International Institute of Social Studies

Working Paper
No. 590

Impact of Ethiopia's Community Based Health Insurance on household economic welfare

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August 2014

ISSN 0921-0210

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Abstract

In 2011, the Government of Ethiopia launched a pilot Community-Based Health Insurance (CBHI) scheme. This paper uses three rounds of household survey data, collected before and after the introduction of the CBHI pilot, to assess the impact of the scheme on household consumption, income, indebtedness and livestock holdings. We[*] find that enrolment leads to a 5 percentage point – or 13 percent – decline in the probability of borrowing and is associated with an increase in household income. There is no evidence that enrolling in the scheme affects consumption or livestock holdings. Our results show that the scheme reduces reliance on potentially harmful coping responses such as borrowing. This paper adds to the relatively small body of work which rigorously evaluates the impact of CBHI schemes on economic welfare.

[*] The authors acknowledge the financial support of the Netherlands Organisation for Scientific Research (NWO-WOTRO), grant number W07.45.103.00.

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1. Introduction

Various forms of health insurance have been advocated as market based risk-transfer mechanisms with the potential to guard against the impoverishing effects of ill-health (see Gertler and Gruber 2002, Xu et al. 2003, Asfaw and Von Braun 2004, Leive and Xu 2008). The recent proliferation of Community Based Health Insurance (CBHI) schemes in many developing countries emanates partly from a need to provide financial protection against unexpected health care costs and to enhance access to modern health care. As a prelude to national coverage, in June 2011, the Ethiopian Government introduced a pilot CBHI scheme in thirteen Woredas (districts) across the four main regional states that constitute 86 percent of the population (Population Census Commission, 2008).[1] The aim of this paper is to examine the impact of this scheme on measures of household economic welfare: consumption, income, indebtedness and livestock.

The economic burden associated with the incidence of ill-health has been documented in a recent but rapidly growing literature on poverty dynamics. Most of these studies examine the consumption implications of health shocks while some delve into the portfolio of coping responses adopted by households.[2] A number of studies show that households in the informal rural sector rely on traditional coping responses such as selling assets and informal borrowing to deal with the adverse consequences of ill-health (Heltberg and Lund 2009, Dekker and Wilms 2010, Sparrow et al. 2014, Yilma et al. 2014). These coping responses are not cost free but entail a compromise – protecting current consumption at the cost of future vulnerability (Flores et al. 2008).

Health insurance primarily addresses out-of-pocket health expenditure, one of two sources of household financial stress from ill health. The second source is forgone income due to

[1] This came following a successful low-cost health service extension program designed to increase the supply of preventive and basic curative health services. See its impact evaluation in Admassie et al. (2009).

[2] See, amongst others, Gertler and Gruber 2002, Wagstaff 2007, Wagstaff and Lindelow 2010, Islam and Maitra 2010, Genoni 2012, Sparrow et al. 2013, Mohanan 2013.

declining capacity to work. While health insurance schemes are not designed to curb this source of vulnerability, they might still provide some protection to households' agricultural income by facilitating early recovery and by reducing pressure on households to reallocate resources meant for productive purposes (for instance, to buy fertilizers and high value seeds) to medical spending. By reducing reliance on potentially harmful coping responses, such as borrowing at usurious rates, health insurance schemes might protect household's economic welfare both in the short and the long-run.

Although analyses of the impact of health insurance has been the subject of a large body of empirical literature, much of this work has focused on health care utilization and out-of-pocket (OOP) health expenditure or on induced behavioural responses such as moral hazard (Leon 2012). Reviews of the literature by Ekman (2004) and Mebratie et al. (2013a) conclude that the evidence base is questionable with regard to the financial protection provided by CBHI. The bulk of the CBHI evaluation literature, with few exceptions[3], relies on cross-section based association and does not identify causal effects. Ignoring self-selection in voluntary insurance uptake is likely to lead to biased estimates of the impact of CBHI.

Moreover, while there are studies that examine whether health insurance helps protect income or wealth from declining due to ill-health (Levy 2002, Lindelow and Wagstaff 2005) or have studied the effect of such schemes on consumption (Wagstaff and Pradhan 2005), there are relatively few studies that have evaluated the impact of such schemes on indebtedness and livestock.

This paper uses three rounds of household panel data – a baseline and two follow-up surveys. The presence of a baseline survey enables us to examine self-selection and to control for both observable and unobservable time invariant factors which may affect self-selection.

[3] Jowett et al. (2003) for Vietnam, Levine et al. (2014) for Cambodia and Lu et al. (2012) for Rwanda, find statistically significant negative effects of CBHI on OOP health spending. Wagstaff et al. (2009) find no statistically significant effects for China.

To identify the effect of the scheme on income, consumption, livestock and indebtedness we rely on both fixed effects and matching methods and compare results for different control groups (within and across pilot and non-pilot districts).

We find that enrolment in the CBHI scheme decreases the probability of indebtedness by 13 percent. We also find a negative, yet imprecise, effect on the amount of outstanding loans. There is no statistically significant impact on livestock holding and consumption. However, crop output and total income increase by 9 to 10 percent of baseline values.

The remainder of the paper is organized as follows. Section two provides the context and design of the CBHI scheme. Section three describes the data. This is followed by a brief discussion on the how the scheme may be expected to influence outcomes. Section five describes the empirical approach and section six presents the results. Finally, section seven concludes.

2. CBHI scheme design

In June 2011, as part of the new health sector financing reform (HSFR) initiatives, the Ethiopian Government launched a pilot CBHI scheme in 13 districts in the four main regions (*Tigray, Amhara, Oromiya,* and *SNNPR*) of the country.[4,5] Regional administrative bodies selected these districts based on directives provided by the Federal Ministry of Health (FMoH). The selection criteria require that the districts fulfil five conditions while in practice selection was based on two conditions: undertaking HSFRs and geographical accessibility of health centers (located close to the main road).[6]

[4] Although initially the plan was to launch the pilot scheme in 3 districts in each of the four regions, an additional district in Oromiya region volunteered to join the pilot scheme and was included.
[5] The main components of the health sector financing reform include revenue retention and utilization by health facilities, fee waiver and exemption of certain services, and establishment of private wings in public hospitals.
[6] The complete set of selection criteria include (1) Willingness of district authorities to implement the scheme (2) Commitment of districts to support the scheme, (3) Geographical accessibility of health centers (4) Quality of health centers, (5) The implementation of cost recovery, local revenue retention, and public pharmacy policies in health centers.

The community element to the CBHI scheme is that villages (Kebeles) decide whether or not to join (based on a simple majority vote), and are subsequently involved in management and supervision. Possibly due to prior sensitization activities, all villages in pilot districts voted in favour of the scheme. Once a Kebele agrees to join, household enrolment is voluntary. To reduce adverse selection, enrolment is at the household level rather than the individual (FMoH 2008).

Benefit packages, registration fees, premiums and premium payment methods are similar within regions but vary slightly across regions (Table 1).[7] While in Amhara region the unit of contribution is the individual (ETB 3 per individual per month) in other regions it is the household. For core household members (parents and minor children), household level monthly premiums range between ETB 10.50 in SNNPR to ETB 15 in Oromiya (Table 1). For each additional non-core household member the monthly premium lies between ETB 2.10 and ETB 3.00. On average, the combined premiums for core household members (parents and underage children) amount to about 1-1.4 percent of household monthly non-medical expenditure.[8] The CBHI scheme is subsidized by both the central and regional/district governments. The central government provides a general subsidy amounting to a quarter of the premium collected at district level while the regional and district level governments cover the costs of providing a fee waiver for the poorest 10 percent of the population.[9]

The benefit package includes both outpatient and inpatient service utilization at public facilities. Enrolled households may not seek care in private facilities unless a particular service or drug is unavailable at a public facility. The scheme excludes treatment abroad and

[7] The design of the scheme is based on a feasibility study conducted by an international consultancy company, Abt Associates, which is also responsible for implementation and monitoring of the scheme in collaboration with relevant government bodies at the federal and local level.

[8] In 2011, monthly household non-medical expenditure was ETB 1103 (USD 1 equals ETB 18).

[9] These households are categorized as indigent groups (households without land, house, or any valuable assets). In December 2012 about 9 percent of total eligible households had received a fee waiver.

treatments with large cosmetic value such as artificial teeth and plastic surgery. The referral procedure requires members to visit health centers before they may be referred to hospitals (district or regional). Those who do not follow this referral procedure need to cover half the costs of their medical treatment.[10] In our sample, CBHI uptake reached 41 percent in April 2012 and 48 percent in 2013 (see Table 1). This is comparable to the official overall figure reported by Abt Associates (45.5 percent in December 2012). Although there is not much of a difference between uptake in April 2012 (41 percent) and uptake in April 2013 (48 percent), the speed of uptake is remarkable compared to experiences in other African countries. Uptake in Senegal after two years was 4.8 percent (Smith and Sulzbach, 2008), in Tanzania 2.8 percent after six years (Chee et al., 2002), in Mali 11.4 percent after six years (Diop et al., 2006), and in Rwanda 35 percent after seven years and 85 percent after nine years (Shimeles, 2010).

3. Data

We use three-rounds of a household panel data set, collected in March/April of 2011, 2012 and 2013. The first round was collected a few months before the launch of the CBHI scheme and serves as a baseline. Sixteen districts located across four main regions of the country (Amhara, Oromiya, Tigray and SNNPR) are included in the survey. For each region we include all three districts that implemented the CBHI pilot and one selected non-pilot district. The non-pilot districts were chosen based on the same criteria that were used to select the pilot districts. Within the districts we applied a two stage sampling design, randomly sampling villages (six from each district) and the households (17 from each village). The total sample size in the first round is 1,632 households comprising 9,455 individuals, of which 98 and 97 percent were successfully re-surveyed in 2012 and 2013.

[10] Access to tertiary level care differs across regions. While in Oromiya coverage includes hospitals located outside the region, in SNNPR they may visit only the nearest public hospital. In Amhara and Tigray, CBHI enrollees may visit any public hospital within the region but not outside the region.

The survey instrument contains information on a variety of individual and household socio-economic attributes such as consumption expenditure, crop output, off-farm income, assets, outstanding loans, household demographics, employment and health conditions. The total value of all outstanding loans at the time of the survey is used to measure indebtedness. We record the number of various livestock types owned rather than their monetary values. It is important to acknowledge that although this is less prone to reporting error, we are not able to capture livestock quality and size differences. Our measures of income are value of crop output and total income in the past 12 months. The survey asks if a household produced any of 33 crop items listed and how much is produced. We calculate the value of crop production using the per unit sales price of each item. If the household did not sell that item we rely on the median price of that item in the district or zone. Crop output is the sum of the monetary value of all items produced in the past year. Total income is the sum of crop output and off-farm income. Off-farm income is calculated by multiplying the number of days worked in the past month with the average cash equivalent remuneration per day. Monthly off-farm income is multiplied by 12 to get annualized figures. This is then aggregated at the household level before adding it to crop output. Our measure of consumption is monthly non-medical per adult equivalent consumption.[11] The survey collected the quantity and monetary value of 41 food items consumed in the last week and consumption expenditure on 34 non-food items in the past month or year, depending on the item. Both food and non-food consumption expenditures are then converted to their monthly equivalents, in per adult equivalent terms.

In addition to the surveys, we also conducted event history interviews with 42 purposively selected households across the four regions. We make occasional references to this qualitative information.

[11] We adopt the age-sex based adult equivalent household size suggested by Dercon and Krishnan (1998).

4. CBHI and expected effects

In principle, since enrollment in CBHI enables access to free care, it might reduce the necessity to rely on coping responses that are less preferred by households. For example, Yilma et al. (2014) find that borrowing is a last resort used by households primarily to meet urgent health care needs.[12] Hence, we expect access to CBHI to reduce the probability of borrowing/indebtedness. Distress sales of livestock to finance urgent health care needs are also expected to decline. Hence, we expect an increase in livestock ownership.[13] The possibility that insurance protects households against the income effects of health shocks has been noted in China (Lindelow and Wagstaff 2005). There are two ways in which CBHI might affect household income. First, it might reduce the negative impact on labor supply by facilitating early treatment and fast recovery. Second, as the following quotes suggest, credit constrained rural households tend to finance health care using by using cash that has been saved for buying fertilizers or seeds. Subsequent delays in production or loss of productivity might compromise household income.

> "My wife is sick of modern illness, TB. She is recurrently sick and goes to health facilities quite often. I spent around 5000 birr. Her illness has affected our harvest. Because of health expenditure, I couldn't buy inputs of production (high yield seeds and fertilizer) on time and hence, reduced my output. [Male respondent, Oumbulo Tenkaka Kebele of SNNPR, Interview conducted on 11th February 2013]"

> "My daughter had a stomach complaint for more than a week. I took her to a traditional healer but she couldn't get better. Then, I took her to a health center... I spent 300 birr for that. Due to her illness, I didn't work on my vegetable garden. As I

[12] Yilma et al. (2014) also show that selling assets and relying on savings are prominent responses to health shocks in these villages.

[13] However, if livestock is held as a buffer stock, for unexpected health care needs, the effect of CBHI may be negative.

used the money I put aside for seeds, I ran out of cash to buy the seeds to plant my vegetables. Although, after sometime, I worked off-farm (dig-out sand and sell) and planted vegetables, I do not expect as much output as I planted it late. [Male respondent, Jara Damuwa Kebele of SNNPR, Interview conducted on 15th of February 2013]"

5. Methods

The non-random nature of insurance uptake is an important empirical concern in identifying the causal effect of CBHI. Demand for health insurance may be driven by affordability or latent health status, in which case simple differences in outcomes between CBHI enrolled and non-enrolled households may not be viewed as causal effects of the scheme. Tables 2 and 3 suggest non-random uptake. At baseline, households that subsequently take up CBHI have higher crop output and income, are more likely to have borrowed, have larger outstanding loans, and larger livestock holdings than households that do not insure. However, we see little differences in consumption. A naive comparison of post intervention outcomes would overestimate the impact of CBHI on income and livestock and underestimate the impact on indebtedness.

We therefore estimate a household fixed effects model that controls for both observed and unobserved time-invariant confounding factors

$$Y_{it} = \beta CBHI_{it} + \delta T_t + \varphi X_{it} + \theta_i + \varepsilon_{it} \quad (1)$$

where Y_{it} is the outcome of interest for household i at time t, the dummy variable $CBHI_{it}$ indicates whether household i is insured in year t, and T reflects year dummy variables for each of the three years. Household fixed effects are captured by θ_i and ε_{it} is a random error term. Time varying controls X_{it} include demographics, various measures of socio-economic status, shocks and household head characteristics (see table 3 for a list of covariates). We estimate the above equation with and without X_{it}. If the confounding role of time-variant

unobserved characteristics is minimal, then we would expect similar treatment effects across these two specifications.[14] In addition, we also combine the fixed effects approach with propensity score matching (PSM). CBHI uptake is modelled as a function of baseline characteristics, and we estimate equation (1) only for households on common support.

We have two groups of control households: uninsured households in pilot districts and households from non-pilot districts. Each control group introduces different sources of bias. For the pilot districts, the voluntary nature of the scheme could induce selection bias. The fixed effects would purge selection effects if these are based on time-invariant characteristics. Pilot districts are also prone to spill-over effects. However, these are most likely to be relevant to health care use and not for economic outcomes, at least not in the short term.[15]

The control districts are drawn from the same regions and fulfil the criteria stipulated by the government in selecting CBHI districts, while any remaining geographical differences will be controlled for by the fixed effects. Although, fixed effects cannot deal with aggregate shocks we explicitly control for information on 22 different shock types (natural shock, crime/conflict related shock, health shock and economic shock). Our robustness check for excluding covariates also tests if the results are sensitive to excluding these shocks.

Finally, there remains a possible confounding effect from other social programs that share targeting and selection criteria with the CBHI pilot. We are aware of only one such social safety net program in rural Ethiopia, the PSNP (Productive Safety Net Program). For both sets of control households, we estimate models with and without an indicator variable for PSNP.

[14] Results without covariates are reported in the appendix, table A1.
[15] We run a placebo test where treatment indicator takes a value of 1 if uninsured household lives in pilot district and 0 otherwise. We do not find any indication of spill-over effects. Results are reported in the appendix, table A2.

6. Estimates

Table 4 presents treatment effects using different control groups. Across methods we find statistically significant positive impact on income (crop output and total income) for the pilot district comparison only. While the magnitudes of the estimates decline as we exclude households that are off support, we find that crop output and total income increase by ETB 785 and ETB 1027, respectively or 9 to 10 percent of baseline values. While the coefficients are also positive when we use households in non-pilot districts as controls, the estimates are not precise. The results provide no evidence that CBHI affects household consumption, as the coefficients lack statistical significance and the magnitudes are small.

We find a negative impact on the probability of having outstanding loans ranging between 4 to 5 percent, depending on methods and control groups, which translates to about 13 percent of baseline values.[16] Figure 1 shows that the source of this effect is a decline in the proportion of indebted insured households. There are also negative coefficients for the amount of outstanding loans although these are imprecise. Estimates for all types of livestock are not statistically significant.

7. Conclusion

This paper explored the impact of Ethiopia's CBHI pilot scheme on household economic welfare. We used three rounds of a household panel dataset, which included one baseline and two follow-up surveys. We deployed different specifications of a household fixed effects model and compared results across different control groups (within and across pilot and non-pilot districts).

We found that enrolment in CBHI decreases the probability of indebtedness by about 5 percentage points. Compared to the proportion of households who were indebted at baseline (37.5 percent), this effect corresponds to a 13 percent decline. We found no statistically

[16] The estimates for the pilot-district control group are, however, imprecise.

significant impacts on consumption and livestock holdings while there is some evidence that CBHI is associated with increases in annual crop output and total income of about 9 to 10 percent.

The effects on indebtedness and output/income (although not robust across control groups) are consistent with the idea that households with access to CBHI are less likely to rely on coping responses such as borrowing and also less likely to divert resources meant for productive purposes to finance urgent health care needs.

Thus, the main benefit of the scheme is its effect on reducing the need to borrow and rely on savings. This may have longer-term benefits in reducing vulnerability to other forms of shocks. A related study has found a sharp impact on increasing health care utilization (Mebratie et al. 2013b). The combined results provide support to the government's recent move to extend the CBHI pilot to a total of 161 districts for further testing. However, a nationwide scale up requires an examination of the scheme's financial sustainability.

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Tables

Table 1. Premium and CBHI uptake per region

Region	Premium per month (ETB)		CBHI uptake (%)	
	For all core HH members	Per each non-core HH member	April 2012	April 2013
Tigray	11	2.5	33.9	50.2
Oromiya	15	3	44.2	44.5
SNNPR	10.5	2.1	35.3	35.4
Amhara	3 per any member		49.5	62.7
Total			40.7	48.2

Notes: A one-time registration fee of ETB 5.00 apply for all households; Payment interval: Tigray (annual), Amhara (biannual), Oromiya (annual or biannual), SNNPR (three times a year or quarterly). Core household members include parents and their children below the age of 18.

Table 2. Baseline differences in outcome variables: insured vs non-insured

	Insured households (N=656)	Non-insured households		
		All districts (N=911)	Pilot districts (N=527)	Control districts (N=384)
Income				
Crop output	8499.0	5985.0***	6551.3***	5212.8***
	(9104.3)	(7044.6)	(7440.0)	(6395.8)
Total income	10017.2	7091.8***	7757.6***	6196.2***
	(9828.0)	(7335.5)	(8089.1)	(6075.1)
Consumption				
Total	244.7	249.4	241.9	259.6
	(146.9)	(170.4)	(162.5)	(180.5)
Food	201.1	206.3	200.6	214.0
	(125.4)	(144.6)	(144.8)	(144.3)
Non-food	43.8	43.0	41.2	45.5
	(39.6)	(45.1)	(37.7)	(53.6)
Indebtedness				
Outstanding loan (%)	37.5	26.0***	26.6***	25.3***
	(48.4)	(43.9)	(44.2)	(43.5)
Total outstanding loan	880.3	527.6***	492.8***	575.4***
	(1689.2)	(1259.3)	(1172.7)	(1369.5)
Livestock				
Goats #	1.2	0.8**	0.7**	0.8
	(5.3)	(2.2)	(2.2)	(2.1)
Sheep #	1.8	1.0***	0.9***	1.2***
	(3.0)	(2.6)	(2.2)	(3.0)
Bulls #	0.4	0.3**	0.3*	0.3**
	(1.4)	(0.7)	(0.6)	(0.7)
Calves #	0.8	0.6***	0.6***	0.5***
	(1.2)	(0.9)	(0.9)	(0.8)
Oxen #	1.4	0.8***	0.9***	0.8***
	(1.3)	(1.0)	(1.0)	(0.9)

Notes: Columns 1-4 report mean (standard deviation; Statistical significance refers to differences in means between the control group and the insured households: *** 0.01, ** 0.05, * 0.1. Crop output refers to total value of production in the past one year. Total income is the sum of crop output and off-farm income. All livestock types refer to number of livestock owned. All monetary values are in Ethiopian Birr (ETB).

Table 3. Baseline differences in covariates: insured vs non-insured

	(1) Insured households (N=656)		(2) All non-insured households (N=911)		(3) Non-insured in pilot districts (N=527)		(4) Non-insured in control districts (N=384)		(5) P-value Ho: (1=2)	(6) P-value Ho: (1=3)	(7) P-value Ho: (1=4)
	Mean	St.dev	Mean	St. dev	Mean	St. dev	Mean	St. dev			
Health measures											
Head ADL Index	0.044	(0.136)	0.054	(0.151)	0.063	(0.167)	0.042	(0.124)	0.181	0.033	0.792
Any illness	46.8	(49.9)	46.9	(49.9)	51.2	(50.0)	40.9	(49.2)	0.977	0.130	0.064
Any chronic illness	16.3	(37.0)	17.1	(37.7)	20.3	(40.3)	12.8	(33.4)	0.671	0.076	0.122
Any paralysis	4.9	(21.6)	3.4	(18.1)	4.4	(20.4)	2.1	(14.3)	0.143	0.677	0.024
Any poor/very poor SAH	15.9	(36.6)	11.9	(32.3)	15.4	(36.1)	7.0	(25.6)	0.022	0.820	0.000
Covariates											
Head does not work	1.2	(11.0)	1.9	(13.5)	1.7	(13.0)	2.1	(14.3)	0.314	0.484	0.275
Head farmer (%)	93.6	(24.5)	87.5	(33.1)	91.3	(28.3)	82.3	(38.2)	0.000	0.130	0.000
Head domestic worker (%)	2.6	(15.9)	5.7	(23.2)	3.6	(18.7)	8.6	(28.1)	0.003	0.313	0.000
Head other employment (%)	2.6	(15.9)	4.9	(21.7)	3.4	(18.2)	7.0	(25.6)	0.019	0.406	0.001
PSNP member (%)	25.8	(43.8)	20.9	(40.7)	10.3	(30.5)	35.2	(47.8)	0.022	0.000	0.001
Asset quintile 1 (%)	10.5	(30.7)	24.9	(43.3)	23.3	(42.3)	27.1	(44.5)	0.000	0.000	0.000
Asset quintile 2 (%)	15.5	(36.3)	23.3	(42.3)	22.2	(41.6)	24.7	(43.2)	0.000	0.003	0.000
Asset quintile 3 (%)	19.4	(39.5)	21.2	(40.9)	21.1	(40.8)	21.4	(41.0)	0.377	0.468	0.439
Asset quintile 4 (%)	23.9	(42.7)	17.8	(38.3)	18.2	(38.6)	17.2	(37.8)	0.003	0.017	0.011
Asset quintile 5 (%)	30.6	(46.1)	12.8	(33.5)	15.2	(35.9)	9.6	(29.5)	0.000	0.000	0.000
Social capital (%)[a]	40.5	(49.1)	35.6	(47.9)	34.4	(47.6)	37.2	(48.4)	0.051	0.033	0.306
Head is male (%)	88.1	(32.4)	85.6	(35.1)	86.1	(34.6)	84.9	(35.9)	0.153	0.315	0.138
Head age	47.3	(13.1)	45.6	(14.5)	46.4	(14.7)	44.5	(14.2)	0.022	0.319	0.001
Head has no education (%)	43.1	(49.6)	48.5	(50.0)	48.8	(50.0)	48.2	(50.0)	0.032	0.050	0.109

Head education informal (%)	15.9	(36.6)	11.2	(31.5)	10.2	(30.4)	12.5	(33.1)	0.007	0.005	0.137
Head education primary (%)	36.9	(48.3)	35.8	(48.0)	35.9	(48.0)	35.7	(48.0)	0.637	0.701	0.682
Head education secondary or more (%)	4.1	(19.9)	4.5	(20.7)	5.1	(22.1)	3.6	(18.8)	0.717	0.413	0.704
Head Muslim (%)	18.8	(39.1)	32.5	(46.9)	17.1	(37.7)	53.6	(49.9)	0.000	0.457	0.000
Head Orthodox (%)	64.6	(47.8)	41.9	(49.4)	54.1	(49.9)	25.3	(43.5)	0.000	0.000	0.000
Head Protestant (%)	15.7	(36.4)	22.2	(41.6)	25.6	(43.7)	17.4	(38.0)	0.001	0.000	0.463
Head other Christian/religion (%)	0.9	(9.5)	3.4	(18.1)	3.2	(17.7)	3.6	(18.8)	0.001	0.004	0.002
Log HH size	1.7	(0.4)	1.6	(0.4)	1.7	(0.5)	1.6	(0.4)	0.000	0.004	0.001
Male (age<=5) share %	6.5	(10.4)	7.9	(12.1)	7.5	(11.8)	8.5	(12.6)	0.017	0.124	0.007
Female (age<=5) share %	6.5	(10.4)	8.1	(12.4)	7.4	(11.4)	8.9	(13.6)	0.010	0.165	0.001
Male [6 18] share (%)	21.7	(17.1)	19.0	(17.1)	19.0	(16.8)	19.0	(17.6)	0.002	0.007	0.014
Female [6 18] share (%)	19.2	(15.9)	18.5	(16.3)	18.7	(16.1)	18.3	(16.7)	0.437	0.604	0.410
Male [19 45] share (%)	15.3	(13.0)	16.0	(13.6)	16.1	(13.8)	15.8	(13.3)	0.336	0.320	0.558
Female [19 45] share (%)	16.3	(11.7)	16.1	(11.4)	16.2	(12.0)	16.0	(10.6)	0.724	0.846	0.671
Male [46 60] share (%)	4.6	(8.3)	3.8	(7.6)	3.6	(7.2)	4.1	(8.0)	0.045	0.026	0.328
Female [46 60] share (%)	5.3	(11.6)	4.8	(12.1)	5.0	(11.9)	4.6	(12.3)	0.420	0.640	0.345
Male [60+] share (%)	3.3	(9.4)	3.0	(9.3)	3.5	(10.2)	2.3	(8.0)	0.579	0.673	0.092
Female [60+] share (%)	1.2	(7.2)	2.8	(11.4)	3.0	(12.2)	2.5	(10.3)	0.002	0.002	0.022
Health shock (%)	32.1	(46.7)	31.2	(46.3)	37.0	(48.3)	23.2	(42.3)	0.710	0.075	0.002
Crime/conflict shock (%)	5.6	(23.1)	7.7	(26.6)	8.9	(28.5)	6.0	(23.8)	0.116	0.030	0.820
Economic shock (%)	37.7	(48.5)	30.3	(46.0)	36.2	(48.1)	22.1	(41.6)	0.002	0.604	0.000
Natural shock (%)	45.5	(49.8)	49.0	(50.0)	49.3	(50.0)	48.4	(50.0)	0.176	0.189	0.359

Notes: Columns 1-4 report mean and standard deviation. P-values for tests of differences in means are reported in columns 5-7; [a] social capital takes the value of 1 if the household has someone to rely on at times of difficulties.

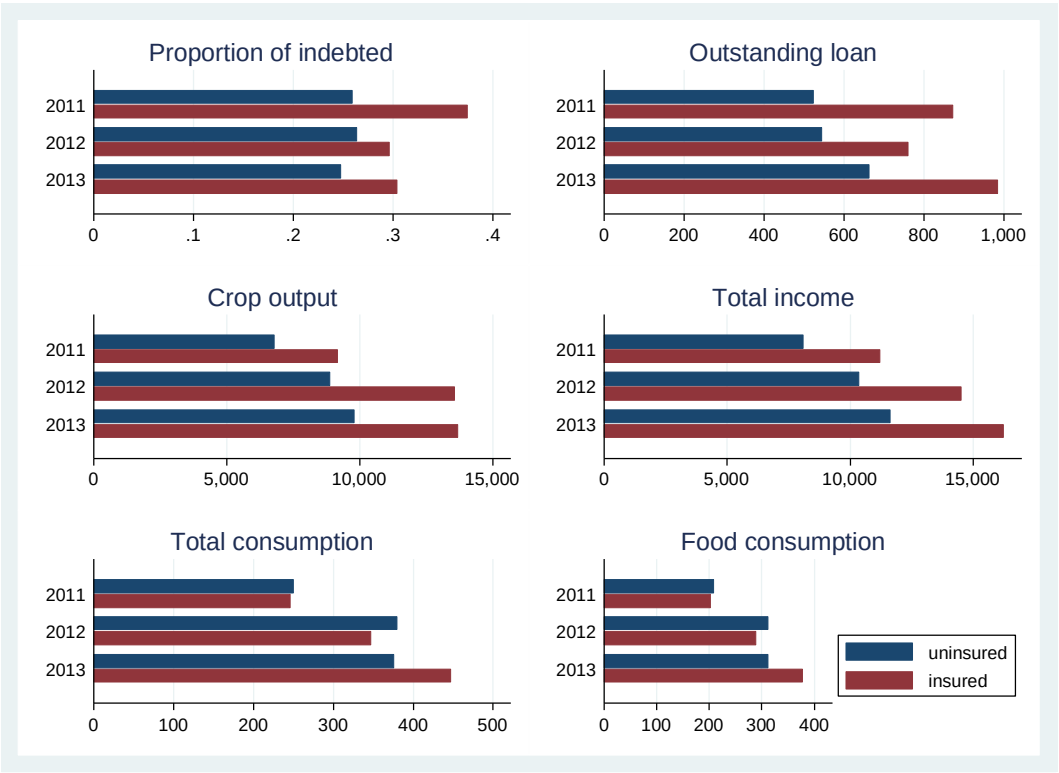
Table 4. Welfare effects of CBHI

	FE with covariates			FE with covariates after matching		
	All districts	control districts	Pilot districts	All districts	control districts	Pilot districts
Income						
Crop output	459.9	286.6	816.4*	418.6	243.8	785.4*
	(477.4)	(572.4)	(460.7)	(481.8)	(573.8)	(470.1)
Total income	675.7	427.8	1,092*	593.9	338.2	1,027*
	(571.3)	(632.7)	(593.6)	(577.3)	(633.7)	(604.2)
Consumption						
Total	18.01	25.03	12.38	-6.556	-1.874	-14.96
	(27.45)	(30.75)	(33.02)	(21.34)	(24.82)	(26.35)
Food	18.59	26.94	10.87	-5.655	0.405	-16.18
	(26.70)	(29.95)	(32.25)	(20.67)	(23.92)	(25.68)
Non-food	0.113	-1.044	2.436	0.0201	-1.285	2.467
	(2.969)	(3.581)	(3.166)	(3.047)	(3.748)	(3.228)
Indebtedness						
Loan (0/1)	-0.0506**	-0.0540**	-0.0340	-0.0483**	-0.0484**	-0.0341
	(0.0222)	(0.0237)	(0.0238)	(0.0225)	(0.0235)	(0.0243)
Loan amount	-44.87	-51.24	-16.72	-36.24	-38.18	-10.62
	(69.76)	(77.20)	(70.32)	(70.81)	(77.93)	(71.84)
Livestock						
Goats #	-0.0835	-0.0357	-0.129	-0.0836	-0.0247	-0.136
	(0.141)	(0.124)	(0.151)	(0.145)	(0.127)	(0.156)
Sheep #	-0.0321	0.0237	-0.0808	-0.0336	0.0205	-0.0808
	(0.113)	(0.129)	(0.114)	(0.114)	(0.130)	(0.115)
Bull #	0.0453	0.0421	0.0247	0.0458	0.0447	0.0209
	(0.0362)	(0.0415)	(0.0349)	(0.0368)	(0.0425)	(0.0356)
Calves #	-0.0177	-0.0360	-0.00440	-0.0210	-0.0380	-0.00400
	(0.0631)	(0.0547)	(0.0647)	(0.0644)	(0.0562)	(0.0664)
Oxen #	0.0451	0.0590	0.0286	0.0439	0.0574	0.0277
	(0.0452)	(0.0480)	(0.0467)	(0.0464)	(0.0495)	(0.0483)

Notes: The column headings refer to the choice of control group: all districts (all non-insured households included), control districts (only non-insured households in control districts included), and pilot districts (only non-insured households in pilot districts included). Standard errors (in parentheses) are clustered at the village level. Results are broadly similar when excluding the time-varying covariates. A list of covariates is given in table 3. In the case of livestock we exclude the asset index quintiles as the index includes number of livestock. Range of number of observations: first column (4230-4665), second column (2816-3101), third column (3153-3520), fourth column (4059-4483), fifth column (2722-3003), sixth column (3053-3412). 66 out of 1548 observations are outside the common support region [0.086-0.869].

Statistical significance: *** 0.01, ** 0.05, * 0.1.

Figure 1. (Selected) outcome variables by insurance status across years



Appendix

Table A1. Welfare effects of CBHI (robustness to excluding covariates)

	FE before matching			FE after matching		
	All districts	control districts	Pilot districts	All districts	control districts	Pilot districts
Income						
Crop output	673.6	497.8	1,105**	670.2	474.1	1,112**
	(476.8)	(577.5)	(466.0)	(481.7)	(576.5)	(477.6)
Total income	971.6*	755.7	1,484**	942.1	695.2	1,466**
	(564.7)	(631.3)	(587.8)	(571.3)	(631.8)	(600.5)
Consumption						
Total	25.59	24.98	20.34	-1.546	-3.115	-8.523
	(28.75)	(33.50)	(32.68)	(20.81)	(26.83)	(24.99)
Food	26.35	27.59	19.39	-0.494	-0.301	-9.072
	(27.86)	(32.57)	(31.65)	(19.87)	(25.83)	(23.97)
Non-food	0.210	-1.143	2.167	0.206	-1.137	2.136
	(2.907)	(3.451)	(3.075)	(2.986)	(3.606)	(3.131)
Indebtedness						
Loan (0/1)	-0.0539**	-0.0572**	-0.0412*	-0.0526**	-0.0537**	-0.0417*
	(0.0221)	(0.0237)	(0.0237)	(0.0221)	(0.0231)	(0.0240)
Loan amount	-43.50	-39.48	-29.20	-38.95	-31.77	-24.24
	(70.60)	(78.52)	(72.77)	(70.79)	(78.63)	(73.35)
Livestock						
Goats #	-0.0801	-0.00357	-0.111	-0.0820	0.00597	-0.122
	(0.145)	(0.126)	(0.157)	(0.149)	(0.129)	(0.162)
Sheep #	-0.0434	0.0190	-0.0817	-0.0430	0.0176	-0.0808
	(0.114)	(0.132)	(0.113)	(0.116)	(0.135)	(0.115)
Bull #	0.0445	0.0368	0.0285	0.0471	0.0399	0.0285
	(0.0352)	(0.0398)	(0.0343)	(0.0357)	(0.0410)	(0.0343)
Calves #	0.00694	-0.00756	0.0164	-0.000696	-0.0150	0.0111
	(0.0634)	(0.0583)	(0.0631)	(0.0649)	(0.0596)	(0.0649)
Oxen #	0.0558	0.0723	0.0439	0.0559	0.0749	0.0418
	(0.0474)	(0.0514)	(0.0476)	(0.0484)	(0.0526)	(0.0487)

Notes: The column headings refer to the choice of control group: all districts (all non-insured households included), control districts (only non-insured households in control districts included), and pilot districts (only non-insured households in pilot districts included). Standard errors (in parentheses) are clustered at the village level. Range of number of observations: first column (4265-4707), second column (2837-3126), third column (3181-3555), fourth column (4080-4510), fifth column (2734-3019), sixth column (3068-3433). 66 out of 1548 observations are outside the common support region [0.086-0.869].
Statistical significance: *** 0.01, ** 0.05, * 0.1.

Table A2. Placebo Test: (Treatment=1 if uninsured lives in pilot district, 0 otherwise)

	Coefficients (St. errors)
Income	
Crop output	-460.3
	(558.0)
Total income	-637.2
	(663.1)
Consumption	
Total	-4.244
	(21.75)
Food	-1.333
	(20.38)
Non-food	-2.904
	(3.091)
Indebtedness	
Loan (0/1)	-0.0176
	(0.0213)
Loan amount	-34.51
	(95.76)
Livestock	
Goats #	0.0366
	(0.0888)
Sheep #	0.134
	(0.145)
Bull #	0.0268
	(0.0384)
Calves #	0.0250
	(0.0402)
Oxen #	0.000696
	(0.0391)

Notes: All estimates are based on OLS regression of change in outcome variables, controlling for covariates (given in table 3) and time dummy. In the case of livestock we exclude the asset index quintiles as the index includes number of livestock. Standard errors (in parentheses) are clustered at the village level. Number of observations ranges from 1561 to 1805.

Statistical significance: *** 0.01, ** 0.05, * 0.1.