THE EFFECTS OF SUBSIDISED MICRO HEALTH INSURANCE ON INSURANCE DEMAND AND WELFARE OUTCOMES IN RURAL BURKINA FASO

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Abstract

This paper evaluates the impact of a 50 per cent subsidy on micro health insurance in Burkina Faso. Applying a sharp regression discontinuity design, we found, first, that the subsidy doubled insurance enrollment, implying that poor households' price elasticity of demand for health insurance is about one. Second, being eligible for the subsidy halves the incidence of healthcare related out-of-pocket expenditures, and, third, reduces the incidence of lost days due to illness by about 40 per cent. We conclude that pricing of health-related micro insurance products has large effects on both insurance take-up and household welfare in low-income contexts.

Keywords: *Micro health insurance; demand for micro insurance; micro insurance pricing; Sub-Saharan Africa.*

JEL Codes: *G22, I13, I38, O15.*

1. INTRODUCTION

Illness is one of the most frequently reported shocks in low-income countries (World Bank, 2013). Health shocks cause indirect costs by preventing individuals from engaging in income-earning activities and trigger high out-of-pocket (OOP) expenditures[1] for medical care at the same time. Therefore, health shocks constitute a severe, yet, unpredictable economic risk (Smith and Witter, 2004) threatening households' consumption levels (Gertler and Gruber, 2002; Wagstaff, 2007). Given unhealthy working and living conditions, poor people are especially exposed to the risk of ill health (Grant,

[1] Household out-of-pocket expenditures comprise "financing of healthcare services directly by households, without use of intermediary financing arrangements such as health insurance schemes" (Rannan-Eliya and Lorenzoni, 2010, p. 12).

2005) while having little access to private insurance (Balkenhol and Churchill, 2002). In the absence of statutory health insurance, poor people thus need to rely on informal insurance mechanisms. These are not only insufficient to fully insure consumption (De Weerdt and Dercon, 2006) but also come at high future economic costs that can increase their vulnerability to poverty (World Bank, 2013).

The objective of this paper is to evaluate the impact of a subsidy on the premium of a micro health insurance in the North West of Burkina Faso. In particular, this paper investigates to what extent subsidization of micro health insurance increases its outreach among the poor, and second, whether subsidization reduces direct costs as well as indirect economic costs of illness. To address the problem of selection bias, which arises because insurance is voluntary, We use a sharp regression discontinuity design (RDD). More precisely, our identification strategy relies on exogenous variation in the eligibility for the premium discount around a poverty threshold. In particular, all households below this threshold are eligible while all households above the threshold are not. Consequently, we estimate the intent-to-treat (ITT) effect of the premium discount on outcomes in the sub-population of households close to the poverty threshold as the difference in outcomes between households just below and households just above this threshold.

Our empirical results suggest being offered the 50 per cent discount increases insurance take-up by about 30 percentage points. This implies a price elasticity of demand of about one. We also find large effects on measures of household welfare. In particular, over a period of one month, being eligible for the subsidy decreases the incidence of healthcare related OOP expenditures from 3.5 to 2 per cent. The probability of losing at least one day due to illness within the same time interval drops from about 7.5 to 4 per cent. Given our empirical strategy, these findings apply to the sub-population of households located on the border of the lowest and second-to-lowest wealth quintile. These households live in severe poverty by international standards. Results of a placebo test and further estimations with observations from different interval sizes around the cut-off confirm the robustness of these findings.

With this paper we contribute to the following literatures. First, it adds to existing evidence on demand for health insurance. Several authors have studied the price elasticity of demand for health insurance in high-income countries. Blumberg et al. (2001) and Chernew et al. (1997) study the impact of subsidies for employer-provided insurance in the US on insurance take-up and find that only large subsidies could influence individuals' enrollment decisions. By exploiting a policy change, Gruber and Washington (2001) estimate the effect of premium subsidies on insurance take-up and report an elasticity

of close to zero. Royalty and Hagens (2005) find that workers' take-up decisions are fairly insensitive to insurance pricing. Thus, evidence from high-income countries suggests that demand for health insurance is fairly inelastic.

Evidence for low-income countries on the relationship between price and insurance take-up predominantly relies on willingness to pay (WTP) studies. These can suffer from hypothetical bias (Chang et al., 2009) and results strongly depend on the experimental set-up (Stewart et al., 2002; Moser et al., 2014). To the best of our knowledge, there are only two studies, which rigorously evaluate interventions aimed at expanding the take-up of voluntary health insurance. Thornton et al. (2010) find that Nicaraguan workers from the informal sector are 30 per cent more likely to enroll in a voluntary micro health insurance scheme when offered a six-month subsidy. Wagstaff et al. (2014) find that a subsidy on the premium together with an information campaign significantly increased insurance take-up among morbid households. This paper is innovative because, first, its context is situated in sub-Saharan Africa. Second, the households targeted by this intervention are much poorer in absolute terms than those in the other two papers. In our view, knowing the structure of demand is even more crucial in low than in high-income environments because inability to afford the insurance premium has been identified as one of the major obstacles to insurance enrollment for poor households (Jakab and Krishnan, 2004).

In addition, this paper contributes to existing evidence on welfare effects of health insurance in low-income countries in two ways. First, it provides evidence on the effects on direct costs of illness in the form of OOP expenditures. The majority of studies[2] reports significant reductions in OOP expenditures for insured patients (Chankova et al., 2008; Jütting, 2004; Franco et al., 2008; Saksena et al., 2010a; Schneider and Diop, 2001). Some micro health insurance schemes were found not to financially protect their members. This is attributed to high co-payments (Chankova et al., 2008: Senegal and Mali) or higher utilization of healthcare services of insured individuals (Aggarwal, 2010; Schneider and Hanson, 2006). Yet, apart from Aggarwal (2010) and King et al. (2009) all of these authors only control for observables and are likely to suffer from selection bias, as insurance is voluntary in all of these studies. Consequently, we make a methodological contribution by applying a RDD to elicit causal effects of the effect of health insurance on direct costs of illness in low-income countries under more modest identifying assumptions than the existing literature. Moreover, to the best of our knowledge, only Aggarwal (2010) estimated the effect of insurance on indirect economic

[2] See overview of existing studies in table 6.

costs in a low-income country, India, and did not find any significant effects. Therefore, this paper makes an innovation by estimating the effect on an important measure of the indirect costs of illness, days lost for work or schooling due to illness, in a country of Sub-Saharan Africa.

The remainder of the paper is organized as follows: chapter two provides background information on the evaluated micro health insurance scheme and the community wealth ranking. The empirical strategy is explained in chapter three and results are presented in chapter four. Chapter five contains a discussion and points at limitations. Chapter six concludes the paper.

2. HEALTH INSURANCE SCHEME AND WEALTH RANKING

2.1 The micro health insurance scheme

In Burkina Faso life expectancy at birth is 55.9 years (UNDP, 2013) and infant mortality is considered high with 91 deaths of 1000 births (Ministere de la santé Burkina Faso, 2011). Apart from weak health infrastructure, high financial barriers to accessing care is considered to be a major driver of underutilization of healthcare. In absence of a statutory health insurance (Ministere de la Santé Burkina Faso, 2011) most inhabitants pay directly at the point of service. About three quarters of private health expenditures are thus OOP expenditures (WHO, 2013) and one fifth of households experienced catastrophic health expenditures[3] in 2002 (Saksena et al., 2010b).

In order to reduce the financial risk associated with health shocks and to improve access to healthcare in the Nouna health district, situated in the Northwest of the country, the Nouna health research centre implemented a community-based health insurance (CBHI) scheme in cooperation with the University of Heidelberg. Since 2006[4] insurance has been offered in 41 villages and Nouna town (Hounton et al., 2012).

The area is characterized by subsistence farming, and illness was found to be a major cause of poverty (Belem et al., 2011). Six to 15 per cent of households experience catastrophic health expenditures even at low levels of healthcare utilization (Su et al., 2006) and time costs represent more than two

[3] Catastrophic health expenditures are here defined as exceeding 40 per cent of household's non-subsistence expenditure (Saksena et al., 2010b).

[4] More precisely, the 41 villages and Nouna town were split into 33 clusters and the insurance was step-wise introduced between 2004 and 2006. In 2004 eleven randomly selected clusters were offered insurance, followed by an additional eleven clusters in 2005. From 2006 onwards insurance was offered in all 33 clusters (De Allegri et al., 2008).

thirds of total costs of illness. In the presence of a health shock, households use savings and assets to meet expenditures. Many were also found to substitute lost labor by calling children and retired people to the fields. Yet, the majority still lost production (Sauerborn et al., 1996).

Enrollment in the insurance is voluntary and takes place at the household level. The annual flat premium[5] for individuals of age 15 and older is 1,500 CFA franc (US$ 3) and for children 500 CFA franc (US$ 1) (De Allegri et al., 2006). Premiums are collected once a year during a long enrollment period (January – June) (Robyn et al., 2012) and the CBHI offers a comprehensive benefit package[6]. At the point of service insured patients do not need to make any payments, and there is no limit to the number of times members can seek care (De Allegri and Kouyate, n.d.).

Enrollment increased from 5.2 per cent in 2004 to 11.8 per cent of the target population in 2010 (Souares, 2013), yet, remained well below the pre-intervention estimate of 50 per cent (Dong et al., 2003). Enrollment was found to be positively correlated with education and past healthcare utilization (Gnawali et al., 2009) but also with income (Gnawali et al., 2009) and assets (Parmar et al., 2012). Only 1.1 per cent of total poor households were enrolled in the insurance in 2006 and qualitative studies suggest that affordability is one major reason for non-enrollment (De Allegri et al., 2006) and high drop-out rates (Dong et al., 2009).

Although on average members are 2.23 times more likely to use healthcare services than non-members (Hounton et al., 2012), insurance does not seem to sufficiently remove barriers to utilization for poor people. Gnawali et al. (2009) reported a significant increase in outpatient visits only for insured individuals of the richest quartile. Parmar et al. (2014) found no increase in utilization for individuals living more than five km away from a healthcare facility, which is problematic since poor people tend to be clustered in remote regions.

2.2 The community wealth ranking

In order to increase enrollment of poor households, a 50 per cent discount was introduced in 2007 for poor households identified by a community

[5] Premiums were set according to findings of feasibility and willingness to pay studies (Dong et al., 2004; Dong et al., 2003) and did not intend to cover the costs of the insurance.

[6] The benefit package includes consultations at the primary health care facilities (CSPS), prescribed drugs, laboratory tests, inpatient hospital stays, x-rays, surgical processes that are offered by the district hospital and ambulance transport from CSPS to the hospital (De Allegri and Kouyate, n.d.).

wealth ranking (CWR) (Souares et al., 2010). The CWR method entailed three steps. First, local criteria of poverty and wealth were obtained during focus group discussions. Second, villagers, community administrators, and traditional leaders chose three local key informants who had lived in the community for a long time. Each informant separately sorted cards with names of all household heads into piles of different wealth categories defined during focus group discussions. Then, each household was ranked in each pile to determine its relative socio-economic position. In the third step, informants reached a consensus by reviewing together the established rankings. No final rank was assigned until consensus was reached. The poorest 20 per cent identified with the CWR in each village were eligible for the insurance discount (Souares et al., 2010). Enrollment of poor households increased to 11.2 per cent in 2007, then slightly fell again to 9.1 per cent in 2009 (Souares, 2013).

3. EMPIRICAL ANALYSIS

By applying RDD, the following analysis aims to account for selection bias when estimating the local average treatment effects (LATE) of eligibility to discount on CBHI enrollment and the intent-to-treat (ITT) effects of eligibility to discount on economic costs of illness. In particular, the sharp RDD exploits a discontinuity in the offer of a 50 per cent discount on the insurance premium for poor households.

3.1 Discontinuity in eligibility to premium discount

As described in section 2.2, a community wealth ranking (CWR) was conducted in order to determine the 20 per cent poorest households in each village. Each household received three independent scores, one from each local key informant, and by consensus the 20 per cent poorest households were identified. From 2007 onwards, households determined as poor could enroll in the CBHI by paying only 50 per cent of the insurance premium. In order to construct a CWR variable, the average of the three scores was calculated for each household. On the basis of these averages, households were ranked and a normalized CWR variable was constructed with values from -0.2 to +0.8 with the cut-off at zero. Households belonging to the 20 per cent poorest households have a negative value and are eligible to discount; the remaining 80 per cent of the households have a positive value and are not eligible to discount.

This can be formalized as follows:

$$Z_i = \begin{cases} 1 \ \ if \ \ x_i < x_0 \\ 0 \ \ if \ \ x_i \leq x_0 \end{cases} \quad (1)$$

Z_i denotes eligibility status. Z_i=1 if the CWR score x_i is smaller than the cut-off x_0. If an individual's CWR score x_i is greater or equal to x_0 she is not eligible for a discount and Z_i=0. Therefore, at the threshold there is a discontinuity in eligibility to discount, which can be used to estimate the effect on the outcome variables.

Let Y_i be the outcome of individual i. All individuals with a CWR score smaller than x_0 are eligible for treatment, thus one can only observe $E[Y_{1i} | x_i]$ to the left of the cut-off. Individuals to the right of the cut-off are not eligible for treatment, so one can only observe $E[Y_{0i} | x_i]$ to the right of the cut-off. Comparing these observable average outcomes in a small neighborhood around the cut-off then yields the average treatment effect at the cut-off x_0.

$$\lim_{\Delta \to 0} E\,[Y_i \,|\, x_0 \leq x_i < x_0 + \Delta] - E\,[Y_i \,|\, x_0 - \Delta < x_i < x_0] = E\,[Y_{1i} - Y_{0i} \,|\, x_i = x_0] \quad (2)$$

for some small positive number Δ.

The great advantage of RDD is that it requires relatively weak identifying assumptions. In particular, the average outcome of those above the cut-off can be used as a valid counterfactual for those right below the cut-off, if $E[Y_{0i} | x_i]$ is continuous. Continuity holds if individuals cannot manipulate the forcing variable, their CWR score. In particular, individuals must not be able to *precisely* sort around the discontinuity threshold. Then, the variation in the treatment in a neighbourhood of the threshold is *as good as randomised* (Angrist and Pischke, 2009; Lee and Lemieux, 2009).

3.2 Internal validity of the identification strategy

How valid is the assumption that individuals cannot manipulate their CWR score? Since the CWR applied a relative concept of poverty, households could only approximate how poor they need to appear in order to be allocated into the lowest wealth quintile. Moreover, the CWR applied a set of characteristics determining poverty. Households would thus have needed to manipulate an array of wealth determinants to significantly increase the probability of being classified as poor.

The three informants may constitute a potential source of fraud through elite capture. Households might have been able to exploit personal relation-

ships with one of the informants to influence their CWR score. Still, in order to precisely sort into the eligible group, they would have needed to arrange for a preferential ranking with all three informants since final scores were determined by consensus. Publishing the targeting results afterwards and allowing for households to object to the results further reduces room for elite capture.

However, local informants might have disproportionally weighted household's observable health status (e.g. a chronically sick family member), since the purpose of the CWR was well known. Nevertheless, such an unbalanced weighting does not pose a threat to the RDD as long as the informants have applied this weighting rule consistently. Nevertheless, this possible source of bias should be further examined.

As a robustness check for individual manipulation, Lee and Lemieux (2009) propose to examine the density of the forcing variable around the cut-off. Yet, the applied relative wealth measure predetermined a fixed number of eligible households. Therefore, by construction there can be no bunching of households just below the cut-off.

As recommended, we also compared the mean of observable characteristics at either side of the cut-off and regressed covariates on eligibility status. If individuals are indeed as good as randomized, there should be no effects (Lee and Lemieux, 2009; Imbens and Wooldridge, 2008). Based on the results that are presented in chapter 5.2 and the theoretical considerations discussed above, we are confident that the discontinuity is regarded as sufficiently valid to estimate the ITT effect of eligibility to discount on the outcomes of interest.

3.3 Empirical specification

First, we estimated the effect of eligibility to discount on enrollment in the insurance.

$$Insured_i = c + \alpha Discount_i + \eta_1 CWRscore_i + \eta_2 CWRscore_i^2 + \eta_3 CWRscore_i^3 + \delta X_i + u_i \quad (3)$$

The variable $Insured_i$ is a binary variable taking on the value 1 if the person is enrolled in the CBHI and zero otherwise. $Discount_i$ is a binary variable denoting eligibility to discount, thus α captures the effect of eligibility to discount on enrolment. $CWRscore_i$ is the CWR score of individual i. In order to account for different functional forms, different polynomials of the CWR variable are included. X_i is a vector of covariates consisting of different socio-economic indicators c is the constant and u_i denotes the error term.

Second, we estimated the effect of eligibility to discount on outcomes of interest (reduced form).

$$Y_i = c + \beta Discount_i + \eta_1 CWRscore_i + \eta_2 CWRscore_i^2 + \eta_3 CWRscore_i^3 + \delta X_i + \varepsilon_i \quad (3)$$

Y_i is the outcome of interest that is OOP expenditures and days lost due to illness. The causal effect of interest on the outcome is β. It is the local average ITT effect capturing the effect of eligibility to discount on the outcomes of interest for all individuals, both those that enrolled and those that did not, at the poverty threshold. $CWRscore_i$ is the CWR score of individual i. X_i is a vector of covariates consisting of different socio-economic indicators. c is the constant and ε_i denotes the error term.

3.4 Data and variables

The empirical analysis combines two data sources. First, for constructing the forcing variable of the RDD, we used a village-wise community wealth ranking (CWR). Second, the analysis drew on the 2008 and 2009 waves of a household survey. Using the sampling frame of a Health and Demographic Surveillance System already operating in the region, a total of 990 households (30 households per cluster) were randomly selected, approximately 10 per cent of the population[7] (De Allegri et al., 2008). Additionally, all households who were enrolled in the insurance at least once since 2004 have also been continuously interviewed since 2004. The sample thus consists of two groups, the *original* randomly selected sample and *insured* households. Sample weights are applied in order to discount the weights of the insured sample. Data were collected between April and June in 2008 and between September and November in 2009. Since most people enroll at the end of the enrollment period in June, insurance status of the year 2007 was matched to survey results of 2008. The final sample consists of 25,494 individuals.

Descriptive statistics of the full sample are presented in table 7, and a list of variables is provided in table 8. The recall period for illness-related indicators is one month. Almost one fifth of the sample is enrolled in the CBHI, and 11.9 per cent suffered from at least one episode of illness during the past month.

[7] "The sample size was estimated in advance to have a 90 per cent power of detecting an increase in health service utilisation of one visit per year between insured and non-insured assuming 2-sided type 1 error probability of 0.05 and given an enrollment rate of at least 50 per cent" (De Allegri et al., 2008, p. 3).

Turning to outcomes of interest, the variable OOP expenditures is constructed as the sum of transport costs, expenditures for drugs, material, and consultations[8], subsistence costs[9], and hospitalization costs. The variable is modelled in three different specifications in order to account both for incidence and depth of OOP expenditures. These specifications may overestimate the true burden of disease since they do not account for (in-kind or cash) transfers from other households (Sauerborn et al., 1996). Only 2.5 per cent of individuals had any OOP expenditures associated with seeking care at a primary health care facility (CSPS) or the hospital (CMA).

The variable days lost is constructed as the total sum of days a person was prevented from working or going to school due to illness. This measure aims at providing a proxy for the opportunity costs of illness. It is important to note that the variable days lost does not take into account whether households substitute labour. Only 6 per cent of the sample could not go to school or work due to illness for at least one day, and the mean amount of days lost due to illness is 0.32 days.

4. MAIN RESULTS

The following sections present results for insurance take-up followed by results for OOP expenditures and days lost due to illness. As recommended by Lee and Lemieux (2009), heteroskedasticity robust standard errors are applied.

4.1 Insurance enrolment

The non-parametric plot with LOWESS regression lines depicted in figure 1 shows the relationship between eligibility to discount and enrollment in the CBHI for the full sample without interval trimming. The graph reveals a positive relationship between the CWR score and the probability of enrollment, which is not surprising since wealth was found to be an important determinant of CBHI membership. Yet, it is clearly visible that that there is a jump where the CWR score equals zero. Individuals with a negative CWR

[8] Consultation costs are defined as costs for consultation and payments to speed up medical examination or to improve quality of care.

[9] Subsistence costs both for the sick person as well as for accompanying individuals include costs for accommodation and meals and presents for the individual offering her place as accommodation.

score close to the cut-off seem to have a higher probability of enrollment than individuals to the right side of the cut-off.

Figure 2 shows the same relationship only for observations in a large (two wealth deciles) and a small interval (one wealth decile) around the cut-off. According to the plots, the size of the jump is approximately 0.20 indicating that the probability of enrollment jumps by about 20 percentage points with eligibility to discount. The regression lines approaching the cut-off from the right and the left are now flatter but still not fully horizontal. This might hint at some heterogeneity problems. Nonetheless, the graph supports confidence that eligibility to discount is a good predictor for enrollment in the CBHI. Moreover, plots do not show any jumps other than at the cut-off. This is reassuring since at any other point of the CWR, score treatment does not change, and hence, there should be no jump.

Further, regression estimates of the effect of eligibility to discount on enrollment shown in table 1 also suggest a significant large positive effect for individuals within one wealth decile (large interval) around the cut-off. The size of the coefficient is large and translates into an upward jump for eligible individuals close to the cut-off between 0.16 and 0.25 (columns 1 to 4 of table 1). Regarding the magnitude, the estimates are roughly in line with the jump observed in the plots. Taking the coefficient of column 3 of table 1 as an example, eligibility to discount is estimated to increase the probability of enrollment on average by 24.9 percentage points. This implies that the price elasticity is large and equal to about one.

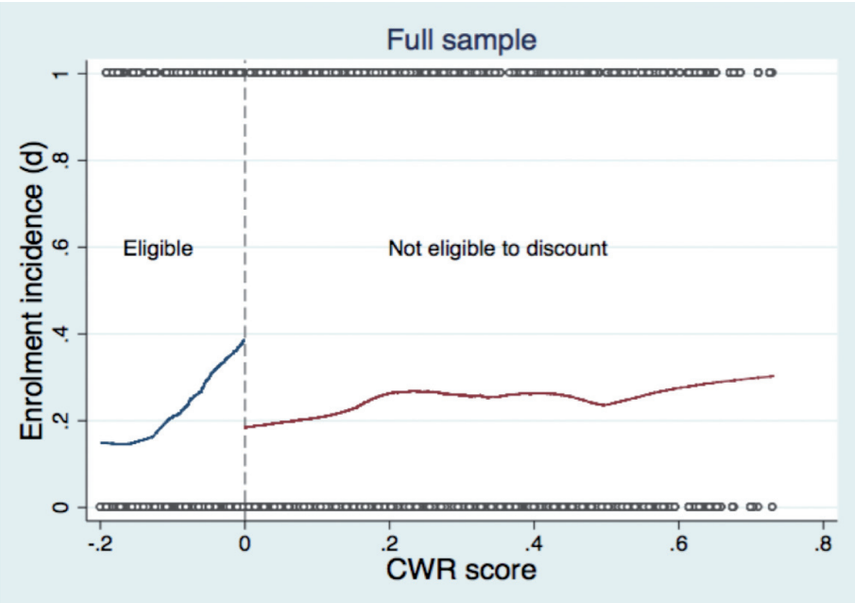
As a robustness check, we also estimated the effect on enrollment taking only observations from one wealth decile around the cut-off (columns 5-8 of table 1). The coefficient remains significant slightly increased in magnitude.

Regarding the included polynomials of the CWR score, the first three polynomials are always significant at the one per cent level in all specifications presented in table 1. The fourth polynomial is never significant. Therefore, the following analysis will be carried out with three polynomials of the CWR score.

4.2 Effects of the subsidy on OOP expenditures

This section presents welfare effects by looking at both an outcome variable for direct and indirect economic costs of illness. we focus on the outcome for all individuals (not just those enrolled) in one wealth decile (large interval) around the threshold and thus obtain ITT effects. Moreover, the sample was restricted to individuals older than 16 years as it was assumed that parents pay for their childrens' medical expenses.

Figure 1: ***Eligibility to discount and enrolment (full sample)***



Using OOP expenditures as a proxy for direct costs of illness, we found a significant reduction of the incidence of OOP expenditures (table 2). Taking column 4 as an example, controlling for visits of primary health care facilities or the hospital (CSPS/CMA) and further covariates, eligibility to discount reduced the probability of having any OOP expenditures by 1.4 percentage points. The magnitude of this effect is quite large, given a sample mean of 2.5 percentage points (table 7). Results seem to be quite robust, as with the exception of column 3 the size of the coefficient does only slightly decrease when adding further controls[10]. The corresponding plot (figure 3) confirms the presence of a discontinuity in the incidence of OOP expenditures, but the jump is smaller than the estimated coefficient.

Further, we estimated OOP expenditures as their share in total expenditures as well as in logs in order to account for the high variation of expenditures. These specifications did not yield robust effects (table 3). The coefficient of expenditure shares is consistently negative but close to zero and never significant, regardless of interval size, included polynomials, and covariates (columns 1-5 of table 3). The estimated coefficient of zero is also confirmed by the corresponding plot (figure 3), where one can hardly detect any jump. The coefficient of the log transformation is negative but loses its significance when adding further controls. Therefore, it cannot be considered as robust (columns 6 to 10 of table 3).

Finally, estimations were also conducted at the household level by creating a binary dependent variable, which is one if at least one family member had any OOP expenditures and zero otherwise. Yet, the coefficient did not suggest any significant effects. Reducing the sample to those individuals who actually had any OOP expenditures and then estimating the effects of eligibility to discount in OOP expenditure incidence did not produce any significant results.

[10] Column 3 does not control for treatment but only for illness. Yet, these variables are correlated which may explain the sudden drop in the absolute magnitude of the coefficient in column three.

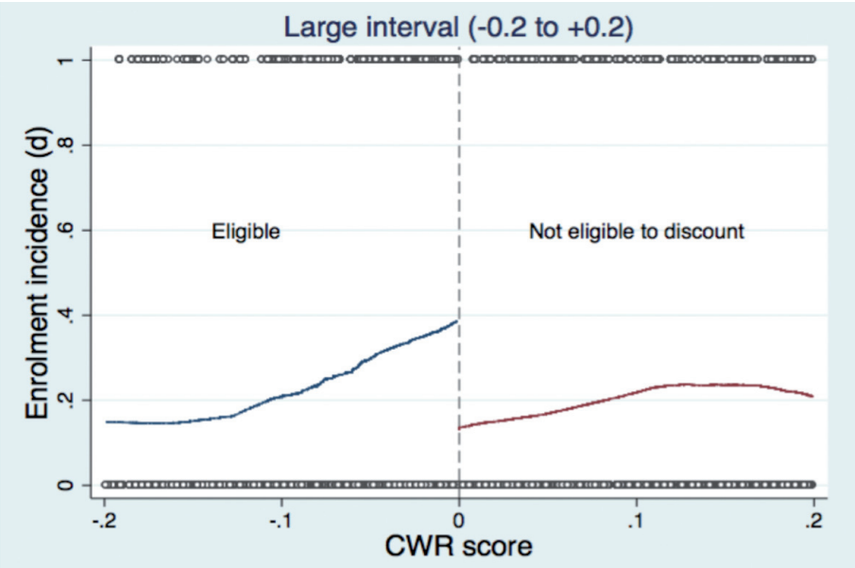
Table 1: ***Enrollment incidence (d)***

	Large interval (-0.2 < CWR score < 0.2)				Small interval (-0.1 < CWR score < 0.1)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eligible to discount (d)[1]	0.158*** (0.014)	0.175*** (0.014)	0.249*** (0.018)	0.251*** (0.018)	0.215*** (0.019)	0.209*** (0.019)	0.272*** (0.024)	0.272*** (0.024)
CWR score	0.688*** (0.061)	0.877*** (0.062)	1.773*** (0.156)	1.807*** (0.157)	1.165*** (0.166)	1.122*** (0.163)	2.555*** (0.383)	2.556*** (0.385)
(CWR score)^2		-2.950*** (0.307)	-2.385*** (0.302)	-3.882*** (1.121)		-5.619*** (1.626)	-5.567*** (1.623)	-6.371 (5.601)
(CWR score)^3			-27.210*** (4.116)	-28.552*** (4.140)			-165.067*** (40.358)	-165.253*** (40.661)
(CWR score)^4				46.701 (32.460)				95.638 (632.057)
Constant	0.082*** (0.008)	0.104*** (0.008)	0.062*** (0.010)	0.066*** (0.010)	0.071*** (0.010)	0.092*** (0.011)	0.059*** (0.013)	0.060*** (0.013)
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	12058	12058	12058	12058	7246	7246	7246	7246
R^2	0.0127	0.0197	0.0233	0.0234	0.0239	0.0256	0.0280	0.0280

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; sample weights applied.

Figure 2: *Eligibility to discount and enrollment (intervals)*



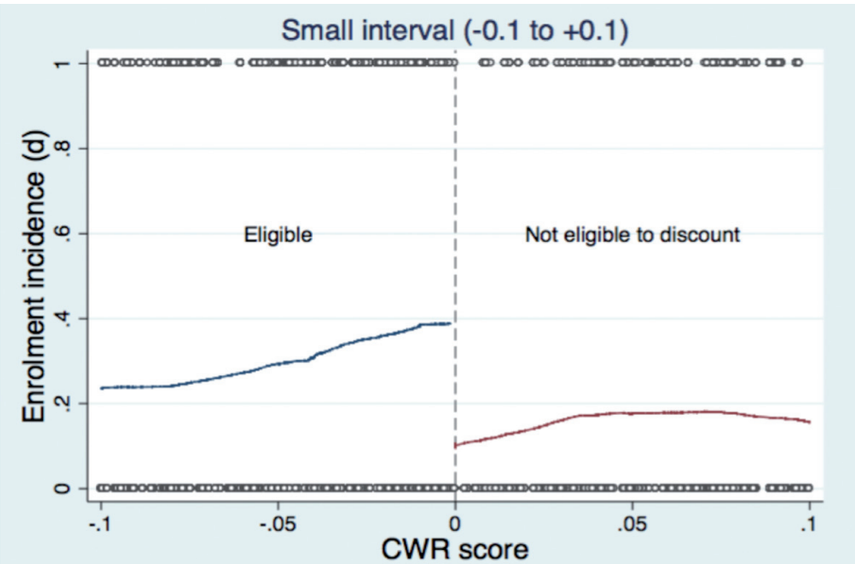


Figure 3: *Eligibility to discount and incidence of OOP expenditures (d)*

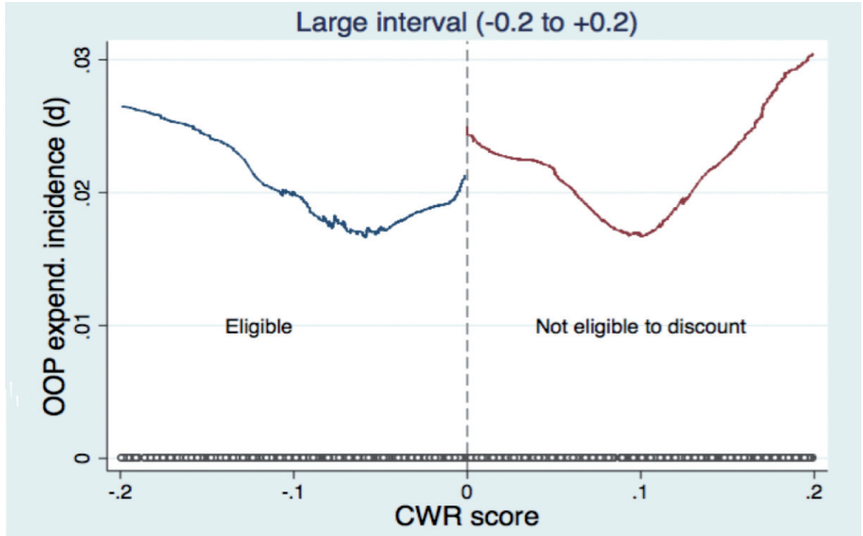


Table 2: *Incidence of OOP expenditures (d)*

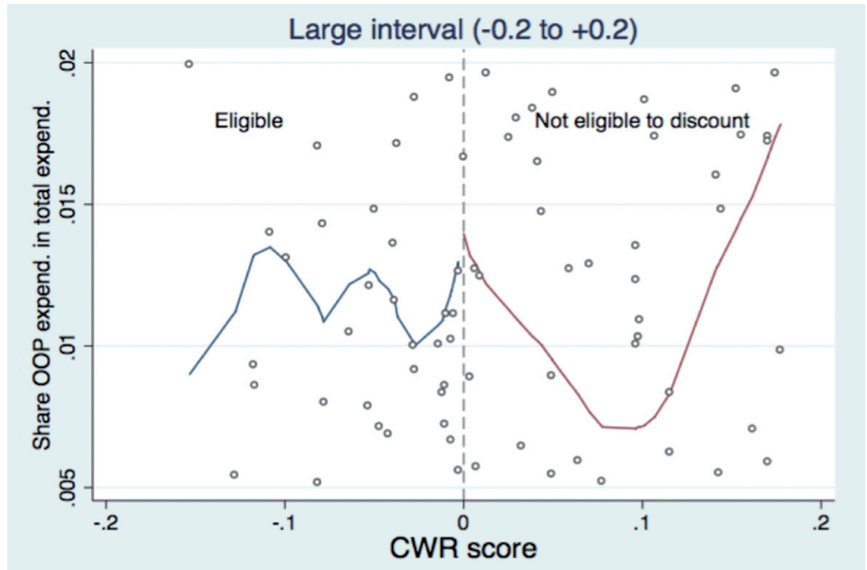
	Large interval (-0.2 < CWR score < 0.2)				
	(1)	(2)	(3)	(4)	(5)
Eligible to discount (d)[1]	-0.017*	-0.016*	-0.004	-0.014***	-0.014***
	(0.009)	(0.009)	(0.009)	(0.005)	(0.005)
CWR score	-0.156*	-0.153*	-0.068	-0.143***	-0.133***
	(0.083)	(0.083)	(0.076)	(0.043)	(0.042)
(CWR score)^2	0.189	0.219	0.092	-0.028	-0.048
	(0.193)	(0.193)	(0.179)	(0.108)	(0.114)
(CWR score)^3	5.031**	4.932**	3.843*	3.902***	3.891***
	(2.387)	(2.393)	(2.184)	(1.206)	(1.215)
Age (in years)	0.000***	0.000***	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female (d)[2]	0.010**	0.013***	0.012***	0.002	0.001
	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)
Literate (d)[3]	0.016***	0.009*	0.006	0.001	0.001
	(0.005)	(0.005)	(0.004)	(0.003)	(0.003)
HH size	-0.001**	-0.001**	-0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Exp.[4] prev. 5 m. (log)		0.002***	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Assets[5]		0.004	0.004*	0.001	0.000
		(0.003)	(0.003)	(0.001)	(0.001)
Animals[6]		-0.001*	-0.000	0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Water inside home (d)[7]		-0.006	-0.005	-0.000	-0.000
		(0.012)	(0.011)	(0.008)	(0.008)
Illness (d)[8]			0.109***	-0.011**	-0.012**
			(0.014)	(0.005)	(0.006)
Life-threatening illness (d)[9]			0.150***	0.039*	0.039*
			(0.032)	(0.020)	(0.020)
Illness treated (d)[10]				-0.073	-0.071
				(0.053)	(0.053)
CSPS/CMA (d)[11]				0.719***	0.718***
				(0.051)	(0.051)
Self treatment (d)[12]				0.077	0.076
				(0.054)	(0.053)
Traditional healer (d)[13]				0.057	0.055
				(0.049)	(0.049)
Ethnicity dummy	Yes	Yes	Yes	Yes	Yes
Religion dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	No	No	No	No	Yes
Village dummies	No	No	No	No	Yes
Constant	0.003	-0.008	-0.003	0.002	0.686
	(0.008)	(0.008)	(0.008)	(0.005)	(5.680)
p	0.000	0.000	0.000	0.000	0.000
N	6820	6820	6820	6820	6820
R^2	0.0101	0.0137	0.1761	0.6624	0.6657

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] sum of total expenditures; [5] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [6] sum of sheep, goats, bullocks, donkeys and horses; [7] reference group: individual has no water source inside home; [8] reference group: individual did not suffer from any illness; [9] reference group: individual did not suffer from any illness she perceived to be life-threatening; [10] reference group: individual did not treat any illness; [11] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [12] reference group: individual did not apply self-treatment; [13] reference group: individual did not visit a traditional healer; sample weights applied.

Figure 4: ***Eligibility to discount and share of OOP and expenditures (log)***



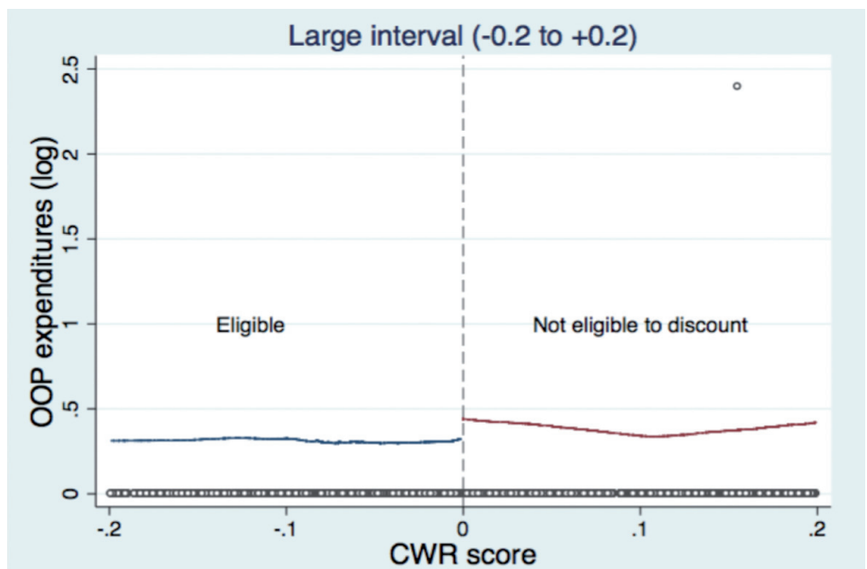


Table 3: ***Share OOP expenditures in total expenditures and OOP expenditures (log)***

	Share OOP expenditures in total expenditures						OOP expenditures (log)				
	Large interval (-0.2 < CWR score < 0.2)						Large interval (-0.2 < CWR score < 0.2)				
	(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	(10)
Eligible to discount (d)[1]	-0.007	-0.006	-0.006	-0.002	-0.005		-0.236**	-0.225**	-0.042	-0.076	-0.058
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)		(0.113)	(0.113)	(0.088)	(0.076)	(0.077)
CWR score	-0.101*	-0.096*	-0.091*	-0.069	-0.083*		-1.873*	-1.815*	-0.512	-0.773	-0.698
	(0.056)	(0.056)	(0.050)	(0.052)	(0.050)		(0.970)	(0.967)	(0.772)	(0.652)	(0.654)
(CWR score)^2	0.023	0.019	-0.056	-0.020	-0.024		-1.852	-1.322	-3.382**	-3.543**	-2.319
	(0.111)	(0.110)	(0.100)	(0.107)	(0.119)		(1.983)	(1.982)	(1.696)	(1.455)	(1.551)
(CWR score)^3	3.584*	3.567*	3.232**	3.213*	3.000*		63.532**	60.343**	44.394**	40.497**	37.701**
	(1.859)	(1.862)	(1.638)	(1.769)	(1.626)		(26.245)	(26.122)	(21.171)	(17.766)	(18.034)
Age (in years)	0.000**	0.000**	0.000*	0.000	0.000**		0.006***	0.005***	-0.002*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female (d)[2]	0.003	0.001	-0.003	0.000	-0.003		0.098**	0.156***	0.117***	0.043	0.029
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)		(0.043)	(0.051)	(0.040)	(0.034)	(0.033)
Literate (d)[3]	0.005**	0.005*	0.003	0.005*	0.003		0.226***	0.099*	0.039	-0.008	-0.031
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)		(0.053)	(0.055)	(0.044)	(0.038)	(0.039)
HH size	0.000	0.000	0.000**	0.000	0.000**		-0.007**	-0.007**	-0.002	0.001	0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Exp.[4] prev. 5 m. (log)		0.000***	0.000	0.000	0.000			0.025***	-0.002	-0.002	-0.001
		(0.000)	(0.000)	(0.000)	(0.000)			(0.006)	(0.004)	(0.004)	(0.004)
Assets[5]		-0.002	-0.003**	-0.002	-0.003**			0.083**	0.087***	0.062***	0.054***
		(0.002)	(0.001)	(0.002)	(0.001)			(0.033)	(0.025)	(0.020)	(0.020)
Animals[6]		-0.000**	-0.000	-0.000*	-0.000			-0.014***	-0.007**	-0.006**	-0.006**
		(0.000)	(0.000)	(0.000)	(0.000)			(0.004)	(0.003)	(0.003)	(0.003)
Water inside home (d)[7]		-0.005*	-0.003	-0.005	-0.005			0.067	0.053	0.069	0.032
		(0.003)	(0.003)	(0.003)	(0.004)			(0.139)	(0.101)	(0.098)	(0.097)
Illness (d)[8]			-0.009	0.027***	-0.009				2.448***	-0.017	-0.045
			(0.006)	(0.008)	(0.006)				(0.148)	(0.065)	(0.067)
Life-threatening illness (d)[9]			0.030	0.063***	0.030				0.846***	0.204	0.189
			(0.020)	(0.023)	(0.020)				(0.290)	(0.248)	(0.246)
Illness treated (d)[10]			-0.023		-0.022					1.412***	1.464***
			(0.066)		(0.066)					(0.495)	(0.493)
CSPS/CMA (d)[11]			0.214***		0.214***					3.598***	3.577***
			(0.065)		(0.065)					(0.458)	(0.456)

Self treatment (d)[12]			0.024 (0.067)		0.024 (0.067)					0.843* (0.487)	0.811* (0.484)
Traditional healer (d)[13]			0.017 (0.049)		0.017 (0.049)					2.386*** (0.790)	2.419*** (0.791)
Ethnicity dummies	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Year dummy	No	No	No	No	Yes		No	No	No	No	Yes
Village dummies	No	No	No	No	Yes		No	No	No	No	Yes
Constant	-0.004 (0.005)	-0.005 (0.005)	-0.002 (0.004)	-0.003 (0.005)	2.633 (4.835)		0.011 (0.099)	-0.177* (0.098)	-0.105 (0.080)	-0.109 (0.068)	-433.878*** (79.808)
p	0.050	0.001	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
N	6820	6820	6820	6820	6820		6820	6820	6820	6820	6820
R^2	0.0055	0.0065	0.1628	0.0510	0.1661		0.0202	0.0292	0.3646	0.5139	0.5210

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] sum of total expenditures; [5] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [6] sum of sheep, goats, bullocks, donkeys and horses; [7] reference group: individual has no water source inside home; [8] reference group: individual did not suffer from any illness; [9] reference group: individual did not suffer from any illness she perceived to be life-threatening; [10] reference group: individual did not treat any illness; [11] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [12] reference group: individual did not apply self-treatment; [13] reference group: individual did not visit a traditional healer; sample weights applied.

4.3 Effects of the subsidy on days lost due to illness

The following section presents estimated ITT effects of eligibility to discount on whether a person lost at least one day due to illness and the amount of days lost during the last month. This measure aims at providing a proxy for the incidence of opportunity costs of illness since during illness individuals cannot engage in well-being enhancing activities.

Table 4 presents estimation results. The main finding is a robust reduction in the probability of losing at least one day due to illness. Irrespective of taking observations from a large or small interval around the cut-off, the coefficient is negative and significant at varying significance levels. Taking column 4 of table 4 as an example estimate suggests that eligibility to discount reduces the probability that an individual has lost at least one day due to illness on average by 1.7 percentage points. The corresponding coefficient when taking observations from the small interval around the cut-off is 0.035, about twice the size (column 9 in table 4). Coefficients are not only larger when taking observations only from a small interval around the cut-off but also vary less when including different covariates. This might hint at a higher credibility of the results from the small interval. The economic significance is quite large given a sample mean of 0.06 (table 7) and a recall period of only one month. In this sense, being offered a 50 per cent price discount on the CBHI premium on average reduces the probability that an individual has lost at least one day due to illness by about 50 per cent. The corresponding plots (figure 5) confirm the regression results by suggesting a downward jump of about 0.015 in the large and about 0.02 in the small interval.

Table 4: ***Incidence of days lost due to illness (d)***

	Large interval (-0.2 < CWR score < 0.2)						Small interval (-0.1 < CWR score < 0.1)				
	(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	(10)
Eligible to discount (d)[1]	-0.026**	-0.026**	-0.016*	-0.017*	-0.019**		-0.037**	-0.036**	-0.034***	-0.035***	-0.038***
	(0.013)	(0.013)	(0.009)	(0.009)	(0.009)		(0.018)	(0.017)	(0.012)	(0.012)	(0.013)
CWR score	-0.209*	-0.208*	-0.145*	-0.159**	-0.172**		-0.312	-0.321	-0.478***	-0.495***	-0.474**
	(0.113)	(0.112)	(0.077)	(0.077)	(0.079)		(0.276)	(0.276)	(0.185)	(0.184)	(0.194)
(CWR score)^2	0.265	0.280	-0.018	0.006	-0.145		-0.757	-0.703	0.291	0.274	0.571
	(0.266)	(0.267)	(0.188)	(0.184)	(0.201)		(1.130)	(1.131)	(0.755)	(0.752)	(0.836)
(CWR score)^3	3.908	3.811	3.929*	4.078*	4.968**		-4.738	-2.908	30.793	30.988	27.558
	(3.149)	(3.147)	(2.194)	(2.160)	(2.227)		(28.605)	(28.742)	(19.223)	(18.988)	(19.910)
Age (in years)	0.001***	0.001***	-0.000	0.000	0.000		0.001***	0.001***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female (d)[2]	0.001	0.004	-0.001	-0.003	-0.003		-0.000	-0.001	-0.002	-0.003	-0.003
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)		(0.006)	(0.007)	(0.005)	(0.005)	(0.005)
Literate (d)[3]	0.007	0.001	0.001	0.001	0.002		0.006	0.003	0.002	0.001	0.002
	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)		(0.007)	(0.008)	(0.005)	(0.005)	(0.005)
HH size	-0.001**	-0.001**	-0.000	0.000	-0.000		-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exp.[4] prev. 5 m. (log)		0.001*	-0.000	-0.000	-0.000			0.002*	-0.000	-0.000	-0.000
		(0.001)	(0.000)	(0.000)	(0.000)			(0.001)	(0.001)	(0.001)	(0.001)
Assets[5]	0.005	0.003	0.002	0.002				-0.002	-0.000	-0.001	-0.001
		(0.004)	(0.003)	(0.003)	(0.003)			(0.005)	(0.003)	(0.003)	(0.003)
Animals[6]		-0.001	-0.000	-0.000	-0.000			-0.001	-0.000	-0.000	-0.000
		(0.001)	(0.000)	(0.000)	(0.000)			(0.001)	(0.000)	(0.000)	(0.000)
Water inside home (d)[7]		-0.000	0.008	0.006	0.007			-0.015	0.002	0.001	0.001
	(0.017)	(0.012)	(0.011)	(0.011)				(0.020)	(0.015)	(0.015)	(0.015)
Illness (d)[8]			0.446***	0.284***	0.284***				0.447***	0.348***	0.345***
			(0.018)	(0.041)	(0.040)				(0.023)	(0.058)	(0.057)
Life-threatening illness (d)[9]			0.268***	0.249***	0.249***				0.262***	0.246***	0.248***
			(0.030)	(0.030)	(0.030)				(0.040)	(0.040)	(0.040)
Illness treated (d)[10]				0.105	0.095					0.070	0.062
				(0.072)	(0.072)					(0.101)	(0.101)
CSPS/CMA (d)[11]				0.110**	0.116**					0.090	0.096
			(0.055)	(0.055)					(0.078)	(0.077)	

Self treatment (d)[12]			(0.057)	0.069 (0.057)	0.073				(0.081)	0.028 (0.081)	0.033
Traditional healer (d)[13]			(0.086)	0.044 (0.085)	0.048				(0.113)	-0.013 (0.111)	-0.012
Ethnicity dummies	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Year dummy	No	No	No	No	Yes		No	No	No	No	Yes
Village dummies	No	No	No	No	Yes		No	No	No	No	Yes
Constant	0.042*** (0.011)	0.040*** (0.010)	0.016** (0.007)	0.015** (0.007)	-28.738*** (9.669)		0.048*** (0.013)	0.047*** (0.013)	0.020** (0.009)	0.018** (0.009)	-14.357 (12.619)
p 0.000	0.000	0.000	0.000	0.000			0.000	0.000	0.000	0.000	0.000
N 12058	12058	12058	12058	12058			7246	7246	7246	7246	7246
R^2 0.0098	0.0108	0.5225	0.5319	0.5381			0.0102	0.0110	0.5190	0.5235	0.5317

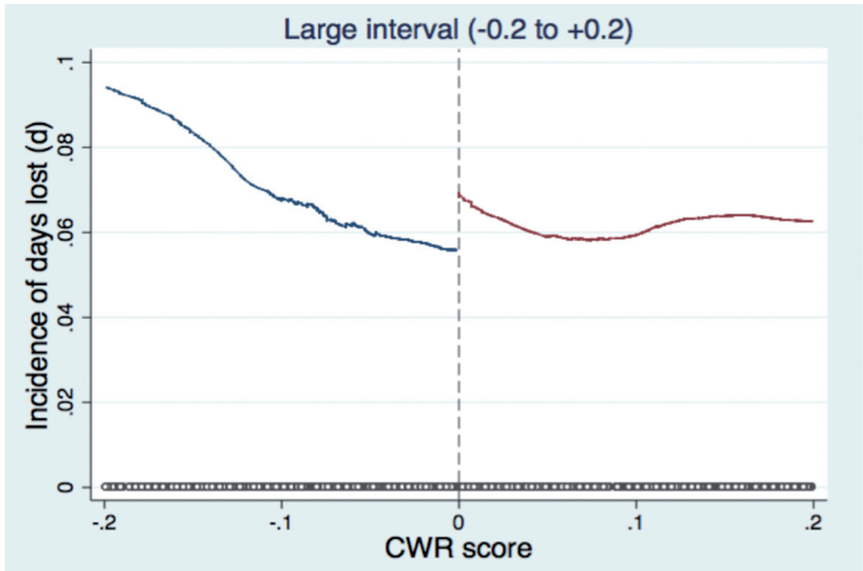
The evidence for the actual amount of days not able to work or go to school is weaker. Results presented in table 5 indicate that eligibility to discount has a negative significant effect on days lost in a small interval around the threshold (columns 6-10 of table 5). Eligibility to discount seems to reduce the amount of lost days on average by about 0.3 days. When including further controls, the coefficient slightly decreases in size but remains significant. However, this is only suggestive evidence, as the estimates are not significant with observations from a larger interval around the cut-off (columns 1-5 of table 5). The jump visible in the non-parametric plots (figure 6) is slightly smaller than the magnitude of the coefficients of the smaller interval but still confirms the results.

Finally, two external effects of illness on family members were investigated. First, since Sauerborn et al. (1996) found high time losses for individuals who cared for sick relatives in the Nouna health district, it was estimated that the CBHI reduces the probability that an individual could not work due to caring for a sick relative. Second, the effect of the CBHI on whether a child was taken out of school due to illness of a family member was estimated. Results neither suggest a significant reduction in the probability that a child was taken out of school nor a significant reduction in the probability that a family member needed to stay at home in order to care for a sick relative.

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] sum of total expenditures; [5] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [6] sum of sheep, goats, bullocks, donkeys and horses; [7] reference group: individual has no water source inside home; [8] reference group: individual did not suffer from any illness; [9] reference group: individual did not suffer from any illness she perceived to be life-threatening; [10] reference group: individual did not treat any illness; [11] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [12] reference group: individual did not apply self-treatment; [13] reference group: individual did not visit a traditional healer; sample weights applied.

Figure 5: *Eligibility to discount and days lost due to illness (d)*



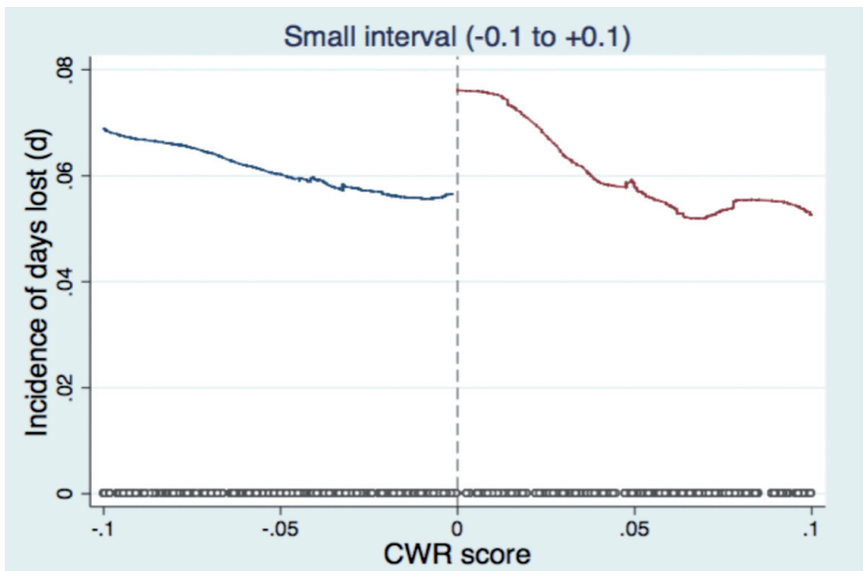
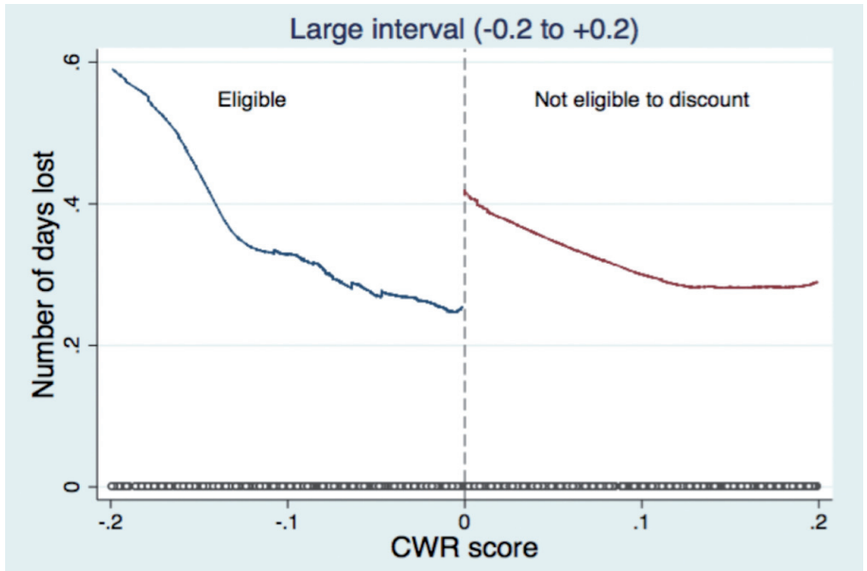


Figure 6: *Eligibility to discount and number of days lost due to illness*



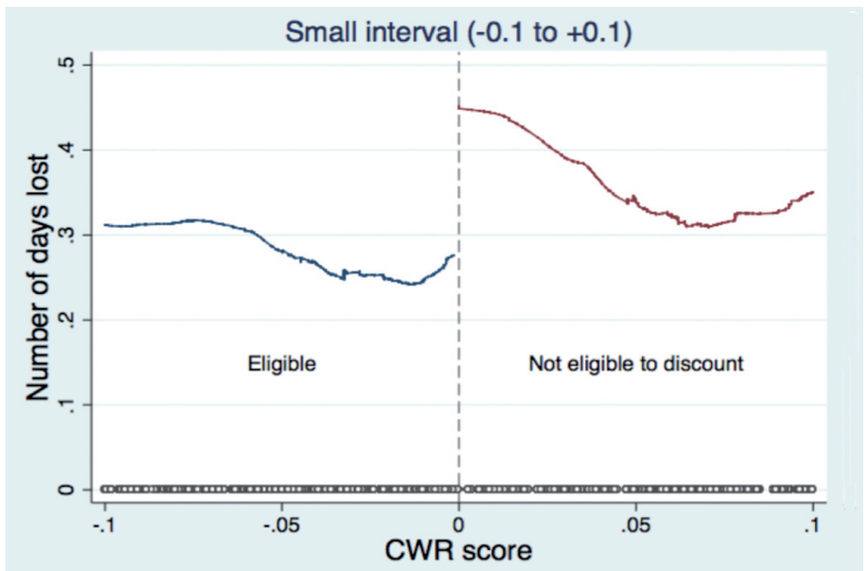


Table 5: ***Number of days lost due to illness***

	Large interval (-0.2 < CWR score < 0.2)						Small interval (-0.1 < CWR score < 0.1)				
	(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	(10)
Eligible to discount (d)[1]	-0.195	-0.187	-0.126	-0.121	-0.080		-0.357**	-0.345**	-0.310**	-0.310**	-0.290**
	(0.164)	(0.164)	(0.154)	(0.159)	(0.203)		(0.148)	(0.148)	(0.127)	(0.122)	(0.120)
CWR score	-0.202	-0.134	0.305	0.347	0.403		-2.972	-2.820	-3.290	-3.234	-2.863
	(1.994)	(1.998)	(1.935)	(1.968)	(2.088)		(2.552)	(2.581)	(2.290)	(2.173)	(2.184)
(CWR score)^2	6.552	6.524	4.898	4.977	4.395		-9.593	-8.998	-2.600	-2.615	2.672
	(8.429)	(8.431)	(8.078)	(8.155)	(7.967)		(11.548)	(11.753)	(10.682)	(10.623)	(11.723)
(CWR score)^3	-44.419	-45.187	-46.601	-48.291	-46.933		148.113	140.573	292.459	279.374	245.218
	(91.385)	(91.549)	(88.757)	(89.076)	(86.377)		(296.169)	(297.382)	(265.480)	(264.302)	(288.326)
Age (in years)	0.013***	0.012***	0.008***	0.008***	0.009***		0.014***	0.014***	0.011***	0.011***	0.011***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)		(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Female (d)[2]	-0.013	-0.027	-0.056	-0.059	-0.068		-0.055	-0.090	-0.101*	-0.103*	-0.114*
	(0.060)	(0.062)	(0.057)	(0.058)	(0.052)		(0.063)	(0.066)	(0.061)	(0.062)	(0.064)
Literate (d)[3]	0.024	0.011	0.024	0.021	0.037		-0.050	-0.049	-0.047	-0.048	-0.053
	(0.046)	(0.051)	(0.046)	(0.047)	(0.044)		(0.057)	(0.060)	(0.053)	(0.053)	(0.057)
HH size	0.002	0.002	0.006*	0.006*	0.004		0.002	0.003	0.005	0.005	0.003
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Exp.[4] prev. 5 m. (log)		0.009	0.001	0.001	0.002			0.011	0.000	0.000	0.000
		(0.011)	(0.010)	(0.010)	(0.011)			(0.009)	(0.008)	(0.008)	(0.008)
Assets[5]		-0.010	-0.016	-0.021	-0.032			-0.059	-0.040	-0.043	-0.050
		(0.044)	(0.039)	(0.038)	(0.042)			(0.059)	(0.052)	(0.052)	(0.053)
Animals[6]		-0.015***	-0.011**	-0.011**	-0.009**			-0.011*	-0.007	-0.008	-0.007
		(0.005)	(0.005)	(0.005)	(0.004)			(0.006)	(0.005)	(0.005)	(0.004)
Water inside home (d)[7]		-0.041	0.028	0.032	-0.040			-0.068	0.044	0.050	-0.027
		(0.097)	(0.088)	(0.087)	(0.079)			(0.117)	(0.100)	(0.103)	(0.117)
Illness (d)[8]			1.746***	1.480***	1.530***				1.842***	2.055***	2.065***
			(0.120)	(0.514)	(0.510)				(0.162)	(0.718)	(0.717)
Life-threatening illness (d)[9]			3.509***	3.498***	3.527***				3.184***	3.061***	3.106***
			(0.737)	(0.775)	(0.775)				(0.741)	(0.719)	(0.731)
Illness treated (d)[10]				-0.557	-0.645					-1.366	-1.381
				(0.836)	(0.828)					(1.252)	(1.248)
CSPS/CMA (d)[11]				0.705	0.771					1.482*	1.504*
				(0.650)	(0.631)					(0.873)	(0.868)

Self treatment (d)[12]				0.860 (0.652)	0.849 (0.648)					0.954 (0.998)	0.951 (0.991)
Traditional healer (d)[13]				0.765 (0.903)	0.777 (0.882)					0.977 (1.213)	0.932 (1.194)
Ethnicity dummy	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Religion dummy	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Year dummy	No	No	No	No	Yes		No	No	No	No	Yes
Village dummies	No	No	No	No	Yes		No	No	No	No	Yes
Constant	-0.077 (0.191)	-0.088 (0.196)	-0.184 (0.186)	-0.187 (0.185)	333.284 (235.845)		0.096 (0.135)	0.086 (0.132)	-0.029 (0.114)	-0.035 (0.114)	353.242* (212.532)
p	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
N	12058	12058	12058	12058	12058		7246	7246	7246	7246	7246
R^2	0.0118	0.0122	0.1505	0.1514	0.1581		0.0178	0.0187	0.2065	0.2099	0.2145

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] sum of total expenditures; [5] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [6] sum of sheep, goats, bullocks, donkeys and horses; [7] reference group: individual has no water source inside home; [8] reference group: individual did not suffer from any illness; [9] reference group: individual did not suffer from any illness she perceived to be life-threatening; [10] reference group: individual did not treat any illness; [11] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [12] reference group: individual did not apply self-treatment; [13] reference group: individual did not visit a traditional healer; sample weights applied.

5. ROBUSTNESS CHECKS

5.1 Sample trimming

In order to check the robustness of our two main findings, significant reduction of the incidence of OOP expenditures and days lost due to illness, we further trimmed the sample around the cut-off. Trimming reduces the probability that unaccounted non-linearity in the counterfactual conditional mean is mistaken for a jump induced by the treatment. This advantage of moving closer to the cut-off and obtaining relatively unbiased estimates comes at a cost. Trimming down the interval reduces the sample size and makes the estimation less precise (Lee and Lemieux, 2009).

Regarding the robustness of the results on the incidence of OOP expenditures, we further restricted observations to a small (-0.1 to +0.1) and very small (-0.05 to +0.05) neighborhood around the threshold (see table 10). Although the coefficient loses its significance for some specifications, the effect of eligibility to discount on the incidence of OOP expenditures is still judged to be relatively robust.

Turning to the welfare impact recap, we found significant effects for the incidence of days lost due to illness in both a large (-0.2 to +0.2) and a small (-0.1 to +0.1) interval around the cut-off. In order to further test the robustness of this result, we additionally varied the amount of included polynomials of CWR score (columns 1-4 of table 11) and restricted observations to a very small interval (-0.05 to +0.05) around the cut-off (columns 5-9 of table 11). Since the coefficients remain significant across all these specifications and only marginally vary in size, we regard this finding as robust.

5.2 Testing for internal validity of the RDD

Three robustness checks suggest strong internal validity of the RDD.

First, we conducted a placebo test by estimating the relationship between eligibility to discount and enrollment prior to the introduction of the discount in 2007. The non-parametric plots (figures 7 and 8) as well as regression estimates of the placebo test (table 12) neither show a jump nor suggest a significant positive relationship between eligibility to discount and enrollment in the years 2004-2006. In particular, the regression coefficients either are insignificant or negative significant which increases confidence in the validity of the estimation strategy.

Second, as discussed in section 3.2, we compared the means of the covariates at either side of the cut-off. It is clearly visible that the difference in means of socio-economic covariates shrinks the further the sample is restrict-

ed to the area around the threshold (table 9). When taking observations from a small interval around the cut-off, only the three sample means remain significantly different.

In addition to comparing the means of the covariates, Lee and Lemieux (2009) also proposed to regress covariates on the variable eligibility to discount. If individuals are truly as good as randomized, there should be no significant effects. Results presented in tables 13 and 14 only suggest a significant relationship for the covariates literate (d), animals, and water inside home (d). This is not too surprising since unlike gender, housing and animals are not strictly predetermined and may have been influenced by the introduction of the discount (via enrolment in the CBHI). While it would have been more reassuring to find no significant effects, Lee and Lemieux (2009) reduce doubts by arguing that "if there are many covariates (…), some discontinuities will be statistically significant by random chance" (p. 49).

Third, we repeated the regressions of eligibility to discount on enrollment including many controls (see table 15). Coefficients only slightly differ compared to estimations without controls presented in table 1. Covariates exhibit expected signs; for example, literacy, assets, and animals increase the probability of enrollment.

Taken together, these statistics indicate that the discontinuity in the eligibility rules introduces sufficient exogenous variation in the treatment variable to produce consistent estimation results across different sample specifications.

6. DISCUSSION

Our results suggest that being eligible to receive a 50 per cent premium discount increases the probability of enrollment by about 30 per cent. This implies a price elasticity of demand for health insurance of about one. This finding differs markedly from studies on the demand for health insurance in developed countries that tend to report inelastic demand for health insurance. Our results remain relatively large in magnitude when compared to the results found by Thornton et al. (2010) in the context of offering formal health insurance to informal Nicaraguan workers. Being eligible to receive a 6-month subsidy increased insurance enrollment by about 30 per cent. Thus, according to our results, the price elasticity of demand for health insurance seems to differ across different contexts. In rural Vietnam, Wagstaff et al. (2014) found insurance demand behavior similar to mine even though the comparison suffers from differing intervention designs. Being randomly assigned to receive an information leaflet on the government health insurance and a 25 per cent reduction on its premium roughly doubled insurance take-up. While this considerable effect translates into a higher price elasticity of demand than in our study, it has only been found for the subsample of morbid households. Regarding policy implications, our finding is that premium subsidies could greatly increase enrollment rates of micro health insurance schemes in low-income countries. This is important, as they often struggle to expand their membership base.

Regarding OOP expenditures, results suggest that eligibility to discount reduces the incidence of OOP expenditures from 3.5 to 2 per cent over a period of one month. This finding is not only statistically but also economically significant as it suggests that being eligible for the premium discount halves the incidence of OOP expenditures. This strong impact can probably be explained with the comprehensive benefit package the CBHI in the Nouna health district offers. In particular, the insurance scheme neither demands any co-payments nor imposes maximum ceilings. As pointed out in the introduction, the majority of studies also report that enrollment reduces OOP expenditures. Thus, our finding is in line with existing evidence. With respect to the other two specifications of the OOP variable, it could be argued that our design does not allow for identifying economically significant effects on the share of OOP expenditures in total expenditures and the actual amount of OOP expenditures (log). In particular, since the average share of OOP expenditures in total expenditures is 0.6 per cent (table 7) but the estimated standard error is about 0.5 per cent (table 3), only an effect of 1 per cent would be statistically significant. Yet, such an effect was larger than the sample average. This might explain why we could not find any significant effects on the share of OOP expenditures in total expenditures.

The results of indirect costs of illness in the form of lost time suggest a large and robust reduction in the probability that an individual lost at least one day due to illness. More importantly, this finding is of great economic significance since we find that being eligible to discount reduces the probability that a household reported at least one lost day due to illness by about 40 per cent. Aggarwal (2010) also studied the effect of a CBHI on time lost due to illness in India but did not find significant effects. Therefore, this finding cannot be put in the context of existing evidence for low-income countries, but our result suggests a strong positive welfare impact of health insurance in a low-income setting. No robust result was found for actual amount of days lost. Again, our design might have been inappropriate for detecting an economically significant effect of eligibility to discount on the amount of days lost due to illness.

Turning to limitations of this study, our empirical design only allows for the identification of local effects in the neighborhood around the threshold. Thus, estimated effects only apply to the subpopulation of households between the poorest and second-poorest quintile. These can be considered as very deprived by international standards. Consequently, our results cannot be generalized to individuals further away from the cut-off since these may systematically differ from individuals close the cut-off. While this is certainly a limitation of our analysis, it can also be regarded as an advantage, as it sheds light on the impact for a particular poor subgroup rather than the entire rural population.

Finally, the relatively large effects found for the incidence of having lost at least one day due to illness require further attention. The large magnitude of the results may hint towards adverse selection into the insurance scheme. By analyzing the correlation between enrollment and previous morbidity, we could test for the presence of adverse selection.

7. CONCLUSION

By triggering high economic costs, health shocks severely threaten poor households' objective of consumption smoothing and can increase their vulnerability to poverty. Despite this great risk in many low-income countries, often neither the state nor the market offers formal health insurance for poor households. Since such an insurance gap also exists in Burkina Faso, a micro health insurance scheme has been established in the Nouna health district in the North West of the country in 2004. The objective of this paper was to evaluate whether the insurance can truly cushion the economic costs of health shocks. In order to account for selection bias, a RDD was applied by exploiting a discontinuity in the offer of a 50 per cent discount on the insurance premium for poor households. The forcing variable was a community wealth ranking determining eligibility to discount. Estimates suggest that the discontinuity in eligibility to receive the premium discount increases the probability of enrollment by about 30 percentage points. This implies that the price elasticity is large and equal to about one. A placebo test confirms the robustness of this result. Welfare results suggest that the probability of having any OOP expenditures was reduced from 3.5 to 2 per cent over a period of one month. we also find that the probability of losing at least one day due to illness dropped from about 7.5 to 4 per cent over the same time period. These findings are of great economic significance and imply that the pricing of health insurance products has large effects on both insurance take-up and household welfare in low-income settings.

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APPENDIX

Figure 7: ***Placebo test (full sample)***

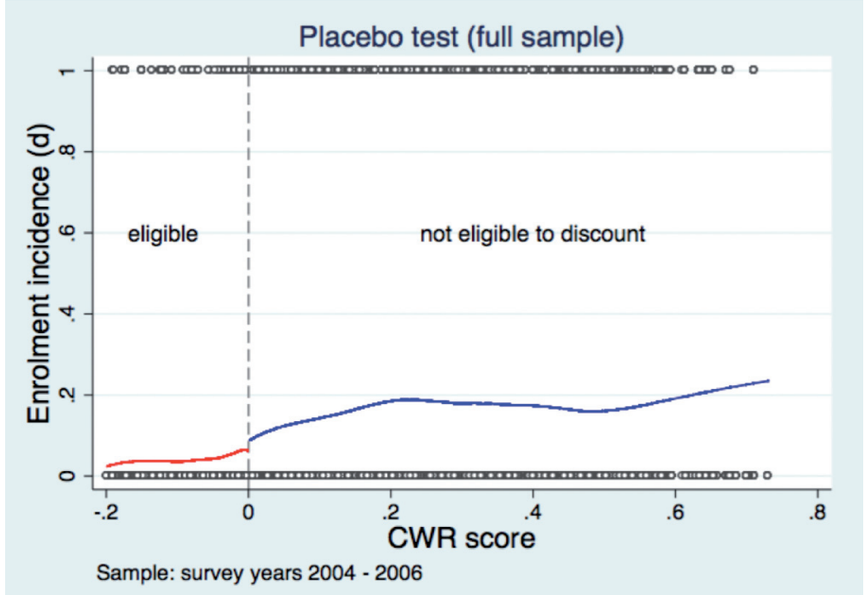


Table 6: ***Existing evidence of micro health insurance in low-income countries***

Author(s), year & region	Data & methodology	Benefit package includes…	Factors influencing enrolment in CBHI	Impact of membership on		
				Utilisation of healthcare	OOP expenditures	Days lost
Aggarwal (2010), India	4109 HH (2007-2008); propensity score matching[1]	Only inpatient surgeries (maximum ceiling) & out-patient diagnostics (OPD)	/	Frequency of surgery (+***), frequency of OPD (+*), frequency of hospitalisation (+)	OOP/surgery expenses (–***), borrowing/ in-patient expenses (other than surgery) (+*), borrowing/OPD expenses (+)	Days lost per episode of illness (+)
Chankova, Sulzbach & Diop (2008), Ghana, Mali, Senegal	>9000 individuals each in Ghana, Mali & Senegal (2004) in regions with long tradition of CBHI; comparing insured and uninsured while only controlling for observables[2]	Ghana: only inpatient; Mali: only outpatient (25-50% co-payments); Senegal: outpatient (25-50 co-payments) & inpatient (max. hospital days)	Senegal: chronic illness (+***) Mali: handicap (+***); all countries: HH head at least secondary education (+***), richest 20% (+***) (comp. to poorest 20%)	Seeking care: Ghana & Mali (+**), Senegal (+); hospitalisation: Senegal (CBHI with high inpatient coverage) (+***); all countries: no different effects for different income strata	OOP for outpatient: Senegal (–), Mali (+) (but high co-payments); OOP for inpatient: Ghana & Senegal (CBHIs with high inpatient coverage) (–***)	/
Franco et al. (2008), Mali	2280 HH (2003-2004); comparing insured and uninsured while only controlling for observables[2]	Outpatient (25% co-payments), drugs (20-25% co-payments), normal delivery (25% co-payments), complicated delivery	HH wealth (+***); distance to facility (–***); education of HH head (+***), female-headed HH (+***), HH with chronically ill and/or handicapped (+***)	Fever treatment in modern health facility (+*), seeking care f. children with diarrhoea (+*)	OOP for fever treatment (–***); share of health expenditure in annual cash expenditure (–***)	/
Jütting (2004), Senegal	2860 individuals (346 HH) (2000); comparing insured and uninsured while only controlling for observables[2]	Only inpatient (flat co-payment per consultation, 50% co-payment for surgery, max. hospital days)	Income (+***), in particular: lower terzile (–*) and upper terzile (+**) (comp. to average income group)	Hospitalisation (+**)	OOP (–**)	/
Saksena et al. (2010a), Rwanda	6800 HH; comparing insured and uninsured while only controlling for observables[2]	Outpatient (flat co-payment per outpatient visit) & inpatient (10% co-payment of costs)	/	Utilisation (+**), no different effects for different income strata	OOP as share of capacity to pay (=non-subsistence spending) (–*)	/
Schneider & Diop (2001), Rwanda	2500 HH in three rural districts of Rwanda (2000); comparing insured and uninsured while only controlling for observables[2]	Outpatient (flat co-payment per visit) and inpatient (with gate-keeping mechanism)	HH head attended school (+***), < 30min to facility (+***), radio (information campaign)(+***); wealth (–) (premium payment in instalments possible)	Visits of modern healthcare facility (+***)	OOP per episode of illness (–***); OOP per episode of care within subgroup of sick people (–***)	/
Schneider & Hanson (2006), Rwanda	3139 HH in three rural districts; binary choice model estimating individuals' need-adjusted visit probability by insurance status[2]	Outpatient (flat co-payment per episode of illness) and inpatient (only consultations and C-sections)	/	Need-adjusted visit probability sign. higher for insured than for non-insured; poor insured more visits than poor non-insured	OOP increased avg. shortfall of income below PL by 1,2% for insured, by 2% for uninsured à small, similar impact (but insured more visits)	/

Notes: *, **, *** represent statistical significance at the 1 per cent, 5 per cent and 10 per cent level;
[1] validity of estimation depends on plausibility of assumption that matching on observables removes all selection bias; [2] estimation is likely to suffer from selection bias; HH = households; OOP = OOP expenditures; PL = poverty line.

Table 7: ***Descriptive statistics (full sample)***

	Mean	Std. Dev.	Min	Max
Insurance & illness				
Insured (d)	0.198	0.398	0	1
Eligible to discount (d)[1]	0.220	0.414	0	1
Illness (d)[2]	0.119	0.323	0	1
Life threatening illness (d)[3]	0.038	0.190	0	1
Illness treated (d)[4]	0.105	0.307	0	1
CSPS/CMA (d)[5]	0.040	0.195	0	1
Self treatment (d)[6]	0.069	0.253	0	1
Traditional healer[7]	0.004	0.063	0	1
Individual outcomes				
OOP expenditures[8] (d)	0.025	0.158	0	1
OOP expenditures[8] (thousand)	0.099	1.546	0	96
OOP exp.[8] / exp.[9] of prev. 5 m.	0.006	0.103	0	4.5
Days lost due to illness (d)[10]	0.060	0.237	0	1
Days lost due to illness[10]	0.327	2.591	0	168
Socio-economic covariates				
Age (in years)	23.644	18.977	0.110	97.643
• Age < 16 years	0.423	0.494	0	1
• Age 16-60 years	0.509	0.500	0	1
• Age > 60 years	0.067	0.251	0	1
Female (d)	0.499	0.500	0	1
Literate (d)[11]	0.297	0.457	0	1
Religion[12]				
• Muslim (d)	0.616	0.486	0	1
• Catholic (d)	0.279	0.449	0	1
• Animist (d)	0.054	0.226	0	1
• Protestant (d)	0.046	0.210	0	1
Ethnicity[12]				
• Bwaba (d)	0.234	0.423	0	1
• Dafin (d)	0.197	0.398	0	1
• Mossi (d)	0.159	0.365	0	1
• Samo (d)	0.084	0.278	0	1
• Peulh (d)	0.048	0.214	0	1
HH size	13.637	9.410	1	80
Nouna town (d)	0.351	0.477	0	1
Exp.[9] last m. (thousand)	5.721	23.420	0	1242.95
Exp.[9] prev. 5 m. (thousand)	17.782	89.380	0	9510
Assets[13]	0.558	1.051	0	7
Animals[14]	1.470	6.751	0	581
Water inside home (d)[15]	0.026	0.159	0	1
N	25494			

Notes: [1] eligible to receive a 50 per cent discount on the insurance premium; [2] at least one illness; [3] at least one illness that was perceived as life-threatening; [4] at least one illness treated [5] at least one visit of a primary health care facility (CSPS) or hospital (CMA); [6] at least one episode of self-treatment [7] at least one visit at a traditional healer; [8] sum of costs associated with seeking care at CSPS/CMA; [9] sum of total expenditures; [10] days an individual could not go to school or work due to illness; [11] at least one year of education or literate; [12] subgroups do not add up to 100 per cent since category 'other' left out; [13] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [15] sum of sheep, goats, bullocks, donkeys & horses; [16] water source inside home; sample weights applied.

Table 8: ***List of variables***

Variable name	Description	Reference group for binary variables
Insurance & illness		
Insured (d)	Individual is enrolled in the CBHI	Individual is not enrolled in the CBHI
Eligible to discount (d)	Individual is eligible to receive a 50 per cent discount on the insurance premium	Individual is not eligible to receive a discount
Illness (d)	Individual suffered from at least one illness last month	Individual did not suffer from any illness last month
Life-threatening illness (d)	Individual suffered from at least one illness she perceived to be life-threatening last month	Individual did not suffer from any illness she perceived to be life-threatening
Illness treated (d)	Individual treated at least one illness last month (e.g. by visiting a CSPS/CMA, self-treatment, traditional healer etc.)	Individual did not treat any illness last month
CSPS/CMA (d)	Individual visited primary healthcare facility (CSPS) or district hospital (CMA) for at least one episode of illness last month	Individual did not visit CSPS or CMA last month
Self treatment (d)	Individual applied self-treatment for at least one episode of illness last month	Individual did not self-treat any illness last month
Traditional healer (d)	Individual visited a traditional healer to seek care for at least one episode of illness last month	Individual did not visit traditional healer to seek care last month
Individual outcomes		
OOP expenditures (d)	Individual had some OOP expenditures due to seeking care at a CSPS/CMA last month	Individual did not have any OOP expenditures last month
OOP expenditures	Sum of individual's costs associated with seeking care at CSPS/CMA during last month: transport costs, subsistence costs, and costs for drugs, material, consultations, and hospitalisation in franc CFA	
OOP exp. / exp. of prev. 5 m.	Share of OOP expenditures in total expenditures of previous five months	
Days lost due to illness (d)	Individual could not work of go to school for at least one day due to illness last month	Individual did not lose any day due to illness last month
Days lost due to illness	Amount of days an individual could not go to work or school due to illness last month	
Socio-economic covariates		
Age (in years)	Age in years	
Female (d)	Individual is female	Individual is male
Literate (d)	Individual is literate or has at least one year of schooling	Individual did not have at least one year of schooling
HH size	Amount of household members (Note: In the region a household is defined as the sum of people sharing resources. Therefore, household size can be very large)	
Nouna town (d)	Individual lives in Nouna town	Individual lives in a village
Exp. last m.	Sum of individual's total expenditures of the last month (e.g. shelter, food, education, clothes, transport) in CFA franc	
Exp. prev. 5 m.	Sum of individual's total expenditures of previous five months (e.g. shelter, food, education, transport) in CFA franc	
Assets	Amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which an individual possesses at least one item	
Animals	Absolute sum of sheep, goats, bullocks, donkeys, and horses	
Water inside home (d)	Individual has a water source inside her home	Individual does not have a water source inside her home

Table 9: ***Descriptive statistics (by eligibility status)***

	Full sample (-0.2 < CWR score < 0.8)			Large interval (-0.2 < CWR score < 0.2)			Small interval (-0.1 < CWR score < 0.1)		
	Eligible[1]	Not eligible	p-value of t-test	Eligible[1]	Not eligible	p-value of t-test	Eligible[1]	Not eligible	p-value of t-test
	Mean	Mean		Mean	Mean		Mean	Mean	
Insurance & illness									
Insured (d)	0.185	0.202	0.008	0.189	0.153	0.000	0.229	0.131	0.000
Illness (d)[2]	0.122	0.118	0.387	0.121	0.115	0.302	0.115	0.117	0.763
Life-threatening illness (d)[3]	0.037	0.038	0.694	0.036	0.033	0.483	0.032	0.033	0.859
Illness treated (d)[4]	0.105	0.106	0.883	0.104	0.103	0.867	0.101	0.106	0.464
CSPS/CMA (d)[5]	0.029	0.043	0.000	0.029	0.036	0.033	0.030	0.031	0.755
Self treatment (d)[6]	0.074	0.067	0.080	0.073	0.071	0.713	0.071	0.077	0.278
Traditional healer (d)[7]	0.006	0.003	0.016	0.006	0.004	0.213	0.006	0.005	0.673
Individual outcomes									
OOP expenditures[8] (d)	0.019	0.027	0.001	0.019	0.024	0.088	0.018	0.020	0.614
OOP expenditures[8] (log)	0.276	0.337	0.006	0.274	0.344	0.008	0.288	0.310	0.506
OOP exp.[8] /exp.[9] prev. 5 m.	0.004	0.007	0.061	0.004	0.005	0.430	0.004	0.003	0.594
Days lost due to illness (d)[10]	0.062	0.059	0.373	0.062	0.061	0.905	0.060	0.061	0.777
Days lost due to illness[10]	0.346	0.322	0.526	0.317	0.342	0.635	0.262	0.386	0.021
Socio-economic covariates									
Age (in years)	25.840	23.024	0.000	25.798	23.385	0.000	25.035	23.430	0.000
Female (d)	0.489	0.502	0.09	0.488	0.488	0.932	0.485	0.485	0.95
Literate (d)[11]	0.251	0.310	0.000	0.248434	0.301	0.000	0.279	0.284	0.594
HH size	9.894	14.694	0.000	9.958	12.307	0.000	9.958	12.307	0.000
Exp.[9] last month (log)	4.165	4.147	0.779	4.164	4.166	0.978	4.204	4.134	0.474
Exp.[9] prev. 5 months (log)	4.829	4.774	0.437	4.827	4.799	0.741	4.869	4.761	0.326
Assets[12]	0.466	0.584	0.000	0.469	0.534	0.000	0.516	0.513	0.912
Animals[13]	0.855	1.644	0.000	0.833	0.961	0.044	0.902	0.883	0.828
Water inside home (d)[14]	0.020	0.028	0.003	0.021	0.015	0.014	0.028	0.007	0.000
N	5358	20136		5257	6801		3884	3362	

Notes: [1] eligible to receive a 50 per cent discount on the insurance premium; [2] at least one illness; [3] at least one illness that was perceived as life-threatening; [4] at least one illness treated [5] at least one visit of a primary health care facility (CSPS) or hospital (CMA); [6] at least one episode of self-treatment [7] at least one visit at a traditional healer; [8] sum of costs associated with seeking care at CSPS/CMA; [9] sum of total expenditures; [10] days an individual could not go to school or work due to illness; [11] at least one year of education or literate; [12] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [13] sum of sheep, goats, bullocks, donkeys & horses; [14] water source inside home; sample weights applied.

Table 10: ***Robustness check of incidence of OOP expenditures (d)***

	Small interval (-0.1 < CWR score < 0.1)				Very small interval (-0.05 < CWR score < 0.05)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eligible to discount (d)[1]	-0.002 (0.011)	0.008 (0.011)	-0.006 (0.006)	-0.006 (0.006)	0.150 (0.189)	0.198 (0.167)	0.097 (0.132)	0.089 (0.159)
CWR score	0.127 (0.180)	0.144 (0.174)	0.015 (0.094)	0.000 (0.103)	13.323** (6.467)	7.321 (5.347)	2.718 (4.602)	0.746 (5.546)
(CWR score)^2	-0.178 (0.835)	0.275 (0.770)	0.190 (0.367)	0.196 (0.425)	8.547 (52.260)	-14.129 (42.234)	-31.874 (37.700)	-31.436 (40.689)
(CWR score)^3	-18.153 (20.490)	-9.511 (19.366)	-6.860 (9.788)	-3.159 (10.656)	-5063.906* (2724.195)	-1792.273 (2115.344)	355.793 (1950.918)	1481.441 (2263.611)
Age (in years)	0.000** (0.000)	-0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	0.004 (0.003)	-0.002 (0.002)	0.000 (0.002)	-0.000 (0.002)
Female (d)[2]	0.009 (0.006)	0.009 (0.006)	-0.000 (0.003)	-0.000 (0.003)	0.079 (0.094)	0.042 (0.074)	-0.054 (0.059)	-0.054 (0.061)
Literate (d)[3]	0.013** (0.006)	0.010* (0.006)	0.002 (0.003)	0.002 (0.003)	0.033 (0.110)	0.021 (0.085)	-0.061 (0.073)	-0.088 (0.074)
HH size	-0.001** (0.000)	-0.001** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.005 (0.007)	-0.007 (0.006)	-0.002 (0.005)	0.002 (0.007)
Exp.[4] prev. 5 m. (log)	0.001** (0.001)	-0.000 (0.001)	0.000 (0.000)	0.000 (0.000)	0.037*** (0.011)	0.004 (0.008)	0.002 (0.007)	0.006 (0.007)
Assets[5]	0.001 (0.003)	0.004 (0.003)	0.001 (0.002)	0.001 (0.002)	0.049 (0.055)	0.062 (0.042)	0.042 (0.037)	0.034 (0.038)
Animals[6]	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.016 (0.012)	-0.005 (0.008)	-0.008 (0.008)	-0.004 (0.007)
Water inside home (d)[7]	-0.020*** (0.006)	-0.017*** (0.006)	-0.011 (0.011)	-0.010 (0.011)	-0.142 (0.110)	-0.072 (0.151)	-0.061 (0.149)	-0.112 (0.151)
Illness (d)[8]		0.087*** (0.016)	-0.019*** (0.007)	-0.020*** (0.007)		2.273*** (0.255)	-0.169 (0.103)	-0.244** (0.106)
Life-threatening illness (d)[9]		0.190*** (0.043)	0.073*** (0.027)	0.071*** (0.027)		1.474*** (0.502)	0.665 (0.465)	0.670 (0.460)
Illness treated (d)[10]			0.027 (0.083)	0.029 (0.083)			0.818 (0.903)	0.937 (0.883)

CSPS/CMA (d)[11]			0.653*** (0.082)	0.651*** (0.082)			3.877*** (0.784)	3.827*** (0.756)
Self treatment (d)[12]			-0.022 (0.084)	-0.023 (0.083)			1.670* (0.872)	1.570* (0.851)
Traditional healer (d)[13]			-0.036 (0.080)	-0.040 (0.080)			3.283*** (1.114)	3.208*** (1.087)
Ethnicity dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	No	No	No	Yes	No	No	No	Yes
Village dummies	No	No	No	Yes	No	No	No	Yes
Constant	-0.010 (0.010)	-0.005 (0.009)	-0.002 (0.005)	-3.197 (6.237)	-0.357** (0.175)	-0.160 (0.141)	-0.137 (0.119)	-572.563*** (164.306)
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	4051	4051	4051	4051	2063	2063	2063	2063
R^2	0.0158	0.1897	0.6776	0.6807	0.0379	0.3968	0.5275	0.5427

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] sum of total expenditures; [5] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [6] sum of sheep, goats, bullocks, donkeys & horses; [7] reference group: individual has no water source inside home; [8] reference group: individual did not suffer from any illness; [9] reference group: individual did not suffer from any illness she perceived to be life-threatening; [10] reference group: individual did not treat any illness; [11] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [12] reference group: individual did not apply self-treatment; [13] reference group: individual did not visit a traditional healer; sample weights applied.

Table 11: ***Robustness check of incidence of days lost due to illness (d)***

	Small interval (-0.1 < CWR score < 0.1)				Very small interval (-0.05 < CWR score < 0.05)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Eligible to discount (d)[1]	-0.028***	-0.027***	-0.038***	-0.038***	-0.036	-0.031	-0.045***	-0.052***	-0.034*
	(0.010)	(0.010)	(0.013)	(0.013)	(0.024)	(0.024)	(0.016)	(0.016)	(0.020)
CWR score	-0.243***	-0.236***	-0.474**	-0.478**	0.100	0.234	-0.973*	-1.112**	-0.215
	(0.083)	(0.084)	(0.194)	(0.195)	(0.825)	(0.834)	(0.555)	(0.555)	(0.668)
(CWR score)^2		0.611	0.571	-0.856	-1.175	-1.856	-3.437	-3.546	-2.769
		(0.830)	(0.836)	(2.593)	(5.983)	(6.050)	(4.368)	(4.320)	(4.789)
(CWR score)^3			27.558	27.775	-289.646	-326.810	240.446	265.926	-9.980
			(19.910)	(19.897)	(344.707)	(346.892)	(235.047)	(232.681)	(270.957)
(CWR score)^4				168.135					
				(283.400)					
Age (in years)	0.000	0.000	0.000	0.000	0.001**	0.001	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female (d)[2]	-0.003	-0.004	-0.003	-0.003	0.001	-0.002	-0.011	-0.010	-0.012*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.009)	(0.010)	(0.007)	(0.007)	(0.007)
Literate (d)[3]	0.002	0.002	0.002	0.002	0.001	-0.004	0.001	0.001	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)	(0.011)	(0.008)	(0.008)	(0.008)
HH size	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Exp.[4] prev. 5 m. (log)	-0.000	-0.000	-0.000	-0.000		0.003*	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)		(0.002)	(0.001)	(0.001)	(0.001)
Assets[5]	-0.001	-0.001	-0.001	-0.001		-0.005	-0.009*	-0.008	-0.008
	(0.003)	(0.003)	(0.003)	(0.003)		(0.007)	(0.005)	(0.005)	(0.005)
Animals[6]	-0.000	-0.000	-0.000	-0.000		-0.003**	-0.001	-0.001	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)		(0.001)	(0.001)	(0.001)	(0.001)
Water inside home (d)[7]	0.003	0.003	0.001	0.001		0.007	0.032	0.032	0.044**
	(0.015)	(0.015)	(0.015)	(0.015)		(0.037)	(0.022)	(0.022)	(0.020)
Illness (d)[8]	0.345***	0.345***	0.345***	0.345***			0.437***	0.446***	0.433***
	(0.057)	(0.057)	(0.057)	(0.057)			(0.031)	(0.078)	(0.077)
Life-threatening illness (d)[9]	0.248***	0.248***	0.248***	0.248***			0.262***	0.250***	0.249***
	(0.040)	(0.040)	(0.040)	(0.040)			(0.053)	(0.056)	(0.055)

Illness treated (d)[10]	0.061 (0.101)	0.062 (0.101)	0.062 (0.101)	0.062 (0.101)				0.056 (0.150)	0.061 (0.149)
CSPS/CMA (d)[11]	0.096 (0.078)	0.096 (0.078)	0.096 (0.077)	0.096 (0.077)				0.020 (0.123)	0.020 (0.123)
Self treatment (d)[12]	0.033 (0.081)	0.033 (0.081)	0.033 (0.081)	0.033 (0.081)				-0.083 (0.124)	-0.078 (0.124)
Traditional healer (d)[13]	-0.011 (0.112)	-0.011 (0.112)	-0.012 (0.111)	-0.012 (0.111)				-0.220 (0.155)	-0.223 (0.151)
Ethnicity dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Village dummies	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Constant	-14.393 (12.626)	-14.329 (12.626)	-14.357 (12.619)	-14.544 (12.645)	0.052** (0.020)	0.047** (0.020)	0.033** (0.014)	0.034** (0.014)	-26.335 (19.085)
p	0.000	0.000	0.000	0.000	0.064	0.087	0.000	0.000	0.000
N	7246	7246	7246	7246	3801	3801	3801	3801	3801
R^2	0.5315	0.5316	0.5317	0.5317	0.0108	0.0131	0.5124	0.5183	0.5287

p<0.10, ** p<0.05, *** p<0.01

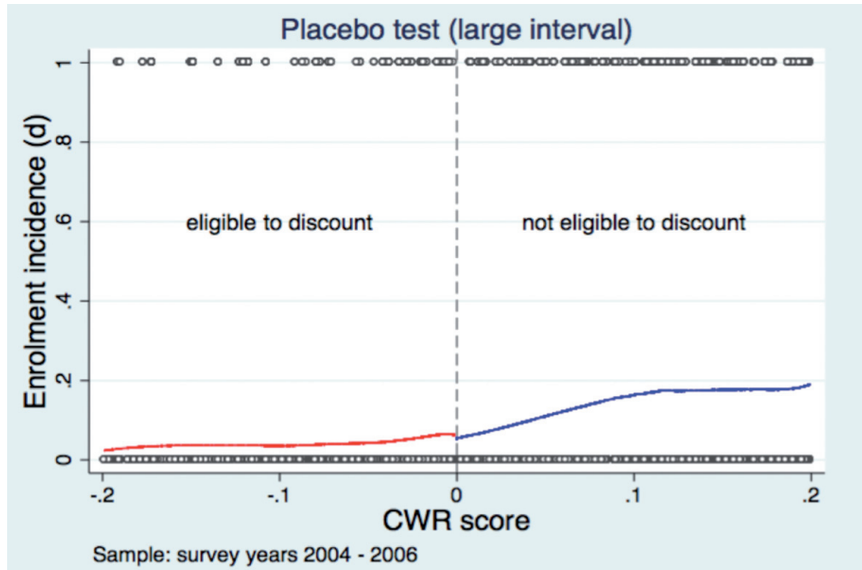
Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] sum of total expenditures; [5] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [6] sum of sheep, goats, bullocks, donkeys & horses; [7] reference group: individual has no water source inside home; [8] reference group: individual did not suffer from any illness; [9] reference group: individual did not suffer from any illness she perceived to be life-threatening; [10] reference group: individual did not treat any illness; [11] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [12] reference group: individual did not apply self-treatment; [13] reference group: individual did not visit a traditional healer; sample weights applied.

Table 12: *Placebo test (eligibility to discount and enrolment, years 2004-2006)*

	Large interval (-0.2 < CWR score < 0.2)			
	(1)	(2)	(3)	(4)
Eligible to discount (d)[1]	-0.024*** (0.008)	-0.029*** (0.008)	0.007 (0.010)	0.005 (0.010)
CWR score	0.467*** (0.036)	0.407*** (0.038)	0.834*** (0.087)	0.791*** (0.089)
(CWR score)^2		1.094*** (0.188)	1.374*** (0.194)	2.801*** (0.629)
(CWR score)^3			-12.963*** (2.390)	-11.333*** (2.485)
(CWR score)^4				-44.492** (18.653)
Constant	0.100*** (0.005)	0.091*** (0.005)	0.070*** (0.006)	0.067*** (0.006)
p	0.000	0.000	0.000	0.000
N	22131	22131	22131	22131
R^2	0.0367	0.0382	0.0395	0.0397

p<0.10, ** p<0.05, *** p<0.01
Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium.

Figure 8: *Placebo test (intervals)*



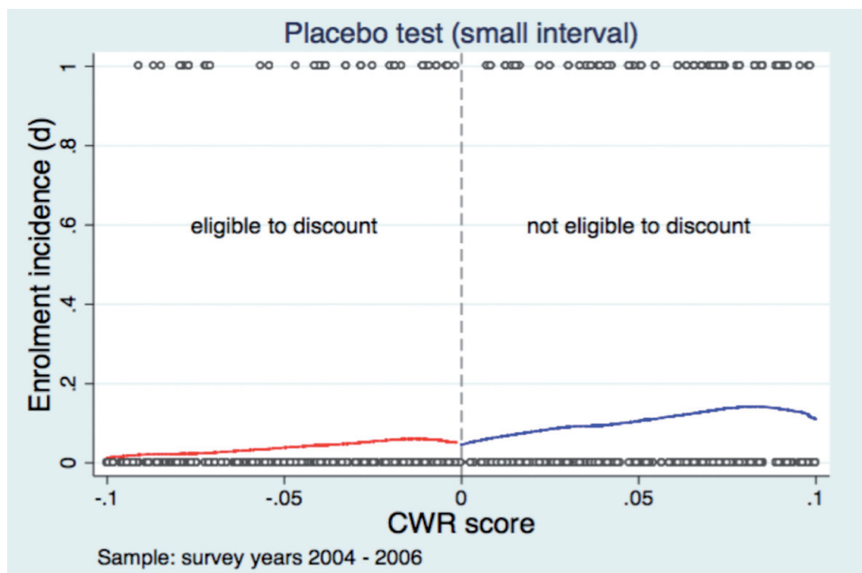


Table 13: ***Socio-economic covariates robustness check I (large interval)***

	Large interval (-0.2 < CWR score < 0.2)								
	Age	Female (d)	Literate (d)	HH size	Exp. Last m. (log)	Exp. Prev. 5 m. (log)	Assets	Animals	Water inside home (d)
Eligible to discount (d)[1]	0.761 (0.980)	0.031 (0.026)	0.048** (0.022)	0.202 (0.257)	-0.177 (0.211)	0.064 (0.239)	0.034 (0.044)	0.545*** (0.158)	0.019*** (0.004)
CWR score	-7.342 (8.763)	0.285 (0.226)	0.639*** (0.195)	12.114*** (2.565)	-2.322 (1.853)	0.478 (2.099)	0.399 (0.402)	5.498*** (1.380)	-0.030 (0.038)
(CWR score)^2	83.210*** (21.528)	0.146 (0.508)	-0.686 (0.421)	-47.319*** (4.592)	3.996 (4.049)	5.003 (4.606)	-1.180 (0.829)	-0.949 (2.585)	-0.067 (0.095)
(CWR score)^3	-254.891 (251.497)	-6.163 (6.281)	-2.648 (5.428)	209.186*** (70.986)	66.754 (51.232)	-24.210 (58.071)	10.997 (11.379)	-92.307** (37.557)	5.923*** (1.240)
Constant	23.520*** (0.593)	0.470*** (0.016)	0.251*** (0.013)	11.283*** (0.163)	4.207*** (0.128)	4.732*** (0.146)	0.487*** (0.027)	0.606*** (0.080)	0.007*** (0.002)
p	0.000	0.771	0.000	0.000	0.473	0.862	0.000	0.000	0.000
N	12058	12058	12058	12058	12058	12058	12058	12058	12058
R^2	0.0066	0.0002	0.0076	0.0497	0.0004	0.0001	0.0031	0.0022	0.0070

p<0.10, ** p<0.05, *** p<0.01 Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; sample weights applied.

Table 14: ***Socio-economic covariates robustness check II (small interval)***

	Small interval (-0.1 < CWR score < 0.1)								
	Age	Female (d)	Literate (d)	HH size	Exp. Last m. (log)	Exp. Prev. 5 m. (log)	Assets	Animals	Water inside home (d)
Eligible to discount (d)[1]	1.010 (1.297)	0.097*** (0.034)	0.063** (0.029)	3.042*** (0.373)	0.125 (0.283)	0.352 (0.320)	0.122** (0.058)	0.778*** (0.247)	-0.022*** (0.004)
CWR score	-4.006 (21.371)	1.607*** (0.561)	0.954* (0.491)	73.619*** (6.524)	4.443 (4.619)	8.151 (5.224)	2.473** (0.993)	10.030** (4.449)	-0.935*** (0.118)
(CWR score)^2	141.695 (89.116)	3.436 (2.307)	5.452*** (2.061)	251.267*** (32.925)	31.375* (18.899)	29.602 (21.398)	11.626*** (4.170)	10.282 (13.000)	1.458*** (0.513)
(CWR score)^3	-463.195 (2278.446)	-130.338** (59.136)	-55.975 (52.861)	-6051.485*** (713.408)	-809.205* (482.294)	-1180.292** (546.105)	-265.278** (104.815)	-497.719 (427.701)	100.373*** (12.978)
Constant	23.270*** (0.791)	0.424*** (0.021)	0.231*** (0.018)	9.115*** (0.223)	4.001*** (0.173)	4.536*** (0.198)	0.413*** (0.034)	0.458*** (0.125)	0.025*** (0.003)
p	0.013	0.031	0.012	0.000	0.081	0.076	0.005	0.002	0.000
N	7246	7246	7246	7246	7246	7246	7246	7246	7246
R^2	0.0024	0.0019	0.0022	0.0354	0.0014	0.0015	0.0022	0.0021	0.0154

p<0.10, ** p<0.05, *** p<0.01 Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; sample weights applied.

Table 15: ***Robustness check of enrolment incidence (d)***

	Large interval (-0.2 < CWR score < 0.2)				Small interval (-0.1 < CWR score < 0.1)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eligible to discount (d)[1]	0.130***	0.141***	0.232***	0.233***	0.200***	0.190***	0.292***	0.290***
	(0.014)	(0.014)	(0.018)	(0.018)	(0.020)	(0.020)	(0.025)	(0.025)
CWR score	0.490***	0.642***	1.730***	1.745***	1.241***	1.158***	3.472***	3.463***
	(0.063)	(0.065)	(0.153)	(0.155)	(0.180)	(0.177)	(0.416)	(0.416)
(CWR score)^2		-2.283***	-1.478***	-2.163*		-7.111***	-6.717***	-9.828*
		(0.314)	(0.319)	(1.157)		(1.910)	(1.906)	(5.789)
(CWR score)^3			-33.161***	-33.778***			-268.423***	-267.950***
			(4.036)	(4.124)			(45.607)	(45.582)
(CWR score)^4				21.297				366.512
				(33.256)				(655.744)
Female (d)[2]	0.045***	0.045***	0.044***	0.044***	0.040***	0.041***	0.039***	0.039***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)	(0.010)
Literate (d)[3]	0.077***	0.077***	0.076***	0.076***	0.067***	0.069***	0.069***	0.069***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)
Age (in years)	0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HH size	-0.003***	-0.003***	-0.003***	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Illness (d)[4]	0.030	0.033	0.033	0.033	0.078**	0.078**	0.077**	0.077**
	(0.029)	(0.028)	(0.029)	(0.029)	(0.039)	(0.039)	(0.039)	(0.039)
Life-threatening illness (d)[5]	-0.048**	-0.048**	-0.048**	-0.048**	-0.039	-0.040	-0.040	-0.040
	(0.023)	(0.023)	(0.023)	(0.023)	(0.030)	(0.030)	(0.030)	(0.030)
Illness treated (d)[6]	0.019	0.013	0.010	0.010	-0.085	-0.087	-0.089	-0.089
	(0.058)	(0.057)	(0.058)	(0.058)	(0.079)	(0.079)	(0.078)	(0.078)
CSPS/CMA (d)[7]	0.231***	0.235***	0.235***	0.235***	0.280***	0.280***	0.281***	0.281***
	(0.049)	(0.048)	(0.048)	(0.048)	(0.067)	(0.067)	(0.067)	(0.067)
Self treatment (d)[8]	-0.081	-0.078	-0.074	-0.074	-0.040	-0.037	-0.036	-0.036
	(0.050)	(0.050)	(0.050)	(0.050)	(0.069)	(0.069)	(0.069)	(0.069)
Traditional healer (d)[9]	-0.054	-0.052	-0.040	-0.040	0.025	0.028	0.037	0.037
	(0.054)	(0.053)	(0.052)	(0.052)	(0.067)	(0.067)	(0.068)	(0.068)

Exp.[10] prev. 5 m. (log)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Assets[11]	0.018*** (0.005)	0.018*** (0.005)	0.018*** (0.005)	0.018*** (0.005)	0.014** (0.007)	0.015** (0.007)	0.014** (0.007)	0.014** (0.007)
Animals[12]	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)
Water inside home (d)[13]	0.172*** (0.039)	0.179*** (0.038)	0.183*** (0.038)	0.184*** (0.038)	0.204*** (0.053)	0.207*** (0.054)	0.226*** (0.053)	0.227*** (0.053)
Ethnicity dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-6.213 (19.267)	-4.489 (19.220)	-8.381 (19.123)	-8.485 (19.110)	77.886*** (25.291)	77.141*** (25.180)	77.415*** (24.897)	77.008*** (24.800)
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	12058	12058	12058	12058	7246	7246	7246	7246
R^2	0.1465	0.1501	0.1550	0.1550	0.1730	0.1752	0.1804	0.1805

p<0.10, ** p<0.05, *** p<0.01

Notes: Robust standard errors in parentheses; [1] reference group: individual not eligible to receive a 50 per cent discount on the insurance premium; [2] reference group: male individual; [3] reference group: individual without at least one year of schooling; [4] reference group: individual did not suffer from any illness; [5] reference group: individual did not suffer from any illness she perceived to be life-threatening; [6] reference group: individual did not treat any illness; [7] reference group: individual did not visit a primary health care facility (CSPS) or hospital (CMA); [8] reference group: individual did not apply self-treatment; [9] reference group: individual did not visit a traditional healer; [10] sum of total expenditures; [11] amount of asset categories (bicycle, motorbike, car, radio, TV, phone, fridge, solar panel) in which individual possesses at least one item; [12] sum of sheep, goats, bullocks, donkeys & horses; [13] reference group: individual has no water source inside home; sample weights applied.