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Can Insurance Increase Financial Risk? The Curious Case of Health Insurance in China

by

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Abstract

The most basic argument for insurance is that it reduces financial risk. But since insurance opens up new opportunities for consuming expensive high-tech care which permits health improvements that are valued by the insured, and because in many settings the provider is able and has an incentive to exploit the informational advantage she has over the patient, it is not immediately obvious that insurance will in practice reduce financial risk. We analyze the effect of insurance on the probability of an individual incurring 'high' annual health expenses using data from three household surveys—one a cross-section, the other two panels. All come from China, a country where providers have until recently largely been paid fee-for-service (often according to a schedule that encourages the overprovision of high-tech care and the underprovision of basic care) and who are only lightly regulated. We define annual spending as 'high' if it exceeds 5% of average income in the sample and as 'catastrophic' if it exceeds 10% of the household's own per capita income. Our estimates of the effect of insurance on financial risk allow for the possible endogeneity of health insurance in the panel datasets by allowing for a time-invariant fixed effect capturing unobserved risk that may be correlated with insurance status, and in the cross-section dataset by using instrumental variables, where we use availability of and eligibility for health insurance as instruments. Our results suggest that during the 1990s China's government and labor insurance schemes increased financial risk associated with household health care spending, but that the rural cooperative medical scheme significantly reduced financial risk in some areas but increased it in others (though not significantly). From our results, it appears that China's new health insurance schemes (private schemes, including coverage of schoolchildren) have also increased the risk of high levels of out-of-pocket spending on health. Where we find evidence of health insurance increasing the risk of 'high' out-of-pocket expenses, the marginal effect is of the order of 15-20 percent; in the case of 'catastrophic' expenses, it is even larger.

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I. INTRODUCTION

The most basic argument for insurance is that it reduces financial risk. The classic textbook argument in the case of health insurance has an individual facing a known probability of falling ill and a corresponding known reduction in wealth caused by the medical expenses necessitated by falling ill. If offered full and actuarially fair insurance the risk-averse individual accepts it, preferring to pay the corresponding premium thereby securing a certain wealth equal to the expected wealth in the absence of insurance. The benefit of insurance is the reduction in risk—the knowledge that whether or not illness occurs, wealth is the same in both states. Relaxing the assumption that insurance offered is full leaves the risk-averse individual preferring insurance, because although not eliminated, the risk associated with illness is substantially reduced.

How this characterization of health insurance plays out in practice—and therefore how far health insurance protects people from financial risk—has been the subject of very little empirical research. Yet it is not obvious that in the real world health insurance always reduces risk. Contrary to the textbook example, there is not a fixed financial loss associated with illness, or even with each type of illness. A wide variety of tests and interventions can be undertaken, even for patients with similar conditions. Patients are not indifferent to the type and extent of care they receive, because in contrast to the textbook model, they derive utility from health status as well as financial wealth, and additional tests and interventions may be expected—at least up to a point—to increase the chances of a recovery. So, patients have an incentive to engage in ex post moral hazard, even if this increases their out-of-pocket payments compared to the simple textbook scenario. Insurance opens up new opportunities for consuming expensive high-tech care

(Nyman 1999), and it is conceivable that the insured values the health improvement so much that with insurance he ends up paying more out of pocket when ill than he does without insurance. This outcome becomes more likely in a setting where the provider is able to exploit the informational advantage she has over the patient, so that the patient finds it hard to trade off the extra costs and the extra medical care. This seems less likely to happen the greater is the control that the insurer has over the care delivered by the provider for a given medical condition (e.g. by paying them prospectively according to diagnosis-related groups), the greater the degree of self-regulation by the medical profession, and the stronger is any ombudsman or other authority acting on behalf of patients.

In many countries, especially developing countries, these checks on provider behavior are typically very limited if not largely absent. This is true of China, which is the setting for the present paper. Health insurers there have only recently begun to pay providers on a prospective basis, and even now in most urban areas and almost all rural areas providers are paid fee-for-service (FFS) by insurers.[1] Furthermore, the government-set schedules for fees and medicines in China provided physicians with a strong incentive to favor high-tech care over basic care. For basic interventions, the government has set the price below cost so as to make them affordable even to fairly poor patients, while more sophisticated interventions are priced above cost to enable providers to make profits on them that can be used to cross-subsidize the delivery of basic interventions. The incentive, of course, is to encourage providers to supply sophisticated care wherever possible. Unsurprisingly, even low-level facilities have acquired sophisticated medical equipment, and there is evidence the care the system delivers is more costly and more sophisticated than is medically necessary (cf. Liu and Mills 1999). The incentive to over-treat is

[1] More details are provided in section II.

accentuated where there is a third party picking up part of the cost, especially one that is simply reimbursing (a fraction of) the costs incurred by the provider. Self-regulation by the Chinese medical profession is limited, and while the Chinese government has identified the delivery of unnecessary and poor quality care as a matter for concern, there are no formal complaint procedures for patients who feel that they have been over-treated. In such a setting, it seems perfectly plausible that at least some patients may end up not only getting more care than would have been the case if they had been uninsured but also paying more out of pocket. Insurance in such a setting may, in other words, actually *increase* the probability of large out-of-pocket payments and hence exposure to financial risk.

There have already been some studies that claim to explore the extent to which health insurance reduces financial risk or 'financial protection'. Mostly, these do so by looking at the effects of health insurance on *expected* health care payments.[2] However, this does not get at the question of risk. Indeed, in the classic textbook case of actuarially fair insurance, expected health care payments, gross of the premium, are the same with and without insurance. A better approach, but one adopted in only one paper to date to our knowledge, is to model the impact of insurance on the probability of individuals incurring 'large' out-of-pocket payments.[3] One could define 'large' either in relation to the household's own per capita income (or consumption), or in relation to the sample average income (or consumption). We employ both approaches, using data from three separate surveys spanning the period 1991-2004 and covering half of China's 32 provinces.

[2] See, for example, the studies in Preker and Carrin (2003).

[3] O'Donnell et al. (2005) explore the factors influencing the probability of a household having catastrophic health care payments, defined as payments that exceed 10% of per capita household consumption. In only three of the six territories studied, do O'Donnell et al. include health insurance: in Hong Kong, no significant effect is found; in Thailand, the only insurance category with a significant coefficient is the 'other cover', and the sign is positive; in Vietnam, insurance is modeled as the number of household members with insurance, and the significant coefficients are negative (they are for the number of children and adults aged less than 65). Unlike the regressions reported in this paper, their regressions are estimated at the household level and do not control for health status.

II. HEALTH INSURANCE IN CHINA—SOME SALIENT FACTS

Under China's pre-reform planned economy, almost all citizens were covered by some form of health insurance. Agricultural workers were covered by the old commune-based cooperative medical scheme (CMS), state-owned enterprise (SOE) workers were covered by the Labor Insurance Scheme (LIS), and civil servants and other government workers were covered by the Government Insurance Scheme (GIS). There were some gaps in coverage (not all urban schemes covered dependents, for example), but the gaps were relatively small (during the 1970s the CMS covered an estimated 90% of the rural population).

China's transition from a planned to a market economy from 1980 onwards brought dramatic reductions in health insurance coverage. The decollectivization of agriculture resulted in an almost total collapse of the CMS. By 1993 less than 10% of the rural population had health insurance.[4] The mid-late 1990s saw several attempts to resuscitate the CMS, but despite these initiatives, CMS coverage nationally remained stubbornly low. By 2003 80% of China's rural population—some 640 million people—lacked health insurance. In that year, half of the rural residents in 2003 who said they did have insurance said they were covered by either private (i.e. commercial) insurance or 'other' insurance, up from 31% in 1993.

Coverage in China's cities has also declined, though less dramatically than in rural areas. As China transitioned to a market economy, the SOE—the backbone of the LIS—came under increasing pressure. LIS coverage fell, as did GIS coverage. By 1998 nearly half the urban population lacked insurance coverage. A variety of reforms have been introduced, including the

[4] Figures on coverage are from China's National Health Survey (NHS), undertaken by the Ministry of Health (MOH) in 1993, 1998 and 2003. The figures for 1993 and 1998 are published in Gao et al. (2002). The urban insurance figures for 2003 are taken from "Health Services Utilization and Urban Health Insurance Reform in China", a presentation by Ling Xu of China's MOH in December 2004 at an MOH seminar on the 2003 NHS. The rural figures for 2003 are from "Main Findings from the 3rd NHS Survey", available online at www.moh.gov.cn, accessed on April 21st, 2005.

setting up in 1998 of a new single urban scheme known as Basic Medical Insurance (BMI), into which LIS and GIS are gradually being subsumed. Despite these reforms, coverage by GIS/LIS/BMI continued to fall between 1998 and 2003. Had it not been for the growth of private and 'other' insurance schemes—these together covered 30% of the urban insured in 2003, compared to just 10% in 1993—coverage in urban China would have fallen below 40% in 2003.

Until fairly recently, providers in China—even those delivering care to insured patients—were paid on a FFS basis. Those CMS schemes that survived during the 1990s simply reimbursed their members' medical bills, and made little attempt to restrict their choice of provider. Prior to the reform process that started in the mid-1990s, the same was true of the LIS and GIS. Members paid very little out of their own pockets, and providers were paid on a FFS basis. Unsurprisingly, costs increased rapidly, exacerbated by the continuous introduction of ever-more-costly medical technology. In 1995, the government launched a health insurance pilot experiment in the cities of Zhenjiang (Jiangsu province) and Jiujiang (Jiangxi province) (cf. e.g. Liu, Cai et al. 2001; Liu and et al. 2003). Among the key elements of the reform was the setting-up of a citywide insurance pool across all work units, financed jointly by employers and employees. The pooled funds were then distributed into individual Medical Savings Accounts (MSA) and a Social Pooling Account (SPA). Supply-side cost-sharing was also introduced, although not until 1997 in Zhenjiang. At the end of 1996, the experiment reform was extended to 57 other cities, and in December 1998 the government called for reform of the existing GIS and LIS in China's remaining cities. By the end of 2003, the vast majority of large cities had implemented the new BMI program, covering over 109 million urban employees. China's smaller cities are still in the process of implementing these reforms.

III. **METHODS, DATA AND DESCRIPTIVE STATISTICS**

We model the effect of insurance on the probability of an individual incurring large annual out-of-pocket payments, with large being defined relative either to the sample average income or the per capita income of the individual's own household.

Use of a basic probit or logit model on cross-section data could reasonably be criticized on the grounds that selection into health insurance is non-random and occurs in such a way as to generate a correlation between the insurance dummy and the error term. This could in principle apply to the CMS, GIS/LIS schemes and private/other schemes. In the case of the CMS scheme, it seems more likely that any selection is adverse to the scheme: people with unobservables that predispose them to a higher-than-expected risk of 'high' expenses are more likely to enroll, biasing the coefficient on insurance upwards. In the case of the GIS/LIS scheme, and possibly the private/other category as well, the bias seems likely to be in the opposite direction: the scheme's members are likely to have a very low risk compared to the population at large, and we may only partially capture this by the observables that we enter in our probit model. We try to get round the possible endogeneity of insurance in two different ways, depending on the dataset. Two of the three household surveys we use are panels. These permit us to allow for an unobserved time-invariant fixed effect capturing unobserved risk, which could be correlated with insurance coverage; the model we use in these surveys is a fixed-effect logit model (cf. e.g. Wooldridge 2002). In the cross-section survey, we use instrumental variables (IV). We capture insurance coverage using two variables, the first indicating whether the individual is a member of a CMS, the second capturing membership of the GIS or LIS.[5] As instruments for our insurance variables, we use a variable capturing whether or not a CMS exists in the village where

[5] In the survey in question, very few respondents said they had private or 'other' insurance. This reflects the date of the survey (1998) and the fact that it covers China's poorer western and central provinces.

the individual lives, and a vector of variables capturing employment status (not just whether employed but also type of job) which should proxy eligibility for GIS/LIS. Both our instruments can plausibly be argued to be correlated with the probability of the individual being insured (for example, a peasant farmer is most unlikely to be insured with GIS or LIS), but neither seems likely to influence the probability of the individual having unduly high health spending, once we have controlled for health insurance and our other covariates, such as household income, education, and so on.

Our surveys are listed in Table 1. They vary in several important dimensions. One is geographic coverage: the Gansu Survey of Children and Families (GSCF) covers just Gansu province; the China Health and Nutrition Survey (CHNS) covers mostly central and eastern provinces; and the World Bank Health VIII project baseline survey (H8BS) cover mostly the poorer central and western provinces. Another difference is the rural-urban focus within provinces: the GSCF and the H8BS are rural-only surveys, while the CHNS covers urban and rural areas. A third difference is the panel dimension: the CHNS and GSCF are both panels, while the H8BS is a cross-section. There are other less obvious differences, as will become apparent below.

Variable definitions and notes on the variables are provided in Table 2. Out-of-pocket health spending is for a 4-week window in the case of the CHNS, and for one-year windows in the two other surveys. In the CHNS, out-of-pocket expenses are explicitly net of any reimbursement; in the other surveys, respondents are not explicitly asked about reimbursement. Information on income is most complete in the CHNS, the GSCF has the second most detailed income information, while income in the H8BS is based on just one question. The low per capita income in the H8BS undoubtedly reflects in part the fact that the sample was drawn from

China's poorest provinces. But it also probably reflects the limitations of the single-question approach to eliciting income in household surveys. We have trimmed outliers on both the out-of-pocket payments and income distributions: the top half of one percent of cases on the out-of-pocket payments distribution and the bottom half of one percent of cases on the income distribution were removed. We define health expenses as 'high' if they exceed 5% of the sample mean per capita household income, and as 'catastrophic' if they exceed 10% of the household's *own* per capita income (cf. e.g. Ranson 2002; Wagstaff and van Doorslaer 2003; Xu, Evans et al. 2003). As is apparent from Table 3, the rates reporting 'high' and 'catastrophic' out-of-pocket payments vary considerably across the surveys (the CHNS having far lower rates), and to a lesser extent over time within each of the two longitudinal surveys.[6] The far lower rates in the CHNS reflect in part the relatively low out-of-pocket payment amounts in our data. The shares are well below those in the Chinese Rural Household Survey, for example. In part, this probably reflects the relatively large number of cases in the CHNS with missing values for the various questions on medical expenses. We have adopted a conservative strategy in such cases, by replacing missing values by zero. Since missing values are somewhat more common in the data among those with insurance, we will end up *underestimating* the effect of insurance on the probability of 'high' or 'catastrophic' medical expenses.

Health insurance coverage varies across the surveys and across waves in the case of the longitudinal surveys. There is no clear trend in the case of the CHNS in the fraction of the sample with some form of coverage, although a continued decline of the traditional schemes

[6] It seems likely that the short (4-week) recall period used in the CHNS would result in a larger annualized out-of-pocket spending figure than the long (12-month) recall period used in the other two surveys. This is borne out by analysis of data from the 1998 Vietnam Living Standards Survey, which inquires about health spending over a 12-month period, and about use of services and medical expenses during the last 4 weeks. Responses to the spending questions covering the last 12 months produce a budget share (share of per capita household consumption) of 5.2%, while the questions covering the last 4 weeks produce an annualized budget share of 9.1%. The fractions of the sample with 'high' and 'catastrophic' expenses, defined along the lines of the present paper, are also higher when the 4-week questions are used.

(GIS, LIS and CMS) is evident. In the case of Gansu, the rise in coverage between 2000 and 2004 seems to be due to an expansion of insurance coverage among children for which the contributions (and presumably the benefits) are fairly low. Considerable provincial variation in insurance coverage is evident in the H8BS, especially in the CMS which was operating in only two provinces in 1998.

As covariates, we include health status, per capita household income, schooling, and in the case of the cross-section age, gender, ethnicity, marital status and the number of children aged 5 or less. Two of the surveys contain self-assessed health (in the GSCF, the assessment was actually done by the woman of the household), which at least in industrialized countries has been found to be a good predictor of mortality and the onset of disability (cf. Idler and Benyamini 1997). In the case of the H8BS, no self-assessment of health is available, and we used instead a chronic illness dummy. We have measured schooling by years of schooling in the CHNS and the GSCF, but in the H8BS have left education coded as levels of attainment. In each of the panel models, we include wave fixed effects as well as individual-specific fixed effects.

IV. **RESULTS**

The basic CHNS results are reported in Table 4, the results for the Gansu panel in Table 6, and the results for the Health VIII baseline survey in Table 7. Additional results for the CNHS are reported in Table 5.

We discuss first the effects of the covariates. In all models, (increasingly) poor health significantly raises the probability of an individual experiencing ‘high’ or ‘catastrophic’ health payments. The probability of ‘high’ out-of-pocket payments varies somewhat with per capita

income, but the majority of the significant coefficients are positive. By contrast, higher per capita incomes are associated with a significantly lower probability of 'catastrophic' health expenses. It is known (Van Doorslaer, O'Donnell et al. 2005) that China is unusual by Asian standards in that 'catastrophic' payments in most other countries are concentrated among the better off. These results show that *even after controlling for the other covariates in our models*, a higher income reduces the probability of experiencing 'catastrophic' health expenses. Like O'Donnell et al. (2005), we find some evidence that higher levels of education, holding constant per capita income, reduces the probability of 'catastrophic' expenses. In the H8BS, the effects of ethnicity vary somewhat across the provinces, as do the effects of having small children in the house: for the most part, however, being from China's Han majority seems to lower one's chances of experiencing 'high' and 'catastrophic' expenses, while having young children in the household increases them.

Turning to the insurance effects, we find evidence across all surveys in support of the hypothesis that health insurance can increase financial risk. There is, however, some heterogeneity in effects by type of scheme, and by locality.

In our basic results for the CHNS data (Table 4) we find a significant effect of health insurance on the probabilities of incurring 'high' and 'catastrophic' health expenses in the sample as a whole and in the urban subsample, but not in rural areas. The marginal effect in the urban subsample indicates that health insurance raises the probabilities of 'high' and 'catastrophic' medical expenses by 11.3 and 14.5 percent respectively. In Table 5, we find that in urban areas, it is worker insurance (presumably LIS) and 'other' insurance (quite likely private insurance) that are associated with an increased risk of 'high' and 'catastrophic' health expenses, with 'other' health insurance raising the probability of 'high' out-of-pocket payments in urban

areas by 20 percent. We also find that, although we find no significant effect for the blanket insurance coverage variable in rural areas in Table 4, we find a borderline significant positive effect for CMS when we separate out cover by scheme in Table 5. Work unit insurance cover also emerges with a positive and borderline significant effect in rural areas. We find some evidence, as reported at the bottom of Table 4, that in rural areas the effect of insurance varies by province.

The evidence from the Gansu panel (Table 6) is also consistent with the hypothesis that health insurance can increase financial risk, and the marginal effect is non-negligible. This is despite the fact the insurance seems to reflect mostly insurance for school children, and the fact that the primary sampling units are all rural areas.

The results for the Health VIII cross-section survey in Table 7 are sensitive to whether or not we treat insurance as endogenous, especially so in the case of GIS/LIS. The relative insensitivity of the CMS effect to the use of IV reflects the fact that CMS operated in only two of the seven provinces sampled (Henan and Guizhou), and in the villages where it existed, most people surveyed were members. The direction of bias in the case of the GIS/LIS effect is consistent with our speculation earlier that this scheme has a high favorable risk profile whose effect we can only partially control for through our observed covariates. The failure to take into account the endogeneity of insurance status in the case of GIS/LIS results in a substantial underestimate of the effect of insurance on the probability of high out-of-pocket health spending, and the IV marginal effects are similar in size to those from the CHNS. Treating insurance as endogenous also makes the difference between the effect being significant and not. The results in Table 7 suggest that in the few villages where it existed, CMS reduced the risk of unduly high

household health spending. By contrast, membership of GIS or LIS significantly increased the risk, by 20 percent or so.

V. **SUMMARY AND CONCLUSIONS**

The results in this paper are consistent with the hypothesis that health insurance need not always reduce financial risk. Our measures of risk are the probability of an individual spending more than 5% of average income and the probability of an individual spending more than 10% of per capita household income on health. Our estimates of the effect of insurance on financial risk allow for the possible endogeneity of health insurance, either by allowing for a time-invariant fixed effect capturing unobserved risk that may be correlated with insurance status, or by using instrumental variables, where as instruments we use variables capturing the availability of or eligibility for health insurance. Results from two separate surveys (the China Health and Nutrition Survey, or CHNS, and the Health VIII baseline survey, or H8BS) suggest that during the 1990s China's government and labor insurance schemes (GIS and LIS) increased financial risk associated with household health care spending. Evidence on the success of the rural cooperative medical scheme (CMS) in reducing financial risk is mixed: the CHNS suggests CMS increased risk, but not significantly, while the H8BS suggests that CMS significantly reduced risk. Two surveys (the CHNS and the Gansu Survey of Children and Families) both suggest that China's new health insurance schemes ('other' and private schemes, including those that cover schoolchildren, as in the Gansu survey) may be associated with increased risk of large out-of-pocket payments. Where we find evidence of health insurance increasing the risk of 'high' out-of-pocket expenses, the marginal effect is of the order 15-20 percent. In the case of the CHNS, our treatment of missing values is likely to result in this being an *underestimate*.

The welfare implications of these findings are not clear-cut. Individuals are likely to weigh any extra risk of large out-of-pocket payments against the additional health gains from being able to receive more extensive and more sophisticated medical care once insured. On balance, people may be better off despite facing a higher financial risk. If, however, providers exploit their informational advantage and take the opportunity of insurance coverage to deliver more expensive medical care that the individual would not have chosen had he been fully aware of the magnitude of the additional health benefits and additional out-of-pocket expenses, then the welfare gains associated with insurance are less clear.

Table 1: Surveys Used

	China Health & Nutrition Survey (CHNS)	Gansu Survey of Children and Families (GSCF)	World Bank China Health VIII project baseline survey
Provinces sampled	Guangxi, Guizhou, Heilongjiang (1997 and 2000 only), Henan, Hubei, Hunan, Jiangsu, Liaoning (not 1997), Shandong	Gansu (1)	Anhui, Chongqing, Gansu, Guizhou, Henan, Qinghai, Shanxi
No. counties sampled	36	20	28
Rural or urban or both	Both	Rural	Rural
Areas covered	Where possible, the provincial capital and a lower-income city were selected, though in two provinces, other large cities had to be selected. Villages and townships within the counties, and urban and suburban neighborhoods within the cities were sampled.	Villages only	Villages and townships
Sampling strategy	A multistage, random cluster process was used to draw the sample surveyed in each of the provinces, which themselves sampled vary substantially in geography, economic development, public resources, and health indicators. Counties in the 9 provinces were stratified by income (low, middle, and high) and a weighted sampling scheme was used to randomly select 4 counties in each province. Villages and townships within the counties and urban and suburban neighborhoods within the cities were selected randomly.[7]	A four-stage stratified random sample was used. First counties were selected (20), then townships (42), then villages (100) and finally children. At each stage care a sampling procedure was used to ensure that sampling was done evenly across the income distribution.[8]	Survey was administered only in project counties[9] which were deliberately selected on the basis of their high rates of poverty, their capacity to implement the project, and their financial resources (counties were responsible for repaying the loan to the World Bank). Within counties, a random cluster process was used to draw households.
Date(s) conducted	1991, 1993, 1997, 2000[10]	2000, 2003	1998
Sample size (no. individuals) per wave	14,578; 13,687; 14,181; 15,334	7,581; 7,581	42,799

[7] Details taken from CHNS website http://www.cpc.unc.edu/projects/china.
[8] Further details are to be found at the GSFC website http://www.ssc.upenn.edu/china/gscf/mainGscf.htm.
[9] The survey covers 22 of the 96 counties eventually included in the Health VIII project. The 22 counties are located in the following provinces in central and western China: Anhui, Chongqing, Gansu, Guizhou, Henan, Qinghai and Shanxi.
[10] The CHNS also collected data in 1989. This wave was excluded from the present analysis because some of the variables were not collected in the 1989 wave.

Table 2: Variable definitions

	China Health & Nutrition Survey (CHNS)	Gansu Survey of Families and Children (GSCF)	World Bank China Health VIII project baseline survey
Out-of-pocket health spending	Total health care expenditures during last month, including expenditures not associated with a provider visit, expenditures associated with first visit to providers (if applicable), expenditures associated with visit to second provider, additional health care expenditures, minus expenditure reimbursed by health insurance (1989 prices). The top half of 1% of observations in each wave have been trimmed.	Sum of expenditure associated with doctor visits and drug purchases during last 12 months.	Annual expenses on drugs, prevention and health care of the family. The top half of 1% of observations in each wave have been trimmed.
High out-of-pocket spending	Annualized out-of-pocket spending in excess of 5% of mean per capita income for the wave in question	Out-of-pocket spending in excess of 5% of mean per capita income for the wave in question	Out-of-pocket spending in excess of 5% of mean per capita income
Catastrophic out-of-pocket spending	Annualized out-of-pocket spending in excess of 10% of household's own per capita income for the wave in question	Out-of-pocket spending in excess of 10% of household's own per capita income for the wave in question	Out-of-pocket spending in excess of 10% of household's own per capita income
Health insurance	A dummy indicating whether they person has any cover. Also a series of dummies, capturing whether they had any of the following types cover, namely public, worker, dependent, work unit, cooperative, maternal and child health prepayment scheme, immunization prepayment scheme, 'other', unknown.	A dummy indicating whether the person has any cover.	A dummy indicating whether the person had any cover. Also dummies, capturing whether they were a member of a CMS or GIS/LIS schemes (people saying they had one of the following: government employee insurance; labor insurance; half labor insurance; medical insurance; coordinated arrangement; others).
Self-assessed health	4-point scale	5-point scale	n/a
Chronic health	Not used	Not used	A dummy indicating whether the individual has a diagnosed chronic disease.
Per capita income	Total household income from all sources divided by number of household members (1989 prices). The bottom half of 1% of observations in each wave have been trimmed.	Income from agriculture, livestock, wages and self-employment. Wage income includes bonuses, subsidies, and the value of in-kind payments.	Household was asked its total household income in the previous year. This was divided by the number of household members to get per capita income. The bottom half of 1% of observations in each wave have been trimmed.
Education	Years of education.	Years of education.	No education (omitted category), elementary school, primary middle school, senior middle school, vocational school, junior college.

Table 3: Descriptive statistics, by survey and wave

	CHNS				GSCF		H8BS
	1991	1993	1997	2000	2000	2004	1998
High out-of-pocket payments	3.3%	1.9%	2.9%	3.4%	21.6%	15.0%	56.5%
Catastrophic out-of-pocket payments	2.7%	1.6%	2.5%	2.9%	19.0%	14.1%	35.2%
Out-of-pocket payment share	2.0%	1.6%	2.2%	7.4%	15.9%	13.9%	12.9%
Health insurance	27.0%	23.1%	23.8%	20.0%	0.3%	18.2%	4.0%
Public insurance	11.2%	10.6%	8.2%	7.1%			
Worker insurance	6.7%	4.9%	3.8%	3.7%			
Dependents' insurance	1.7%	1.2%	0.5%	0.2%			
Work unit insurance	3.7%	0.5%	8.2%	5.0%			
Cooperative medical insurance	0.2%	2.4%	0.7%	0.4%			
MCH insurance	0.1%	0.0%	0.1%	0.1%			
Planned immunization insurance	2.8%	1.8%	0.8%	0.8%			
Other health insurance	0.6%	0.8%	0.8%	0.4%			
Insured but type unknown	0.1%	0.8%	0.8%	2.3%			
Cooperative medical scheme							2.5%
GIS, LIS, etc.							1.4%
SAH excellent	13%	13%	14%	14%	49.5%	36.9%	
SAH good	63%	64%	61%	50%	22.8%	33.1%	
SAH fair	21%	21%	22%	31%	21.0%	21.9%	
SAH poor	3%	3%	3%	5%	5.1%	6.2%	
SAH very poor					1.5%	1.8%	
Chronic illness							3.5%

Table 3 (contin.): Descriptive statistics, by survey and wave

	CHNS				GSCF		H8BS
	1991	1993	1997	2000	2000	2004	1998
Per capita income (RMB)	1675.0	1324.5	1534.5	1392.7	1844.29	3351.85	825.61
Years of schooling	15.28	15.29	16.78	17.87	13.56	16.77	
Age							28.96
Gender							52.4%
Han							81.8%
Married							51.9%
No. children under 5							0.36
No education							23.7%
Elementary school							31.2%
Primary middle school							36.3%
Senior middle school							7.4%
Vocational school							1.1%
Junior college							0.3%
N	14034	13227	13604	14502	7580	7580	42581

Note: CHNS panel is unbalanced because not all provinces were sampled in each wave (cf. Table 1), some households left the CHNS as it proceeded, but some were replaced by new households.

Table 4: Basic results for 1991-2000 CHNS panel

	High out-of-pocket payments			Catastrophic out-of-pocket payments		
Variable	Sample	Urban	Rural	Sample	Urban	Rural
Health insurance	0.328	0.561	0.190	0.307	0.59	0.12
	(2.20)	(2.40)	(0.97)	(1.85)	(2.20)	(0.55)
	0.069	*0.113*	*0.041*	*0.074*	*0.145*	*0.029*
SAH good	0.353	0.197	0.419	0.241	0.036	0.357
	(1.68)	(0.56)	(1.59)	(1.04)	(0.09)	(1.24)
SAH fair	1.218	1.151	1.243	0.997	0.638	1.184
	(5.55)	(3.16)	(4.49)	(4.15)	(1.54)	(3.97)
SAH poor	2.432	1.947	2.627	2.233	1.656	2.474
	(9.71)	(4.51)	(8.44)	(8.29)	(3.43)	(7.48)
Per capita income	70.888	39.156	101.722	-210.39	-205.95	-208.96
	(1.54)	(0.54)	(1.69)	(3.55)	(2.29)	(2.62)
Years of schooling	-0.008	0.000	-0.013	-0.009	-0.004	-0.012
	(0.79)	(0.02)	(1.01)	(0.83)	(0.18)	(0.92)
1993 wave	-0.634	-0.486	-0.711	-0.62	-0.569	-0.641
	(5.87)	(2.51)	(5.41)	(5.25)	(2.55)	(4.57)
1997 wave	-0.239	-0.122	-0.315	-0.154	-0.008	-0.224
	(2.27)	(0.63)	(2.46)	(1.35)	(0.04)	(1.65)
2000 wave	-0.036	-0.148	0.036	0.064	0.002	0.113
	(0.34)	(0.73)	(0.28)	(0.55)	(0.01)	(0.83)
N	14905	5128	9796	14905	5128	9796
Av. no. waves	2.4	2.2	2.5	2.4	2.2	2.5
Log likelihood	-906.84	-294.61	-607.02	-771.57	-225.51	-542.34
Chi squared	300.265	71.902	238.779	265.023	58.704	213.762
Prob value for hypothesis of constant effects across provinces	0.037	0.952	0.027	0.310	0.901	0.270

Note: Models are fixed effects logits, estimated on the 1991, 1993, 1997 and 2000 waves of the CHNS. Income expressed in millions of RMB for the estimation. The first number for each covariate is the coefficient, the second (in parentheses) is the t-statistic, and the third (in italics, and listed only in the case of the insurance dummy) is the marginal effect (conditional on a zero fixed effect).

Table 5: Further results for 1991-2000 CHNS panel

	High out-of-pocket payments			Catastrophic out-of-pocket payments		
	Sample	Urban	Rural	Sample	Urban	Rural
Public insurance	0.237	0.413	0.052	-0.033	0.265	-0.275
	(1.04)	(1.26)	(0.16)	(0.12)	(0.65)	(0.75)
	0.050	*0.078*	*0.012*	*-0.008*	*0.065*	*-0.068*
Worker insurance	0.385	0.843	-0.340	0.367	0.850	-0.367
	(1.61)	(2.64)	(0.85)	(1.33)	(2.31)	(0.79)
	0.079	*0.144*	*-0.079*	*0.088*	*0.197*	*-0.091*
Dependents' insurance	-0.422	-0.171	-0.246	-0.104	0.200	-0.330
	(0.45)	(0.17)	(0.09)	(0.11)	(0.19)	(0.11)
	-0.098	*-0.035*	*-0.057*	*-0.026*	*0.049*	*-0.082*
Work unit insurance	0.328	0.279	0.380	0.420	0.370	0.467
	(1.41)	(0.56)	(1.42)	(1.63)	(0.66)	(1.58)
	0.067	*0.052*	*0.080*	*0.100*	*0.090*	*0.109*
Cooperative medical insurance	0.670	0.129	1.084	0.638	-0.077	1.097
	(1.38)	(0.18)	(1.62)	(1.20)	(0.09)	(1.58)
	0.127	*0.025*	*0.191*	*0.148*	*-0.019*	*0.228*
Other health insurance	0.912	1.472	-0.324	1.149	1.945	-0.865
	(1.71)	(2.29)	(0.28)	(1.97)	(2.59)	(0.65)
	0.162	*0.199*	*-0.076*	*0.243*	*0.355*	*-0.212*
Insured but type unknown	-0.199	-0.523	0.467	-0.427	-1.043	0.325
	(0.36)	(0.65)	(0.57)	(0.62)	(0.96)	(0.31)
	-0.045	*-0.115*	*0.095*	*-0.106*	*-0.249*	*0.077*
N	14905	5128	9796	14905	5128	9796
Av. no. waves	2.4	2.2	2.5	2.4	2.2	2.5
Log likelihood	-904.926	-290.578	-604.867	-768.446	-220.295	-539.586
Chi squared	304.086	79.956	243.092	271.275	69.127	219.277

Note: Models are fixed effects logits, estimated on the 1991, 1993, 1997 and 2000 waves of the CHNS. Equations include in addition to health insurance variables all the covariates in Table 4. Income expressed in millions of RMB for the estimation. The first number for each covariate is the coefficient, the second (in parentheses) is the *t*-statistic, and the third (in italics) is the marginal effect (conditional on a zero fixed effect).

Table 6: Results for 2000-2003 Gansu panel

	High out-of-pocket payments	Catastrophic out-of-pocket payments
Health insurance	0.520	0.645
	(3.76)	(4.26)
	0.126	*0.155*
SAH good	0.287	0.314
	(3.08)	(3.00)
SAH average	1.017	0.866
	(10.15)	(8.08)
SAH poor	1.839	1.675
	(12.13)	(10.78)
SAH very poor	2.263	1.946
	(7.81)	(7.25)
Per capita income	-0.331	-481.037
	(0.13)	(11.05)
Years of schooling	-0.013	-0.013
	(1.48)	(1.57)
2000 wave	-0.690	-0.280
	(11.67)	(4.30)
N	7580	7580
Av. no. waves	2.0	2.0
Log likelihood	-1158.29	-1005.97
Chi squared	403.33	457.043

Note: Models are fixed effects logits, estimated on the two waves of the GSCF. The first number for each covariate is the coefficient, the second (in parentheses) is the *t*-statistic, and the third (in italics) is the marginal effect (conditional on a zero fixed effect).

Table 7: Results for 1998 Health VIII baseline survey

	'High' payments		Catastrophic payments		Out-of-pocket payments	
Variable	Probit	IV Probit	Probit	IV Probit	OLS	IV
CMS	-0.481	-0.749	-0.968	-1.040	-41.652	-48.269
	(12.03)	(10.40)	(16.05)	(11.89)	(9.05)	(5.83)
	-0.190	*-0.289*	*-0.258*	*-0.269*		
GIS, LIS, etc.	0.078	0.599	0.073	0.536	19.361	90.995
	(1.33)	(4.15)	(1.20)	(3.67)	(2.92)	(5.82)
	0.030	*0.209*	*0.027*	*0.208*		
Chronic	0.724	0.717	0.803	0.797	93.843	93.197
	(16.86)	(16.63)	(20.47)	(20.28)	(21.65)	(21.45)
Per capita income	186	187	-950	-953	21099	20710
	(16.00)	(15.96)	(53.67)	(53.50)	(18.02)	(17.45)
Gender	-0.031	-0.033	-0.016	-0.018	-0.357	-0.679
	(2.26)	(2.42)	(1.14)	(1.28)	(0.23)	(0.43)
Han	0.133	0.132	0.081	0.080	0.492	0.416
	(7.04)	(6.94)	(4.03)	(3.99)	(0.22)	(0.19)
Married	0.000	0.000	-0.023	-0.024	-7.121	-7.336
	0.00	(0.02)	(1.05)	(1.10)	(2.90)	(2.98)
No. children aged less than 5	0.045	0.045	0.033	0.033	2.116	2.246
	(3.95)	(3.92)	(2.73)	(2.76)	(1.59)	(1.68)
Elementary school	0.032	0.030	0.005	0.001	1.650	0.965
	(1.62)	(1.53)	(0.25)	(0.05)	(0.73)	(0.43)
Primary middle school	0.147	0.144	0.048	0.043	1.310	0.461
	(7.17)	(6.97)	(2.22)	(2.00)	(0.55)	(0.19)
Senior middle school	0.278	0.267	0.180	0.168	11.195	9.112
	(9.21)	(8.78)	(5.74)	(5.30)	(3.24)	(2.61)
Vocational school	0.204	0.137	0.099	0.033	10.891	0.660
	(2.90)	(1.88)	(1.30)	(0.42)	(1.36)	(0.08)
Junior college	0.172	0.059	0.275	0.178	43.513	28.253
	(1.39)	(0.47)	(2.15)	(1.36)	(3.08)	(1.95)
Constant	-0.203	-0.195	0.211	0.216	59.852	60.682
	(6.21)	(5.94)	(6.01)	(6.15)	(15.83)	(16.00)
N	36616	36616	36616	36616	36616	36616
Log likelihood	-24400	-24400	-21700	-21800		
Chi squared	-1001	-983	-4445	-4227		

Note: Equations include age and age squared in addition to variables listed. The first number for each covariate is the coefficient, the second (in parentheses) is the *t*-statistic, and the third (in italics, indicated only in the case of the insurance dummies) is the marginal effect.

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