

Asset Poverty, Technology Adoption and Livelihoods in Rural Ethiopia

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Traditional income measures of poverty do not distinguish between chronically poor households and those experiencing more temporary poverty due to passing conditions. Furthermore, income-based classifications consider non-poor households to be both those that are at risk of falling into poverty as well as those that are not at risk. The tendency to group households that are likely to exit poverty independently with other poor households who cannot exit poverty without assistance, however, can undermine the targeting of interventions to alleviate poverty and distort evaluation of anti-poverty programs. Newly developed asset-based poverty measures enable more nuanced identification of poverty status that can lead to better program targeting. This study uses panel data from Ethiopia to generate an asset-based poverty classification scheme. Regression results are used to derive an asset index and classify households into various categories of poverty. The asset-based poverty classifications are found to predict future poverty status more accurately than income-based measures, implying that the asset-based measure could be used to more carefully target and evaluate poverty interventions. This implication for program evaluation was further tested via an analysis of the differential impact of governmental, non-governmental, and donor programs on the behavior and wellbeing of rural households. In particular, I consider the impact of micro-credit services on Ethiopian farmers in differing degrees of asset poverty. Results show that the impact of participating in these programs on household livelihood and the adoption of new technologies varied with poverty status. Similarly, results further reveal that the impact of modern technologies (use of chemical fertilizer, pesticides or irrigation) varies with asset-poverty status. These findings imply that distinct institutions and technologies may be required for households with specific, identifiable poverty characteristics.

Background

Since Ethiopia's political transition in the early 1990's, the government has embraced market-oriented economic policies and macro-economic reforms as tools for stimulating the economy and reducing poverty (Rashid et. al., 2006). Several studies by the Ethiopian Economic Association and Dercon (2006) also show that the economy has grown since the economic transition. While the incidence of poverty in Ethiopia has fallen, it remains staggeringly high with over 84% of the population still living on less than \$2 a day (UN, 2006). Faced with persistent rural poverty, the Government of Ethiopia, donor communities and NGOs have increasingly sought to improve farmers' access to modern technologies and agricultural markets.

Despite numerous institutional interventions to promote agricultural innovation, technology adoption rates remain low in rural Ethiopia (Spielman et al, 2007), and the impact of many technologies and interventions among the poorest households has not been formally tested. This research thus explores the differential impact of micro-credit services on technology adoption and the livelihoods of farmers in rural Ethiopia.

Identifying and applying an appropriate mechanism for poverty classification are necessary preliminary steps to measuring any existing differential impact of micro-credit services over poverty classes. The poverty measure should distinguish between households that are consistently poor or non-poor from those that are transitionally poor or non-poor due to passing climatic or market conditions. While this distinction is not always possible with traditional income based measures, it can be applied with asset-based measures.

Asset-based approaches use the expected returns on households' physical and human assets to categorize households into poverty classes. The asset poverty line is generated using a regression analysis to determine the minimum assets required to generate and sustain consumption at the income poverty line. Households whose assets imply that their income will be below the poverty line are asset-poor, while those whose assets are expected to yield incomes above the income poverty line are asset non-poor. In any given year, exogenous factors may give an asset-poor household the ability to consume above the poverty line. Due to lack of assets, such a

household is unlikely to sustain this consumption and thus can be considered to remain poor. Likewise, a household with many assets may experience a year of low consumption, but the asset-based approach would continue to classify the household as asset non-poor because it has the capacity to increase consumption without external assistance.

Using an econometric model that accounts for household characteristics, village-level features and time-specific incidents, this study estimates the relationship between household assets and consumption expenditures. From this estimation, an asset index measure is generated for each household which can be compared to the minimum asset base to support consumption above the poverty line. The dynamics of this asset measured over the 10 year period considered in the study are used to classify households into those who remained asset-poor in every survey period (chronically poor); those who were never asset poor during the time frame (non-poor); and finally those who transitioned in and out of asset poverty across the decade (transitorily poor). The reference point in this classification is the rural Ethiopian poverty line, which is well below \$2/day. Thus, even those households classified as non-poor for the purposes of this research would generally be considered poor in a global sense.

Using this asset poverty status profile as a basis for analysis, the role of micro-credit on the adoption of three new technologies was explored. The impact of such institutions and modern technologies on household livelihoods was also evaluated for the different asset poverty classes. The technologies considered here are fertilizer use, chemical use, and irrigation. While the research recognizes that participation in micro-credit services could also support livelihood in ways other than influencing the adoption of these or other technologies, the author expects household participation in these institutions to have some effect on their production decisions and behavior. This is because micro-credit organizations in Ethiopia provide credit as well as other services including technical and health trainings. In some instances, they also provide access to various inputs. Furthermore, the current government focus on an agriculture development led initiative (ADLI) has highlighted improved access to information and inputs via these institutions as part of its goal.

Institutional participation and its impact on household livelihood are modeled in a two-step procedure to address potential endogeneity problems caused by unobserved characteristics which could affect both household participation in government or international donor programs as well as technology adoption. Using appropriate econometric techniques, the determinants of household participation in various programs organized by the Government of Ethiopia and other development agencies were first identified and then the impact of the programs on livelihood was estimated.

Major Findings

This study finds that the focus on improving modern agricultural practices inherent in the strategy adopted by the Government of Ethiopia and other development actors has had some benefits. The effect of the various interventions, however, is not evenly distributed because the non-poor accrue most of the benefits.

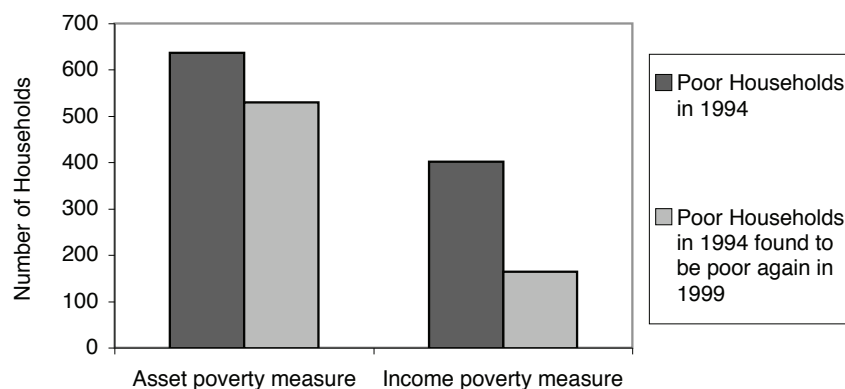
Comparing households across various asset poverty classes suggests significantly different outcomes from technological and institutional interventions than when all households are considered as a single group. For example, aggregating household data without distinguishing poverty status suggests that micro-credit had a positive impact on household welfare as well as on the decision to adopt irrigation practices. A separate analysis, on the other hand, of the different classes of households revealed that this was true only among the asset non-poor. This indicates a need to rethink general approaches to program evaluation that often ascribe failure or success to programs without necessary consideration of the possible differential effects on members of the different target groups.

The goal of this study was to explore if institutional interventions aimed at increasing technological adoption rates and improving livelihoods were having any impact on rural Ethiopian farmers and whether that impact was distributed equally across different classes of those farmers. Given the role that modern practices can play in addressing food security and promoting economic growth, there are potential benefits to expanding their use and effectiveness. With limited land and increasing population, opportunities for farmers engaging in various off-farm activities, especially those involving processing and semi processing of agricultural products, could be very useful sources of income generation. Expanding the use and effectiveness of off-farm activities and modern technology practices necessitates future investigation into why poorer households are not participating and/or benefiting from these practices and associated institutional interventions. Current research is underway to explore the economic rationality of non-adoption behavior in the poorest of households.

Practical Implications

This research has identified a method of poverty measurement that is more consistent in predicting household poverty status in the medium to long-term than direct consumption expenditures or income. This improves policy makers' ability to classify households for program development and implementation and also contributes to the ability to track progress in alleviating chronic poverty in rural Ethiopia. Figure 1 provides an overview of the predictive power of the different measures. It shows that the number of households predicted to be poor in 1994 who remained poor using

Figure 1. A Comparison of Poverty Prediction in Rural Ethiopia Using Asset and Income Poverty Measures



the asset measure is much higher than those predicted by the income measure. The prediction accuracy of the asset measure is over 82 percent. Five-hundred and thirty out of the 637 asset-poor households in 1994 were asset-poor again in 1999. The prediction accuracy for the income poverty measure, on the other hand, is only about 40 percent. One-hundred and sixty-four out of the 402 income-poor households in 1994 were income-poor again in 1999. The more dramatic decline in income poverty as opposed to asset poverty suggests that many of those households whose income placed them out of poverty in 1999 lack the asset base to maintain a non-poor status.

The research also shows that the various classes of poor households are differentially able to take advantage of institutional or donor services and technologies. Unfortunately, the current findings reveal that the benefits accrue more to those households categorized as non-asset-poor rather than those that are consistently rated as asset-poor. Development practitioners can thus use asset-based poverty measures to better target interventions.

Third, the study has shown that asset poverty measures can serve as effective tools for improved program evaluation. Since poor households are not necessarily poor in the same ways, asset-based poverty measures provide a more nuanced approach for program evaluation. While a development initiative may not appear to be effective for an entire village or group of villages when evaluated based on income measures, asset-based poverty measures can identify a program's effectiveness at the household level within the group. Not only can researchers distinguish where the program works, but they can also begin to explore why that is. Though most of the households in our sample are poor by absolute world standards (\$1.08 or \$2 a day), there is still diversity amongst the poor. Households face different constraints which affect their ability to take advantage of those opportunities expected to improve their welfare.

Further Reading

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This project uses panel data techniques to generate an asset poverty classification scheme based on household productive capacity. This asset-based poverty measure is tested against traditional income based measures and found to more accurately predict future poverty status. It can thus be used as a basis for evaluating poverty alleviation programs and interventions.

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