

been used to host microfinance efforts in SSA (Musona & Coetzee, 2001; Rutherford, 1999). Because they are initiated locally, informal savings groups create a special sense of ownership among group members. Stakeholder behavior of the members is enhanced, and when saving is successful, aspirations and empowerment of the members may increase. Participating in these savings clubs allows households to purchase durable goods for the home, or use their savings as start-up capital for small enterprise.

Formal savings includes retail and commercial banks as well as postal banking. However, as Bauman (2001) observes in the case of South Africa, competitive and regulatory changes have led to a substantial rollback of retail banking services. Service reduction has primarily affected low- and middle-income customers, further limiting their access to banking facilities. The high fees and minimum balances required by commercial banks function to deny banking access to the poor. Moreover, the physical distances that the poor in rural areas must travel to commercial banks create very high transaction costs. Given these substantial barriers, the poor in SSA save primarily through informal savings groups (ROSCAs and ASCrAs) rather than in formal savings institutions.

Inheritance is a prominent pathway to asset accumulation, especially in rural areas where sons typically inherit their father's or uncle's estate. In the rural areas of SSA, which are governed by customary law, inheritance is governed by social norms that typically favor males. If a husband predeceases his wife, his assets are inherited by the eldest son, who is expected to take care of the mother (Aryeetey, 2004; Clark, 1994). In the event the man had no sons, his estate would be inherited by his eldest nephew rather than his wife.

Covariates of asset ownership in SSA

Beyond the gender bias of inheritance, several studies have shown that gender has an effect on asset accumulation (Bajtelsmit & Bernasek, 1996; Blumberg, 1988; LeBeau, Iiping, & Conteh, 2004). In SSA, women not only own fewer assets than men (Deere & Doss, 2006; Doss, 2006; LeBeau, et al., 2004), but the assets they own tend to be non-income-producing assets such as pans, cups, brooms, and hoes. In contrast, men tend to own income-producing assets such as plows, boats, nets, land, and livestock (Muzora, et al., 2002). Because women do not usually own a portfolio of income-producing assets, they cannot easily enhance their economic circumstances. Further, women's ability to accumulate assets is governed by norms that historically have favored men to the disadvantage of women, and these legal systems limit the extent of women's control over assets (Fafchamps & Quisumbing, 2005). For example, even though a woman may have used her savings to begin and maintain a small business, her husband has legal standing in making decisions regarding that business.

Turning to potential predictors of asset accumulation, education is associated with asset accumulation. In developed countries, education is closely associated with wage employment that, in turn, provides income for asset accumulation. However, many rural areas of SSA have limited employment opportunities, limiting the scope of any association between education and paid employment. In developing countries, however, education is associated with assets, but via different pathways than employment. Schultz (1989) suggests that in developing countries, education improves a household's ability to efficiently adjust production decisions during periods of change. In this instance, farmers with greater educational attainment achieved higher crop yields by selecting

the most effective mix of crops and methods. As a result, in times of drought, farmers with more education were able to manage risk and vulnerability better than their less-educated counterparts.

Asset accumulation also appears to be related to health factors. Net assets diminish with declining health, because poor health can reduce current income and also increase medical expenses (Smith, 1999). The association of health status with assets is particularly applicable to the SSA region because of the high incidence of HIV/AIDS. Places of employment in urban areas of SSA have high absenteeism rates that may be due to the prevalence of HIV/AIDS in the working population (Dixon, McDonald, & Roberts, 2002), and this absenteeism is likely to affect the process of asset accumulation. However, the association of HIV/AIDS with asset accumulation has not been documented in rural areas where formal wage employment is limited.

Marital status also affects asset accumulation (Grinstein-Weiss, Zhan, & Sherraden, 2006; Wilmoth & Koso, 2002). Historically, marriage has been considered a source of financial security (Waite & Gallagher, 2000), and it continues to be a determining factor for economic well-being, particularly for women. The pooled resources of a married couple may provide a financial cushion that allows them to buffer crises and accumulate assets over time.

Prior wealth and current economic resources appear to be important determinants of additional asset ownership. When assets are at a minimum, income generation is at its lowest, and therefore saving to acquire assets does not take place. This barrier to saving is particularly pronounced in SSA, where assets form the production base for many families.

Moreover, individuals' current asset ownership may affect their attitudes and beliefs about lifetime asset accumulation (Sherraden, 1991). According to Ajzen & Madden (1985), a person's access to resources affects his or her thoughts and attitudes toward future asset accumulation. Current ownership of resources appears to foster better planning, to promote anticipation of life's variables, and to encourage higher personal aspirations. In general, people who have resources report they feel more capable of accumulating assets because they can plan better and have concrete resources on which to base their plans.

Research Methods

Project overview

Data used in this study were obtained from a demonstration and research initiative designed to test asset-building innovations in Africa. Implemented in Masindi, Uganda between 2004 and 2008, the Ugandan pilot project used a quasi-experimental design, comparing across treatment and comparison villages. This design was chosen in part because of high risk of "contamination" across treatment and control subjects if randomly assigned in the same village. The Center for Social Development (CSD) at Washington University's Brown School designed and carried out the research, while International Care and Relief-Uganda (ICR) implemented the pilot. ICR is a national nongovernmental organization that has implemented numerous multi-sector programs since its founding in 1996.

The intervention implemented in this project was a structured asset-building program offered to approximately half of the study sample ($n=203$ people) for a three-year period. The intervention

comprised a comprehensive program that included matched funds for participants' savings, financial education, and training on how to manage the asset they planned to acquire with their savings. Treatment group participants opened savings accounts in a commercial bank using initial deposits of money earned by selling food. Deposits had to remain in the accounts for a minimum of 6 months before participants were eligible to receive matched funds at withdrawal. To encourage participants to develop a habit of saving by making regular deposits, the program administrators placed restrictions on deposits of large sums. The match cap, which was the maximum of participant savings eligible to receive matched funds, was 500,000 Ugandan Shillings (UGS) or 285 USD. Participants who successfully reached their savings goals received matched funds at a 1:1 ratio. To encourage sustainability and viability of the assets, only purchases of productive assets (i.e., those that would generate income) were eligible for matching funds. Acceptable livestock assets included chickens, goats, cows, and oxen. Other acceptable assets included means of transportation, such as bicycles or motorcycles, which could be used to transport others for a fee; land for growing crops or building a home; materials to build commercial structures or personal houses; and items to start a small business, such as sewing machines or grinding mills.

The project also incorporated local community institutions, called Local Parish Councils (LPCs), which are similar to village committees. The LPCs selected the participants for the project in consultation with ICR. The project did not use random assignment of participants. Instead, the LPCs consulted with ICR to ensure compliance with the sampling criteria set by CSD, and selected participants based on economic need. Given the persistent poverty among SSA families, the LPCs and ICR perceived it was prudent to reach out to these families with a social development intervention. Thus, to some extent, the poorer people of the community were chosen by LPCs and offered the opportunity to participate in the project. In addition, and as explained below, the LPCs functioned as a local access point for the commercial bank.

Due to the absence of banks in the six intervention-site villages and the distance to the bank in the business district of Masindi, Stanbic bank (an international bank operating in 16 African countries) established a mobile bank that visited the villages every week to collect savings. Participants who wanted to complete their own banking transactions could either wait for the weekly mobile bank visit or travel to the bank in the Masindi business district.

The Masindi district that was home to the pilot project has a population of 479,865 persons, of which 232,000 (49.1%) are females and 247,000 (50.9%) are males. In comparison with the national average of 87 persons per square kilometer, the Masindi district is densely populated with 97 individuals per square kilometer. Masindi is home to 56 ethnic groups, nearly 100,000 internally displaced persons, and a large number of refugees, most from the Sudan. Agriculture employs nearly 94.5% of the population of the district. A few artisans live in the region and work in metal fabrication, woodworking, brick making, and pottery.

Research design

The study sample consisted of 393 individuals assigned to the intervention group ($n = 203$) or the comparison group ($n = 190$). The intervention group consisted of 203 individuals from six villages who were selected by the LPCs as participants in the asset-building intervention. The comparison sample consisted of 190 economically similar individuals selected from six other Masindi villages that were located approximately 20 miles from the intervention sites. The comparison group was a

no-treatment condition and did not participate in the intervention. Individuals in both the intervention group and comparison group had participated in agricultural development projects also conducted by ICR prior to this asset-building project. At the time of enrollment, all participants signed a letter of consent indicating their commitment to participate in the research for a period of five years.

The intervention group participants attended eight hours of mandatory financial education. This training provided general banking information such as guidance on how to make deposits and withdrawals, read bank statements, and understand interest and fees. In addition, the training included asset-specific training that was aimed at providing participants with a skill set to help them manage their individual assets. The asset-specific trainings included business planning and management, bookkeeping, goat herding, chicken farming, and modern farming techniques.

Data collection

Data were collected by 12 locally trained interviewers who conducted face-to-face surveys. Questionnaires were administered twice to the two groups over a 13-month interval. Wave 1 was conducted in August 2005, and Wave 2 was conducted in September 2006; both waves used the same survey questions. The survey consisted of more than 100 items that were adapted from two instruments used in previous research: the American Dream Demonstration survey, which measured wealth accumulation and wealth effects; and the World Bank's Living Standard Measurement Survey, which measured asset thresholds for families. Additional items included measures of participants' financial expectations.

Main variables

Asset-building intervention. A variable for the asset-building intervention was coded as 1 if the case received the intervention and 0 if the case did not receive the intervention (i.e., assigned to the comparison group).

Personal characteristic covariates. Likely predictors of asset ownership in SSA—including gender, marital status, education, health, and prior wealth—were identified as personal characteristic covariates in the study. It was important to include these characteristics in the data analysis because these characteristics not only had the potential to impact asset accumulation independent of the intervention but could also interact with the intervention. Including these variables assisted in isolating the main effects of the intervention.

Gender was measured at the nominal level, age was measured as a continuous variable, and marital status was measured at a nominal level with six categories: single never married,¹ married, divorced, widowed, separated, and other. Education was measured at the ordinal level; however, this variable was changed into a continuous variable by assigning the number of years equivalent to the level of education. Health was a continuous variable, with a scale of 1 to 7. Prior wealth was measured as all the wealth that a participant had reported on the Wave 1 survey.

¹ During the piloting exercise, this category was changed to clarify the categories of marital status. Respondents commented that the category single was not clear in that context because people who are not married whatsoever are considered single. Therefore, to qualify singleness, the never married category was added to the single category.

Wealth outcomes. Measures for wealth outcomes included productive assets, financial assets, total assets, and net-worth.

Productive assets. A measure of productive assets was calculated by assigning an average value² to a particular asset and multiplying this value by the number of such assets owned by a respondent. For example, in the case of a respondent with three cows, the average value for cows was assessed, and this value was multiplied by three.

Financial assets. Financial assets were measured as the aggregate value of all the money a participant had in a bank, an informal savings group, or elsewhere, using information reported in the survey. The survey included three questions that asked respondents how much money they had in a bank, in their household, and/or with friends and relatives.

Total assets. A measure of total assets was calculated by aggregating productive assets and financial assets.

Net worth. Net worth was calculated by subtracting total debt from total assets.

Demographic and socioeconomic characteristics at Wave 1

Table 1 presents the demographic and socioeconomic characteristics of the research sample for Wave 1. Since the same individuals are interviewed at Wave 2, these descriptive statistics are only provided for Wave 1. Minimal changes occurred in the variables reported for gender, age, and marital status during the 13 months between Wave 1 and Wave 2. The first column of the table shows the variables under discussion. Each variable is dichotomized into two categories except for the variables for age (four categories) and prior wealth (five categories). The last column (far right) presents a result of a chi-square test of differences across the groups.

At Wave 1, the sample was predominantly male, with a ratio of 2.88 males to 1 female. However, women were targeted in the intervention on the basis of gender bias in asset accumulation pathways, which explains why there are more females than males in the treatment group. The total sample contained more males than females. Another key target group of the project were youth between the ages of 15 and 30 years. These targeted youth constituted approximately 42% of the treatment group, whereas targeted youth were nearly 18% of the comparison group. Both the treatment and comparison group had more married participants than unmarried participants. The majority of respondents had a household size of four or fewer people.

Overall, nearly half of the Wave 1 sample had a primary education, which is equivalent to elementary school in the United States. The majority of the study participants had no college education, and less than a fifth had some college education. However, those with some college education were not evenly distributed, with the vast majority of respondents with some college education in the treatment group.

² Responses to asset values may not have been reliable due to lack of knowledge of the price of these assets by respondents. Assigning an average value provided by the Ugandan market analyzers mitigated some of these measurement challenges.

Respondents were also asked about the kind of work they had done for the majority of their lives. The range of work included trading, farming, clerical work, construction, managerial or professional work, and services such as cleaning. These ranges of employment status were dichotomized into two variables of self-employment and formal employment. Self-employment, which included informal employment, was the norm across the sample. The high rate of informal employment is reflective of Uganda's national economy, in which the informal sector is the largest employer, especially in rural areas (Kraybill & Bashaasha, 2006).

Table 1. Wave 1 demographics and socioeconomic characteristics of study sample

Variable	Treatment Group Number (%)	Comparison Group Number (%)	Totals Number (%)	Probabilities of Bivariate χ^2 test
Gender				
Male	82(40.4)	141(73.2)	223(45.3)	$p < .0001$
Female	121(59.6)	49(26.8)	170(54.7)	
Age(in years)				
15 to 30	84(42.2)	29(17.7)	113(31.1)	$p < .0001$
31 to 45	84(42.2)	78(47.6)	162(44.6)	
46 to 60	24(12.1)	47(28.7)	71(19.6)	
61 and older	7(3.5)	10(6.0)	17(4.7)	
Marital Status				
Married	152(76.0)	139(80.8)	291(78.2)	$p < .160$
Unmarried	48(24.0)	33(19.2)	81(21.8)	
Household Size				
Four or less	127(64.1)	95(55.2)	222(60)	$p < .051$
More than Four	71(35.9)	77(44.8)	148(40)	
Educational Level				
No College	151(75.9)	166(96.5)	317(85.4)	$p < .0001$
Some College	48(24.1)	6(3.5)	54(14.6)	
Employment Status				
Self-employment	154(77.4)	149(80.1)	303(78.7)	
Formal employment	45(22.6)	37(19.9)	82(21.3)	
Prior Wealth (In US\$)				
0 – 1	10 (17.2)	48 (82.8)	58 (15.4)	$p < .001$
2 – 49	15 (28.8)	37 (71.2)	52 (13.8)	
50 – 200	53 (42.1)	73 (57.9)	126 (33.5)	
201 – 499	37 (75.5)	12 (24.5)	49 (13)	
500 – 1000	32 (84.2)	6 (15.8)	38(10.1)	
1001 and Above	41 (77.4)	12 (22.6)	53 (14.1)	

Data analysis

The quasi-experimental design of the study raised fundamental methodological questions of selection bias. The challenge, with this question of selection bias, is to separate the effect of the treatment from effects that resulted from other factors. For example, we had to determine how we could know that the outcome was a direct result of the asset-building intervention and not a result of the person's gender, age, prior wealth, education and health (i.e., factors established in literature as associated with asset accumulation).

In quasi-experiments, a counterfactual is introduced—in this case, a comparison group that did not receive treatment—to estimate the outcomes without treatment. Selection bias, however, may still influence outcomes. It is possible that differences between the treatment and comparison groups affect the impact of the intervention. One way of addressing this selection bias is to match individual treatment and comparison cases on relevant pretreatment characteristics so that the differences in the outcomes between the two groups could be attributed to the intervention with less doubt.

Rosenbaum and Rubin (1983) suggest the use of a matching procedure based on a balancing score known as the propensity score (i.e., the probability of participating in a program given a particular observed characteristic). Propensity score matching (PSM) involves pairing treatment and comparison cases that are similar on a given number of observable characteristics. PSM is a useful approach when more than two observable variables or characteristics are used to match the cases from the treatment with cases from the comparison group. The PSM method provides a natural weighting scheme that yields unbiased estimates of the treatment. The weights are formed as the inverse of the predicted probability that an individual would make the choice to participate in the treatment. The resulting predicted probabilities are used to create weights that are used in subsequent analyses.

In the DiD method, the treatment group is exposed to an intervention, and the comparison group is not exposed to the intervention. The sampling units in both groups are observed at time 1 and time 2, and the average gain in the comparison group is subtracted from the average gain in the treatment group. This procedure removes the biases that may exist at time 2 between the treatment and comparison group that could be the result of either permanent differences between those groups or trends taking place in the environment over time.

The combination of these two methods (PSM and DiD) is commonly used to analyze causal effects of treatment from observational data and reducing selection bias in non-randomized field experimental research. Caliendo and Kopeinig (2008) outline steps for implementing an analysis that combines PSM and DiD. In this study, PSM was used to match treatment and comparison cases to minimize selection bias. The difference-in-differences (DiD) method was used to compare observed outcomes for the two groups over two periods.

First, a logistic regression model was used to estimate the probability of participation versus nonparticipation. The dependent variable was a binary variable (treatment = 1 and comparison = 0) and the independent variables in the model were age, gender, education level, employment type, marital status, prior wealth, and number of children in the household.

For each participant, a comparison group participant was identified who matched on propensity score (common support set). Treatment effects were estimated using the common support set only. Heckman, Ichimura, and Todd (1998) report that violating the common support condition is a major source of treatment effect bias as conventionally measured. Therefore, an important step in our analysis was to check for the overlap of the region of common support between the treatment and comparison group. To determine the common support region in this study, trimming was conducted using 5% and 10% of cases. This step excluded treated cases in this propensity score range, which verifies the common support set, and produces results with greater reliability.

PSM and DiD methods were used to calculate the treatment effects. DiD mitigates the remaining bias after PSM and further improves precision. DiD calculates the before-and-after differences for the participants, and the before-and-after differences for multiple nonparticipants using local linear weights. These differences (between the differences for the participants and the differences for the nonparticipants) were compared to determine the treatment effects. Confidence intervals were directly observed from the actual distribution of the parameter estimates around the mean. According to Guo, Barth, and Gibbons (2006), bootstrapping is the only method available in software packages that can offer an alternative to testing whether the group difference is statistically significant. Local linear estimation provides weighted average outcomes of non-treated cases. Asymptotic distributions of these weighted averages are complicated. Currently no procedure is available in any software package that offers parametric tests to discern whether or not group difference is statistically significant (Guo, Barth, & Gibbons, 2006). Therefore, our analysis uses bootstrapping to estimate the standard error of the sample mean difference between treated and untreated cases.

Sensitivity analyses were conducted by testing the sensitivity of estimated treatment effects using common support. We used sensitivity analysis because it is not possible to estimate the magnitude of selection bias with non-experimental data. Therefore, in this study, the magnitude of selection bias problem is addressed by Lechner-bounds for significance levels and confidence intervals (Aakvik, 2001; Rosenbaum, 2002).

Results

As discussed earlier, the first step in the PSM procedure was to match cases in the treatment group with similar cases in the comparison group based on covariates that might influence asset accumulation success. The covariates used to match cases in this study were likely predictors of asset ownership, namely gender, age, marital status, education, health, and prior wealth.

Table 2 presents the estimated average treatment wealth effects for the treated group. Beginning with productive assets, the treatment group has an increase of \$39.08 in the mean for productive assets from Wave 1 to Wave 2, while the mean for productive assets for the comparison group decreased by \$8.48 over the same period. Therefore, the unadjusted mean difference between the treatment and comparison groups was \$47.55. In other words, the average change in productive assets for the treatment group was \$47.55 greater than that of the comparison group. To correct for selection bias in the intervention, the DiD estimation takes into consideration the distance between a treated case and a comparison case on the propensity scores in calculating the treatment effects of the treated. However, the adjusted mean difference is the reported value because that value accounts for the bias that exists before matching. Therefore, for the productive assets, the point estimate of

the DiD was -\$11.00, which falls into a 95% bootstrap confidence interval bounded by -\$251.68 and \$222.47. This result indicates that 95% of the time, the difference in the productive assets between the treatment group and the comparison group would fall between -\$251 and \$222.47; thus, the difference between treatments and comparison groups for productive assets is effectively zero and not statistically significant.

Table 2. Estimated average treatment effects on household wealth change: Difference-in-differences estimation by local linear regression

Treatment & Comparison	Outcome Measures: Household Wealth in US\$			
Unadjusted Mean Difference	Productive Assets	Financial Assets	Total Wealth	Net-worth
Mean Difference between 13 months and Baseline	39.08	1367.51	1777.89	2153.92
Participants in the asset-building intervention (n=193)	-8.48	44.95	105.72	96.20
Comparison group who did not receive any intervention (n=164)	47.55	1323.01	1672.18	2057.71
Adjusted Mean Difference				
DiD Point Estimate (Bias Corrected 95% Confidence interval)	-11.00 (-251.68 ↔ 222.47)	1323.01 (946.02 ↔ 2182.08)	1672.18 (1190.50 ↔ 2463.33)	2048.20 (1479.44 ↔ 3090.02)
Sensitivity Analyses				
DiD Point Estimate (Bias Corrected 95% Confidence Interval)				
<i>Changing Bandwidth:</i>				
Small – bandwidth = .01	-7.57 (-194.24 ↔ 103.85)	1326.31 (1056.41 ↔ 2008.02)	1675.59 (1255.12 ↔ 2395.00)	2051.62 (1549.28, ↔ 2921.15)
Medium – bandwidth = .05	-7.57 (-194.24 ↔ 103.86)	1326.32 (1056.41 ↔ 2008.02)	1675.59 (1255.12 ↔ 2395.00)	2062.36 (1549.28 ↔ 2921.15)
Large – bandwidth = .8	-11.76 (-251.68 ↔ 222.47)	1323.95 (950.65 ↔ 1822.74)	1672.18 (1190.50 ↔ 2463.33)	2049.86 (1557.11 ↔ 2960.58)
<i>Trimming:</i>				
5% (8 cases excluded)	-7.57 (-197.41 ↔ 178.55)	1326.32 (1040.90 ↔ 1705.98)	1675.59 (1394.08 ↔ 2182.53)	2138.86 (1686.33 ↔ 2645.25)
10% (16 cases excluded)	-21.71 (-247.95 ↔ 203.87)	1324.14 (1022.82 ↔ 2005.14)	1624.72 (1130.55 ↔ 2096.03)	2001.12 (1460.43 ↔ 2792.70)

For other measures of wealth, we find significant positive effects. Significant differences are found on the adjusted means for financial assets (\$1,323.01); total wealth (\$1,672.18); and net worth (\$2,048.20). These values fall into 95% bootstrap confidence intervals bounded by \$946.02 and \$2182.08; \$190.50 and \$2463.33; and \$1479.44 and \$3090.02, respectively.

As previously mentioned, the rationale for conducting a sensitivity analyses was to check if the overlap of the treatment and comparison group in the matching was stable. Bandwidth specifications and trimming were used to test the sensitivity. When we examined the different estimates, the results for all the wealth variables were stable. Further, the trimming showed there was good overlap, which indicated the matching procedure was adequate. Consequently, the DiD

estimates were considered to be reliable. For productive assets, financial assets, total wealth, and net worth, all the analyses showed a 95% bootstrap confidence interval bounded by non-zero DiD estimates.

Discussion

The primary objective of this study is to determine the wealth impacts of an asset-building intervention on rural households in SSA. In other words, we want to answer the question of whether those in the asset-building intervention have accumulated more assets than participants who did not receive the intervention.

The results of our analyses indicate that the asset-building intervention has positive effects on several measures of wealth of participants who received the intervention, including financial assets (+\$1,323), total wealth (+\$1,672), and net worth (+\$2,048). These effects are not only significant, but economically very meaningful. Positive changes in resources of this magnitude among very poor villagers in Uganda are substantial. To put the results in perspective, the average annual cash income of a village household in rural Uganda may be \$340 per year, so the intervention effect on net worth over a 13-month period would represent the equivalent of over 5 years of cash income. An effect size of this magnitude materially alters household well-being and very likely improves quality of life.

In practical terms, these findings mean that participants who received the intervention hold more assets and therefore will likely have more income for their families, greater educational opportunities for their children, improved economic stability for their families, and increased opportunities to accumulate additional assets.

It is reasonable to expect that financial assets might display significant effects of the intervention, because the program design included access to a bank account and a commitment by participants to make regular deposits into the account without making frequent withdrawals. In addition, because treatment group participants had formal bank accounts with saving statements, unlike their counterparts in the comparison group, it is possible—maybe likely—that those in the intervention had a recollection of amounts in their accounts, and therefore, made more accurate reports of savings in their survey answers. In addition, savings data could easily be compared with the account monitoring software MISIDA (a Management Information Systems software used to monitor the savings accounts of the treatment group) for verification. In contrast, the comparison group had to rely on memory recall of savings amounts, which could not be verified. The comparison participants' reliance on memory may have introduced an imbalance into the comparison of the financial assets between the two groups.

The net worth effects displayed a substantial difference of \$2,048 between the treatment and comparison groups. Basically, the net worth effects are the change in net worth over time. For example, a person's net worth increases over time if he or she engages in both paying off debt and accumulating savings. Thus, the interpretation of net worth effects in this study might be that participation in the program had an impact on participants' debt repayment over and above the improvement in their savings behavior. In practical terms, this finding of net worth effects means that the intervention may increase economic stability for households in SSA because the intervention increases households' access not only to assets that are needed for day-to-day responsibilities, but also the collateral needed to acquire additional assets to sustain the family in the

long term. In addition, this economic stability might provide households with the possibility for greater future planning. In times of crisis or disaster, these families could use their assets to cushion the impact of turbulent events.

On the other hand, we find no significant impact of the asset building intervention on productive assets. What could be the possible explanation? It could be that productive assets have not been measured well (recall that we used average market prices rather than participant reported values for productive assets). It could be that savings intended for productive assets were kept in financial form and reported. It is possible that a substantial number of participants at Wave 2 had not yet purchased their asset, and their savings were still held in financial form (i.e., savings in a bank account). Or it could be that savings were used for tangible and productive assets, but then quickly sold and the assets returned to financial form (assets are always fungible and there is a long history in development of participants selling tangible assets and using the money for something else). Either of these latter explanations would be consistent with the pattern of results that we find.

Overall, the findings for impacts on total wealth and net worth are noteworthy. In development studies, there is little previous rigorous research on total wealth and net worth, and this study finds large positive effects. Also, it seems likely that some financial assets will be transferred into productive assets over time, and treatment participants will eventually own more productive assets.

The goal of the intervention was to demonstrate that an intervention consisting of access to banking mechanisms, financial education, saving incentives, and peer support may have positive effects on asset holding and the ability to save. Due the study design, we can say with reasonable confidence that the combined intervention led to positive and meaningful results, but we are unable to say what particular aspects of the multi-faceted intervention caused the impacts. Perhaps it is less a matter of savings incentives, and more a question of access to banking or financial education. Perhaps with the same training and support, the comparison group could have accumulated assets as effectively as the treatment group. Future research should attempt to test variations of this intervention and ask these fundamental questions.

Policy implications

The present study finds positive impacts of an asset-building intervention on those who participated in the intervention. These results are similar to findings from asset-building research in industrialized countries that have shown that planned asset-building vehicles contribute in some degree to savings, asset accumulation, economic stability, political participation, and better social outcomes (McBride, et al., 2003; Moore, et al., 2001; Scanlon & Page-Adams, 2001).

In the SSA region, poor people's access to institutionalized asset-building instruments is quite limited. This lack of access to institutional banking is a primary reason poor households continue to use informal systems of accumulating assets. As few as one-quarter of households in developing countries have any form of financial savings with formal banking institutions (Mas & Siedek, 2008). Having access to financial services is a fundamental tool to build productive capacity of households, to smooth expenditure when cash inflows are erratic (e.g., due to seasonality of crops), and to protect against emergencies (natural disasters or death in a family). Although families accumulate some assets through these informal savings groups, the savings tend to be in small amounts that do not enhance long-term well-being or economic stability. Providing access to safe, secure, and simple

asset-building vehicles that are protected by law may assist poor families to accumulate assets that can enhance their well-being.

In addition, assistance to poor families in this asset-building trajectory should include incentives or capital (sometimes called cash transfers) to boost the families' immediate asset base, allowing them to engage in meaningful asset accumulation activities. Such assets policy should ensure inclusion of those who are typically denied access to asset-building products because of prohibitive requirements such as requiring formal employment to open an account. Also, with increasing technological development, including cell-phone banking and bio-identification, those who lack formal education should no longer be excluded from access to financial services and products. The accounts offered in this applied research offer an example of an asset-building instrument that successfully provided a simple, safe, and easily understood product that was accessible for poor people in a developing country.

Thinking more inclusively, asset-based policy in developing countries could also target the younger generation. Providing savings vehicles for younger children may produce a generation that understands the importance of savings and engages in saving and other financial practices more effectively. Products to promote a lifelong habit of savings could be in the form of accounts for all children that are established at birth. Although a program of universal child accounts would be an ambitious goal, steps toward this goal can and should be taken. Implementation could take place in stages over a period of years.

One of the main constraints to access to asset building and other financial services is the cost of reaching dispersed and low-income populations. As noted above, greater access may be achieved by adopting systems that use a low-cost, high-volume transactional environment such as branchless banking, mobile banking using cell phones, or the Internet. A flexible banking system should allow people to pay into or cash out their accounts by interacting remotely with the bank using information technology in a trusted way. Given the expansion and reduction in costs of computer access and related information technology, the potential for greater—perhaps even universal—access seems promising.

Conclusions and Future Directions for Research

This study has investigated the impacts of an asset-building intervention on rural households in SSA. Given the economic and social context of SSA, it is particularly challenging for poor households to gain economic stability. These households engage in innovative and often less-than-successful strategies for acquiring economic stability due to limited access to formal financial instruments and tools. These innovative strategies may include informal and unregulated ways of saving that often put poor people's savings at risk. Apart from lack of regulated financial tools, access is limited to existing formal savings tools due to the complexity of available financial products, lack of familiarity with financial institutions, and often high transaction costs because of distance to financial institutions. The asset-building intervention in this study has included incentives and structures for saving, financial education, peer support, and asset-specific training. This intervention addressed some of the crucial concerns that have been discussed in savings research concerning barriers to savings for poor people. These barriers include lack of proximity to financial institutions, inconvenience (long queues, feeling of intimidation), and high costs. In contrast, asset-building interventions such as the one in this study are simple, accessible, localized, and appeal to poor

people because they address the assets that poor people themselves use every day and view as viable. In addition, asset-building accounts at the most basic level could be viewed as a “gateway product” to other financial products and services that poor people may access after engaging in asset-building financial products and programs.

Overall, results of this study show that asset-building interventions have potential utility as a policy solution for improving the economic well-being of poor households in SSA. As an incentive to encourage the poor to save, many asset-building interventions provide an opportunity for matched saving (see Schreiner & Sherraden, 2007; Sherraden, 1991). In addition, asset development accounts can provide governments and international organizations with opportunities to channel resources for development directly to poor families. Because the resources reach the poor families directly, expenditures for overhead costs by nongovernmental organizations are eliminated or greatly reduced, which gives poor people more resources at their disposal to improve their economic well-being.

In view of the existing disparities in asset accumulation pathways in SSA, asset-building interventions appear to be an effective way of providing marginalized populations, especially women, with a vehicle to accumulate assets. If taken to scale and offered as a universal public program, asset-building interventions have the potential to mitigate the barriers that women and the poor face in accumulating assets. Implementation of a region-wide program would not only benefit the women of SSA but also future generations because children are direct beneficiaries of the positive outcomes of asset ownership by women.

It is clear that more research should be undertaken to investigate the efficacy of asset-building strategies, as well as the effects of assets on households in SSA. Future research should include longitudinal studies that address causal relationships with variations of asset accumulation pathways. The pathway variations investigated should include savings programs targeted towards households over time, the effects of various incentives, and tests of impacts on outcomes in the areas of education, health, future investment, accounts targeted (particularly for children in the household), and various levels of community involvement. Such findings would offer more definitive evidence to inform programs and policies.

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