

Pathways out of Poverty in Rural Mozambique

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Draft – comments are welcome

Introduction

This research addresses three questions: (i) how have the incidence of poverty and the distribution of income changed? (ii) what factors are associated with rural household income change? and (iii) what factors are associated with moving out of or into poverty in the short-run? The analysis presented is based on a nationally representative two-period panel data set from Mozambique, covering the years 2001/02 and 2004/05. We cannot unambiguously argue that poverty headcount in 2005 (a year of more widespread drought) was higher than poverty headcount in 2002, but the poverty gap and squared poverty gap measures were both higher in the second period. Poverty has spatial, demographic, occupational, and asset holding dimensions. The diversification of off-farm income sources is strongly associated with increases in household income, and thus poverty reduction. For agricultural activities, especially crop production, reduction in vulnerability to drought is important for poverty reduction. Northern provinces are more vulnerable to drought, even though southern provinces receive less rainfall.

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Data sources

We use panel data from TIA05, a national representative data set from rural Mozambique, covering the period from September 2004 to August 2005. A total of 4054 households were re-interviewed in 2005. Of the original TIA02 sample, about 850 households could not be re-interviewed in 2005 due to many reasons, migration being the most common. Only panel households are used in the analysis because poverty dynamics studies require data from the same households across time. We correct for attrition bias using Inverse Probability Weights calculated by Mather and Donovan (2007) for their analysis of prime-age adult mortality and poverty in Mozambique. Rural incomes are calculated from TIA data as the value of own production and off-farm earnings, less any paid-out costs (Walker et al., 2004). Similar to the poverty lines, rural household incomes from the 2001/02 agricultural season were inflated to reflect 2004/05 prices.

Data from FEWSNET was used to estimate days of drought during the main maize-growing season. Days of drought in this paper refer to total days when cumulative precipitation is inadequate for healthy crop growth. Relative to 2002, days of drought in 2005 were considerably higher in the north, though both years experienced more drought days than the 5 year average, with the exception of a favorable season in 2002 in the north (Mather et al., 2007).

Methods

We use the popular Foster-Greer-Thorbecke measures of poverty to evaluate changes in poverty incidence, poverty gap, and squared poverty gap. We also use stochastic dominance and Lorenz curves to assess changes in income distribution and inequality. In terms of regression analysis,

we use three different types of regressions. We first predict household income per adult equivalent in each year using Ordinary Least Squares. Then we run first-difference models to evaluate the factors underlying household income changes, and multinomial logit models to evaluate the factors associated with movements out of and into poverty in the short-run. In order to identify the most promising interventions amenable through policy, we simulate poverty changes based on the adoption of cash crops, reduction in drought vulnerability, and increases on landholdings.

How have income distribution and poverty changed?

Though mean household income per adult equivalent increased between 2002 and 2005, the lowest two income quintiles experienced a decrease in household income. Consequently, median household income per adult equivalent has decreased between 2002 and 2005, and the distribution of income has become more unequal. However, poor households are not necessarily doomed to stay at the bottom of the distribution as some of the poorest households in 2002 moved to the highest income quintile in 2005. Although at the national level poverty headcount has increased, we cannot unambiguously say that poverty incidence was higher in the second period. In terms of poverty gap and squared poverty gap, at the national level we can unambiguously say that both the depth and severity of poverty was higher in the second period.

What are the various poverty dimensions in rural Mozambique?

Poverty in rural Mozambique has various dimensions. In terms of a geographical dimension, Nampula province is an area of major concern. Nampula is one of the most populated provinces,

and despite its agricultural potential, it is one in which the percentage of households moving out of poverty is among the lowest, and the percentage of those moving into poverty is among the highest. Overall, poverty incidence has slightly increased as the percentage of households moving into poverty is greater than the percentage of households moving out of poverty. In Sofala province by contrast, poverty headcount, poverty gap and squared poverty gap have significantly decreased.

In terms of the demographic dimension of poverty, we find that the percentage of households remaining poor is higher among female-headed households. Male-headed households are also more likely to have moved out of poverty than female-headed households. With the exception of those moving out of poverty, on average the household size has increased for all other poverty status categories.

In terms of the occupational dimension of poverty, we find that households moving out of poverty had a large percentage increase from almost all off-farm activities, except from the extraction of forestry and fauna resources with a high return (charcoal production and fishing). In contrast, households moving into poverty had decreases from all off-farm sources. Households staying poor were able to increase their income from all off-farm activities, but their increase was not significant enough to lift them out of poverty. Thus, diversification in off-farm income opportunities is important in reducing poverty in rural Mozambique.

In terms of assets, we find that households staying poor started out with smaller landholdings. Landholding size has increased for all poverty status categories except among households moving into poverty. These households started out with more land than the poor in 2002, but their average landholding size was smaller than of those who stayed non-poor.

In terms of agricultural practices and access to services, two distinct patterns are noteworthy. First, the use of fertilizers, pesticides, and animal traction has increased among households moving out of poverty. In contrast, households moving into poverty have experienced a decrease in the use fertilizers, pesticides, and animal traction. Much of the change in fertilizer and pesticide use is likely associated with adoption or disadoption of tobacco and cotton. Although the percentage of households using animal traction has decreased at the national level, households moving out of poverty were able to maintain (or increase) its use, whereas those moving into poverty significantly disadopted animal traction use. The use of improved seeds and cultivation practices is higher among the non-poor, and reduction in the use of such technologies is correlated with moving into poverty. Second, there are notable regional differences in the response of poverty mobility to access to public services and use of improved agricultural practices.

What are the factors underlying household income change?

Adoption of improved agricultural technologies and cash crops is associated with increases in household income, especially in the center and north. These findings are consistent with other studies (Walker *et al.*, 2006; Walker *et al.*, 2004; Boughton *et al.*, 2006), where the role of agriculture in poverty reduction is acknowledged. In addition to adoption of improved technologies, diversification of income sources is also associated with changes in household income. For example, in Sofala province, many household members have engaged in self-employment activities, the use of animal traction has increased, the average cattle herd size has almost doubled, more households have access to extension services and price information, and change in days of drought was not significant. The combination of all these factors resulted in

increases in household income, and thus, decreases in poverty incidence, poverty gap, and severity.

The widespread drought in 2005, particularly in northern and southern Mozambique, has also contributed to household income change. Households experiencing drought had relatively lower crop production, which contributed to a decline in total household income in cases where off-farm income opportunities were insufficient to compensate. This result indicates the importance of diversification of income sources, especially in predominantly rain-fed agricultural systems, which is the case of rural Mozambique. On the other hand, this result implies that reduction in the vulnerability of agriculture to drought will lead to increases in household income, and ultimately, poverty reduction.

What are the factors underlying poverty movements in the short-run?

Most of the results show that factors associated with movements out of poverty are the same as those associated with movements into poverty. An exception is the use of animal traction in central provinces, and adoption of tobacco in central and northern provinces. Animal traction is used to cultivate relatively large areas and households cultivating such areas are more likely to be non-poor. Thus, adoption of animal traction is likely to be more effective in helping the non-poor avoid falling into poverty than in lifting the poor out of poverty. The marginal effect of cultivating tobacco is significant in increasing household income among the poor, but not in avoiding non-poor households from falling into poverty.

What are the most promising interventions to rapidly reduce poverty?

For a country like Mozambique, where agriculture is dependent on erratic rainfall, the occurrence of drought is one of the major limitations. The simulation results show that reducing drought vulnerability has a significant impact in poverty reduction. The government already recognizes the importance of small-scale irrigation as a means to combat drought, and numerous projects are underway. But irrigation tends to be very costly and hence the proportion of farmers who have access to irrigation technology remains very low. In the medium-term, genetically modified drought-tolerant varieties of maize will become available. It will be very important for the government to have the necessary policies in place to allow the testing of such genetically modified drought tolerant varieties. Thorough study of each of these options is needed as they could be technically or economically unfeasible in some regions.

Surprisingly, southern provinces are relatively less vulnerable to drought even though they receive less rainfall compared to northern provinces. Because northern provinces rely more on agricultural activities and have higher shares of crop income, households in that region are more vulnerable to weather shocks.

Simulation of the adoption of tobacco in central provinces resulted in significant decreases in poverty headcount. At present, expansion of area under cash crops is limited to zones where tobacco or cotton companies operate. Similarly, animal traction is concentrated in the center and south. Broadening the poverty reduction potential of cash crops will require a more detailed study of the potential for adoption in new areas. The results also show that tobacco and cotton were not significant in reducing poverty in the north, which has to do with disadoption in 2005 and the relatively low performance of cotton and tobacco contract farming companies in northern provinces.

Key finding

This paper presented empirical evidence regarding the vulnerability of rural households to occurrence of drought and its impact on poverty. It also showed the role of off-farm income both in lifting the poor out of poverty and in the prevention of a descent movement into poverty. Reducing drought vulnerability and promoting off-farm employment opportunities will significantly reduce poverty in rural Mozambique. Where expansion of cultivated area is possible, increasing landholding size can significantly reduce poverty.

References

For a full list of references and more details on pathways out of poverty in rural Mozambique, please see one of the following publications:

Cunguara, B., Mather, D., Boughton, D., Crawford, E., Tschirley, D., and E. Payongayong. 2008. Pathways out of poverty in rural Mozambique. MINAG Working Paper n° XX, downloadable at <http://www.aec.msu.edu>

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