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Household out-of-pocket health spending, health insurance coverage, and children's school attendance in the Philippines

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The microeconomics of family posits that households value and promote the welfare of their members, but given limited resources, their investments in terms of time and money in their children's health and education and expenditures on other consumption goods are necessarily jointly determined. In this paper, we develop and test a household allocation model that highlights the links between out-of-pocket health spending, health insurance, and schooling decisions. Applying the model on subsamples of households from the 2004 and 2007 Annual Poverty Indicators Survey, we find that insurance coverage with PhilHealth tends to increase the share of health in total expenditures, which in turn reduces the likelihood of school attendance. We also find that PhilHealth coverage has a positive, significant, and independent effect on the likelihood of school attendance. These suggest that the design of social health insurance and other social protection programs, including household-level antipoverty programs, must take into account the joint determination of health, education, and other household decisions to achieve their desired overall impact on household welfare.

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1. Introduction

Like Thailand, Vietnam, and other East Asian developing countries, the Philippines adopted a social health insurance program to widen overall access

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to health care and to protect the insured population from catastrophic health payments. Although these social health insurance programs share the same goals, they vary in design features—from enrollment and premium collections to fund management and benefit design, to accreditation and service fee payments. Built into these features are information, incentives, and constraints that influence household health care utilization and out-of-pocket health payments, and, ultimately, the residual disposable income for investments and other consumption goods. If health insurance is inadequate to lessen the adverse impact of health shocks, then household members could forsake treatment and lose their jobs, and the resulting financial burden could force them to cut down on their consumption, forego their leisure, or even sacrifice the education or welfare of their younger members [Wagstaff 2007; Gertler and Gruber 2002; Flores et al. 2008; Morduch 1995]. Clearly, evidence on any of these issues could help guide reforms on health policy and other social protection programs in developing countries.

With the Philippines as a case study, we assess here the effect of health insurance coverage on household out-of-pocket health spending, and, if any, on the schooling status of school-age members. There are both theoretical and empirical bases to expect these two impacts of health insurance. The microeconomics of household behavior posits that households value and promote the welfare of each household member but are faced with the decision of allocating fixed and limited household resources among these members. The same theory also states that the allocation may not only vary across household members but also across expenditure items. The consequence of this assumption is that household investments in human capital—in terms of time and money spent on their children's health and education—and other consumption goods are jointly determined, although apportioned in varying rates among household members [Becker 1991; Thomas 1990; Berhman 1997]. Implicitly, then, health insurance and anything else that impinge on health spending may also impinge on education and other household expenditures.

Evidence also shows the impoverishing effects of catastrophic health spending. For example, Xu et al. [2007] estimate that as many as 150 million people worldwide suffer major financial setbacks due to catastrophic health payments. In selected developing Asian countries, van Doorslaer et al. [2006] approximates that around 78 million people are forced to subsist on less than US$ 1 a day because of major health shocks. Applying the same methodology to more recent data, Ico [2008] and Lavado [2007] find that many Filipino households remain economically vulnerable to health risks. In Indonesia, Gertler and Gruber [2002] report that the incidence of major illness led to a

significant reduction in the average consumption of Indonesian households, and that the reduction is mitigated by the presence of insurance or third-party financing coverage (i.e., mutual-help or self-help schemes). Other studies show that health insurance enables households to cope with shocks that negatively affect consumption and savings. In Gujarat, India [Ranson 2002], and Vietnam [Wagstaff 2007], local health insurance schemes have reduced the risk of catastrophic health payments, including that of the poor. In the United States, Medicaid coverage is found to have a "sizable and significant effect on wealth holdings" [Gruber and Yelowitz 1999]. A similar negative impact on household precautionary savings and a positive effect on total consumption were observed in Taiwan following the introduction of the National Health Insurance in 1995 [Chou, Liu, and Hammit 2003]. Intuitively, it was as if health insurance substituted for precautionary savings, including wealth holdings, as protection from uncertainties.

This is the opportune time for an empirical assessment of the effects of health insurance on out-of-pocket health spending and schooling decisions in the Philippines. Since 2000, the Philippine Health Insurance Corporation (PhilHealth), which is tasked to administer the National Health Insurance Program, has become more aggressive in extending coverage, particularly to the poor, and introducing new benefit packages. In 2008, PhilHealth had about 15.9 million members, nearly twice as many compared to its membership in 2000. Including the dependents of members, the total number of PhilHealth beneficiaries has risen from nearly 29.6 million in 2000 to 68.9 million in 2008. Over the same period, the proportion of the indigent members (enrolled under the so-called Sponsored Program) has increased significantly from 4 percent to 20 percent. The PhilHealth members coming from the government and formal private sectors accounted for about 91 percent and 50 percent of the total membership in 2000 and 2008, respectively.

PhilHealth has also raised the benefit ceilings for drugs, X ray, and laboratory services since 2002, and introduced benefit packages for TB directly observed treatment short-course (TB DOTS), severe acute respiratory syndrome (SARS), and dialysis treatment. In 2005, it launched the benefit packages for outpatient malaria, outpatient HIV, newborn care, and third normal spontaneous delivery. Beginning in 2002, PhilHealth offered service contracts to local government units on a capitation basis to provide outpatient services to insured indigent families. Thus, an evaluation of how these improvements in enrollment and benefit design have increased access to health care and/or reduced out-of-pocket health spending could provide policy guides as PhilHealth gears up to expand

enrollment among those in the informal sector toward its goal of universal health insurance coverage.

However, there are indications that PhilHealth's performance remains wanting. In contrast to PhilHealth's reported high population coverage, the actual coverage based on nationwide household surveys may in fact be more modest. Based on the various rounds of the Annual Poverty Indicators Survey (APIS), the proportions of households with members identifying themselves as PhilHealth members were only about 41 percent, 44 percent, and 42 percent in 2002, 2004, and 2007, respectively. Also, based on the 2003 National Demographic and Health Survey, only about 30 percent of the households have PhilHealth coverage, of which only about 32 percent used their benefits during the past 12 months. According to the Philippine National Health Accounts, the share of private out-of-pocket sources in the total health care financing remained at 49 percent and 48 percent in 1992 and 2005, respectively, while the shares of social insurance (comprised mainly of PhilHealth) were 6 percent and 11 percent in the same two years [Capuno and Kraft 2009; Racelis et al. 2008].

Considering that PhilHealth may only confer limited financial protection, then the question of how beneficiary households adjust consumption, investment, and labor decisions given PhilHealth coverage acquires urgency. One specific intrahousehold allocation issue involves the decision to keep children in school. This household resource allocation issue takes on particular relevance given the worsening trends in basic education. Figures from the Department of Education show that the participation rate at the elementary level dropped from 90 percent in SY 2002-2003 to 85 percent in SY 2007-2008. Likewise, participation rates at the secondary level were consistently below 65 percent over the same period. Performance in terms of average annual dropout rates and average annual completion rates was just as alarming, with nearly one in ten students in both the elementary and high school levels dropping out of school and average annual completion rate below 75 percent in both levels.

Evidence from recent surveys tends to support the proposition that the observed trends in schooling performance are consequences of financing and, hence, intrahousehold resource allocation decisions. The 2002, 2004, and 2007 APIS indicate that the high cost of education is one of the main reasons why school-age children between 6 and 17 years old are not currently attending school. Given the argument that household resources and income are vulnerable to health shocks, then the extent to which PhilHealth coverage can reduce the resource loss due to health expenditures and how these averted losses are then used to finance schooling should be examined.

These issues are further investigated in the rest of the paper. To guide the analysis, a model of household behavior that highlights the links between out-of-pocket health spending, health insurance, and schooling decisions is presented in section 2. We introduce the regression model and regression data in section 3. In section 4, we present the regression results concerning the causal links between schooling decisions, out-of-pocket health spending, and PhilHealth coverage. Section 5 contains further discussion of the results and their implications. Short concluding remarks end the paper.

2. Conceptual framework

In this section, we outline a model of household decision making under uncertainty, focusing mainly on the decision to invest in education (or keeping a child enrolled in school) and how this is jointly determined with consumption of health care and other goods.

Consider three goods: F, E, and H where F is an aggregate measure of consumption goods while E and H are education and health care goods, respectively. Specifically, E is defined as an indicator variable for being in school and H is an indicator variable for utilization of health care services conditional on illness. Assume further that F is fully financed out of current income. In the base case, E and H are also paid for by the household from current income although we will later examine the case where H can be financed by insurance.

A household may be in any of two possible states. It may experience illness with a probability ρ or remain healthy with a probability $1-\rho$. We use the subscripts 0 and 1 to denote health and illness, respectively. When faced with an illness, the household's budget constraint is

$$Y_1 = P_F F_1 + P_E E_1 + P_H H \tag{1}$$

where Y is income and the P's refer to prices. The healthy household avoids spending on H, thus its budget constraint is given by

$$Y_0 = P_F F_0 + P_E E_0. \tag{1'}$$

When E and H are fully financed out of current income, P_E and P_H are out-of-pocket expenses.

A household's utility function conditional on illness is defined as

$$U = \gamma U(F, E).$$

Note that the utility function implicitly assumes that only basic goods and schooling have direct bearing on utility. H affects utility only to the extent that

consumption of goods F and E is enjoyed more (less) under conditions of the better (worse) health. The parameter γ is a measure of health at the end of the period of illness, which is assumed to be a function of health care utilization and initial health status, S_0:

$$\gamma = \gamma(H; S_0).$$

We further assume that individuals with more severe illnesses have worse health status at the beginning of the period and that sick individuals who seek health care are healthier after the bout of illness. In symbols, $\partial\gamma/\partial S_0 > 0$ and $\partial\gamma/\partial H > 0$. In our model, we assume a unitary household wherein the decision makers (parents) act as one and that they allocate F, E, and H among the household members so that issues concerning differences in parental preferences in intrahousehold allocations are assumed away [Berhman 1997].

The household maximizes the following expected utility function by choosing F, E, and H:

$$EU = (1-\rho)U_0(F,E) + \rho\gamma(H; S_0)(F; E)$$

subject to the budget constraints (1) and (1').[1]

The optimal solution is a system of demand equations, which includes an average demand function for education:

$$\Pr(E=1) = E(P_F, P_H, P_E, Y; S_0, \rho)$$

where $\partial\Pr(E=1)/\partial Y > 0$, $\partial\Pr(E=1)/\partial P_E < 0$, $\partial\Pr(E=1)/\partial S_0 > 0$, and $\partial\Pr(E=1)/\partial\rho < 0$. The marginal effect of out-of-pocket health expenditures on the likelihood of being in school is negative, i.e., $\partial\Pr(E=1)/\partial P_H < 0$ since households face trade-offs in spending on E and H.

Suppose we introduce the possibility that H can be financed by a third party. In particular, we assume that H is financed by a social health insurance scheme such as PhilHealth so that out-of-pocket expenses for health are now redefined as:

$$P'_H = C - I \tag{2}$$

where I denotes insurance coverage of the reimbursement-type whose magnitude is determined exogenously (say, by the state).

We also assume that the premium, k, is actuarially determined by insurance coverage I:

$$k = k(I).$$

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[1] In the specification of the expected utility function, the parameter γ can be interpreted as a discount factor that lies between 0 and 1 and takes on a value of 1 if the person is not ill.

Thus the budget constraints under third-party financing are redefined as follows:

$$Y_1' = P_F F_1 + P_E E_1 + P_H' H - k(I),$$
$$Y_0' = P_F F_0 + P_E E_0 - k(I),$$

where k are premiums collected at each health state, respectively. P_H in this case already incorporates the reimbursement from insurance.

In this case, then the average demand for E is given by

$$\Pr(E=1)' = E(P_F, P_H, P_E, Y, I; S_0, \rho). \tag{3}$$

Taking the derivative of (3) with respect to insurance indicates that insurance has a direct effect on the likelihood of being in school and an indirect effect that works through P_H:

$$\frac{\partial \Pr(E=1)'}{\partial I} = \frac{\partial \Pr(E=1)'}{\partial P_H}\frac{\partial P_H}{\partial I} + \frac{\partial \Pr(E=1)'}{\partial I}. \tag{4}$$

The second term is the direct effect and is akin to a positive income effect—the increase in demand for education resulting from an expansion of household resources. The first term measures the indirect insurance effect that operates through the price of health care. This is also positive since $\partial \Pr(E=1)'/\partial P_H < 0$ and $\partial P_H / \partial I < 0$ by (2). We thus expect the combined effects of health insurance on the probability of schooling to be positive.

3. Empirical strategy

3.1. Regression model

Following the household model above, we investigate the empirical relationship between household out-of-pocket health spending, health insurance coverage, and the probability of school attendance with the following probit regression model [Wooldridge 2002]:

$$E_1^* = \boldsymbol{X}_1\boldsymbol{\beta}_1 + \alpha_1 P_H + \alpha_2 I + \varepsilon_1,$$
$$P_H = \boldsymbol{X}_1\boldsymbol{\delta}_{21} + \boldsymbol{X}_2\boldsymbol{\delta}_{22} + \delta_{23} I + \upsilon_2,$$
$$E_1 = 1\left[E_1^* > 0\right],$$

where E_1^* is schooling status; P_H is out-of-pocket health expenditures; I is the insurance coverage; $\boldsymbol{X}_1$ and $\boldsymbol{X}_2$ are vectors of child and household characteristics

(including income); the β's, α's, and δ's are regression coefficients; and ε_1 and v_2 are error terms. The error terms are assumed to have zero mean, bivariate normal distribution, and independent of $\boldsymbol{X}_1$, $\boldsymbol{X}_2$, and I. In this specification, the endogeneity of P_H is explicitly represented not only because of the effect of I on P_H but also because H and E are jointly determined. To instrument for the endogeneity of P_H, a second instrumental variable equation using $\boldsymbol{X}_1$, I, and instrumental variables ($\boldsymbol{X}_2$) are employed. The endogeneity of P_H is checked using Wald χ^2 test.

As can be seen in the model, I affects E^* directly through the first equation and indirectly through the second equation. This specification captures the notion that health insurance coverage could influence the household demand for education services in two ways. First, it could reduce the household's out-of-pocket spending for health, and consequently induce a positive income effect on education and other consumption goods. Second, it increases effective household budget, possibly by freeing up precautionary savings or reducing the need for wealth holdings, which also then induces a greater demand for education services. Ignoring either of these effects could lead to biased estimates.

The model is estimated using the IV-probit routine in STATA. To get a sense of the size and direction of the bias, two other probit models are estimated. In the naive model, only the first equation is fitted to the data. In this case, I is assumed to have only a direct effect on E^*, and P_H is assumed to be exogenous. In the second alternative specification, I is assumed to influence E^* exclusively through P_H, which is also now treated as an endogenous regressor. The endogeneity of P_H in the latter equation is also checked.

Due to data limitations, the estimating equation specified above is not the exact empirical translation of the theoretical model (3) derived in the previous section. In particular, instead of health expenditures, its share in the total expenditures is used in order to reduce the impact of correlation between income and health expenditures. Another caveat is the specification of I as a discrete variable, rather than as a continuous variable as specified in the theoretical model. The implication of this switch is that the estimated marginal effects of P_H on the probability of schooling needs to be scaled up by the average peso amount of insurance coverage to get the true impact of I working through P_H.[2] However, since the scaling factor must be multiplied against all the estimated marginal effects obtained from the three probit models, then nothing is lost if the estimated marginal effects alone are compared against each other.

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[2] If I is continuous as in (2), then $\partial P'_H / \partial I = -1$. If I is a discrete variable that can take a value equal to 0 or 1, then $P'_H = F - sFI$, where s is the proportion of the fees supported by insurance. In this case, the marginal effect of insurance is $P'_H(I=1) - P'_H(I=0) = F - sF - F = -sF$. Thus, the estimated marginal effect of I on P_H in the empirical model must be multiplied by the average support value $(-sF)$ to derive its true marginal impact.

3.2. Data

The household samples are culled from the 2004 and 2007 rounds of the APIS. Conducted by the National Statistics Office since 1998 as a rider to the Labor Force Survey, the APIS is designed to elicit information on different indicators related to poverty. The information collected includes demographic and economic characteristics of the family, health and education status of the family members, housing, water and sanitation condition of the household, membership in PhilHealth and health maintenance organizations. Both the 2004 and 2007 rounds had a national sample of about 51,000 housing units drawn from 2,835 primary sampling units (barangays). The survey is representative at the national and regional levels [Ericta and Luis 2009].

From the complete samples of the two rounds of APIS, a subsample of household members is used in this study. In particular, the subsample is limited to members who are between 6 and 22 years of age, and who have not yet completed tertiary or college education.[3] Officially, six years is the minimum age of entry in primary school, which can be completed in six or seven years. High school takes another four years, while most college courses can be completed in five years. The subsample also excludes household heads or their spouses, parents or in-laws. The subsample size is 144,624, of which 70,432 are from the 2007 APIS.

The regression variables used here are shown in Table 1. The main dependent variable is Inschool, which takes on a value of 1 if the household member was currently attending school and 0 if not. About 77.4 percent of the sample household members reported to be in school during the survey period. The explanatory variables of main interest are the Share of Health and PhilHealth. The former (Share of Health) is defined as the percentage share of out-of-pocket medical care expenditures in the total household expenditures. For the two-year period, the average share of medical expenditures is about 1.7 percent, although it can be as much as 94.8 percent for some households. The latter (PhilHealth) takes on a value of 1 if any household member was member of PhilHealth and 0 if none. About 42 percent of the subsample had PhilHealth coverage.[4]

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[3] In the APIS, the age range for schooling is from 5 years to 24 years. This range includes those who might be attending preschool, since six years is the official age of entry to elementary schools, and those who pursue higher education after college.

[4] As mentioned in the first section, majority of the current PhilHealth members and beneficiaries are the indigents (sponsored members), the employed sector (from both the govern-

Table 1. Variable definition and descriptive statistics

Variable	*Definition*	*Obs.*	*Mean*	*Std. dev.*	*Min.*	*Max.*
Inschool	1 if household member currently attend school, 0 otherwise	144,624	0.774	0.418	0	1
Share of Health	Percent share of medical care expenditures in total household expenditures	144,624	1.691	4.911	0	94.792
PhilHealth	1 if any household member is a PhilHealth member, 0 otherwise	144,624	0.416	0.493	0	1
Age	Age in years	144,624	12.99	4.52	6	22
Age_sq	Square of age (in years)	144,624	189.17	123.1	36	484
Male	1 if male, 0 otherwise	144,624	0.533	0.499	0	1
Child	1 if child or grandchild of the household head, 0 otherwise	144,624	0.948	0.222	0	1
Member 6_22	Percent share of members 6-22 years old	144,624	52.06	15.39	6.67	100
Member 5_65	Percent share of members below 6 years old or 65 years old and above	144,624	11.49	13.29	0	80
Head_ill	1 if household head got ill, injured or both during past month, 0 otherwise	144,624	0.203	0.403	0	1
Head_age	Age in years of the household head	144,624	46.10	10.84	16	99
Head_ school	Number of years of schooling of the household head	132,189	7.21	3.34	0	17
Incomepc	Family income per capita (in thousand pesos)	144,624	12859.3	17486.03	0	1195240
Incomepc_sq	Square of family income per capita	144,624	4.70e+08	5.70e+09	0	1.40e+12
Region NCR	1 if region is National Capital Region, 0 otherwise	144,624	0.09	0.287	0	1
Y2007	1 if year is 2007, 0 otherwise	144,624	0.487	0.50	0	1

Variables pertaining to child characteristics are introduced to capture the direct and indirect cost of education. The child's age in years and its squared value are used to account for the fact that the direct cost of education increases from elementary to high school to college, partly as a result of the reduced state subsidy after basic education. Also, education for older children has high opportunity costs since they would have to forego possible employment.[5]

Several controls for parental preferences are also introduced. These variables include gender of the child (Male) and a binary indicator of whether the child is the household head's direct descendant (Child). A little over half of sample are male, and most are either the child or grandchild of the household head. Additionally, parental preference is accounted for by age and the years of schooling of the household head. On average, the household heads are about 46 years old and have completed about seven years of schooling (i.e., completed at least elementary education).

Household resources are also important determinants of the demand for education. The important indicators of available resources for schoolchildren are income per capita and family composition. Family composition is represented by the proportions of school-age members (Member 6_22), which reflect the dependence on the working-age members of the family. The mean percentage share of this group is about 52 percent.

Two dummy variables are also constructed to account for possible unobserved supply-side factors that affect the supply, price, or quality of education, which vary with location or time. These are the dummy variables for year (Y2007) and region (Region NCR). Of the total subsamples, about 10 percent reside in the National Capital Region and half were observed in either year.

Finally, to identify the impact of health spending, indicators for the health status of the various members of the household are included. These are a variable indicating vulnerability to health risks (Member5_65—the proportion of family members with ages below 6 or 65 years and above), and the illness/injury status of the household head. The mean proportion of those aged below 6 and 65 years and above is around 11.5 percent, and about one in five household heads reported to have fallen ill, injured, or both during the survey reference period (past month).

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ment sector and formal private sector), and the nonpaying members (retirees). For these groups, their PhilHealth enrollment is, in a sense, involuntary. In contrast, the voluntary-paying members from the informal sector remain a minority, accounting for only 17 percent of the total PhilHealth membership in 2008.

[5] There is no available measure of child's innate ability in APIS, although it could be an important determinant of schooling decisions. However, since child's ability is unlikely to be correlated with share of health spending and PhilHealth coverage, the omitted variable is unlikely to bias the coefficient estimates for the two variables of interest.

4. Results

4.1. IV-probit model

Table 2 shows the results of the probit model that links the probability of school attendance to share of health in total expenditures, both directly and indirectly to PhilHealth coverage, and to other child and household characteristics and other unobserved location-specific or time-specific factors. In this case, the share of health spending is treated as an endogenous regressor, which in turn is regressed against a set of explanatory variables, as presented in the bottom half of the table.

Among the regressors with the statistically significant coefficients in the bottom half of the table are PhilHealth (0.2459), Member 6_22 (-0.0054), Incomepc (0.00005), Incomepc_sq (-1.14e-10), and Region NCR (-0.6220). The positive effect of PhilHealth coverage is possibly the effect of induced consumption of health services even as it reduces the unit price of such service. In other words, health spending could be increasing with insurance, as beneficiaries tend to access more health care when treatment cost is subsidized. Also, both the coefficients of the unique identifying variables—Member5_65 (0.0221) and Head_ill (1.5682)—are positive and statistically significant. These results can be explained by the observation that the very young and the very old household members are more susceptible to health risks than other members, while maintaining the health of the household heads, who are usually the family breadwinner, is likewise a family priority. Implicit in the specification is the assumption that both health stock variables influence the probability of schooling only through their effects on health expenditures. With a test statistic of 6.41, the Wald chi-squared test rejects the null hypothesis of exogeneity and the assumption of independence between the school attendance and share of health spending equations.

From the share equation, the predicted shares of health spending are obtained and then used as a regressor in the probability of schooling function. As can be seen in the top half of the table, this particular variable has negative and statistically significant marginal effects on the dependent variable. Specifically, a percent increase in the share of health in total spending reduces the probability of schooling by a percent. Equally noteworthy finding is the positive and statistically significant coefficient of PhilHealth, which indicates that insurance coverage may have also encouraged the use of more services or of costly services. The other regressors that likewise have statistically significant marginal effects are Child (0.0807), Members6_22 (-0.0007), Region NCR

(-0.0396), Y2007 (-0.0199), Head_age (0.0014), Head_school (0.0202), and Male (-0.0597). The nonlinear effects of the child's age and the household income per capita are likewise confirmed in this case. For each of these variables, the marginal effect is positive but at a declining rate.

The findings on the effect of the share of health spending and PhilHealth on the probability of schooling meet expectations. That the (predicted) share of health spending tends to reduce the likelihood of school attendance can be understood as households are being forced to skimp on education and other consumption spending when they fall ill or sick, which requires them to undertake costly treatment or to be absent from work. Consistent with the prediction of the household model, PhilHealth coverage both directly and indirectly affects the likelihood of school attendance. The indirect effect is negative since PhilHealth coverage induces higher health spending and thus reduces the available resources for education. However, this effect is offset by a second positive effect. This direct effect on the probability of schooling suggests that insurance also enlarges the disposable income of households that see less need for precautionary saving or other asset holdings for contingencies.

4.2. Alternative models

To check the consistency of the empirical results so far, two alternative specifications of the probit models are applied to the data. First, the probability of schooling function is estimated, with the share of health assumed to be a predetermined variable, with PhilHealth, Head_ill, Member6_22, and all the other variables in the previous models as regressors. In this "naive" model, PhilHealth is assumed to have only a direct influence on the probability of schooling. Second, the probability of schooling function is estimated with the share of health spending taken as an endogenous regressor, and only through this variable does PhilHealth influence schooling.

The results of the naive probit model are presented in the left half of Table 3. In this case, the marginal effects of the share of health spending and PhilHealth are statistically significant and have same signs as those in Table 2. However, the magnitudes are not equal. In particular, the marginal probabilities of the share of health spending are -0.0098 and -0.0014 in Table 2 and Table 3, respectively. For PhilHealth, the corresponding marginal effects are 0.0294 and 0.0270. The differences in the estimated effects indicate that this misspecified model, which disregards the endogeneity of the share of health spending, attenuates the true marginal effects of this variable and that of PhilHealth.

Table 2. Probability of school attendance, controlling for endogeneity of share of health spending
(IV probit model: Dep. variable=Inschool, endogeneous regressor=Share of health)

Equation/ Explanatory variable	*Coefficient*	*Robust std. error*[a]	*Marginal effects*[b]
INSCHOOL			
Share of health	-0.0381*	0.013	-0.0098*
PhilHealth	0.1156*	0.0153	0.0294*
Age	0.3174*	0.0306	0.0816*
Age_sq	-0.0185*	0.0009	-0.0048*
Male	-0.2336*	0.0164	-0.0597*
Member 6_22	-0.0027*	0.0005	-0.0007*
Child	0.2811*	0.0524	0.0807*
Head_age	0.0054*	0.0007	0.0014*
Head_school	0.0785*	0.0038	0.0202*
Incomepc	0.00003*	1.27e-06	7.45e-06*
Incomepc_sq	-5.83e-11*	6.62e-12	-1.50e-11*
Region NCR	-0.1461*	0.0444	-0.0396*
Y2007	-0.0773*	0.0178	-0.0199*
Constant	-0.7491*	0.2749	
SHARE OF HEALTH			
PhilHealth	0.2459*	0.0592	
Age	-0.0137	0.21	
Age_sq	0.0003	0.0007	
Male	0.0234	0.0352	
Member 6_22	-0.0054*	0.0014	
Member 5_65	0.0221*	0.0021	
Child	-0.0397	0.0889	
Head_ill	1.5682*	0.1129	
Head_age	0.0206*	0.0022	
Head_school	-0.0042	0.0111	
Incomepc	0.00005*	0.00001	
Incomepc_sq	-1.14e-10*	3.47e-11	
Region NCR	-0.6220*	0.0961	
Y2007	-0.0598	0.0524	
Constant	0.0551	0.2146	

Table 2. Probability of school attendance, controlling for endogeneity of share of health spending (continued)
(IV probit model: Dep. variable=Inschool, endogeneous regressor=Share of health)

Equation/ Explanatory variable	*Coefficient*	*Robust std. error*[a]	*Marginal effects*[b]
Number of obs.	132189		
Log pseudo-likelihood	-1.85e+08		
Wald test of exogeneity			
χ^2	6.41		
Prob>χ^2	0.0114		

[a]Adjusted for 17 clusters (regions); [b](dy/dx), for dummy variables this is obtained for the discrete change from 0 to 1; *Significant at the 1 percent level.

The attenuation bias due to misspecification is also evident in the results of the second alternative model, wherein the share of health spending is considered endogenous and the only channel through which PhilHealth influences the probability of school attendance. As can be seen in the bottom right half of Table 3, PhilHealth still has a positive and statistically significant impact (0.2264) on the share of health spending. Also, most of the statistically significant determinants of the share of health spending in Table 2 are likewise found to be important here. Compared to that in Table 2, however, the marginal effect of the share of health spending is only -0.0067, which is still greater than -0.0014 obtained in the naive probit model. In this case, the result of the Wald chi-squared test indicates that the null hypothesis of exogeneity cannot be rejected. However, in the light of the previous results, there could be an omitted variable bias here since PhilHealth appears to be significant in the school attendance equation in Table 2.

5. Discussion

5.1. Health spending reduces the likelihood of school attendance

It has been noted that catastrophic health spending could lead to adverse consequences, including the loss of employment, income reduction, transient or aggravated poverty, and even poor health, especially for those who fail to complete treatment [Gertler and Gruber 2002; van Doorslaer et al. 2006; Riphahn 1999]. Thus, information about the extent and channels by which health shocks affect other household consumption, investment, labor, and leisure could help in the design of social protection programs, including health insurance, unemployment benefits, consumption subsidies, or education vouchers.

Table 3. Probability of school attendance, with direct or indirect PhilHealth effects only

Equation/ explanatory variable	*Probit model (share of health is exogenous)*			*IV-probit model (share of health endogenous and PhilHealth as instrument)*		
	Coefficient	*Robust std. error[a]*	*Marginal effects[b]*	*Coefficient*	*Robust std. error[a]*	*Marginal effects[b]*
INSCHOOL						
Share of health	-0.0056*	0.0009	-0.0014*	-0.0264***	0.0146	-0.0067***
PhilHealth	0.1072*	0.0152	0.0270*			
Age	0.3198*	0.0325	0.0813*	0.3200*	0.0316	0.0819*
Age_sq	-0.0187*	0.0009	-0.0048*	-0.0186*	0.0009	-0.0048*
Male	-0.2382*	0.0162	-0.0601*	-0.2365*	0.0164	-0.0601*
Member 6_22	-0.0042*	0.0005	-0.0011*	-0.0027*	0.0005	-0.0007*
Member5_65	-0.0044*	0.0005	-0.0011*			
Child	0.2757*	0.055	0.0782*	0.2885*	0.0515	0.0827*
Head_age	0.0049*	0.0008	0.0013*	0.0052*	0.0007	0.0013*
Head_school	0.0801*	0.0038	0.0204*	0.0813*	0.0036	0.0208*
Head_ill	-0.0154	0.0213	-0.0039			
Incomepc	0.00003*	1.18e-12	6.82e-06*	0.00003*	1.17e-06	7.57e-06*
Incomepc_sq	-5.35e-11*	6.08e-12	-1.36e-11*	-5.93e-11*	6.23e-12	-1.52e-11*
Region NCR	-0.1252*	0.0429	-0.0333*	-0.1508*	0.0446	-0.0407*
Y2007	-0.0785*	0.0171	-0.0200*	-0.0813*	0.0174	-0.0208*
Constant	-0.6064**	0.2952		-0.7522*	0.2824	

Table 3. Probability of school attendance, with direct or indirect PhilHealth effects only (continued)

Equation/ explanatory variable	*Probit model (share of health is exogenous)*			*IV-probit model (share of health endogenous and PhilHealth as instrument)*		
	Coefficient	*Robust std. error[a]*	*Marginal effects[b]*	*Coefficient*	*Robust std. error[a]*	*Marginal effects[b]*
SHARE OF HEALTH						
PhilHealth				0.2264*	0.0666	
Age				-0.0139	0.021	
Age_sq				0.0003	0.0007	
Male				0.0232	0.0353	
Member 6_22				-0.0056*	0.0014	
Member 5_65				0.0218*	0.0021	
Child				-0.0398	0.0888	
Head_ill				1.5753*	0.1113	
Head_age				0.0206*	0.0022	
Head_school				-0.0037	0.0113	
Incomepc				0.00005*	0.00001	
Incomepc_sq				-1.14e-10*	3.46e-11	
Region NCR				-0.6235*	0.0957	
Y2007				-0.0607	0.0523	
Constant				0.0715	0.2128	

Table 3. Probability of school attendance, with direct or indirect PhilHealth effects only (continued)

Equation/ Explanatory variable	*Probit model (share of health is exogenous)*			*IV-probit model (share of health endogenous and PhilHealth as instrument)*		
	Coefficient	*Robust std. error*[a]	*Marginal effects*[b]	*Coefficient*	*Robust std. error*[a]	*Marginal effects*[b]
Number of obs.	132189			132189		
Log pseudo-likelihood	-47373.26			-1.85e+08		
Pseudo R^2	0.3514					
Wald test of exog.						
χ^2				2.05		
Prob>χ^2				0.1526		

[a]Adjusted for 17 clusters (regions). [b](dy/dx), for dummy variables this is obtained for the discrete change from 0 to 1.
*Significant at the 1 percent level; **significant at the 5 percent level;; ***significant at the 10 percent level.

The results presented here reveal that a percent increase in the share of health care spending in total family expenditures, which reflects the out-of-pocket spending for health, reduces by nearly a percent the probability of school attendance among Filipino children aged 6-22, other things being constant. This only underscores the fact that household investments in human capital—principally, in health and education of its members—are jointly determined, since parents usually draw the budget for such and other expenditures, as it were, from the same pocket. Ignoring this fact could lead to misestimates of the adverse effects of out-of-pocket health spending. In our results, the misestimated reduction in the probability of schooling for an average child in a typical household could be less than one-half percent. When this reduction is inflated to school-age population, however, it could involve tens of thousands of children, who should have benefited from possible government assistance were it not for measurement errors.

5.2. PhilHealth coverage, while increasing health expenditures, also positively impacts on the likelihood of schooling

As a social protection program, a social health insurance should facilitate health care access of the needy and protect them from financial ruin. Due to moral hazard, the insured, however, may be induced to use more health care than necessary or avail of more costly services. When that happens, out-of-pocket spending may in fact increase with insurance coverage. Corroborating evidence is found in this paper. Specifically, PhilHealth coverage has a positive and statistically significant effect on the share of health spending. Since higher health spending leads to lower probability of school attendance, then PhilHealth coverage also adversely, albeit indirectly, affects schooling.

Interestingly, our results also find that PhilHealth coverage has another direct and opposite impact on school attendance. In particular, it directly improves the chances of school attendance among children by nearly 3 percentage points. Ignoring this channel is tantamount to misestimating the effects of health spending on school attendance. This means that health insurance also influences nonhealth decisions, which in this case redound to children's welfare. Arguably, the increase in the household demand for education services is induced by greater disposable income made available with insurance. Insurance coverage may have reduced the need for precautionary savings, asset holdings, or higher borrowings, any of which could have freed up finances for children's education. This finding then supports the case for universal health insurance coverage in the Philippines.

5.3. The differential impact of PhilHealth coverage on school attendance across families by income deciles, share of health spending, and age of schoolchildren

Using the estimates in Table 2, we simulate the effect of PhilHealth coverage on the probability of school attendance across households in various income per capita deciles, severity of catastrophic health spending, and among children of various age groups.[6] The idea is to identify any differential impact of insurance coverage across various population groups. If such differential benefits exist, then the information can be used to improve targeting of insurance coverage. While the ultimate goal is universal coverage, sequential or partial targeting of population groups may be necessary in the interim due to fiscal or organizational constraints.

The differential impacts of PhilHealth coverage across income groups are shown in Figure 1. In 2004 (Panel A), the increase in the probability of schooling for children in the lowest income decile could be as much as 5 percentage points. For those in the fourth decile up to the ninth decile, the incremental probability is 3-4 percentage points. In contrast, this particular benefit from PhilHealth coverage is marginal (0.014) for those in the richest decile. Similar pattern can be discerned in 2007 (Panel B). The incremental probability is greater for the lowest income group (0.036) than for their richest counterparts (0.014). Also, those in the middle-income deciles experience largely the same effect on the probability of schooling with insurance. The observed pattern thus supports the government's aggressive strategy to extend PhilHealth coverage to the indigent population. Sustaining the coverage of the poor and extending the same to those in the lower-middle-income class—which may include workers in the informal sector—may also help achieve universal basic education completion, one of the government's commitments under the Millennium Development Goals.

It is normally assumed that a family already suffers serious financial setbacks if their health spending begins to exceed 10 percent of their expenditures [van Doorslaer et al. 2006]. This is evident in Figure 2 where it is shown that probability of school attendance falls sharply as the share of health spending goes beyond 10 percent. Households with health spending less than 10 percent of their total expenditures constitute over 95 percent of the total samples used here.[7] In 2004 (Panel A), the drop in probability is from about 80 percent for households who spend at most 10 percent of their total budget on health to

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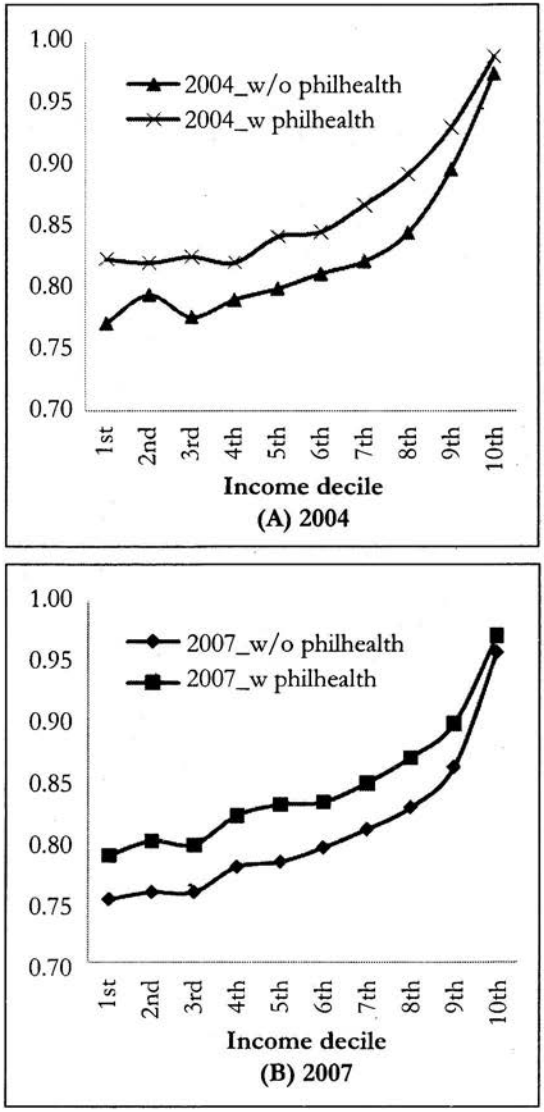
[6] To obtain the predicted total probability of school attendance in these simulations, the age and income variables are rescaled by 10 and 10,000, respectively.

[7] Also, there were few or no households observed in 2004 or 2007 that had severe catastrophic health spending (i.e., greater than 80 percent of household expenditures). In 2004 and 2007, there were no families observed that had very high share of health spending in total family expenditures. In some categories with less than ten observations, these observa-

below 4 percent for those that allot between 60 percent and 70 percent of their total budget on health. However, PhilHealth coverage tends to alleviate this unfavorable impact. In 2004, for example, PhilHealth coverage could lead to as much as 17 percentage point increase in the likelihood of schooling in families with health spending that takes up 40 percent or 70 percent of their total outlays. Roughly the same pattern can be observed for 2007 (Panel B). The adverse effect on schooling is worse for those with severe catastrophic health spending. Likewise, PhilHealth tends to cushion the adverse effect on all covered families, but more especially to those that devote nearly half of their family resources to health care. These simulations only underscore the hard decisions that parents have to make between sending their children to school, on the one hand, and regaining or maintaining the health of its members, on the other. However, the trade-off can be made less painful with PhilHealth coverage.

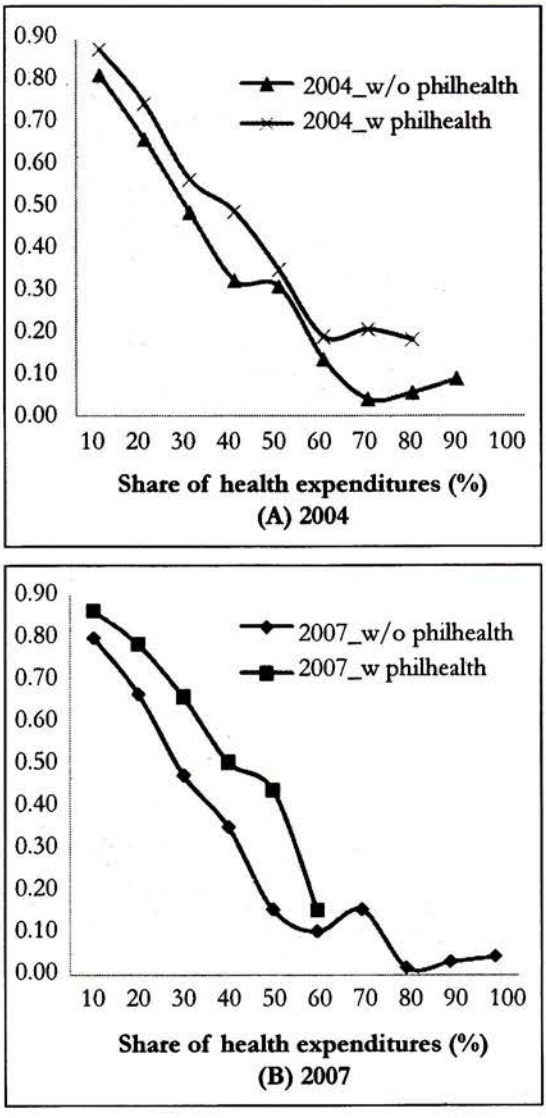
Finally, Figure 3 shows the incremental effects of PhilHealth coverage on the likelihood of schooling of children aged 6–22 years. The results of this simulation are particularly relevant to education policy to halt if not reverse the escalating trends in dropout rates, nonparticipation rates, and number of out-of-school youths. This problem is particularly acute among children at the secondary school level or higher. As the simulation results suggest, the same age group could benefit a lot from insurance coverage. In both 2004 (Panel A) and 2007 (Panel B), the sharp decline in the probability of schooling starts at aged 14, especially for households without PhilHealth coverage. With PhilHealth coverage, however, the probability of schooling increases between 10 percent and 13 percent, especially for those who are supposed to enter college (16-20 years old). There are two reasons why this age group benefits more than others from PhilHealth coverage. One is that elementary education is heavily subsidized, thus the relative burden of sending the younger children to school, or the effect of additional income on their schooling, is less. Second, the opportunity cost of schooling for the older children is high, especially for those who are at least 15 years old and ready to be employed. However, keeping these youths in school is very important since the country's basic education cycle is already inadequate as it is by international standards. Achieving this goal can be partially attained with the help of social health insurance.

Figure 1. Probability of school attendance with and without PhilHealth coverage, by income per capita decile, 2004 and 2007



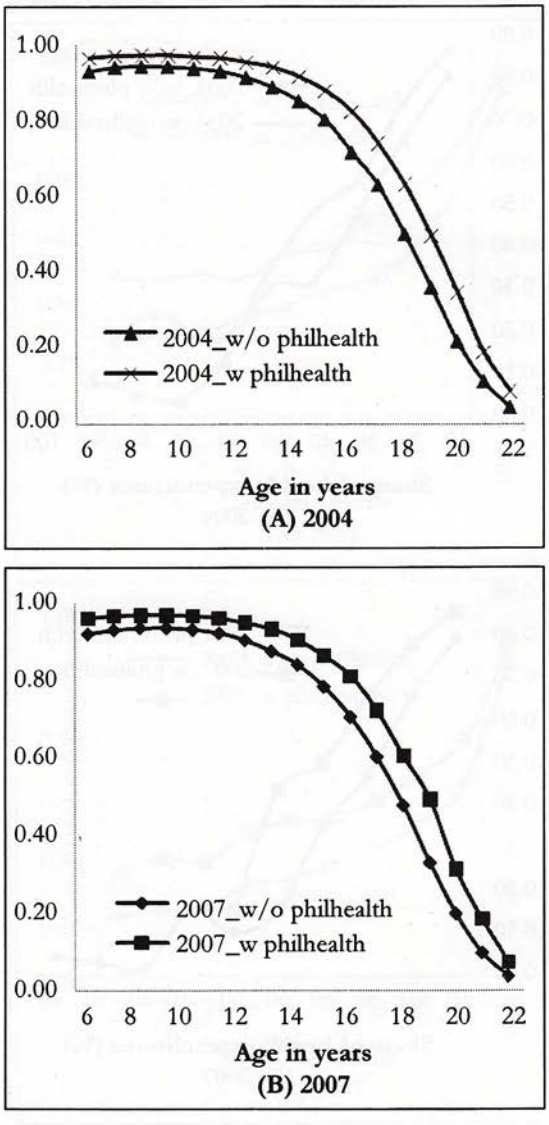
Sources: APIS 2004 and APIS 2007; authors' own calculations.

Figure 2. Probability of school attendance with and without PhilHealth coverage, by share of health in total expenditures, 2004 and 2007



Sources: APIS 2004 and APIS 2007; authors' own calculations.

Figure 3. Probability of school attendance with and without PhilHealth coverage, by age of child, 2004 and 2007



Sources: APIS 2004 and APIS 2007; authors' own calculations.

6. Concluding remarks

To recapitulate, the results show that household health spending grows with PhilHealth coverage and tends to adversely affect schooling decision. The increment in health spending may be due to greater access to health care or to more costly treatment. Either way, the consequence is less residual income for education and other household consumption. However, PhilHealth coverage is also found to have a direct and positive influence on schooling decisions. One possible reason for this is that the insurance coverage is a substitute for wealth holdings or other types of precautionary savings, which then frees up household finances for education and other consumptions. While the exact effect of health insurance on precautionary savings is not fully explored here and must be investigated further, the results suggest that ignoring either of the two channels by which PhilHealth coverage could affect schooling decisions could seriously bias the estimated effect of out-of-pocket health spending on schooling decision, and underestimate the full impact of PhilHealth coverage on household welfare.

The evidence on the influences of PhilHealth coverage on the likelihood of school attendance underscores the interrelatedness of health, education, and other consumption or investment decisions at the household level. Also based on APIS, similar linkages at the household level have been found between fertility and savings [Orbeta 2005a] and between fertility and children's education [Orbeta 2005b]. Other similar, corroborating findings from other studies are reported in Quimbo, Kraft, and Capuno [2009]. Because of the joint determination of health and education decisions at the household level, policies that take these interrelationships into account are likely to have better overall results and fewer unintended consequences. Thus, as antipoverty programs, conditional cash transfers that encourage both good health-seeking behavior and school attendance are commendable.

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