JOURNAL OF SOCIAL SCIENCES, HUMANITIES AND INNOVATION

Vol 1 Issue 4 (2026)

http://jsshi.org/

Do Matching Grants Improve Rural Household Asset Building? Insights from Smallholder Farmers

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Keywords:

Matching Grant Programs, Smallholder Farmers, Asset Accumulation, Productive Assets, Rural Livelihood

Abstract:

Smallholder farmers in developing countries often struggle to build productive assets, which limits their ability to improve their livelihoods over time. Matching grant programs are designed to help farmers invest in their farms, but it is unclear whether these programs lead to lasting improvements in household wealth. This study looks at the effect of a matching grant program on household assets using data from 352 smallholder households. We use a difference-in-differences method and create an asset index based on principal component analysis to measure changes in household assets over time. The results show that households in the program increased their asset index by about 2.63 standard deviations compared to households that did not participate ($p < 0.001$). In practical terms, this is similar to gaining several livestock and important farm tools, showing a clear improvement in productive capacity. Robustness checks using alternative asset measures, including factor-analysis-based indices and simple asset counts, give similar results, confirming the effect is reliable. These findings suggest that well-designed matching grant programs can help smallholder households build assets, become more resilient, and improve their long-term livelihoods.

1. INTRODUCTION

The concept of poverty reduction has now begun to change in the past years whereby emphasis has not been given to short-term income/consumption but household assets accumulation over a long period. The empirical studies across the world have revealed that asset accumulation can help alleviate household resilience, decrease shock vulnerability, and disrupt interests of combining generations in poverty(Banerjee et al., 2021; Lade et al., 2017) . In the case of rural communities in Sub-Saharan Africa, including Zambia, such assets are a life-sustaining device in terms of standing against the frequent climatic and market risks(Adelaja et al., 2021; Baptista et al., 2022; Maziya et al., 2024). Although the theoretical view is that asset accumulation is the

solution to avoiding poverty traps, poverty is still rife in Zambia rural societies where most of the households are not cash strapped or have no access to the formal credit to invest in the productive investments. Thus, most households are still asset-poor, which restricts their possibilities to alleviate livelihoods or adapt to shocks(Dhar & Dutta, 2025; Gupta, 2024). This indicates an international and national shortage of new financial programs that allow households to make investments in productive resources, enhance their resilience, and help them enhance sustainable upward social movement in the long run. The matching grant is one promising strategy that could be used to attract investment among people as it will reduce the entry cost. In comparison with cash transfer which is aimed at immediate usage, matching grant entails that some of their own resources should be utilized by the recipients. This will promote local ownership and the intervention will be more sustainable. Theoretically, such grants accomplish two purposes, the first is affording the capital used by households to adopt productive technologies, and the second is encouraging future planning and saving (Koomson et al., 2023; Wang et al., 2018). Numerous government-funded and donor-funded programmes in Zambia are targeted to assist the rural livelihoods of the country by empowering the smallholder farmers to enhance production and rural infrastructure development. As an example, the Smallholder Agribusiness Promotion Programme (SAPP) and Enhanced SAPP (E-SAPP) offered matching grant to farmer groups to invest in small-scale processing facilities, storage, and post-harvest equipment (IFAD, 2024). Similarly, Agricultural Productivity and Market Enhancement Project (APMEP) facilitated the increase of productivity and access to the market through subsidizing irrigation facilities, farm machinery, aquaculture, livestock support, and community market facilities. Another initiative, funded by the World Bank, TRALARD project assists with climate-resilient production, natural resource management, and irrigation development in rural places, including Luapula. Moreover, through Zambia Agribusiness and Trade Project (ZATP and ZATP-II) farmer organisations (and their associated communities) receive grants to gain access to productive resources, small-scale infrastructures, and climate-responsible technologies to enhance their competitiveness and market involvement.. While these programmes collectively support asset accumulation at the group or community level, there is limited empirical evidence on whether matching grants and asset investments lead to sustained increases in individual household assets, beyond short-term operational or enterprise-level improvements. Such a gap in knowledge highlights the importance of the research on the conversion of such interventions into household-level building of assets and resilience in the long term of smallholder farmers. This paper examines matching grants potential in Chipili district on the impact of such programs in accumulating household assets. Although much of the previous literature has focused on matching grants on Small and Medium Enterprises (SMEs), there is less information on how matching grants affect the individual households of rural areas and their allocation of asset portfolio. With regard to Chipili district, this paper offers an argument concerning the evidence as to whether matching grants affect real increases in asset ownership or merely substitute household savings. Through such contribution, the study is attempting to contribute to the broader debate of creating social protection frameworks that can bring the African households out of survival and into more sustainable and stable livelihoods.

1.1 Research Objective

This study aims to assess the effect of a matching grant program on household asset accumulation among smallholder farmers in Chipili District, Zambia.

2. Literature Review

2.1 Theoretical Framework

The impact of matching grants on smallholder farmers' assets can be explained using Asset-Based Poverty Theory and Credit Constraint Theory. Asset-Based Poverty Theory argues that poverty is not only about having low income, but also about lacking productive assets such as livestock, farming tools, equipment, and savings(Barrett et al., 2006; Chavez & Lufin, 2022; Gupta, 2024). These assets help households earn stable income, cope with climate and market shocks, and gradually move out of poverty. Many rural households remain poor because they do not have enough financial resources to invest in such assets, which limits their long-term economic stability. Credit Constraint Theory supports this explanation by showing why farmers often fail to invest in productive assets even when good opportunities are available(Tilore et al., 2024; Varga, 2017). Smallholder farmers usually face problems such as lack of cash, absence of collateral, and high interest rates on loans. These challenges prevent them from accessing credit and investing in improved farming technologies or assets(Mersha & Ayenew, 2018). Matching grants help to solve these problems by reducing the cost of investment and providing financial support. Because farmers are required to contribute part of the investment, matching grants also encourage responsibility, ownership, and careful use of the assets acquired. Together, these theories provide a strong explanation of how matching grants work. Asset-Based Poverty Theory explains why owning productive assets is important for reducing poverty, while Credit Constraint Theory explains how financial support helps households invest in those assets. When combined, these theories suggest that matching grants can have both short-term and long-term benefits. Households not only gain productive assets but also improve their ability to plan for the future, manage risks, and reinvest in their livelihoods.

Based on these theories, this study hypothesizes that households that receive matching grants will accumulate more productive assets than households that do not receive grants. This reflects the role of targeted financial support in overcoming financial and structural barriers to investment.

2.2 Conceptual framework

The conceptual framework demonstrates how the matching grants help farmers to build assets, and better their livelihoods. The grants involve the financial aid with farmers obliging to chip in with their own funds. This will make it responsible and have a feeling of ownership of the investments made. The matching grants also assist households in clearing deficits of money and inadequate access to credit enabling them to invest in productive assets including farm instruments, machinery, livestock and storage facilities. Such assets enable farmers to produce more, to earn more and take greater risks like climate and market shocks. The more farmers have acquired assets with time; the higher the chances of saving, reinvesting and future planning. The process results in short-term gains in property ownership and in the long-term, gains in livelihoods of households. Figure 1 shows the conceptual framework showing the link between matching grants, asset accumulation, and improved livelihood resilience among smallholder farmers.

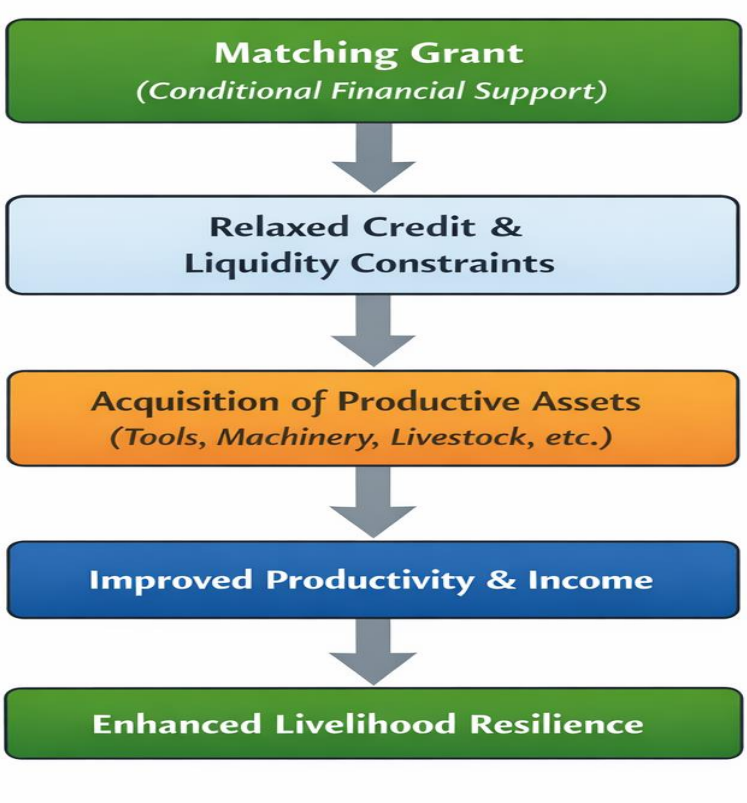


Figure 1: *Conceptual framework*

2.2 Empirical Review

2.2.1 Matching Grants in Agricultural and Rural Development

Matching grants are a common instrument in rural and agricultural development particularly in the Sub-Saharan Africa. The aim of these grants is to stimulate investment but to share the cost of productive assets between farms and implementing agencies. In contrast, matching grants alleviate cash constraints as opposed to normal credit schemes. They also request farmers to make a contribution to the cost which makes them feel ownership and more committed to the project. Matching grants were frequently implemented by organizations like the World Bank and IFAD to help smallholder farmers get more commercial, start an enterprise, and enter the markets(Bardhi, 2016). It is based on matching grants as these can assist to remedy the issues in rural finance particularly where farmers lack access to sufficient funds in reasonable rates. In most poor nations, financial markets in rural areas are not strong and banks may be inaccessible to small farmers. Matching grants avail a means through which farmers can be able to invest in productive assets, expand their businesses, and better their lives even where they are not able to borrow (Musa & Dahiru, 2025; Sberro-Kessler, 2019). Although matching grants seem to be popular, the evidence regarding their effect remains scarce. There are some studies that indicate positive changes on income and assets but there are few studies that demonstrate these changes. Indicatively, research conducted in Rwanda established that equivalent grants have contributed to horticultural income, household earnings and assets growth by farmers. It also provided

additional employment to the family members and workers, demonstrating that these grants can assist households to better their economic lives. Nevertheless, the outcomes were better among farmers who initially had larger credit or risk issues(Hossain et al., 2022) . Previous research indicates that although matching grants are widely used to promote investment in productive assets and income-generating activities, robust empirical evidence on their long-term effects on welfare and asset sustainability remains limited. Reviews of matching and innovation grant programmes suggest that rigorous evaluations particularly those examining sustained income, productive asset retention, and livelihood outcomes are relatively rare (Ton et al., 2015). This is a significant gap since matching grants are one of the major components of rural development plans and they demand a considerable am A1QGESount of resources.

2.2.2 Grants, Credit Constraints, and Household Asset Accumulation

A major challenge in developing countries is that many poor rural households face serious financial barriers that limit their ability to invest in productive activities. Smallholder farmers, in particular, often struggle to access formal credit markets because they lack sufficient collateral, borrowing involves high transaction costs, and lenders face difficulties in obtaining reliable information about rural borrowers(Adjognon et al., 2017; Eidt et al., 2020) . As a result, households may fail to invest in opportunities that could generate high returns, which can contribute to persistent poverty over time. Matching grants may help reduce these constraints by providing farmers with upfront support to acquire productive assets such as livestock, farm equipment, and improved technologies. Empirical evidence shows that easing capital constraints through grants or cash transfers can encourage poor households to invest more in income-generating activities and gradually build their asset base. For example, experimental studies in Africa find that unconditional cash transfers increased savings, productive activities, and ownership of durable assets while the programs were implemented (Handa et al., 2018; Handa et al., 2025). Similarly, randomized evaluations in Tanzania indicate that cash support led households to increase investment in small enterprises and productive capital (Baird et al., 2024). Systematic reviews also suggest that cash transfer programs improve household welfare more broadly and can strengthen economic stability and resilience among beneficiaries(Pega et al., 2022). Asset accumulation is particularly important in rural areas because assets often provide a more stable measure of wellbeing than income, which tends to fluctuate in agrarian settings. Durable assets enhance household resilience by supporting consumption smoothing and helping families cope with unexpected shocks. Households with greater asset holdings are generally better able to manage challenges such as unemployment, rising food prices, or crises like the COVID-19 pandemic. These assets can also reduce food insecurity and influence the coping strategies households adopt during difficult periods (Berdegué et al., 2024; Berdegue et al., 2023). Evidence from other contexts further highlights the role of assets in managing risk. In rural India, households rely on assets as a form of self-insurance to smooth consumption when income shocks occur, especially in the absence of formal insurance systems (Malaeb, 2016). Likewise, research from Senegal shows that asset ownership helps lessen the negative impact of shocks on consumption, underlining the importance of assets in maintaining household economic stability (De Vreyer & Lambert, 2014)

2.2.3 Matching Grants and Household Welfare

Empirical findings on matching grants are mixed, with outcomes varying across contexts and program designs. Some studies find that grants can promote investment, improve enterprise performance, and increase income, especially when combined with complementary services such as training and market access support. For example, evaluating a matching grant scheme targeting horticultural entrepreneurs in Rwanda, Hossain find that beneficiary households experienced significant increases in household income, employment generation, and durable asset holdings compared to non-beneficiaries, indicating that matching grants can promote longer-term economic resilience and asset accumulation. Similarly, more recent experimental evidence further confirms that capital grants enable firms to upgrade to higher-technology durable assets, leading to increased productivity and business expansion(Janes et al., 2026) However, other research highlights implementation challenges such as elite capture, weak monitoring, and limited sustainability after project completion(Strand et al., 2022; WorldBank, 2016). In some cases, grant-supported gains appear short-lived and do not translate into durable welfare improvements(Baird et al., 2019). For example, the long-run follow-up evidence of the Youth Opportunities Program in Uganda revealed that entrepreneurial grants initially raised the earnings and employment but the effect on earnings and employment mostly faded out nine years post-intervention, even when there was some asset effect (Blattman et al., 2020).These mixed findings suggest that the effectiveness of matching grants depends heavily on targeting, institutional support, and the broader market environment (WorldBank, 2016). Importantly, while many studies focus on productivity and income outcomes, fewer evaluations explicitly examine household asset accumulation, even though assets capture longer-term wealth creation and structural change. This represents a key gap in the literature.

2.2.4 Research Gap and Contribution of the Study

Although matching grants have become common in agricultural development projects, scanty causal data exists on how they affect the accumulation of assets by households among smallholder farmers. A great part of the literature is concerned with short-term income / production results, and less with asset formation as a measure of wealth creation and resilience in the long-term. The study makes a contribution to the literature, as it estimates the effect of a matching grant program on household asset accumulation of smallholder farmers in Zambia. Based on a difference-in-differences method and an asset index based on PCA, the study offers new evidence on whether or not matching grants can result in long-lasting household wealth improvements. The results provide relevant policy implications on how to design rural enterprise support interventions to support inclusive and sustainable agricultural transformation.

3. Methodology

3.1 Study Area

The research was carried out in the District of Chipili located in the Luapula Province in the Northern part of Zambia which is a rural District. The rationale of selecting Chipili is that the district has a large number of smallholder farmers under the agricultural support programmes including Enhanced Smallholder Agribusiness Programme (ESAPP) matching grant.The district is representative of areas of rural development in Zambia and development interventions have real challenges and opportunities.

3.2 Study Design

The quasi-experimental design based on a difference-in-differences (DiD) instrument was chosen to evaluate the effect of the matching grant on the accumulation of household assets. This design compares time-variation between the farmers receiving the grant (treatment group) and those who did not (control group), with adjustments of differences and time trend existing prior to the study period. Essentially, this approach approximates what outcomes would otherwise have occurred to beneficiaries assuming they were disqualified on the basis of non-beneficiaries.

3.3 Sampling and data collection

A multi-stage sampling method was used. Beneficiaries were randomly selected from matching program records in one agriculture camp, while non-beneficiaries were chosen from nearby agriculture camp with similar socio-economic and farming characteristics. The final sample included 352 households: 240 beneficiaries and 112 non-beneficiaries. Data were collected through structured questionnaires on household demographics, farm characteristics, income, and asset ownership. Key informant interviews were conducted to supplement household data.

3.4 Variables and Measurements

The asset index of the household was the dependent variable, which was produced through the principal component analysis (PCA) of farm equipment, livestock, tools, and durable goods. Other tests to achieve robustness were also employed, such as factor analysis and simple counts. The primary independent variable was interaction of the treatment indicator (1 = beneficiary, 0 = non-beneficiary) and the post-intervention indicator (1 = after, 0 = before). The controls variables were the age, gender, education, household size, farm size, and primary farming activity.

3.5 Empirical Strategy

The study estimated the following DiD regression model:

We estimate the effect of the matching grant on household asset ownership by fitting the following difference-in-differences specification

$$asset_{index_{\{it\}}} = \alpha + \beta_{1,Post_{\{t\}}} + \beta_{2,Treat_{\{i\}}} + \delta,\left(Post_{\{t\}} \times Treat_{\{i\}}\right) + u_{\{it\}}$$

where:

$AssetIndex_{it}$ is the first-principal-component score of household i's asset vector at time$_t$.

$Post_t$ = 1 if post-intervention (endline), 0 if baseline.

$Treat_i$ = 1 if household i was assigned the matching grant, 0 otherwise.

δ is the coefficient of interest (the average treatment effect, in SD units).

u_{it} is the error term (standard errors clustered at household level).

This DiD approach nets out both unobserved, time-invariant household heterogeneity and common macro- or season-specific shocks, relying on the parallel-trends assumption for identification (Angrist & Pischke, 2009). shows that, under this assumption, the interaction term consistently estimates the program's causal effect. We cluster standard errors at the household level to account for within-household serial correlation (Cameron & Miller, 2015). According to Filmer and Pritchett (2001),the dependent variable is constructed via principal components analysis. Each of the 26 asset indicators ranging from farm implements to durable household goods is standardized to mean zero and unit variance before PCA extraction of the first component.

3.6 Ethical Considerations

The University of Zambia Humanities and Social Research Ethics Committee (HSSREC) review granted ethical approval. Furthermore, the Ministry of Agriculture granted the researchers permission to collect data from the farmers. Participants were requested to provide informed consent, and personal information identifiers were removed to ensure confidentiality.

4. Results

Table 1:Demographic characteristics of the Respondents

Variable	Beneficiaries (N=240) (%)	Non-Beneficiaries (N=112) (%)	Total (N=352)(%)	Chi-square (p-value) χ^2(p)
Age				
Under 30	59(24.6)	18 (16.1)	77 (31.9)	
30–39	61 (25.4)	35 (31.3)	96 (27.3)	
40–49	98 (40.8)	37 (33)	135 (38.4)	
50 and above	22 (9.2)	22(19.6)	44(12.5)	11.39 (0.010)
Gender				
Male	147 (61.3)	74 (66)	221(62.8)	
Female	93 (38.8)	38 (33.9)	131(37.2)	0.76(0.383)
Education Level				
No formal education	63 (26.3)	9(8.0)	72 (20.5)	
Primary	129 (53.8)	68 (60.7)	197 (56)	
Secondary	48 (20)	31(27.7)	79 (22.4)	
Tertiary	0(0)	4(3.6)	4(1.1)	23.625 (0.000)
Main Farming Activity				
Crops	188 (78.3)	104(92.9)	292(48)	
Livestock	0(0)	6(5.4)	1.7 (6)	
Mixed	52(21.7)	2 (32)	54 (15.3)	34.474 (0 .000)
Household Size				
1–2	15 (6.3)	2(1.8)	17 (4.8)	
3–5	115(47.9)	61(54.5)	176(50)	
6–8	93 (38.8)	43(38.4)	136 (38.6)	
More than 8	17(7.1)	6(5.4)	23(6.5)	4.157(0.245)
Farm Size (hectares)				
Less than 1	20 (8.3)	10(8.9)	30 (8.5)	
1–2	48(20)	13 (11.6)	61(17.3)	
2–5	46(19.2)	43 (38.4)	89 (25.3)	
More than 5	126(52.5)	46(41.1)	172(48.9)	16.341 (0.001)

Source: Primary Data

Table 1 shows the background characteristics of matching grant beneficiaries and non-beneficiaries. Some differences between the two groups are statistically significant. Beneficiaries were mostly between 40 and 49 years old, while non-beneficiaries had more farmers aged 50 and above ($p = 0.010$). The gender distribution was similar, with most respondents being male, and the difference was not significant ($p = 0.383$). Education levels differed between the groups ($p < 0.001$). More beneficiaries had no formal education, while non-beneficiaries were more likely to have secondary or tertiary education. Farming activities also differed ($p < 0.001$), as non-beneficiaries mainly grew crops, while beneficiaries were more involved in mixed farming. Household size was similar across both groups ($p = 0.245$). However, beneficiaries generally had larger farm sizes compared to non-beneficiaries ($p = 0.001$). This suggests that farmers with more land were more likely to benefit from the matching grant programme.

Effect of matching grant on household assets

Table 2 shows Loadings and unexplained variance for each of the 26 asset variables on the first principal component (PC1), which explains 12.91% of total variance.

Table 2: Household Asset Index

Asset Variable	PC1 Loading	Unexplained Variance
hoes_owned	0.1184	0.953
slashes_owned	0.2062	0.8573
ploughs_owned	0.3471	0.5957
ox_cart_owned	0.1173	0.9538
tractors_owned	−0.0109	0.9999
rippers_owned	0.0515	0.9914
hammer_mill_owned	0.0556	0.9891
hand_mill_owned	0.1625	0.9736
bicycles_owned	0.2551	0.9349
motorbikes_owned	0.1255	0.9843
cars_owned	0.0712	0.9949
battery_solar_owned	0.2445	0.9403
radios_owned	0.236	0.9443
televisions_owned	0.1874	0.9649
cell_phones_owned	0.2173	0.9527
sewing_machines_owned	0.2121	0.955
tables_owned	0.161	0.9741
mattresses_owned	0.1779	0.9683
braziers_owned	0.1365	0.9813
satellite_dish_owned	0.1057	0.9888
cattle_owned	0.1097	0.9879
goats_sheep_owned	0.2842	0.9192
poultry_owned	0.3633	0.8681
small_shop_trading	0.0499	0.9975
handicrafts_artisan	0.1146	0.9869

Baseline Balance

Table 3: Pre-intervention balance results

Group	Obs	Mean	SD	95% CI
Non-beneficiaries (0)	224	–1.3618	1.0527	[–1.5004, –1.2232]
Beneficiaries (1)	480	0.6355	1.7716	[0.4766, 0.7944]
Difference		–1.9973	0.1278	[–2.2481, –1.7464]

t = –15.63, p < 0.001.

Table 3 shows pre-intervention balance results that suggests an imbalance difference between not matching grant farmers and beben with the treatment group having a mean PCA asset index of 0.6355 while the control group's index is –1.3618. The difference of –1.9973, t-value –15.63, p<0.001, validates the need for a Difference-in-Differences (DiD) approach. This pre imbalance discrepancy is important because it confirms the validity of the DiD approach where we can disregard certain factors affecting the asset index's causal relationship over time. We observed a significant difference in the treatment group's PCA index which suggests that this group was more asset-wealthy than the control, which poses challenges in estimating treatment effects. The pre-treatment imbalance justifies the DiD approach.

Difference-in-Differences (DiD) Estimates

Table 4: Effect of Grant on PCA Asset Index

Variable	Coef.	SE	T	p-value	95% CI
Post	–0.1004	0.1088	–0.92	0.357	[–0.3144, 0.1137]
Treat	0.6547	0.1103	5.93	0.000	[0.4377, 0.8718]
Post×Treat	2.6258	0.145	18.1	0.000	[2.3405, 2.9111]
Constant	–1.2914	0.0889	–14.53	0.000	[–1.4662, –1.1166]

N = 704; clusters = 352; R^2 = 0.6490; Root MSE = 1.024.

The findings from the DiD estimates in Table 4 shows positive effect of the matching grant on the PCA asset index. From the interaction term (Post×Treat) result of 2.6258, indicate that the matching grant increases the asset index by around 2.63 standard deviations relative to the control group. This effect is also robust and practically significant (p < 0.001), implying that the matching grant has a considerable effect on asset accumulation.

Robustness Check

The alternative indices used in our robustness checks further confirm the credibility of our results. Treatment effect consistency outlined in Table 5 also shows that they remain large and significant across all other specifications of asset indices, be it the factor-analysis based asset index,/simple count of assets. Such treatment effect consistency across diverse parameters strengthens our findings and indicates that the effect of the matching grant is not a mere product of the index construction used.

Table 5: Treatment Effect Across Alternative Indices

Index Specification	Post×Treat Coef.	SE	T	p-value	95% CI
PCA-based AssetIndex	2.6258	0.145	18.1	0.000	[2.3405, 2.9111]
Factor-analysis AssetFA	1.3099	0.0697	18.81	0.000	[1.1729, 1.4469]
Simple count AssetCount	16.5036	0.9026	18.28	0.000	[14.7283, 18.2788]

The observed effect sizes (1.3099 for factor-analysis asset index and 16.5036 for simple count asset index) suggest that the asset values, as well as the scope of assets held by beneficiaries, have increased with the support of the matching grant.

Asset Index Distribution

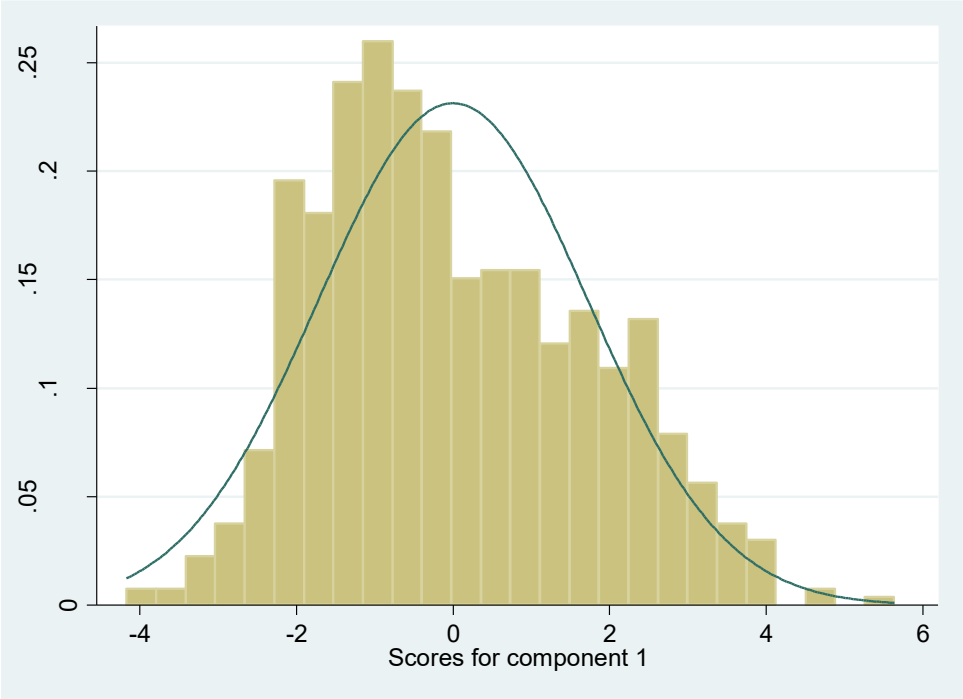


Figure 2: *Distribution of the PCA-based Asset Index*

As demonstrated in Figure 2, the distribution of the PCA asset index appears to be approximately normal with a slight tail on the right, confirming the appropriateness of applying Ordinary Least Squares (OLS) regression for our analysis. This indicates that a large portion of respondents possess asset indices towards the mean value, but there is also a substantial portion of those with high asset accumulation, referred to as outliers. The right skew may be indicative of a few participants who, owing to the matching grant, have disproportionately profited and reveal the striking inequality that potentially exists in asset accumulation among beneficiaries.

5. Discussion

The difference in difference regression results reveals a significant positive effect of the matching grant intervention on the asset index, with an estimated increase of 2.63 standard deviations for treatment households compared to their non-matching grant counterparts. This finding is not only statistically significant ($p < 0.001$) but also practically meaningful, suggesting that the intervention has a substantial effect on asset accumulation. The coefficient on the interaction term (Post × Treatment) indicates that, after controlling for pre-existing differences and time trends, the matching grant recipients experienced a marked improvement in their asset position. This aligns with existing literature that posits that targeted financial interventions can effectively enhance household welfare and economic resilience. For instance, one of the most recent Study by Banerjee et al. (2021), titled “Long-Term Effects Of The Targeting The Ultra Poor Program” found that the considerable asset index increases for the so-called ultra poor as a result of BRAC’s ultra poor asset-transfer program. This means that matching grant farmers did not merely acquire new productive assets and but also improved in other areas of livelihood.

Such asset accumulation can have enduring impacts on livelihood (Haushofer & Shapiro, 2018). Greater resource wealth raises resilience and income potential, especially in the future. The result is robust in the sense that whether we construct the asset index using PCA, factor analysis (1.3099), or even simple counts (16.5036), it does not change based on how the index was created. The reliability of the finding regarding smallholder farmers underscores the positive program influence on asset construction for the smallholder farmers who were beneficiaries of the matching grants. The study finding is in line with the growing literature on combined asset-and-training programs. For instance, Argent et al. (2014) examined the "One Cow per Poor Family" program in Rwanda, where some participants received additional training while others did not. They discovered that training added to livestock transfers had "permanent and economically significant impacts on asset accumulation." In fact, even in a difficult rural setting, the combination of assets plus training considerably enhanced milk yields, earnings, and rural assets. Similarly, Hossain et al. (2022) analyzed a horticulture matching-grant scheme in Rwanda using regression discontinuity design and found that the grants not only increased income from horticulture but also wage income, employment, and household assets. They describe these results as "increases…asset holdings" and "long term positive impacts on the livelihoods of small-scale producers." These results closely resembling this study's argument strongly suggest that adequately designed grant programs coupled with training tend to significantly increase smallholders' resources in diverse African settings. In contrast, earlier reviews focusing solely on training are often less optimistic. For example, Stewart et al. (2016) conducted a systematic review of African agricultural training and found no average impact on farm income or yield from farming training alone. They observe that most straightforward training interventions did not increase total harvest value unless highly participatory, such as through Farmer Field Schools. With those study results in mind, it is reasonable to determine that adding training to support with tangible assets or funds significantly enhances impact. The matching grant used in this study effectively relaxed credit constraints and factored training into concrete funding, like for equipment or inputs, which significantly increased impact. Argent et al. (2014) do assert, however, that assets and skills complement each other tremendously: trained farmers are able to effectively utilize new assets and attain returns that would not be possible from mere cash transfers or gifts of assets." A 2.63 SD increase in assets corresponds to considerable returns. Argent et al. (2014) point out that the rate of return to training in their context was "high and likely larger than for other investments available to beneficiaries." In practical terms, they find that modest training costs were recouped if households increased milk production for just a few extra months. Similarly, our result implies that the matching grant's cost may have been easily offset by gains from higher production, better crop and livestock management, or new income sources enabled by the assets. The robust positive effect across index measures suggests the intervention led to broad asset purchases (tools, equipment, livestock, durable goods, etc.) rather than only cash smoothing. Such asset gains are likely to compound over time: owning more and better farm capital often raises next-season yields and income, feeding back into still greater accumulation (Banerjee et al., 2021; Hossain et al., 2022). Moreover, the design of matching grants can explain sustained benefits. The matching component ensures farmers themselves invest which research shows promotes effort and viability(Hossain et al., 2022) . The attached training helps farmers manage new assets effectively. Sberro-Kessler (2019) World Bank review finds that agriculture-focused matching grants tend to be "more successful and larger" than non-agricultural ones, especially when they include group eligibility, equipment purchases, and technical assistance. Our program incorporated several such features: it targeted farming activities, required beneficiary investment (half the funds), and provided extensive training.

These factors, consistent with best practices in the literature help explain the unusually large impact on livelihoods.

6.Conclusion and Recommendation

6.1 Conclusion

This paper has analysed how an agricultural matching grant programme has impacted on household asset accumulation among smallholder farmers. In a difference-in-differences design, the findings indicate that the intervention had significant and statistically significant positive effect on the asset index. Beneficiary households gained approximately 2.63 standard deviations of assets relative to non-beneficiaries, which means that they gained significant economic status and strength. The results indicate that equal grants can be efficient in alleviating credit limitation and assist farmers to invest in productive resources like equipment, livestock and durable goods. Notably, the positive influence is strong in various approaches to creating the asset index, which proves the effectiveness of the findings. The research paper adds to the accumulating findings that asset-based support with training yields more and more durable livelihood changes than training-only initiatives. The matching grant design promotes the sustainable accumulation of assets by encouraging farmer co-investment, and technical assistance reinforces the outcome of smallholder development. In general, the findings suggest that properly structured matching grant programmes can have a significant role in enhancing welfare of rural areas, productive potential, and inclusive agriculture transformation in low-income contexts.

6.2 Recommendation

Policymakers should explore the idea of increasing matching grant programmes, these programs can assist smallholder farmers to develop productive assets and enhance their livelihoods. Grants cannot work effectively without training and technical support that will make sure farmers use new resources correctly and receive long-term benefits. The design of programmes also ought to encompass the flexibility of co-investment, or special provision to access poorer and smaller farmers who may otherwise be locked out. The need to have farmers to contribute part of their own resources fosters ownership and hard work, which promote sustainability. Lastly, asset gains should be monitored and evaluated over the long-term to ensure that they are still enhancing income and resilience in the long-term.

6.3 Limitations of Study

Although this study provides solid evidence on the benefits of matching grants, it has a few limitations. To begin with, the analysis is based on observational data and, though the difference-in-differences assists in balancing the differences that existed before, the results could still be affected by the unobserved factors. Second, the analysis is limited to the accumulation of assets and ignores the other dimensions of household welfare including the consumption, health or the education outcomes. Third, the results are founded on a given a matching grant programme in Chipili district and thus may have restricted applicability to other regions or contexts. Lastly, the study also captures short- to medium-term effects, thus, so it does not provide evidence on the very long-term sustainability of the asset gains.

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