



POLICY BRIEF No. 51

Understanding the link between the Productive Safety Net Program and agrobiodiversity cultivation in Ethiopia

The study

Our study aimed at investigating the possible linkages between agrobiodiversity and the Ethiopian Productive Safety Net Program (PSNP), an extensive social protection program, which is part of Ethiopia's national Food Security Program. Both agrobiodiversity and the PSNP have proven to be two critical elements helping to foster the resilience of smallholder farmers to climate-induced challenges. Surprisingly, there is still little evidence on the relationship between social protection programs and crop diversification. Thus, the potential relations of PSNP with farm-level diversification need further examination.

Crop diversification plays a vital role in minimizing the risk of agricultural production failure (Davis & Schirmer 1987) and can improve resilience to climate change and crop disease outbreaks (Kozicka et al. 2020). It provides a form of insurance against environmental fluctuations, since different species react differently to environmental change, leading to an improvement in ecosystem resilience (Yachi & Loreau 1999; Walker 1995). Many studies concur that crop diversification can also contribute to pest suppression (Bommarco et al. 2013; Chaplin-Kramer et al. 2011), improve soil fertility (Tiemann et al. 2015; McDaniel et al. 2014), deliver nutrition diversity (Lin 2011) and enhance productivity and yield stability for a number of crops, thus increasing and stabilizing household income

KEY MESSAGES



Ethiopia's Productive Safety Net Program (PSNP) and agrobiodiversity are two of the crucial pillars of resilience in Ethiopia. Yet the impact of the PSNP on agrobiodiversity is not yet well understood, and synergies and trade-offs between them are still largely unexplored.



This study shows that the net impact of the Ethiopian PSNP is negative on indices of agrobiodiversity and on indicators of on-farm labor time. This indicates that the extra income received by beneficiaries from participation in the PSNP acts as a disincentive for further improvements towards farm diversification of participating farmers.



The findings of this study call for a re-evaluation of the PSNP, particularly in light of the newly initiated Phase 5 of the program. PSNP5 should bring more focus on strengthening the long-term resilience of the participants, shifting the attention towards on-farm investments, especially in the form of higher agrobiodiversity cultivation.

(Makate et al. 2016; Njeru 2013; Abson et al. 2013; Demissie & Legesse 2013). In Ethiopia, agrobiodiversity plays a particularly important role in smallholder farming systems (Box 1).

Social safety nets (SSNs) are quite ubiquitous in Africa (Beegle et al. 2018) and the effects of SSN programs on resilience are well documented (Godfrey-Wood & Flower 2018). Ethiopia's PSNP has been shown to strengthen the resilience of its beneficiaries (Box 2), in terms of self-reported food security, with respect to adverse weather shocks (Knippenberg & Hoddinott 2017). The recent case study by Abay et al. (2020) is emblematic. It demonstrates that PSNP beneficiaries were generally less affected by the (unprecedented) compound shocks affecting smallholder households in Ethiopia during the Covid-19 pandemic, in which the likelihood of becoming more food insecure and the duration of the food gap increased less for PSNP beneficiaries compared to non-beneficiaries of the program, with greater effectiveness among poorer and marginalized households. Previous studies investigate the direct effects of PSNP transfers on the wellbeing of beneficiaries. Several studies suggest that the social

program has been effective in improving household food security (Berhane et al. 2014; Berhane et al. 2011; Gilligan et al. 2009), household food consumption (Garcia & Moore 2012; Jones et al. 2010), and daily calorie intake per capita (Gilligan et al. 2013). Other studies show that Ethiopia's PSNP had positive effects on children's nutritional status (Porter & Goyal 2016; Debela et al. 2015). In addition, participation in the PSNP is associated with increased livestock holding (Berhane et al. 2014) or tree planting (Andersson et al. 2011). The program has achieved remarkable successes on many fronts, such as providing improved community-level such as enhancing households' assets or graduating households out of poverty (Sabates-Wheeler et al. 2020).

Even though the PSNP and agrobiodiversity both have a positive impact on the resilience of smallholder farmers, synergies and trade-offs between them are still largely unexplored. Higher income from the PSNP participation could shift farmers' priority from short-term food production gains of a mono-cropped farm to long-term benefits provided by a diverse system, like resilience to future shocks and the long-term positive

BOX 1. THE ROLE OF AGROBIODIVERSITY IN ETHIOPIAN SMALLHOLDER FARMING SYSTEMS



Ethiopia is located in the sub-tropic climatic zone, with one main rainy season (meher) in summer and a second shorter period of occasional rainfalls (belg) in the early spring. Around 80-85% of Ethiopians are engaged in agriculture, with the farming systems being mainly of a subsistence, smallholder nature. Ethiopia's extremely diversified landscape defines challenges and constraints for the smallholder

farmers according to their geographical location: agricultural potential is indeed unevenly distributed in space, with the most populated areas in the highland agroecological system being characterized mainly by the production of cereals (among others, wheat, barley, and teff) (Chamberlin & Schmidt 2012).

In such a diversified context, the cultivation of different crops on one piece of land is a common practice adopted by smallholder farmers to reduce vulnerability, market risks, income instability, and food insecurity (FAO 2012; Michler & Josephson 2017). Ethiopia maintains an important gene pool of cultivated crops and their wild relatives. However, these are threatened, particularly by habitat loss due to land degradation and agriculture conversion, and due to the competition with improved crop varieties on existing agricultural land.



impact on soil health and nutrition security. If the net impact of PSNP on agrobiodiversity cultivation is positive, there is a synergy in building farm-household's resilience, both in the long and the short term. To this virtuous relation between agrobiodiversity and the PSNP, it may also be possible to juxtapose a trade-off narrative, whereby the income/consumption stabilization generated by the enrolment in the PSNP diverts farmers away from income and output stabilizing on-farm investments, largely towards riskier on-farm or off-farm activities, leading to lower levels of agrobiodiversity.

In the literature, the evidence linking income transfers to agrobiodiversity is scarce, but the available results rather suggest a negative relationship between the two. Farm diversity has been found to be inversely related to access to financial support (i.e. social payments and credits) and off-farm income in the case of dry forests of southern Ecuador (Ochoa et al. 2018). With this study, we contribute to bridging this knowledge gap.

BOX 2. THE ETHIOPIAN PRODUCTIVE SAFETY NET PROGRAM (PSNP) DETAILS



The Ethiopian Productive Safety Net Program (PSNP) was launched by the government of Ethiopia in 2005. It provides direct income support to more than 8 million poor people in Ethiopia, primarily through their participation in the construction of large-scale public works, as well as through unconditional cash transfers to poor households with limited labor capacity (Sharp et al. 2006; Hoddinott et al. 2012). The program runs through the 282 most chronically-food insecure woredas (districts) in rural Ethiopia; 85% of PSNP beneficiaries receive an average of 10 birr per day

(data from 2010) to compensate their work in the construction of community assets (Hoddinott et al. 2012). Most of these activities occur between the months of January and June, so as not to interfere with households' farming activities (mostly concentrated in the second half of the year) (Berhane et al. 2014). Approximately 15% of individuals eligible for inclusion in the PSNP are unable to support the program with adequate labor, due to disability, infirmity or a very high household dependency ratio and therefore receive direct cash support.

The recently completed fourth-phase of the PSNP (2015-2020) was highly climate-oriented; climate change mitigation and adaptation have been at the forefront of the planning of public works, with microclimate management techniques such as terracing, watershed rehabilitation and small-scale irrigation occupying a predominant role among the works proposed. PSNP4 has also introduced a number of innovations in the planning of public works, gender provisions and investment in program management tools (Anderson and Farmer 2015).

Theoretical framework

Participation in the PSNP grants beneficiaries—mainly from chronically food-insecure and poor households—higher direct income support or unconditional cash transfers from the government, aimed at boosting food consumption and developing private assets along with public services. These subsidies result in a higher and more stable income at the household level. Even though the public

works are usually conducted during low farming seasons and should not interfere with households' farming activities, there might be a negative impact of the participation in the PSNP on the overall labor availability. Furthermore, the impact of the increased income level and stability on on-farm labor is not clear. It has been shown in the past that income transfers from the government reduce off-farm labor (Vergara et al. 2004) and could hence increase on-farm labor availability.

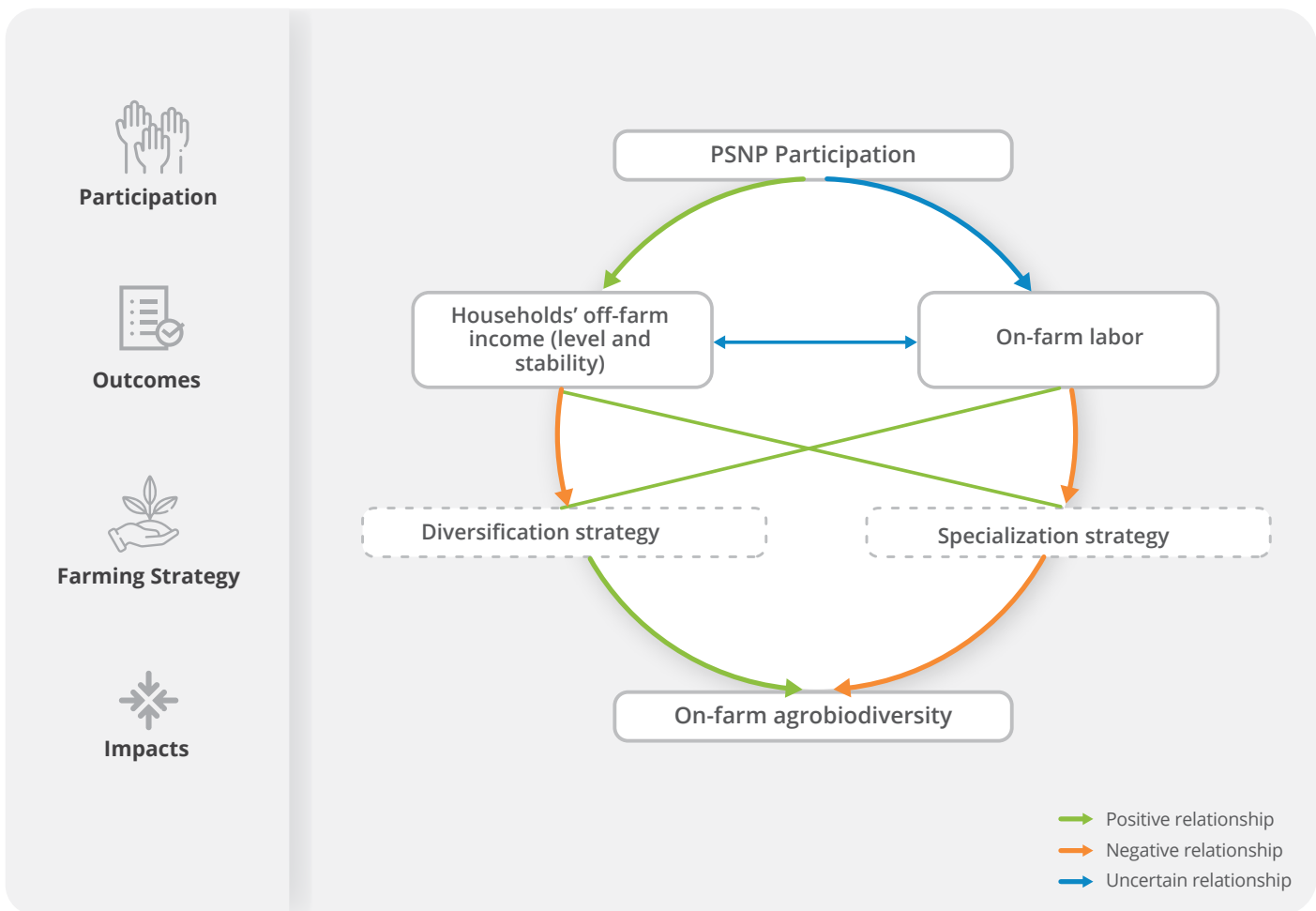


Figure 1. Theory of change for the effect of the PNSP on agrobiodiversity

In studying the effect of the PNSP on the degree of agrobiodiversity planted at farm-household level, we formulate the following hypotheses (H) on the net effect of the program on farm labor and agrobiodiversity:

- H1:** positive impact (diversification strategy): Higher income availability results in a higher on-farm labor and higher degree of investment in agriculture by the participants. The possibility to diversify crop varieties is considered a primary asset for farmers, therefore on-farm investments result in higher agrobiodiversity at household level.
- H2:** negative impact (specialization strategy): The higher income stability crowds out income and consumption stabilizing farming strategy towards specialization, focused on a smaller number of the most profitable crops and animals. It follows that on-farm labor decreases, and the crop diversity is reduced.

The theory of change which supports these two hypotheses is represented in Figure 1.

The dataset

For this analysis, we relied on the Ethiopian Socioeconomic Survey (ESS), a household-level panel survey implemented every two years since 2011-2012, thanks to a collaboration between the Central Statistics Agency of Ethiopia (CSA) and the World Bank Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA). The survey was sampled to be nationally representative of urban, rural, and small-town areas, stratified by region.

The data includes, among others, information on:

- 1 Whether households are participating in PNSP (running since 2005);
- 2 The number of cash or food transfers in the preceding 12 months, (if any); and
- 3 Farm production diversity.



The sample employed in this analysis is drawn from all territories of Ethiopia (except for the Sidama region) and it includes 3,165 households, which have been surveyed in two time frames: the first panel survey was iterated between 2011 and 2012 while the second panel wave was performed between 2014 and 2015. Roughly 22% of the households in our sample were beneficiaries of the PSNP.

The methodology

In order to infer empirically whether a higher level of agrobiodiversity could be found among PSNP beneficiaries, the strategy needed to account for the fact that the eligibility and assignment of PSNP is not a random process. Furthermore, the data employed in this study were collected after the program had started, thus making it difficult to identify a suitable counterfactual. To mitigate these empirical challenges, the methodology used for the impact assessment of the PSNP involved an estimation that combines the conditional Difference-in-Difference (DID) estimator and the Propensity Score Matching (PSM) method. The DID estimator allows us to measure the average change in labor effort and degree of agrobiodiversity related to the beneficiary households of the PSNP (i.e. treatment group) minus the average change in these two outcomes of the non-beneficiary households of the PSNP (i.e. control group). In a complementary manner, the PSM method allows us to balance the estimation, checking for the beneficiary and non-beneficiary groups' characteristics. The variables employed to check for sample selection biases are related to households' observable characteristics not influenced by the PSNP, including gender, age and education of household head, household size, dependency ratio, participation in extension programs, and assistance received, which differ from the PSNP per se.

To elicit the effect of PSNP on agrobiodiversity and, more in general, on agricultural activities, we selected two outcome variables of interest: firstly, we investigated whether beneficiary households of the PSNP increase or decrease the time devoted to agricultural activities. Thus, we focused on the Total Farm Labor Days and on the Farm Labor Intensity. Secondly, to analyze if participation in the PSNP encourages households to maintain a higher crop diversity, we measured three complementary indicators: crop richness index, Simpson's diversity index, and Shannon index.

Results and discussion

Results of our empirical estimates reveal that Ethiopia's social protection program has a negative effect on household farm labor, both for farm labor days and farm labor intensity. Our results clearly indicate that households benefiting from PSNP transfers on average devoted less time to agricultural activities on their farms than households that did not participate in the program. This difference is signaled by a diminishing number of total days of farm labor (about 33 days a year less or -38.93%) and the farm labor intensity for the beneficiaries of the program (-29.93%). The effect is statistically significant. Furthermore, on average, participation in the PSNP is associated with a lower diversity of on-farm crop cultivation, particularly for crops devoted to food consumption (e.g., cereals such as wheat, teff and barley). All three agrobiodiversity indicators are lower for beneficiaries: participating in PSNP results on average in 9.66% less crop richness, 13.13% lower Simpson Index and 13.96% lower Shannon Index.



These findings are in line with recent studies on the effectiveness of the program, which suggest that while PSNP succeeds in improving the general well-being of beneficiaries, its effects are not sufficiently robust to shield recipients from the impact of severe climate-related shocks (droughts in primis) (Béné et al. 2012; Sabates-Wheeler et al. 2020). Coupled with the current projection on exacerbated climate-change impacts on rural households in sub-Saharan Africa, these findings pose important questions for the design and implementation of these schemes. Among others, it remains unclear to what extent PSNP influences households' income diversification strategies (Conway & Schipper 2011; Davies et al. 2009). This is crucial, given the strategic role that diversification plays in managing risks and improving households' adaptation to them (Barrett et al. 2001; Below et al. 2012).

Social safety net programs are potentially responsible for generating direct and indirect positive externalities on households' resilience (Devereux & Guenther 2009). In particular, it has been observed that programs like PSNP encourage the households to diversify their sets of possibilities, diverging resources towards activities that are alternatives to farming (Andersson et al., 2011). Our results suggest that PSNP is not promoting investment in agriculture, be it in terms of on-farm diversification or on-farm labor: this is highly consistent with studies/findings by Weldegebriel & Prowse (2013). Previous studies also support these findings: for instance, Devereux (2006) indicates that cash transfers had limited impacts on on-farm investment in terms of the purchase of inputs. The study states that out of 768 participants surveyed in 2006, only 11.5% used cash transfers to purchase seeds, while only 3.4% purchased fertilizers. Moreover, the demand for labor in public works might also generate what is generally defined as the "crowding-out" effect (Andersson et al. 2011), even if PSNP planning requires a period of intervention that is theoretically detached from any farming season, empirical evidence suggests that this might not be the case for all the woredas that fall within the intervention. A study by Devereux et al. (2008) reported this problem in Chiro, Fedis Kalu, Lasta and Kilte Awlalo woredas, where there was a direct overlap in the timing between the agricultural work season and the provision of public works.

In our analysis, this crowding-out effect appears to be strong and consistent among PSNP beneficiaries.

Policy insights and recommendations

The findings and insights of this study call for a re-valorization of PSNP, especially as the program enters its 5th phase of operation. While PSNP IV focused more on climate-centered actions, this 5th phase should steer towards strengthening the participants' resilience in the face of climate-induced shocks. Indeed, it can be argued that PSNP should strive to meet two conditions if it is to tackle climate adaptation and resilience. On the one hand, it should focus on supporting the transformation towards higher food security; and on the other, it should adopt a long-term perspective that fosters on-farm investment and services, taking into account the changing nature of climate shocks and stressors.

Thus, with regard to PSNP and similar large-scale social protection projects in place in other territories, policymakers should not underestimate the fact that the income generated through participation in the building of public works, accompanied by a lack of adequate perspective on how to re-invest the off-farm income earned into on-farm income activities, might actually be deterring farmers from improving or expanding their farming activities. The PSNP should therefore shift its attention towards training farmers on the importance of rural investments, rather than solely subsidize farmers for off-farm services. There are tradeoffs to be considered. Specific trainings on the return of rural investments that favor reinvestment in farming activities—in the short and long term—might hamper the farmers' willingness to pay for off-farm services and products. However, in compensation, they will bolster agrobiodiversity, food security and livelihoods from on-farm investments. Therefore, to achieve its goal, Phase 5 of the PSNP initiative should incorporate an even stronger resilience-oriented approach, with actions that instill a stronger awareness among farmers about the importance of strengthening their farming activities to achieve food security and better livelihoods.

Furthermore, given the negative correlation observed for on-farm labor resulting from PSNP participation, PSNP policymakers should initiate parallel evaluation programs aimed at understanding the reasons and challenges for participants in preserving their rate of engagement in agricultural activities. Finally, we urge policymakers to consider agrobiodiversity outcomes when designing the next phase of PSNP.




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