Assets, Shocks and Poverty Traps in Rural Mozambique

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17 July 2009

Abstract
Using a micro-level approach to poverty traps, this paper explores welfare dynamics among households in post-war rural Mozambique. More than a decade after the end of the civil war, poverty levels are still high today and rural areas are frequently faced with shocks, including droughts, cyclones, and crop diseases. Conceptually, the paper builds on an asset-based approach to poverty and tests empirically for the existence of a threshold that results in different accumulation equilibria with household panel data. Thereby it aims to address (1) the nature of poverty transitions made by rural households in Mozambique between 2002 and 2005 (2) the (potential) existence of a poverty trap that leaves some groups of households structurally poor in the long term and (3) whether households at different positions in the wealth distribution differ in their risk management strategies, and how this relates back to welfare dynamics. The paper contributes to the literature by providing empirical evidence on the role of assets in household welfare trajectories and by taking into account the role of shocks and their potential interlink with poverty.

Keywords: poverty traps, welfare dynamics, asset-based approach, Mozambique
1. Motivation

Low-income households in developing countries where financial and insurance markets are incomplete or even absent are exposed to a variety of risks resulting in high income volatility (Baulch and Hoddinott 2000; Dercon 2002, 2005; Paxson 1992; World Bank 2001). Households protect their livelihood by employing risk management strategies in order to reduce the likelihood of shock occurrence ex ante and to mitigate and cope with the impact of a shock ex post (World Bank 2001: 141). The type of risk has been found to be of key importance on the degree of risk insurance achieved by households. Covariate shocks affecting all households in a community or region, such as weather shocks, are generally more difficult to insure and more likely to have a larger impact on household well-being than idiosyncratic shocks (Rosenzweig and Binswanger 1993; Townsend 1994). In this context, it has been found that many of the applied mechanisms to react to income fluctuations are characterized by a lack of effectiveness and are often a cause of poverty in itself (Carter and Barrett 2006; Deaton 1992; Dercon 2002; Rosenzweig and Wolpin 1993; Townsend 1995; Zimmerman and Carter 2003). In addition, low-income households may be faced with longer-term effects of shocks. Uninsured asset losses may cast households into a downward spiral, in which their asset base is brought down to a level below which accumulation growth and improvements of their livelihoods are not feasible. As autarchic savings and investment is no longer possible, these households may find themselves trapped in poverty (Barnett 2008; C. B. Barrett and McPeak 2004; Baulch and Hoddinott 2000; Carter and Barrett 2006; Zimmerman and Carter 2003).

It is crucial to understand households’ vulnerability to poverty and to identify the level and shape of welfare dynamics in order to inform and design policy interventions. For instance, policy responses to a multiple equilibrium situation of household welfare with potential poverty traps would have to be quite different to a single equilibrium situation. This may call for tailored social protection measures that would lift households above the critical threshold so that they may escape poverty in the long term.

This paper empirically explores welfare dynamics and poverty traps in the context of post-war Mozambique, using a micro-approach. The 16 years civil war, lasting until 1992, had devastating effects on human beings, destroyed much of the little infrastructure in place, and forced the state of economic development back to the immediate post-independence level. More than a decade after the ending of the civil war, Mozambique is still one of the poorest countries today. While Mozambique achieved robust macroeconomic growth rates and considerable improvement in overall welfare levels since the end of the war, the majority of the population lives below the official poverty line. About 51.5 and 55.3 percent of the population in urban and rural areas, respectively, were poor in 2003 (Mather et al. 2008). In addition to low levels of market integration, agricultural technology and productivity, rural households have to struggle with recurrent shocks, such as droughts, floods, cyclones, crop pests, and animal diseases. The paper uses two waves of a nationally representative household panel survey to derive factors that determine households’ asset accumulation in this fragile environment. The paper then tests whether some groups of households in rural Mozambique are likely to be trapped in poverty in the long-term. Finally, the paper explores risk management strategies employed by households at different stages in the overall wealth distribution.

2. State of the art and gaps in existing research

Only recently, there have been growing attempts to integrate findings on the impact of risk and shocks on households and their reactions towards them with the analysis of poverty
dynamics. With an increasing availability of longitudinal data for developing countries, researchers and policymakers have begun to move away from static views of poverty as empirical evidence has shown that people move in and out of poverty with varying degrees of duration as well as magnitude (Addison et al. 2009; Baulch and Hoddinott 2000; Hulme and Shepherd 2003; Jalan and Ravallion 2000). An important refinement arising from this is the distinction between transitory and chronic poverty, as researchers try to understand under which conditions poverty reproduces itself in a way that households are unable to take up new economic opportunities and become trapped in a welfare equilibrium below the poverty line.

The analysis of poverty traps at the micro-level has been strongly informed by insights from the convergence controversy over the growth of nations. Specifically, macro approaches have introduced the ideas of conditional or club convergence and multiple equilibria that are associated with critical thresholds of capital or income (a review is provided by Carter and Barrett 2006). In the microeconomic context, risk and shocks are recognized as crucial forces that may lead to such permanent consequences. This may be the case if assets – and particularly productive assets, such as land, livestock, but also human capital in the form of education or health – are irreversibly lost and households are constrained in their access to effective risk management strategies.

These dynamics have been conceptualized by Carter and others in an asset-based approach to poverty (Carter and May 2001; Carter and Barrett 2006; Carter et al. 2007; Zimmerman and Carter 2003). According to this approach, as a first step a static asset poverty line is defined as the level of assets that predicts a level of well-being equal to the poverty line expressed in income or expenditure terms (see figure 1 below). Similar to the concept of vulnerability, the asset-based approach indicates the likelihood of making transitions into or out of poverty over time and allows decomposing such movements into stochastic transitions that are due to positive or negative shocks and structural transitions grounded in a sustainable asset base.

A further step in this framework is the definition of a dynamic asset poverty line, a threshold at which accumulation dynamics bifurcate. As in the macroeconomic approach to multiple

![Figure 1: Dynamic and static asset poverty lines (Source: Carter and Barrett 2006, p. 191)](source: carter and barrett 2006, p. 191)

A further step in this framework is the definition of a dynamic asset poverty line, a threshold at which accumulation dynamics bifurcate. As in the macroeconomic approach to multiple
equilibria and poverty traps, underlying the asset-based approach is the assumption that returns to scale are locally increasing, which allows for the existence of multiple equilibria. A household above the dynamic asset poverty line may pursue an autarchic saving strategy by reducing consumption. With time the household arrives at an asset level necessary to achieve higher returns on activities and would then eventually move out of poverty. In contrast, households below the dynamic asset poverty line – also called Micawber threshold (Lipton 1994) – are too poor to bear such sacrifices. If they also lack the opportunity to borrow, poor households are unable to reach an asset level necessary to move out of poverty and are trapped in poverty. Although the concept of poverty traps is not novel (e.g., Michael Lokshin and Ravallion 2002; Ravallion and Jalan 1996), the dynamic asset-based approach identifies not only who is poor in a given moment of time, but also allows forward-looking projections of what types of households lack durable inputs to generate income and escape poverty in future.

However, empirical support for this explanation is still limited, given that detailed household panel data on income, assets, and shocks are needed to construct static and dynamic asset-based poverty lines. Moreover, the usage of stock variables versus flow variables to test for poverty traps remains debated (Barrientos 2007). Some studies do indeed find evidence for nonlinear welfare dynamics, such as Lybbert et al. (2004) for Southern Ethiopia, Barrett et al. (2006) for Northern Kenya and Madagascar and Adato (2006) for South Africa. All three studies use non-parametric techniques for estimating changes in household asset holdings. Other authors, however, do not detect multiple dynamic equilibria. For example, using ICRISAT data from rural India, Naschold (2009) explores asset dynamics with a semi-parametric approach and does not find evidence for a poverty trap. Neither do Lokshin and Ravallion (2004) for Hungary and Russia, Jalan and Ravallion (2004) for rural China and Antman and McKenzie (2007) for urban Mexico. However, the latter explore poverty traps as defined in income space and also employ parametric techniques. Hence, while all of the above-cited studies explore welfare dynamics, both conceptual and methodological approaches differ widely, which inhibits both the comparability of results and the further development of the conceptual approach.

Very few empirical studies on welfare dynamics explicitly take into account the role of shocks and their potential interlink with poverty in the modeling of welfare trajectories. The results of this branch of research is very much in line with (earlier) contributions to the question of whether and to what extent households smooth consumption or assets after being exposed to a shock (Asfaw 2004; Devereux 1993; Ersado et al. 2003; Fafchamps et al. 1998; Rosenzweig and Wolpin 1993). Households near or just below an identified poverty threshold are found to behave differently to those above the threshold in their post-disaster recovery paths (Ersado et al. 2003; Zimmerman and Carter 2003). Better-off households were found to draw on assets and savings as a buffer stock for maintaining their consumption level. In contrast, poor households rather smooth productive assets in order to preserve their livelihood and ensure future income streams, for example by lowering consumption or withdrawing children from school. Thus, they jeopardize their assets in more indirect ways in the long term (Dercon and Hoddinott 2005; Hoddinott 2006). Gubert and Robillard (2008) find that, in the absence of appropriate coping mechanisms, parents in rural Madagascar withdraw children from school to let them work. Then again, the poorest of the poor are pushed into destitution and sacrifice their asset base for distress sales to raise money for immediate survival (Devereux 1993: 42-44). Similarly, Dasgupta (1997) argues that below a certain asset level, households are not capable to generate sufficient income to meet the most basic nutritional needs and may fall into a nutritional poverty trap.

From this brief review of the current stage of research follows that there is only scant empirical evidence so far on a) how exactly welfare patterns across households in a given
developing context evolve over time and which role assets play in these longer-term trajectories and b) how these specific welfare dynamics relate to the experience of shocks and the adoption of risk management strategies. A number of more specific questions arise in this context that may contribute to advancing the empirical state of knowledge in this field. First, are there indeed non-linearities in households’ underlying welfare dynamics, i.e. multiple equilibria towards which households gravitate in their accumulation of wealth that are associated with poverty traps? Second, and if so, where exactly is the threshold where households’ wealth accumulation and portfolio management bifurcates and leaves those below it in a permanent situation of low productivity and destitution? Third, which types of shocks – including idiosyncratic and covariate shocks – are most likely to have a severe impact on the expected welfare dynamics? Fourth, which type of protection and coping strategies are applied by households given their initial position of wealth and how effective are these in terms of moving households above an asset threshold? That is, do households below and near the potential threshold apply strategies that are systematically different to those applied above the threshold?

3. Data used

The paper employs the 2002 and 2005 panel waves of the Trabalho de Inquerito Agricola (TIA) household survey collected in Mozambique. The TIA is a nationally representative rural household survey, including approximately 4,100 farm households in 80 of the 128 rural districts of the country. The survey questionnaire covers household demography, ownership of land, agricultural assets, and livestock, usage of land, farming, income, self-employment, access to services, and exposure to shocks. In addition, households were asked to rank different income-generating strategies according to their importance and there were specific questions about the impact of shocks, food insecurity, and the usage of shock coping strategies. Idiosyncratic shocks captured in the survey include mortality and health shocks and uncontrolled fires damaging fields, while climate shocks are examples of covariate shocks, with crop pests and livestock disease a middle category. Additionally, covariate shocks are captured by a community questionnaire, which allows assessing the magnitude of a shock (i.e., the proportion of households affected in a given community) and has an important impact on the effectiveness of insurance against risk.

4. Research questions and approach

Drawing on the presented literature, this paper explores three research questions in the context of post-war rural Mozambique. First, what is the nature of poverty transitions made by rural households across the three survey years? Second, does a poverty trap exist that leaves some groups of households structurally poor in the long term? Third, do households at different positions in the wealth distribution differ in their risk management strategies, and how does this relate back to welfare dynamics?

The setting of rural Mozambique seem particularly suitable to applying the asset-based approach, given that about 65 percent of household income in rural areas is derived from crop production, with off-farm employment and remittances playing less of a role. In other words, asset composition in a typical rural household is not too heterogeneous.

In a first step, a version of the Carter and Barrett (2006) model will be estimated to test whether a static asset-based poverty line exists. The analysis will start with a simple approach that only considers land, the key production input in rural Mozambique that is carefully measured in the dataset. It is then extended by constructing an asset index from a bundle of weighted assets, including livestock, agricultural tools, and means of transport that are likely
to shape a household’s future income-earning opportunities. Livestock assets will be aggregated in Tropical Livestock Units (TLU) in order to capture the contribution of each type of livestock to household income as well as the heterogeneity of livestock ownership across different agro-ecological zones in Mozambique. Incorporating a multi-dimensional definition of an asset-based poverty line introduces a more realistic picture, while it also allows to cross-check results derived from the exclusively land-based asset line. Both definitions of asset measures have continuous values; hence we do not expect econometric challenges as identified by Elbers et al. (2007).

In a second step, a dynamic asset poverty line will be tested for. The key challenge in testing for the existence of a dynamic asset poverty line is that this threshold is likely to be unstable. Hence, the paper will employ flexible non-parametric estimation techniques to map the relationship between assets and income and identify a dynamic threshold, as described in Carter et al. (2007). However, since non-parametric approaches are limited in their ability to control for other covariates, the analysis will as well employ fully parametric and semiparametric regression techniques, following a procedure suggested by Naschold (2009). This will allow us to control for other basic household, community and regional characteristics. A particular focus will be given to the relative impact of idiosyncratic versus covariate shocks on household welfare trajectories in the three-year time horizon.

Third, the analysis will look at the variability and combination of strategies used by households to manage shocks. While it would in principle be relevant to compare risk management strategies of households below and above the dynamic poverty threshold, the questionnaire only inquired coping strategies employed by households suffering from food insecurity during the past 12 months. Therefore, the analysis will be constrained to food insecure households (about 43 percent of sample households), exploring whether the coping strategies of households close to the dynamic poverty threshold are systematically different from households trapped in poverty. From the nature of coping strategies, conclusions will be drawn about whether households smooth productive assets, health, or income when faced with shocks.

5. Descriptive results and expected results from multivariate analysis

Descriptive evidence from the TIA panel data indicates that overall well-being has declined between 2002-2005. Asked to evaluate their economic situation during the survey period, 52 percent of households found their situation to have worsened, while only 18 percent indicated their personal situation to have improved.

Exposure to shocks is widespread and the majority of households faced losses in agricultural production during the past season. Drought is the shock with the largest magnitude, severely affecting 75 percent of sample communities and about 90 percent of households. In addition, drought is reported by households to be the most important reason for losses in crops and, albeit less important, for leaving some plots fallow. In contrast, crop pests and livestock disease occur in an equally large number of communities, but the proportion of affected households is much lower as compared to drought. Unconditional analysis reveals that exposure to shocks reduces household welfare, irrespective of the welfare measure employed. For example, households affected by a drought are 4.5 percentage points more likely to suffer from hunger during the past 12 months. Similarly, households reporting their economic situation to have worsened over the past three years are 4 percentage points more likely to be affected by drought. Interestingly, the effect of a death occurring to a household has different repercussions. While a death increases the likelihood of a household experiencing a decline in well-being by 8.2 percentage points, a mortality shock only weakly increases the likelihood of
a household suffering from hunger. This seems to suggest that households are better able to mitigate the extreme consequences of an idiosyncratic shock compared to covariate shocks.

As regards coping strategies employed by food insecure households, sacrificing nutrition (and hence health status and human capital of household members in the long term) seems to be much more prevalent than drawing down the productive asset base. For instance, across the two waves 88 and 82 percent of food insecure households indicated that they reduced the quality and number of meals, respectively. In contrast, 24 and 8 percent, respectively, of surveyed households jeopardized their productive asset base by consuming seeds originally reserved for the next agricultural season and selling livestock and other goods oddly.

Based on these unconditional results, we hypothesize that a poverty trap defined in asset space exists. Furthermore, there is descriptive evidence from other studies that point towards the same direction. Analyzing the same data as this paper, Mather, Cunguara and Boughton find that “the poorest households in 2005 are considerably poorer than the poorest households in 2002, while the wealthiest households in 2005 are considerably wealthier than the wealthiest households in 2002” (Mather et al. 2008: vii). The rising inequality across households seems to suggest that a group of households that lack productive assets cannot benefit from improved infrastructure and better access to market.
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