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# Linking Social Protection Schemes: The Joint Effects of a Public Works and a Health Insurance Programme in Ethiopia

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**ABSTRACT** *In developing countries and in particular in sub-Saharan Africa, social protection schemes tend to operate in silos. However, schemes targeting the same geographical areas may have synergies that have not yet been examined, and which are worth scrutinising. This paper contributes to this knowledge gap by examining the joint impacts of two social protection programmes in Ethiopia, that is, the Productive Safety Net Programmes and a Community Based Health Insurance Scheme. Based on three rounds of individual level panel data and several rounds of qualitative interviews, we find that individuals covered by both programmes, as opposed to neither or only one of the two programmes, provide greater labour supply, have larger livestock holdings, and have a lower amount of outstanding loans. Furthermore, joint participation is associated with greater use of modern health care facilities as compared to participating only in the safety net programme. These results show that bundling of interventions enhances protection against multiple risks and that linking social protection schemes yields more than the sum of their individual effects.*

## 1. Introduction

As in other developing countries, rural Ethiopian households are exposed to a variety of natural, economic, and health risks (Yilma et al., 2014). Continued dependence on rain-fed agriculture as the main livelihood source (Di Falco, Veronesi, & Yesuf, 2011; Tilahun, Teklu, Michael, Fistsum, & Awulachew, 2011), coupled with the lack of well-developed credit and insurance markets, intensifies the effects of these risks. For instance, in the absence of health insurance, exposure to a health shock may lead to borrowing and selling of assets and reinforce existing poverty and, in turn, harm the ability of households to cope with non-health related risks. This paper is motivated by the potential interplay and mutually reinforcing negative effects of different types of shocks, which suggests that effective protection may require the simultaneous implementation of multiple social protection interventions.

There is a large literature that has examined the effect of specific social protection instruments. For instance, in the context of low and middle income countries a number of papers have demonstrated the effect of cash transfer programmes on food consumption, health and educational outcomes (Behrman & Hoddinott, 2005; Burchi, Scarlato, & D'Agostino, 2016; Hidrobo, Hoddinott, Kumar, & Olivier, 2018), the effect of public works programmes on asset-building, climatic risks and food security (Anderson, Mekonnen, &

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Stage, 2011; Gilligan, Hoddinott, & Taffesse, 2009), and the effect of health insurance schemes on health care utilisation and financial protection on the one hand (Mebratie et al., 2013; Pagán, Puig, & Soldo, 2007; Strupat & Klohn, 2018) and on borrowing and assets sales on the other (Yilma et al., 2015).

Despite this large body of work, studies which have examined the interlinkages and the joint effects of participating in different social protection programmes on welfare outcomes, are scarce. In contrast, there is a comparatively well-developed literature which has examined the interlinkages between agricultural interventions and social protection programmes, although papers on Africa even in this literature are limited.<sup>1</sup> For instance, Pace et al. (2017) use difference-in-difference (DiD) with propensity score matching to analyse the joint effect of Malawi's Farm Input Subsidy Program (FISP) and Social Cash Transfer Program (SCTP), which target poor and ultra-poor households, on household expenditure and production. Despite the lack of explicit coordination between the two programmes, the authors find that the joint effect of participating in both programmes increases total expenditure per adult equivalent by 24 per cent as compared to the baseline mean for households who participate in both the programmes and the value of production increases by at least 70 per cent of the baseline mean. Daidone et al. (2017) also use a DiD approach to examine the joint effect of a homestead gardening programme which targeted households who were eligible for a child grants programme. They conclude that the positive effects of the programmes on productive agricultural activities may be attributed to the joint effect of the two schemes. Turning to Ethiopia, in an evaluation that relied on propensity score matching, Gilligan et al. (2009) examined the joint effects of the Productive Safety Net Programme (PSNP) and an agricultural intervention – Other Food Security Programme (OFSP) – and found that, among other effects, access to both programmes enhanced food security and increased the use of agricultural technologies. However, access to both programmes did not lead to faster asset growth as compared to households that did not have access to either of the programmes. In a related paper, Hoddinott, Berhane, Gilligan, Kumar, and Taffesse (2012) used a dose response model to investigate the joint effect of being a beneficiary of both the PSNP and the OFSP as compared to participation only in the PSNP. They find that participation in both programmes tends to enhance agricultural investments.

Closest to the theme of this paper which deals with the joint effects of social protection programmes, Jensen, Barrett, and Mude (2017) examine the comparative individual effects as well as explore the joint impacts of a cash transfer programme and a livestock insurance scheme in Northern Kenya. They find no evidence of positive synergies and attribute this to the minor overlap in coverage between the two programmes. In the Ethiopian context, Berhane, Hoddinott, and Kumar (2014) examine the effect of the Productive Safety Net Programme (PSNP) and the community-based nutrition (CBN) programme in localities where both schemes are operating. Their investigation reveals that there are no joint effects on various indicators of child nutrition. However, they also point out that the two schemes are 'loosely meshed' and are co-located but not linked programmatically. While our paper also focuses on Ethiopia, there are differences in terms of the scheme interactions that we explore as well as the context.<sup>2</sup>

Motivated by the findings that PSNP participants are substantially more likely to enrol in a Community Based Health Insurance (CBHI) scheme (Shigute et al., 2017), and by the limited research on the impacts of multiple social interventions, this paper examines the interplay between the CBHI and PSNP. In particular, the paper investigates whether participating in both the CBHI and the PSNP provides additional protection to households as compared to participating in none of the schemes or as compared to participating in only one of the schemes. Consistent with the motivation for launching the CBHI and PSNP, we focus on the effects of the schemes on modern health care utilisation, off-farm labour supply, livestock assets, loan uptake, and the value of outstanding loans.<sup>3</sup>

The paper relies on three rounds of individual panel data. The first edition of the data was collected in 2011, that is, before the launch of the CBHI, and subsequent rounds were collected in 2012 and 2013. We also draw on qualitative information collected through key informant interview and focus group discussions conducted in 2012, 2014, and 2017. Our analysis of both sources of information yields a consistent picture.

We find that both programmes complement each other and generate synergies. Individuals covered by both programmes, as opposed to neither of the two programmes, provide more off-farm labour, have higher livestock wealth and have a lower amount of outstanding loans. Furthermore, joint participation as opposed to participating only in the PSNP is associated with greater use of modern health care facilities. Thus, our

results indicate that the co-ordination of a public works and a health insurance scheme affords greater protection to vulnerable households.

The paper unfolds by providing in the next section a brief description of the two programmes. [Section 3](#) discusses the data while [Section 4](#) outlines an analytical and an empirical framework. [Section 5](#) discusses the findings while [Section 6](#) contains concluding observations.

## 2. A brief overview of the PSNP and the CBHI

### 2.1. *The Productive Safety Net Programme (PSNP)*

Before 2005, efforts to enhance food security and deal with natural disasters were based on providing emergency assistance (MoARD, 2009a). With the objective of relieving households from dependence on emergency assistance, the government, in collaboration with donor agencies, designed the PSNP. The PSNP attempts to shift the trend from meeting short-term food needs to addressing the root causes of food insecurity by building durable community assets – mainly natural resource management projects designed to reduce soil erosion, control floods, and harvest and conserve water (MoARD, 2009b, 2010).

The programme focuses on food insecure households residing in food insecure areas. Participation is not voluntary but is based on a combination of geographical and community-based targeting. At the first stage, government officials identify food insecure districts based on previous food aid allocation data. Within districts, local administrators identify chronically food insecure villages and allocate the PSNP resources within these villages. Household-level targeting is based on selecting households who have received emergency aid in the past and on other criteria such as assets, income from non-agricultural activities, and from alternative sources of employment. However, communities have discretion to modify this approach and to annually update their lists of food-insecure households based on local conditions.

The programme differentiates between two types of beneficiaries – direct support and public works – and offers support in cash or in kind to eligible households with no able-bodied members while public works beneficiaries receive payments based on their labour contributions.<sup>4</sup> In the short-run, the programme expects to enhance food security by meeting the immediate needs of food insecure households and in the medium- to longer-run by preventing sales of productive assets and promoting sustainable livelihoods through the construction of rural infrastructure.

Unlike previous food security efforts, a key objective of the PSNP in its current design is to integrate existing and future development interventions. As stated in the Programme Implementation Manual (MoARD, 2010, p. 6), ‘The PSNP is not a project but a key element of local development planning.’ This approach has been re-emphasised in the most recent PSNP design document (MoA, 2014, p. 3), which aims to ensure that

poor and vulnerable households benefit from an essential suite of services including safety net transfers, livelihood interventions, key health and nutrition services, community assets constructed through public works and support to households up to, during and beyond safety net graduation to ensure that the improvements they have achieved are sustainable.

### 2.2. *Community Based Health Insurance (CBHI)*

Over the past decade, Ethiopia has invested heavily in its rural health infrastructure and recorded progress in a number of population health outcomes (Mebratie, Sparrow, Yilma, Alemu, & Bedi, 2015). For instance, child mortality per 1,000 live births has fallen from 166 in 2000 to 88 in 2011 and maternal mortality rates have declined from 871 to 676 per 100,000 live births (Mebratie et al., 2015). Despite these improvements and investments in infrastructure, as is evident from the figures, challenges remain. For instance, overall utilisation rates remain low. According to the Ethiopian Demographic and Health Survey, in 2011, annual per capita outpatient health care utilisation was about 0.3 visits. This low utilisation rate is accompanied by a high

reliance on out-of-pocket (OOP) payments to finance health care.<sup>5</sup> In particular, Yilma et al. (2014) show that households finance health care, in decreasing order of importance, by dissaving, asset sales, and borrowing.<sup>6</sup>

In response to this situation, in June 2011, in an attempt to enhance access to health care and help defray costs while at the same time prevent the use of harmful coping strategies, the government launched a voluntary CBHI. The pilot scheme was launched in 13 districts, of which nine were classified as food insecure and were covered by the PSNP.<sup>7</sup> The CBHI scheme covers outpatient and inpatient health care services in public health facilities and does not cover treatment with largely cosmetic value. Monthly contributions for core household members (parents and minor children) vary between Birr 10.50 (US\$ 0.56) and Birr 15 (US\$0.80) per month with an additional monthly premium of 2.10 to 3 Birr per non-core household members. Average monthly premiums amount to about 0.5 per cent of household monthly income. There are no co-payments or deductibles.

While the scheme is government driven, the community is engaged in scheme management and supervision. The rollout phase involved a two-step process. First, the community decides whether to participate in the scheme and subsequently households choose whether to enrol or not. Based on our survey data, in 2013, almost 51 per cent of individuals in the pilot districts had enrolled in the scheme.

### 3. Data

The paper is based on three rounds of panel data. The first round was collected in March–April 2011, that is, a few months before the launch of the CBHI, while subsequent rounds were collected in March–April 2012 and March–April 2013. Data collection followed a stratified sampling design and the survey was fielded in 16 districts located in four main regions of the country (Amhara, Oromia, Tigray, and SNNPR). Within each district, six villages were randomly selected and within each village, 17 households were randomly surveyed, yielding a total sample of 1,632 households. The follow-up survey in 2012 revisited 1,599 households and the 2013 edition covered 1,583 households (3% attrition). The analysis reported in the paper focuses on working-age adults (aged 15 to 65) and is based on an unbalanced panel of 12,820 observations.<sup>8</sup>

In each region, the survey covered three CBHI pilot districts and one non-pilot district. The non-pilot districts were chosen based on the same criteria used to select the pilot districts. Of the 16 districts, there are nine districts where both the CBHI and the PSNP operate, three where the CBHI operates but not the PSNP and four where the PSNP operates but the CBHI was not offered (see [Table A1](#), in the Appendix). The questionnaire included questions on PSNP and CBHI membership, modules on individual and household socio-economic characteristics and demographics, assets, employment, consumption expenditure, health and health care use, access to credit, social networks, and shocks.

We also collected three rounds of qualitative information through key informant interviews and focus group discussions (FGDs). These were conducted in 2012, 2014, and in 2017. Among other topics, these interviews and discussions focused on factors that determine participation in the CBHI and the experience of officials and FGD participants with the two interventions.

## 4. Analytical framework and empirical approach

### 4.1. Analytical framework

Our objective is to examine whether participating in both the CBHI and the PSNP provides additional protection to households as compared to participating in only one of the schemes or as compared to not participating in any of the schemes. Potentially, the two schemes may have an effect on a variety of outcomes, and based on the main channels through which they are expected to operate, this section outlines and motivates the key outcomes that are the focus of this paper.

The main aim of the CBHI is to enhance access to health care use and to protect households against the costs of financing health care. As shown in Yilma et al. (2014), in the absence of access to insurance, households meet their health expenses by reducing savings, borrowing, and selling assets. Informal insurance arrangements and support from family and friends in the form of remittances are not a major source of

support. Hence, it may be expected that insurance will work towards not only enhancing access to health care and reducing out-of-pocket payments for medical services but will also allow households to reduce their reliance on borrowing and avoid asset sales.<sup>9</sup>

The PSNP is expected to enhance food security by providing payments for labour contributions. It is also expected to prevent households from borrowing and resorting to asset sales during times of crises. Thus, simply due to the needs of the scheme, PSNP participants may be expected to provide more off-farm labour as compared to non-participants. Furthermore, these labour contributions are important not only from the perspective of households but also from the perspective of PSNP managers, as labour is needed to construct public works. As discussed in Shigute et al. (2017), participation in the PSNP has a strong effect on CBHI uptake. Despite the fact that the two schemes are not programmatically linked, the large effect of PSNP participation on CBHI uptake may be attributed to the keen sense of the links between the two programmes as perceived by local officials.

For instance, based on the qualitative information gathered through the key informant interviews, we found that government officials have been taking measures to integrate different development interventions such as agricultural extension, education, and health programmes. In particular, health extension workers focus on PSNP beneficiaries and during PSNP-related meetings or while workers are taking a break from their PSNP work, they provide information on personal hygiene and sanitation, child and maternal health issues, and health insurance. They also encourage PSNP beneficiaries to enrol. This approach is illustrated by a statement made by a key informant in the Tigray region,

Continuous education on health issues including about the recently introduced community-based health insurance scheme is provided to those people who are covered under PSNP. Moreover, during the distribution of PSNP payments, the participants are asked if they would like to register for CBHI. (Interviewed in December 2012)

More recently, in fieldwork conducted in May 2017 in SNNPR district, key informants at the woreda and the regional level argued that being a member of the CBHI delivers greater benefits for PSNP members since they are food insecure and they cannot afford to cover unexpected expenses of health shocks.

Not only are PSNP participants encouraged to enrol but local officials expect enrolment to translate into greater health care utilisation, quicker recovery from their illnesses, and influence the ability of the PSNP participants to provide labour. During a discussion on the CBHI scheme a key informant in Oromia region remarked,

We inform PSNP members to join the [CBHI] scheme because we want them to get immediate treatment when they get sick. If they are not treated immediately, it affects their performance in public works. These beneficiaries do development work and we don't want them to fall sick so the idea is if they buy insurance and get care then it may also improve their health outcomes. (Interviewed in October 2014)

At the village level, the same government officials are responsible for implementing both the PSNP and the CBHI and this clearly provides an incentive for officials to push both schemes. Furthermore, from the perspective of PSNP beneficiaries, PSNP payments are dependent on labour contributions and these payments are not available if there are work-absences due to sickness. In such circumstances, CBHI uptake is expected to encourage timely access to health care which in turn might reduce illness-related losses in labour contributions and at the same time reduce payments lost due to work-related absences. Thus, PSNP participants who are also CBHI members may be expected to utilise greater health care, and provide more labour as compared to PSNP participants who are not enrolled in the CBHI.

Indeed, the potential links between the two programmes are not restricted to officials and a FGD participant in Oromia remarked,



I can feed my family with the payment I get from PSNP public works and my kids can go to school not worrying about whether and what they will eat. Because of my CBHI, I and my kids can get proper treatment whenever we get sick. If it wasn't for CBHI I might have to go around my neighbourhood and ask for borrowing which is very difficult. (Discussed in September 2014)

Discussing her own situation, another individual in the discussion pointed out that,

I am the head of my household. Before I enrolled in the CBHI, I used to be absent from public works for days when either myself or my kids get sick. I used to run into arguments during payments justifying my long absence to the foreman. Going to the health centre was not easy for my family. When they informed us about CBHI, I was the first one to enrol. Now, thanks to my membership, I don't get any more complaints for being absent as I immediately go to the health centre when either I or my children get health problems and continue working on the public works. I now tell my non-CBHI neighbours to enrol in the scheme. (Discussed in September 2014)

Similarly, a FGD participant in SNNPR articulated the links between the two schemes and stated that the CBHI is a very useful intervention for food insecure households,

So far we used to get some money from PSNP in order to purchase food. Now we are getting health services almost for free after joining CBHI. What shall I say simply I would like to thank God. (Discussed in May 2017)

Overall, the CBHI on its own is expected to increase health care utilisation and to protect households from resorting to borrowing and asset sales. The PSNP is expected to lead to an increase in off-farm labour and through provision of payments in lieu of labour, it is expected to prevent food-insecure households from borrowing and selling assets to meet their consumption needs. Given the partially overlapping aims of the two interventions and the potential linkages between the PSNP and the CBHI we expect that those who participate in both the programmes will use more health care, provide more off-farm labour, they should also be less likely to take up a loan and to sell assets in order to cope with shocks.<sup>10</sup>

#### 4.2. Empirical approach

Based on the preceding discussion, the empirical analysis focuses on examining the joint effects of the two programmes on health care use, off-farm labour supply, livestock assets, and borrowing.<sup>11</sup> To identify the joint effects of the CBHI and PSNP we exploit individual-level panel data and estimate several variants of a difference-in-difference (DiD) model. That is,

$$Y_{ijt} = (CBHI * PSNP)_{ijt}\beta + CBHI_{ijt}\gamma + PSNP_{ijt}\delta + X_{ijt}\eta + T_t\theta + (W * T)_{jt}\sigma + \lambda_i + \varepsilon_{ijt}, \quad (1)$$

where  $Y_{ijt}$  represents the outcome of interest for individual  $i$  residing in woreda  $j$  at time  $t$ , the interaction term  $(CBHI * PSNP)_{ijt}$  indicates participation in both the CBHI and the PSNP (both are binary variables), while  $CBHI$  and  $PSNP$  indicate participation in either of the two programmes, and  $X_{ijt}$  is a vector of time-varying observables.<sup>12</sup> We include two sets of time effects,  $T_t$  represents a time fixed effect,  $(W * T)_{jt}$  is a woreda-specific time-effect,  $\lambda_i$  is an individual fixed effect, and  $\varepsilon_{ijt}$  is a time-variant individual error term.<sup>13</sup> The main coefficient of interest is  $\beta$ , which indicates the additional effect of participating in both the PSNP and the CBHI as compared to participating in only one of the two schemes.<sup>14</sup>

While it is straightforward to estimate Equation (1), there are a number of potential identification concerns. As mentioned in Section 2, participation in the PSNP is not voluntary and households cannot self-select themselves into the scheme. Beneficiaries are selected based on community identification of their food-insecure status as well as an assessment of their assets and employment status. While this does not preclude the possibility that unobserved factors such as

local influence and social networks may influence beneficiary selection, unless such factors are changing over time it is perhaps reasonable to argue that Equation (1), which controls for time-varying socio-economic characteristics and individual fixed-effects, is likely to be able to deal with endogeneity of PSNP participation. While initial selection into the PSNP may be less of a concern, there is the possibility of reverse causality between PSNP status and household asset position. That is, over the course of the three years, households may exit the PSNP as their asset position improves, which in turn implies that there would be a tendency to underestimate the effect of the PSNP. One option would be to drop such observations but this may not be appropriate as graduating households may have been able to build up assets because of the protective effects of both schemes. We adopt a conservative approach and retain such households in the sample. At the same time, we do provide evidence that leaving such individuals out of the sample leads to underestimation of the PSNP effect.<sup>15</sup>

A perhaps more challenging issue is the endogeneity of CBHI membership. As described in Section 2, households choose whether to join the CBHI and it is possible that CBHI membership is driven by unobserved characteristics that are systematically associated with the outcomes, and thereby confound scheme effects. While Equation (1) includes individual fixed effects and controls for time-varying socio-economic attributes, it is still possible that unobserved time-varying factors such as changes in health status, which influence the outcomes of interest, also drive CBHI uptake. Keeping in mind the potential selection issues, prior to discussing estimates of Equation (1), we explore differences between CBHI participants and non-participants and also examine what drives scheme uptake.

## 5. Results

### 5.1. PSNP and CBHI uptake

In 2011, before the launch of the CBHI, about 21 per cent of the sample respondents were enrolled in the PSNP. The figure increased slightly in 2012 (22%) but fell to 18 per cent in 2013 (see Table 1). While the aggregate PSNP enrolment figures do not exhibit much variation over time, this is misleading, as over the three years it is not the same individuals who remain in the scheme. Some individuals graduate from the scheme while others join the scheme. With regard to the CBHI, within a year of its launch, CBHI enrolment reached 43 per cent and in 2013 rose to 51 per cent (Table 1). PSNP beneficiaries are far more likely to participate in the CBHI scheme. For instance, in 2012 about 65 per cent of PSNP beneficiaries enrolled in the scheme as compared to an enrolment rate of 38 per cent amongst non-beneficiaries while in 2013 the corresponding figures were 72 and 46 per cent (Table 2). By 2013, 52 per cent of the sample was not enrolled in either of the two schemes, 30 per cent were enrolled only in the CBHI, 9 per cent in both schemes, and 8 per cent only in the PSNP (Table 3).

### 5.2. Who enrolls in the PSNP and the CBHI?

Table 4 provides descriptive statistics conditional on programme status at baseline, that is, before the launch of the CBHI.<sup>16</sup> The figures show a clear hierarchy in terms of socio-economic status and programme participation. For instance, 46 per cent of the individuals who are in both the programmes belong to the poorest consumption quintile as compared to 20 per cent amongst those in no programme. Individuals belonging only to the CBHI are at the top rung, followed by those who are not members of a programme, PSNP members and finally those who participate in both schemes. This clear-cut pattern based on socio-economic status is in sharp contrast to health status. Across the four categories, there are small differences in the three health status variables. There is no evidence that individuals with poorer health status – either self-assessed or based on the incidence of recent illness or the prevalence of chronic conditions – are more likely to join the CBHI or both schemes.



**Table 1.** Participation in PSNP and CBHI

Programme	2011		2012		2013	
	Membership		Membership		Membership	
	%	N	%	N	%	N
PSNP	21.2	918	21.8	940	17.6	732
CBHI	0	0	43.2	1,445	50.6	1,640

**Table 2.** CBHI uptake and PSNP participation

Enrolled in the CBHI	2012			2013		
	PSNP member	Non-members	Total	PSNP member	Non-member	Total
Enrolled	410 (64.6)	1,035 (38.2)	1,445 (43.2)	380 (72.2)	1,260 (46.4)	1,640 (50.6)
Total	635	2,707	3,342	526	2,715	3,241

*Notes:* Observations are restricted to the districts where CBHI was offered.

**Table 3.** Participation in CBHI and PSNP – full sample

Programme	2011		2012		2013		Sample total	
	Membership		Membership		Membership		Membership	
	%	N	%	N	%	N	%	
PSNP only	21.2	918	12.2	530	8.5	352	14.0	1,800
CBHI only	–	–	23.9	1,035	30.4	1,260	17.9	2,295
Both programmes	–	–	9.4	410	9.2	380	6.2	790
No programme	78.8	3,414	54.5	2,362	52.0	2,159	61.9	7,935
Total		<b>4,332</b>		<b>4,337</b>		<b>4,151</b>		<b>12,820</b>

*Notes:* Observations include districts where CBHI was not offered.

Multinomial logit estimates of the probability of being in the four categories (Table 5) yields the same message. Individuals in the highest consumption quintile are about six percentage points less likely to belong to both programmes and nine percentage points more likely to enrol in the CBHI. Similarly, households with larger land endowments are four percentage points less likely to belong to both programmes and six percentage points more likely to enrol in the CBHI. With regard to health status, past illness has no bearing on programme status, the incidence of chronic illness reduces the probability of being in both programmes by three percentage points and has no bearing on determining entry into the CBHI. If anything, those with better self-assessed health status are more likely to join both programmes and self-assessed health status does not influence insurance uptake.

With regard to the outcomes, at baseline, consistent with the consumption data, those who participate in both programmes have substantially lower livestock holdings and are far more likely to be engaged in off-farm work (see Table 4). At baseline, their utilisation of health care is also lower as compared to those who do not belong to both programmes or those who eventually participate only in the CBHI.

**Table 4.** Descriptive statistics conditional on membership status

Variables	Total Sample (1)	CBHI* PSNP (2)	CBHI (3)	PSNP (4)	No Programme (5)	p-value (6)
<b>Outcome variables</b>						
Utilisation of modern health care (1/0)	0.10	0.07	0.11	0.09	0.10	0.04
Number of visits to modern health facilities	0.17	0.12	0.18	0.15	0.17	0.16
Off-farm worker (1/0)	0.13	0.29	0.1	0.31	0.09	0.00
Number of hours worked off-farm (in a month)	11.02	22.4	7.7	23.0	7.7	0.00
Value of Livestock (Birr)	19963.74	13031.1	29897.0	12815.6	17585.27	0.00
Loan uptake (1/0)	0.32	0.50	0.34	0.41	0.27	0.00
Amount of loan (Birr)	2186.23	2052.73	2340.87	2485.57	2040.97	0.94
<b>Covariates</b>						
<i>Socio-economic status</i>						
Poorest consumption quintile	0.23	0.46	0.17	0.28	0.20	0.00
2nd consumption quintile	0.21	0.25	0.18	0.27	0.21	0.04
3rd consumption quintile	0.19	0.13	0.21	0.16	0.20	0.00
4th consumption quintile	0.20	0.12	0.20	0.21	0.20	0.00
Richest consumption quintile	0.17	0.03	0.24	0.08	0.19	0.00
No education	0.39	0.40	0.34	0.43	0.41	0.98
Informal education	0.07	0.04	0.10	0.05	0.06	0.14
Primary education	0.42	0.42	0.44	0.43	0.41	0.96
Secondary education and above	0.12	0.14	0.12	0.09	0.12	0.33
Land cultivated	1.1	0.69	1.6	0.79	1.0	0.00
Experienced shock	0.88	0.83	0.83	0.88	0.91	0.00
<i>Demographic characteristics</i>						
Age	32.3	32.6	32.1	32.5	32.2	0.59
Male	0.51	0.48	0.54	0.47	0.52	0.14
Household size	6.5	6.7	6.9	5.9	6.4	0.06
Religion- Orthodox	0.49	0.55	0.61	0.60	0.40	0.00
Religion- Protestant	0.21	0.28	0.17	0.12	0.25	0.14
Religion – Muslim	0.27	0.13	0.21	0.25	0.32	0.00
Religion- other religion or no religion	0.03	0.04	0.00	0.03	0.04	0.96
<b>Health status</b>						
Self-assessed health-good	0.80	0.84	0.80	0.80	0.80	0.06
Self-assessed health-not good	0.20	0.16	0.20	0.20	0.20	0.06
Past illness event	1.8	1.5	1.9	1.8	1.8	0.31
Chronic illness for more than 30 days	0.06	0.03	0.06	0.07	0.06	0.02
<b>Financial participation and networks</b>						
Savings in bank account	0.13	0.03	0.22	0.10	0.12	0.00
Member of Iqub – informal rotating savings/ credit group	0.07	0.06	0.09	0.04	0.07	0.86
Member of a formal credit & saving association	0.11	0.09	0.21	0.02	0.10	0.68
Official position held	0.25	0.13	0.38	0.19	0.23	0.00
<b>Regions</b>						
Tigray	0.21	0.48	0.07	0.61	0.13	0.00
Amhara	0.26	0.07	0.39	0.17	0.26	0.00
Oromia	0.25	0.07	0.35	0.07	0.27	0.00
SNNPR	0.28	0.37	0.19	0.15	0.33	0.12
Observations (N)	4,259	390	1,011	512	2,346	

Notes: CBHI and PSNP membership status in 2012 values. All other characteristics are based on the 2011 survey. P-value for comparison of means in columns 2 and 5.

The clear picture emerging from this section is that selection into the four different groups is strongly linked to socio-economic status and not to health status. The empirical estimates presented in the next section do control for a range of time-varying attributes, including socio-economic status and for individual fixed-effects. Furthermore, the substantially lower socio-economic status and lower health care use, at baseline, for

**Table 5.** Probability of participating in PSNP and CBHI- multinomial logit marginal effects estimates (std. error)

Variables	No programme	CBHI only	PSNP only	Both programmes
<b>Socio-economic status</b>				
2 <sup>nd</sup> Consumption Quintile (Ref: Poorest Quintile)	0.058*** (0.018)	-0.024** (0.010)	-0.012** (0.005)	-0.022*** (0.006)
3 <sup>rd</sup> Consumption Quintile	0.036*** (0.011)	0.031*** (0.011)	-0.031*** (0.002)	-0.036*** (0.002)
4 <sup>th</sup> Consumption Quintile	0.030*** (0.010)	0.023** (0.010)	-0.019*** (0.003)	-0.034*** (0.005)
5 <sup>th</sup> Consumption Quintile	0.020** (0.009)	0.089*** (0.008)	-0.046*** (0.003)	-0.062*** (0.004)
Informal Education (Ref: No Education)	-0.057** (0.027)	0.037** (0.017)	0.014*** (0.005)	0.006 (0.013)
Primary Education	-0.035*** (0.009)	0.018 (0.014)	0.007 (0.008)	0.009 (0.008)
Secondary & above Education	-0.021 (0.020)	0.007 (0.023)	-0.003 (0.011)	0.017 (0.012)
Land Cultivated	-0.004 (0.005)	0.061*** (0.004)	-0.022*** (0.002)	-0.036*** (0.003)
Experienced Shock	0.067*** (0.009)	-0.024** (0.012)	-0.005 (0.007)	-0.037*** (0.003)
<b>Demographic characteristics</b>				
Age	-0.0004 (0.0006)	-0.0002 (0.0005)	-0.00001 (0.0001)	0.0006 (0.0004)
Male	0.016 (0.014)	0.0007 (0.011)	-0.006 (0.006)	-0.011* (0.006)
Household Size	-0.011*** (0.002)	0.020*** (0.001)	-0.007*** (0.0007)	-0.002*** (0.0008)
Religion-Orthodox (Ref. category: Muslim)	0.010 (0.010)	0.198*** (0.019)	-0.170*** (0.018)	-0.038*** (0.005)
Religion-Protestant	-0.142*** (0.031)	0.189*** (0.026)	-0.020** (0.008)	-0.027*** (0.006)
Religion- Other religion or no religion	0.111** (0.049)	-0.119** (0.050)	0.021 (0.016)	-0.013 (0.013)
<b>Health status</b>				
Self-assessed health – good (Reference not good SAH)	-0.048*** (0.016)	0.016 (0.013)	0.014*** (0.005)	0.018*** (0.002)
Past illness	-0.002* (0.001)	0.001 (0.002)	0.0003 (0.0004)	0.0004 (0.0005)
Chronic illness	0.016 (0.024)	0.001 (0.034)	0.009 (0.012)	-0.026*** (0.0032)
<b>Financial participation and networks</b>				
Saving in bank account	0.002 (0.019)	0.049*** (0.010)	-0.006 (0.008)	-0.045*** (0.005)
Member of Iqub	-0.009 (0.018)	-0.034** (0.014)	0.031*** (0.005)	0.012** (0.005)
Member of credit and saving association	-0.053*** (0.004)	0.024 (0.017)	-0.037*** (0.008)	0.066*** (0.011)
Official position held	-0.049*** (0.009)	0.063*** (0.012)	-0.006** (0.002)	-0.008*** (0.003)
Observations	4,214	4,214	4,214	4,214
Pseudo R-squared	0.193	0.193	0.193	0.193
Log pseudo likelihood	-3895.630	-3895.630	-3895.630	-3895.630

Notes: All explanatory variables are at their 2011 values; Standard errors in parentheses; \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.1.

**Table 6.** Descriptive statistics by membership status – full sample

Variables	Total Sample (1)	CBHI* PSNP (2)	CBHI (3)	PSNP (4)	No Programme (5)	p-value (6)
<b>Outcome variables</b>						
Utilisation of modern health care (1/0)	0.09	0.11	0.11	0.08	0.09	0.06
Number of visits to modern health care facilities	0.14	0.14	0.19	0.13	0.13	0.62
Off-farm worker (1/0)	0.12	0.33	0.06	0.31	0.07	0.00
Number of hours worked off-farm (in a month)	11.50	30.0	6.6	25.69	7.8	0.00
Value of Livestock Assets (Birr)	19375.3	13560.6	27765.0	12703.6	19041.1	0.00
Loan uptake (1/0)	0.30	0.41	0.27	0.41	0.27	0.00
Amount of loan (Birr)	2499.16	2468.38	3314.12	2392.75	2307.13	0.19
<b>Covariates</b>						
<i>Socio-economic status</i>						
Poorest consumption quintile	0.22	0.35	0.16	0.30	0.21	0.00
2nd consumption quintile	0.22	0.25	0.17	0.26	0.21	0.01
3rd consumption quintile	0.20	0.19	0.21	0.18	0.20	0.37
4th consumption quintile	0.19	0.14	0.23	0.17	0.19	0.00
Richest consumption quintile	0.17	0.07	0.22	0.09	0.19	0.00
No education	0.38	0.36	0.32	0.43	0.39	0.09
Informal education	0.06	0.04	0.09	0.05	0.06	0.00
Primary education	0.43	0.45	0.44	0.41	0.43	0.15
Secondary education and above	0.13	0.15	0.16	0.11	0.12	0.02
Land cultivated	1.06	0.64	1.5	0.74	1.05	0.00
Experienced shock	0.77	0.59	0.74	0.76	0.79	0.00
<i>Demographic characteristics</i>						
Age	32.6	32.7	32.8	33.1	32.5	0.71
Male	0.51	0.47	0.53	0.47	0.52	0.01
Household size	6.5	6.7	6.8	6.0	6.5	0.05
Religion- Orthodox	0.49	0.57	0.65	0.60	0.41	0.00
Religion- Protestant	0.22	0.27	0.15	0.15	0.25	0.15
Religion – Muslim	0.26	0.14	0.19	0.21	0.30	0.00
Religion- other religion or no religion	0.03	0.02	0.01	0.04	0.04	0.03
<i>Health status</i>						
Self-assessed health – good	0.81	0.86	0.80	0.83	0.80	0.00
Self-assessed health – not good	0.19	0.14	0.20	0.17	0.20	0.00
Past illness event	1.5	1.5	1.5	1.6	1.4	0.80
Chronic illness for more than 30 days	0.04	0.04	0.04	0.06	0.04	0.51
<i>Financial participation and networks</i>						
Savings in bank account	0.13	0.12	0.21	0.07	0.12	0.63
Member of Iqqub – informal rotating savings/ credit group	0.07	0.07	0.08	0.05	0.07	0.56
Member of a formal credit & saving association	0.11	0.10	0.16	0.06	0.11	0.78
Official position held	0.23	0.16	0.35	0.17	0.22	0.00
<i>Regions</i>						
Tigray	0.21	0.49	0.13	0.60	0.12	0.00
Amhara	0.26	0.07	0.40	0.14	0.27	0.00
Oromia	0.24	0.07	0.29	0.07	0.28	0.00
SNNPR	0.29	0.37	0.18	0.19	0.33	0.05
Observations (N)	12,820	790	2,295	1,800	7,935	

Notes: The p-value is for differences in means between columns 2 and 5.

those who belong to both programmes, suggests negative selection into this category and supports the idea that, if at all, estimates of the effect of belonging to both social programmes are likely to be downward biased.

### 5.3. The joint effect of CBHI and PSNP

Estimates of the joint and individual effect of the two programmes on health care utilisation, labour supply, livestock, and borrowings are presented in [Table 7](#).<sup>17</sup> We begin with a discussion of the effect of the two schemes on health care utilisation. Participating in the CBHI increases the probability of using outpatient health care by 2.3 percentage points. In contrast, PSNP membership on its own does not have a statistically significant effect on health care use. However, the additional effect of belonging to both programmes is a 4.6 percentage point increase in the use of health care. These effects imply that joint participation versus only participating in the PSNP is associated with a 6.9 percentage point increase in health care utilisation while there is no additional effect as compared to participating only in the CBHI. Joint membership also has a positive effect on the frequency of using modern health care, although the effect is not precise. While the estimates in [Table 7](#) focus only on adults, we also estimated the effect of participation in the two schemes on other household members, that is, young children (less than 15) and older adults (65 and above) and for the full sample (see [Table S4](#), and other Supplementary Materials). These estimates confirm the finding that joint membership increases both the probability of using health care and the frequency of use. Thus, not only does participating in the PSNP translate into greater enrolment in the CBHI (see [Table 2](#)), it also translates into greater use of health care amongst those belonging to both programmes.

As discussed in [Section 4](#), government officials use the PSNP as a platform to encourage greater uptake of CBHI not only to fulfil enrolment targets but also to mitigate the effect of health-related reasons for not providing PSNP labour contributions. If this is valid then participation in both programmes may be expected to translate not only into greater health care use but also into greater off-farm labour supply. As shown in [Table 7](#), participating in the PSNP increases the probability of providing off-farm work by 13 percentage points. Given the nature of the PSNP, which requires off-farm work in order to obtain benefits, this may be expected. In contrast, on its own CBHI membership has no effect on labour supply. However, the additional effect of participating in both programmes is positive and statistically significant (seven percentage points).

The large, positive, and statistically significant effect of joint membership is also evident in terms of hours of off-farm labour supply. An individual participating only in the PSNP provides an additional six hours of work as compared to those who do not participate in any programme while individuals belonging to both programmes provide 11 more hours per month to off-farm activities. Thus, participating in both schemes translates into 17 more hours of work per month as compared to participating only in the PSNP. The increase in health care use and the increase in off-farm labour supply is consistent with the claim of government officials and the view of participants who are members of both programmes (see [Section 4](#)) that the CBHI helps individuals access health care in a timely manner and may reduce health-related absenteeism in public work activities of the PSNP.

On their own, the two social programmes do not have an impact on the value of livestock assets (see [Table 7](#)). This is consistent with the findings on the effect of the CBHI on livestock assets as reported in [Yilma et al. \(2015\)](#) and also the effect of the PSNP on livestock assets as reported in [Andersson et al. \(2011\)](#).<sup>18</sup> In contrast, belonging to both programmes is associated with a 717 Birr increase in the value of livestock or a modest increase of about 4 per cent as compared to those who don't belong to either of the two programmes.

With regard to the incidence of borrowing, the effect emanates almost entirely from CBHI membership. PSNP on its own does not influence the probability of borrowing and the joint effect is zero. In contrast, conditional on borrowing, while CBHI membership encourages greater borrowing, membership of both programmes works towards reducing the debt burden of households. Belonging to both programmes is associated with a 616 Birr or 28 per cent reduction in debt.<sup>19</sup>

Overall, for almost all the outcomes, the interaction term is statistically significant and large, implying that the joint effect of the two programmes is larger than the sum of the individual effects. These estimates suggest that the PSNP and the CBHI may be used as complementary instruments for enhancing health care utilisation, off-farm labour supply, protecting household assets, and reducing indebtedness.

**Table 7.** Effect of CBHI and PSNP on health care utilisation, off-farm labour supply, and asset accumulation

	Modern health care utilisation (1/0)	Number of visits to modern health facility	Participation in Off-Farm Work (1/0)	Number of Hours worked in Off-Farm	Value of Livestock Assets (Birr)	Loan Uptake (1/0)	Outstanding Loan (Birr)
CBHI*PSNP	0.046** (0.019)	0.037 (0.039)	0.067*** (0.024)	10.90*** (2.80)	886.4** (422.7)	-0.013 (0.031)	-1280.0*** (226.8)
CBHI	0.023* (0.012)	0.07*** (0.024)	0.008 (0.010)	-0.57 (1.34)	-176.2 (313.8)	-0.033** (0.016)	619.3*** (134.2)
PSNP	-0.017 (0.013)	-0.034 (0.025)	0.130*** (0.019)	6.12*** (2.20)	7.16 (399.4)	-0.012 (0.023)	45.18 (238.0)
Joint effect vs. no programme	0.052*** (0.019)	0.073** (0.037)	0.205*** (0.025)	16.45*** (2.82)	717.38* (432.93)	-0.057* (0.031)	-615.57*** (281.56)
Joint effect vs. only PSNP	0.069*** (0.017)	0.108*** (0.033)	0.075*** (0.023)	10.32*** (2.64)	710.22* (381.75)	-0.046 (0.029)	-660.75*** (187.42)
Joint effect vs. only CBHI	0.029 (0.020)	0.003 (0.041)	0.197*** (0.026)	17.02*** (2.98)	893.53* (465.23)	-0.025 (0.032)	-1234.85*** (291.75)
N	12,820	12,820	12,820	12,820	12,820	12,820	3,840
Adj. R-sq	0.012	0.014	0.031	0.023	0.049	0.043	0.176

Notes: The first three rows provide estimates based on Equation (1), while estimates in the last three rows show the effects of participating in both programmes compared to a specific control group. Specifications include individual fixed effects, time fixed effects, woreda-specific time trends, socio-economic characteristics (consumption quintiles, education, crop land ownership, and experience of shock), time-varying demographic characteristics (household size) and access to formal and informal financial institution. Standard errors in parentheses are clustered at the individual level. \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .



#### 5.4. Robustness checks

As has been shown in [Table 4](#), at baseline, there are clear differences in the socio-economic status of those who are enrolled in both schemes versus those who are not enrolled in either scheme or enrolled only in the CBHI. While our estimates do control for individual fixed-effects and time-varying traits, it is still possible that pre-existing unobservable differences at baseline may influence the trajectory of the outcome variables in subsequent years and contaminate the effects of the CBHI and the PSNP. This section reports on three robustness checks carried out to probe the sensitivity of the estimates.

First, we restricted the sample only to those who participate in the PSNP. As shown in [Table 4](#), at baseline, those who participate only in the PSNP have similar characteristics as compared to those who participate in both programmes.<sup>20</sup> While not as crisp as those reported in [Table 7](#), estimates conditioning on PSNP status (see [Table S4](#)) reveal a similar pattern. That is, PSNP participants who are enrolled in the CBHI are four percentage points more likely to use health care and 10 percentage points more likely to engage in off-farm labour. Their labour contribution in terms of hours of work is 31 per cent higher than their non-CBHI enrolled counterparts. While there is no effect on livestock assets, their participation in the CBHI is associated with an 18 per cent reduction in borrowing.

Second, we estimated the probability of enrolling in the CBHI as a function of characteristics at baseline and obtained estimates of the probability of enrolling in the programme. Subsequently, we restricted the PSNP sub-sample to observations on common support and estimated a propensity-score weighted specification of Equation (1). As shown in [Table S6](#), estimates based on the reweighted sub-sample are very similar to those reported in [Table S5](#).

Finally, the CBHI scheme is meant to enhance access to health care only from public health centres and hospitals as opposed to publicly provided health posts (which provide free access) and privately run health centres. If we are picking up spurious effects then it is possible that joint participation in the CBHI and PSNP will also have an effect on health care utilisation from health posts and from privately run clinics. Estimates provided in [Table S7](#) show that this is not the case. The effects we identify emanate entirely from an increase in health care utilisation from publicly financed health services and specifically from publicly run health centres as opposed to health posts and private clinics.

## 6. Discussion and concluding remarks

In developing countries and in particular in sub-Saharan Africa, social protection schemes tend to operate in silos. However, the mutually reinforcing negative effects of the different types of risks, especially those confronting rural households in developing countries, suggests that effective social protection may require multiple coordinated interventions. So far, the empirical literature on the joint effects of social protection schemes is limited. However, schemes targeting the same geographical areas of a country offer an opportunity to identify the potential of linking social protection schemes.

This paper exploited the geographical overlap of the Productive Safety Net Programme (PSNP) and the Community Based Health Insurance (CBHI), two large social protection interventions in Ethiopia, to examine their joint effect on health care utilisation, off-farm labour supply, livestock assets, and outstanding loans. The analysis was based on three rounds of panel data and informed by several rounds of qualitative interviews. We exploited the panel data, baseline, and two follow-up surveys and controlled for individual and time fixed-effects as well as a range of time-varying traits to provide arguably credible estimates.

Despite the fact that the two social protection schemes are not formally linked, the qualitative interviews revealed that village-level officials were aware of the potential complementarities between the PSNP and the CBHI. Consistent with the expectations and actions of these officials, we found that participating in both programmes yields substantial additional benefits. Specifically, individuals who participate in both programmes, as opposed to neither, were five percentage points more likely to use outpatient care and 21 percentage points more likely to participate in off-farm work. Participation in both programmes was associated with a 4 per cent increase in livestock and a 28 per cent decline in debt. Except for the effect on livestock, the estimates were not sensitive to a number of robustness checks.

Despite this, given the targeted nature of the PSNP and voluntary enrolment into the CBHI we do not claim that these are causal effects, but estimates that are robust to a variety of confounding factors.

Our results demonstrate that, at least in Ethiopia, not only may participation in a public works programme be used to leverage greater uptake of health insurance, but that the existing village-level co-ordination of the two social protection interventions generates synergies and does provide greater protection to vulnerable households. The results of this paper support the idea that systematic linking of social protection schemes currently operating in Ethiopia, as envisaged among others by UNICEF (2016), are likely to generate positive effects. Indeed, unlike Winston Smith in Orwell's *1984* who worries whether a strong state will assert that 'two plus two equals five', in the current case the combination of the two programmes delivers more than the sum of the individual effects.

## Notes

1. Soares, Knowles, Daidone, and Tirivayi (2016) provide a 37-study review of the combined effects of agricultural and social protection interventions. Of the studies included, nine are from Africa of which four are on Ethiopia.
2. A related body of literature examines the bundling of health insurance with microfinance loans (Banerjee, Duflo, & Hornbeck, 2014; Hamid, Roberts, & Mosley, 2011). Evidence on the effectiveness of such an approach is mixed.
3. We focus on livestock as a measure of wealth. According to Dercon (2004), in rural Ethiopia, livestock is the most important marketable asset and accounts for a large proportion (90%) of the value of household assets.
4. The latter component accounts for 70 to 85 per cent of the total beneficiaries (six million individuals) and budget (MoARD, 2010, 2011). The programme operates in 319 food insecure districts (40% of the total districts) in eight regions of the country (FDRE, 2012; MoARD, 2011). In 2013–2014, the programme had a cash budget of \$205 million and access to 274,844 metric tons of food.
5. FMOH (2010) estimates that local and international donors finance about 40 per cent of health care, out-of-pocket (OOP) expenditure accounts for about 37 per cent, central and local governments cover about 21 per cent, while employer and private insurance schemes cover the remainder.
6. Support from social networks is limited and households do not appear to resort to increasing labour supply or reducing consumption.
7. The pilot CBHI was offered to about 300,000 households.
8. The year-specific number of observations is 4,332 individuals in 2011; 4,337 in 2012; and 4,151 in 2013 (Table 3).
9. Yilma et al. (2015) show that participation in the CBHI leads to a reduction in borrowing while there are no effects on asset holdings. Whether participation in both the CBHI and the PSNP enhances these effects is the subject of this paper.
10. While the channels through which the PSNP and CBHI are expected to influence borrowing and assets are self-evident, the expected effects of the CBHI on labour supply are perhaps not as straightforward. Our expectation buttressed by the qualitative interviews is that the CBHI increases timely use of health care use and consequently reduces the incidence or duration of illnesses and thereby increases labour supply. Unfortunately, we do not have sufficiently accurate information on the sickness history of individuals to demonstrate that access to health care has prevented illnesses or reduced illness durations.
11. Essentially, we look at four different outcomes. However, for some of the outcomes we have measures of incidence and intensity.
12. The time varying variables include demographic characteristics (age, household size), socio-economic status (consumption quintile, education, land cultivated), experience of any shock in the 12 months preceding the survey, and variables capturing financial participation and networks. We also estimated specifications that excluded consumption and included three time varying health status variables. The estimates are robust to the inclusion/exclusion of these variables.
13. The sample is divided into three sets of woredas – see Table A1. We allow woreda-specific time effects for each of these three types of woredas.
14. The specification used to identify the joint effect differs from Pace et al. (2017). In their specification, the sample is divided into four mutually exclusive groups and their variable indicating joint participation takes on a value 1 and 0 otherwise and is not an interaction term. In our case, we use an interaction term. Regardless of the specification used, the results are not different.
15. The data supports this idea and shows that those who move out of the PSNP have a higher asset position. For instance, those who were in the PSNP in 2011 and remained in 2013, had mean livestock assets of Birr 12,276 while those who left in 2013 had livestock assets of Birr 17,919. Similarly, those who were in the PSNP in 2012 and remained in 2013 had livestock assets worth Birr 12,489 while those who left in 2013 had assets worth Birr 17,731. The differences are statistically significant. We also find that those who left the PSNP and are CBHI members, tend to have livestock assets of higher value, as compared to those who graduated from the PSNP but are not CBHI members (Table S1).
16. Table 6 provides descriptive statistics conditional on programme status for the full sample.
17. For detailed estimates see Tables S2 and S3.
18. In contrast to Andersson et al. (2011), Berhane, Hoddinott, Kumar, and Taffesse (2011) find that five years of participation in the public works programmes raises livestock holdings by 0.38 tropical livestock units relative to those who have participated for only one year. The effect is statistically significant.

19. We also estimated household level regressions of livestock and borrowing (Table S8). The effect of joint membership on livestock is positive but statistically insignificant while the effect on the amount of borrowing remains in the same range as reported earlier.
20. A joint test for differences in means of the six outcome variables (excluding loan amount as the number of observations differs) yields a p-value of 0.374. Individually, none of the outcome variables are statistically different at least at the 5 per cent level.

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## Disclosure statement

No potential conflict of interest was reported by the authors.

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## Appendix

**Table A1.** District level intersection of CBHI and PSNP

	Region			
	Amhara	Oromia	SNNPR	Tigray
<b>PSNP = 1</b>	Tehuledere	Deder	Dale	Kelite Awlalo
<b>CBHI = 1</b>		Kuyu	Denboya	Ahferon
			Damot Woyde	Tahitay Adiabo
<b>PSNP = 1</b>				
<b>CBHI = 0</b>	Qallu	Kersa	Awasa Zurya	Saesy Tseadamba
<b>PSNP = 0</b>	Fogera	Gimbichu	–	–
<b>CBHI = 1</b>				

Table A2. Description of variables

Variable	Description
<b>Outcome variables</b>	
Modern health care utilisation	Visited a modern health care facility for outpatient healthcare (OHC) in the two months preceding the survey
Number of visits to modern health facility	Number of times a modern health care facility is visited for OHC in the two months preceding the survey.
Participation in off-farm activities	Engaged in off-farm work in the four weeks preceding the survey
Number of hours worked off-farm	Number of hours of off-farm work in the four weeks preceding the survey
Value of Livestock Assets	Value of livestock assets owned by the household, in Birr. Livestock includes the number of oxen, bulls, cows, horses, donkeys, mules, camels, goats, sheep, and chicken; we use median prices for each type of livestock based on a price survey conducted in 2014 (Biggeri, Burchi, Ciani, & Herrmann, 2018)
Loan	Currently household has an outstanding loan
Amount of Loan	Amount of the outstanding loan in Birr
<b>Explanatory Variables</b>	
<b>Socio-economic status</b>	
CBHI*PSNP	Enrolled in the CBHI and the PSNP
CBHI	Enrolled in the CBHI
PSNP	Enrolled in the PSNP
Consumption quintiles	Classification of individuals based on monthly consumption expenditure (in Birr) excluding health care spending (poorest [1 <sup>st</sup> ] quintile), 2nd quintile, 3rd quintile, 4 <sup>th</sup> quintile, richest [5 <sup>th</sup> ] quintile)
Education	Education level of an individual (no education, informal education, primary education, secondary and above education)
Land cultivated	Size of land cultivated in hectares
Household shock experience	Experience of any type of shock (health, natural, economic, social, institutional, market, or other) in the 12 months preceding the survey.
<b>Demographic traits</b>	
Age	Age in complete years
Male	Male
Household size	Number of household members
<b>Health status</b>	
SAH-good	Self-assessed health is rated as good (includes very good and excellent)
SAH- not good	Self-assessed health is rated as not good (includes average)
Past illness event	Total number of days ill in the two months preceding the survey
Chronic Illness	Disease symptoms have persisted for more than 30 days
<b>Financial participation and networks</b>	
Savings in bank account	At least one member of the household has savings in bank account
Member of iqub	At least one member of the household participates in iqub
Member of credit & saving association	At least one member of the household participates in credit and saving association
Official position held	At least one member of the household held or still holds official (kebele or traditional) position.