

Impacts of the Productive Safety Net Program on livestock and tree holdings of rural households in Ethiopia

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Introduction

There is an international perception of a dependency syndrome associated with food aid to food insecure households in poor developing countries. It is argued that food aid could change the behavior of its recipients by making them more dependent on it and less active in terms of their economic and social activities. There is, however, limited rigorous empirical work that looks into the effects of food aid or safety net programs on behavior of households, particularly in relation to effects on their investments in productive assets.

In this paper, we study the Productive Safety Net Program (PSNP) in Ethiopia in order to see how it has affected households' investment and disinvestment in productive assets. The PSNP is the largest currently operating social protection program in sub-Saharan Africa outside of South Africa, and its impacts and effectiveness are therefore important both in their own right and because they have implications for similar but smaller programs elsewhere.

The main purpose of the PSNP is to provide food insecure people with public work for five days a month during the agricultural slack season and thereby enable households to smooth consumption and prevent them from selling productive assets to overcome food shortages. The public work is also intended to create valuable public goods, and reduce seasonal liquidity constraints and thereby stimulate investments.

However, there is also a risk that the program discourages private investments that are of importance for future production opportunities; if more labor is allocated to work in public programs; it means that less labor is available for on-farm production and investments. Moreover, if assets are themselves used as buffer or a way of spreading risks, the introduction of a public safety net may reduce the demand for asset holdings.

Hence, in addition to studying the effect of the PSNP on asset holdings, we investigate if assets themselves are used as informal safety nets; both ex ante, by looking whether risk aversion determines investments in assets, and ex post, by looking if assets are sold in times of temporary shocks. We also explore whether this potential role has been affected by the

Key Findings

- Participation in PSNP does not lead households to have a behavior of disinvesting in livestock and trees.
- We found participation in the program encourages households to invest more in trees.
- The program has a positive impact on improving tree cover of land.
- We have not found evidence that PSNP protects households' livestock in times of climate or economic difficulties / shock

introduction of a safety net, i.e. given that a household takes part in the program is risk aversion a determinant for investment and do the households need to sell their assets when exposed to shocks?

The focus of this paper is on livestock and tree holdings. These assets are of special interest for several reasons. Livestock is usually considered as the most important (productive) asset and if the households can increase their number of livestock they have a good chance of becoming more food secure. Tree holdings play a similar role as livestock and they are also of interest from an environmental perspective. Ethiopia's forest cover is estimated to be below 4 per cent of the country's total area of about 1 million sq km and deforestation is estimated at about 200,000 ha per year.

Livestock and trees can also be seen as potential informal safety nets; livestock holdings may be used as a buffer to cope with temporary income shocks, and drought resistant trees may also be planted for sale in times of income shocks in order to reduce the vulnerability of income to weather conditions.

In order to study these issues, we use panel data collected both before the PSNP started and about two years after it started. The rich data set available for our study, which includes information both on farm household behavior, but also on variables such as risk aversion and discount rates, enables us to analyze farm households' investment decisions in a more sophisticated fashion than has previously been attempted by most studies in Ethiopia.

Next we discuss previous experiences with food-for-work programs, in Ethiopia and elsewhere, and describe the PSNP. Then we briefly present the data and methods used. Finally we present the results and conclusions.

Background

In Ethiopia, food insecurity has long been a wide spread problem. Over 80 per cent of about 74 million people of Ethiopia live in rural areas and are heavily dependent on rain fed agriculture; this has made them extremely vulnerable to changes in weather conditions. Over the last four decades there have been a number of severe famines due to droughts in Ethiopia. Even in years with normal rainfall, food shortages and hunger have been a recurrent problem for millions of people; more recently this problem has been exacerbated by increases in food prices.

The problem of food insecurity in Ethiopia has to a large extent been addressed by annual emergency food aid from abroad. During the past two decades Ethiopia has been the largest recipient of food aid in Africa and one of the largest recipients in the world. For recipients, food aid has been characterized by uncertainties, poor timing and insufficient assistance. In 2005, to combat the persistent problem of food insecurity and to move away from the previous system of annual emergency appeals, the Ethiopian government and a consortium of donors launched a new social protection program called the Productive Safety Net Program (PSNP). Operating with an annual budget of nearly 500 million USD, the PSNP is the largest currently operating social protection program in sub-Saharan Africa (outside of South Africa) and reaches more than 7 million Ethiopians. The basic idea behind the program is to provide food insecure people with public work during the agricultural slack season, and thereby enable them to smooth consumption and prevent them from selling productive assets in times of temporary food shortages.

The PSNP is one of several components of the Ethiopian government's Food Security Program (FSP). The other components are voluntary resettlement and something called Other Food Security Programs (OFSP). OFSP includes a wide range of activities that differ between regions, but the main item is "household packages" which is a package of loans for agricultural and non-

agricultural activities. The PSNP is planned to last for five years. After that, with the help of OFSP, the households are expected to graduate from the program, i.e. have gone from a status of food insecure to a status of food secure.

Most of the rigorous work on evaluation of social protection programs has been done for programs in Latin America and, to a lesser extent, South Asia. This work therefore contributes to the limited literature on such evaluation in Africa. Given the scale of the social protection programs, these programs are an important part of governments' policy frameworks to stimulate economic growth by addressing issues of credit and insurance market imperfections.

The PSNP differs from previous food-for-work programs in the sense that it operates continuously over several years by focusing on selected households with the objective of phasing out. This feature may affect investment behavior differently than previous programs did. While there are some attempts to evaluate the PSNP, to our knowledge the only rigorous attempt at evaluating the PSNP is by Gilligan et al. (2008). Gilligan et al. (2008) find that the PSNP and other food security programs increase food security but at the same time reduce growth rates in livestock holdings. However, while this study provides valuable information, it does not say anything about the safety net's potential for protecting assets in times of temporary income shocks, even though protecting assets from income shocks is one of the main aims of the program. Moreover, Gilligan et al. (2008) only had access to recall data, making any firm conclusions problematic.

The PSNP is based on the premise that food insecure households are resource-poor and their livelihoods become vulnerable to shocks which could be devastating. As an ex-ante risk management strategy households rely on income source portfolio diversification. The PSNP seeks to enhance this strategy and reduce vulnerability of households to shocks while also enhancing their participation in the development of their community which helps in long term development. This involves a shift from the existing emergency humanitarian aid which is predominant to one where productive safety nets are put in place in a multi-year framework.

The major objective of the PSNP is stated as guaranteeing transfers to the population who are most food insecure on a chronic basis year after year (the predictable chronically food insecure). It is also aimed at protection from assets depletion at household level and assets creation at community level by addressing immediate human needs while simultaneously supporting the rural transformation process.

The basic principles of the program include partnership, continuity, predictability, productivity-enhancing, avoiding dependency syndrome, integration with *woreda* (district) development plans and flexibility. The Productive Safety Net Program has two components: public works and direct support. Public works is the core component of the program used to mitigate the impacts of climatic and food insecurity risks on chronically food insecure farmers by providing employment to those who have 'able-bodied' labor. The direct support component delivers assistance to members of the community who cannot participate in public works but need assistance. A combined administrative and community targeting method is applied in the selection of beneficiaries of both the public works and direct support components of the safety net program.¹ With regard to the direct support component of the program beneficiaries who are eligible to get the benefit will get it without any conditionality. It is expected that combining community and administrative targeting makes targeting more cost-effective and minimizes targeting errors.

¹ Administrative targeting is a process of selecting safety net beneficiaries by a specially formed administrative body using objective and standardized indicators derived from reliable database. Community targeting is a method of selecting safety net program beneficiaries by the community based on their own knowledge about the food security situation of their locality area and of each other on individual basis. A third method that could be used is self-targeting in which able-bodied persons chose to participate in public works and labor poor households present themselves for direct benefits.

Three issues considered to determine eligibility for public works and direct support are whether the household has a chronic history of food need, the level of the food gap or unmet need and whether the household has labor available for work. Beneficiary list is expected to be revised twice a year. Individual households and peasant associations not satisfied with the targeting process and outcomes have the right to appeal. It is also noted that concerned parties should ensure genuine participation of women in safety net targeting with women included as members and leaders of food security taskforces. Interests of children should be taken into account during targeting and regular monitoring of public works sites is required to guard against child labor.

Data

We use panel data collected in the years 2002, 2005 and 2007 through collaborative research projects of the Departments of Economics of Addis Ababa University and University of Gothenburg and the World Bank. The data come from 14 sites in East Gojam and South Wollo zones of the Amhara region of Ethiopia. However, we only use the data from South Wollo zone as the sites in East Gojam were not covered by the PSNP and many of the agricultural characteristics of the two zones are different, making East Gojam unsuitable as a comparison region. The sites were selected to ensure variation in vegetative cover and agro-ecology while the households from each site were selected at random.

The panel data was supplemented with data from a separate household survey, the PSNP survey, through collaboration between the University of Gothenburg, Umeå University and Ethiopian Development Research Institute, conducted during April to June in 2008². In the PSNP survey the households from the previous sample were asked about their participation in the PSNP and other food-for-work programs during the years 2005, 2006 and 2007.

Methods

To investigate how participation in PSNP affects livestock and tree holdings we need to address the potential problem of selection bias. Selection bias stems from the fact that we cannot know what the outcome for a participating household would have been if it had not participated. If participation is randomly assigned, the outcome of non-participating individuals serves as a good estimate of the counterfactual. However, if households that are participating have characteristics that differ from the ones that are not participating, comparison of the outcome between the two groups will yield biased estimates.

If the selection is based on variables that are observable to the analyst, the problem of selection bias can be solved by controlling for these variables in a regression analysis or by the method of propensity score matching. However, if the selection is based on variables that are unknown to the analyst, other methods need to be applied. In the PSNP program, participation is largely based on asset and income variables that are observable both to the policymakers and to the analyst. We therefore apply regression analysis and propensity score matching in this paper. As a point of departure we use regression analysis which allows us to easily address the main questions of interest in this paper.

One advantage of using propensity score matching compared to regression analysis is it ensures that participating and non-participating individuals are comparable, something that is not guaranteed in the regression analysis. In both methods we use the changes in asset holdings, rather than levels, as dependent variables. This removes the problem of selection on

² To obtain information about food security and related programs from different sources, interviews were also conducted with officers responsible for food security issues from the woreda (district) and kebele (subdistrict) councils; in addition some households took part in a separate focus group discussion during this period.

unobservables that affect the levels of asset holdings. There is, of course, still a risk that selection is based on variables that are unobservable and that not only affect levels but also changes in asset holdings—a limitation that is unavoidable for this type of study.

In the regression analysis, changes in livestock and tree holdings are estimated as functions of variable levels at the beginning of the program and of changes in explanatory variables since the beginning of the program. The variables of special interest in this study are: PSNP participation, risk aversion, income shocks and the interaction between PSNP on the one hand and risk aversion and income shocks on the other.

When estimating the propensity score, it is important that the variables that are used to predict the probability of participation are unaffected by participation, i.e. they should be measured before the program started or be fixed over time. We therefore use 2002 as a baseline year. The outcome is defined as the change in asset holdings between 2005 and 2007. To make the PSM analysis comparable to the regression analysis, a household is considered as treated if they conducted public work in 2005.³

Results

For the changes in livestock holdings, we find from the regression analysis that there is no statistically significant impact of PSNP participation as such in any of the three estimated models. Income shocks have a negative impact on livestock holdings, confirming the buffer hypothesis. The interaction variable between PSNP participation and income shocks is positive and is almost identical to the income shock variable in magnitude, but is not statistically significant. Many of the other variables are statistically significant with the expected signs or are not statistically significant. Thus, access to credit, which is one of the measures included as part of OFSP, has a positive impact on livestock holdings; so does the education level of the household head, as well as the level of farm income. Households that gave loan or that received more remittances also had larger increase in livestock holdings. On the other hand, the household's discount rate does not appear to matter for the change in livestock holdings, and neither does risk aversion.

For changes in the number of trees on the household's land, the results suggest that they play the same buffer role as livestock. However, tree holdings actually increase more for PSNP participants than for non-participants, and this difference is statistically significant. Income shocks have no significant effect on the change in the number of trees on the farm. The discount rate does not matter for tree holdings either; risk aversion does have an impact, but the sign is the opposite of what we would expect if trees were seen as a safer alternative than crops; higher risk aversion leads to a larger increase in tree holdings. PSNP participation does not appear to affect the impact of risk aversion. Similar to the results for livestock holdings, remittances and being a lender have positive impacts on the change in tree holdings.

The results from the PSM suggest that there is no significant difference in changes in livestock holdings between participants and non-participants, but participants seem to increase their tree holdings relatively more; this result supports the finding from the regression estimations. It is important to note that the results are sensitive to what input variables are used in the model.

³ This approach has the drawback that some of the households that participated in 2005 dropped out before 2005 and some of the households that participated in 2007 but not in 2005 is considered as untreated.

Conclusions

In this paper, we have used both regression analysis and propensity score matching in order to evaluate the impacts that the Ethiopian Productive Safety Net Program has had on rural households' holdings of livestock and forest assets/trees. We have used panel data collected from 2002 onward. There are remaining potential problems such as possible selection problems. Still, unlike many similar studies, this study is an improvement for reasons including the fact that we have data on actual behavior both before and after the program started. The data used for the two approaches differ slightly, but the results are nonetheless similar in nature.

We find no indication that participation in PSNP leads households to disinvest in livestock or trees; in fact, the number of trees has increased for households that participate in the program. It could be the case that participation in PSNP (where tree planting and subsequent forest management work on public lands is one of the activities) leads to households becoming more skilled in forestry and switching to increased forest planting as a result. In the presence of some possible competition between labor for PSNP and labor for private activities, tree planting may also have been chosen as it tends to be less labor intensive.

An alternative, perhaps more plausible, interpretation is that the recent increases in wood prices may have made tree planting more profitable than crops, but that farmers are nonetheless hesitant to plant trees because they take several years to grow and the land is unavailable for crop farming in the meantime. If this is the case, having a secure source of income from the PSNP in the meantime may well encourage farmers to switch from annual crops to trees. This would also explain the observed negative relationship between risk aversion and the number of trees; any long term planting decisions will also be affected by uncertainty about future land tenure, making risk averse farmers more hesitant to make planting decisions where the benefits will be several years in coming.

We find no evidence that the PSNP protects livestock in times of shock. Shocks appear to lead households to disinvest in livestock but not in trees. Conceivable explanations include that livestock is a more liquid asset and that livestock may have died due to shocks such as bad weather conditions. Another explanation might be that households may harvest trees in times of shock, but replant in sufficient numbers so that the total number of trees does not change much; replanting of trees appears to be easier than reinvesting in livestock. Given the uncertain weather conditions, the fact that most of the households in our study areas mostly grow eucalyptus trees which are fast growing and drought resistant may also have contributed to this result.

PSNP has only been in place since 2005, and it may be too early to say what the longer term impacts are. However, the official goal is that it will be phased out in a few years' time. Looking at our findings, it appears that there is no trend towards increased livestock holdings as a result of the program, despite the fact that this is the intended goal. On the other hand, the program does appear to encourage additional tree planting, which may have become more profitable in recent years. Thus, the program does seem to raise the long term income earning potential of the households covered, though perhaps not in the intended manner. Whether households will in fact be able to graduate from the program at its scheduled end date in 2010 is something that remains to be seen, but it does appear that their incomes may be higher than before.

Our results suggest that increased forestry activity is taking place as a result of PSNP, and that improved credit access (which is part of OFSP, though not of PSNP) leads to increases in livestock holdings. The first of these impacts is somewhat unexpected; the second impact is expected, but it is surprising that this factor appears to be more important than the existence of the PSNP. To the extent that PSNP and OFSP have lasting effects on household welfare, it appears that these effects will be more complex and indirect in nature than originally intended.

ABOUT THIS BRIEF

This brief is a summary of the research paper “**Impacts of the Productive Safety Net Program in Ethiopia on the Livestock and Tree Holdings of Rural Households**” written by Camilla Andersson, Umeå University, Alemu Mekonnen, Addis Ababa University and Jesper Stage, University of Gothenburg. The study was conducted by the Environmental Economics Policy Forum for Ethiopia in collaboration with Addis Ababa University, the University of Gothenburg, Umeå University and Ethiopian Development Research Institute.

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