Health Care Utilization and Health Status of NCMS Elderly Enrollees in China:

Evidence from CHARLS Data

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Abstract

This study explores the effect of benefit designs and demographic factors on health care utilization and health status of elderly rural enrollees in the New Cooperative Medical Scheme, a rural health insurance program implemented by the Chinese government in 2003. Using the new data from CHARLS pilot study, we find that immediate reimbursement does not have a statistically significant effect on health utilization as suggested in a previous study, but instead on health status. Other policy-related factors neither have a significant effect due to limited data and large standard deviation nor display a consistent effect.

JEL classification: I13, I18

Keywords: health insurance; health care utilization; health status; reimbursement method; New Cooperative Medical Scheme; rural China

I. Introduction

Under a medium level of fertility and mortality assumption rate, it is projected that the proportion of the Chinese population age 65 and over will increase from 94 million, 7% of the total population in 2000, to about 334 million, 23.1% of the total population in 2050 (Lowry, 2009). More than 50% of the total population live in rural areas, and a majority of the young labor force migrate into the cities as temporary workers for better wages and more opportunities, leaving home the elderly who have the greatest need for health care. Furthermore, health care costs have risen much faster than per capita income in China, making health expenses increasingly unaffordable, and the problem of adequate health care support an increasingly vital and challenging issue (Lowry, 2009). This is especially a problem in the rural areas because unlike the urban population who are under a more formal retirement system, rural residents have work that is low paying and more physically demanding, and therefore rely more on family support in old age (Giles, Wang, and Cai, 2011).

In the response to the increasingly inadequate and unaffordable medical access in the rural regions, the Chinese government introduced the New Cooperative Medical Scheme (NCMS), a government-run insurance program funded by voluntary mutual assistance of participating farmers and subsidized by the local and central government, in 2003 when 80% of rural population were without health insurance of any kind (Wagstaff et al., 2009). Over time, the NCMS has expanded its coverage tremendously from 310 out of 2,861 rural counties in 2004 (Mao, 2005) to 2,451 by the end of 2007, accounting for 86% of all rural counties in China (Wen, 2008).

Roughly speaking, the main two goals of the newly introduced NCMS are two-fold: increasing the access to essential medical treatment and improving the health status of the rural

population. While some previous studies have proven the positive effect of NCMS on rural health care utilization and health status, the factors, especially insurance policy related factors, that lead to higher utilization and better health status of rural enrollees have not been thoroughly studied. Therefore, our paper consists of two steps: First, we will examine the effects of different NCMS policy-related and demographic factors on health care utilization of NCMS elderly enrollees. We plan to build the first part of our research on Zhong's study (2010) with a few modifications of certain variables, as well as additions of new variables, and compare our results to his conclusions. In the second part, we will move on to test the effect of the policy-related and demographic factors used in the first part on health status with an added control variable of enrollment length.

Our paper proceeds as follows: Section II provides a brief background of Chinese health care system and NCMS; Section III summarizes several relevant literatures in the field and highlights how our study contributes to the field; Section IV introduces the data we use in our study, CHARLS; Section V clarifies the variables we use in our empirical models and explains the rationale behind them; Section VI goes into depth to analyze the results we get from our regression; and Section VII concludes with our major findings and their implications.

II. Background

The health care system in China separates population into two main groups: urban residents consisting of 45.7% of the population, and rural residents consisting of 54.3% of the population (Lu, Liu and Shen, 2001). Under the Chinese Hukou system, individuals are usually permanently bound to their rural or urban birthplace, and can only receive health care benefits where their Hukou is located.

The urban health care system is further broken down into three subgroups according to job functions. Group A includes government staff working in government parties, non-governmental organizations, public organizations, the army, public health sector, research institutions, and education system, who are fully covered under the China National Labor Union and the Ministry of Organization. Group B includes staff in all kinds of enterprises in urban areas and are covered by the Urban Employee Basic Medical Insurance, an employer-based insurance scheme that includes both an individual account and social pooling. Group C includes urban residents without formal employment such as children, elderly and unemployed workers, who are covered by the Urban Resident Basic Medical Insurance (Hougaar et all, 2001).

On the other hand, rural residents are mostly covered by the New Cooperative Medical Scheme. Over the years, China's rural health care system has gone through many major changes. From 1949 to 1978, the Chinese government implemented the communal health care system that provided public health care services for all citizens financed by welfare fund of the communes. This system effectively covered 90% of all Chinese villages into the mid-1970s when the commune system collapsed, and health insurance transitioned from a collective system to a household responsibility system under the old Cooperative Medical Scheme (CMS) where

individual farmers were expected to contribute to a major portion of the health care funding. From 1978 to 1999, the central government reduced its share of national health care spending from 32% to 15% of the entire health care funds, transferring the responsibility to local governments and individuals. However, this system deteriorated quickly due to inadequate funding, dwindling political interests, and poor management. By 2003, 96% of rural households in China lacked medical insurance, and the ability to pay became a major determinant of whether people sought medical treatment (Hougaard, Osterdal and Yu, 2011).

This situation was exasperated by the tremendous rise of health care costs in the past two decades. Although per capita income in 1999 increased by 222% in China's rural areas compared to 1990, cost of health care increased much more significantly, with the cost of a doctor visit increasing by 625% and that of in-patient treatment increasing by 511% (Zhao, 2006). This is mainly due to the profit-seeking behaviors of medical providers under a system that does not separate prescribing and dispensing. In China, prices for basic health services are set at reasonable prices for poor patients, while prices for more sophisticated health services are set above cost-efficient standards mainly to cross-subsidize the delivery of basic services that general public would need (Yip and Hsiao, 2008). However, this created many moral hazards because providers had the incentive to offer sophisticated care even when unnecessary, especially through utilizing high-tech medical equipment and drugs whenever possible (Blumenthal and Hsiao, 2005). Due to these cost increases and lack of insurance, a significant segment of the Chinese population, especially rural population who generally have lower income and less social security provisions, had trouble accessing adequate medical care. For example, the 2003 National Health Survey shows that 46% of the rural residents who were ill did not seek health care and 40% of these people identified cost as the main reason (Yip and Hsiao, 2009).

In the response to the challenges of rural health coverage, the Chinese government introduced the New Cooperative Medical Scheme (NCMS) in 2003. In order to overcome the negative views of the old CMS, the NCMS was funded mostly by subsidies from the central and local governments with only limited voluntary funding from NCMS participants. In addition, the program was managed directly by the central governments, as opposed to the village level governments who managed the old CMS, in order to better organize and allocate funds to different provinces. A typical package includes a household medical saving account for outpatient expenditures and a social pooling account for inpatient expenses with higher deductibles (You and Kobayashi, 2009; Yip and Hsiao, 2009).

Over time, the NCMS has expanded tremendously its coverage from 310 out of 2,861 rural counties in 2004 (Mao, 2005) to 2,451 by the end of 2007, accounting for 86% of all rural counties in China (Wen, 2008). Meanwhile, subsidies from various levels of government have increased significantly, and as a result personal contributions have decreased greatly (China Ministry of Health and Ministry of Finance, 2003 and 2008). However, NCMS budget was only 20% of the average per capita total health spending in rural areas (World Health Organization, 2004), which raises the question of whether NCMS was efficient enough to support the health care needs of the entire Chinese rural population (World Health Organization, 2004). Despite this fact, there is constantly a huge surplus in NCMS funds. For example, in 2005, 27.28% of counties in eastern provinces, 32.51% in central provinces, and 55.98% in western provinces had large surpluses (Lei & Lin, 2009). This may signal inefficient usage caused by the narrow risk pooling level of NCMS due to its meager funding and shallow coverage for many non-catastrophic diseases.

III. Literature Review

We intend to build our thesis off Zhong's study (2010), which examines the relationship between the methods of patient reimbursement and health care utilization using the China Health and Retirement Longitudinal Study (CHARLS) data set, which we will discuss in more details in the section below. Generally speaking, there are two common approaches to method of reimbursement including immediate reimbursement, where the insured pays at the coinsurance rate for each treatment after exceeding the deductible, and delayed reimbursement, where the insured pays the full cost for each treatment gets reimbursed in the future. In his study, Zhong uses a two-part model to measure both the effect of immediate reimbursement on the probability that an NCMS enrollee has utilized health care in the past month, as well as on the total number of times of health care utilization. This is important because the doctor's role in medical treatment after the initial visit may greatly decrease the effect of consumer incentives on health care utilization. However, consumer incentives are still vital in the process because they decide whether they want to visit the doctor at all. Zhong concludes that a main aspect of NCMS that greatly affects enrollees' utilization of outpatient care is the reimbursement policy.

Many factors may lead to this conclusion. First of all, the system does not address the fundamental financial needs of rural patients because many people in the rural area do not have enough money to pay for treatments to begin with. Therefore, regardless of the percentage of reimbursement one may receive, which is in generally really low, they would still not be able to afford the upfront costs, making the system useless under this condition. In addition, most of the rural population has either never had a clear concept of insurance, or had negative experiences with the old CMS. The complex cost-sharing arrangements are enough to baffle and deter them from participating in NCMS, and the addition of lag time in receiving reimbursements would

only decrease the enrollees' confidence even more (Zhong, 2010). On the other hand, immediate reimbursement would increase health care utilization by establishing trust amongst insurers with immediate cash returns. Furthermore, health care costs are lower when individuals receive immediate reimbursement, which also saves considerable time and transaction costs, another major factor of consideration for rural people who may live far from health care facilities (Zhong, 2010).

However, although the reimbursement method may significantly increase health care utilization, it has little effect for people in bottom income quartile, which mostly consists of people from the rural population. Since the NCMS generally has high deductibles and coinsurance rates, reimbursements may be meaningless to the very poor participants. Even if the insurer pays a significant part of the health care costs, they are still unable to afford the high medical costs. Therefore, there is a downward trend of the effect of health care reimbursement on utilization. This also affects results for the two provinces studied, Zhejiang and Gansu. The effect of immediate reimbursement is stronger in Zhejiang, one of the richest provinces, while the coefficient for reimbursement in Gansu, one of the poorest provinces, is positive but statistically insignificant. Therefore, the effect of immediate reimbursement is an inversed U-shape across income levels of the participants (Zhong, 2010).

Although Zhong found a positive effect of immediate reimbursement on health care utilization, he concludes with the idea that health care utilization by itself is not a sufficient mechanism of measuring the effectiveness of a health care system. As mentioned earlier, the two main goals of the recent health care reforms in rural China to increase access to essential medical treatment and to improve the rural population's health status. Therefore, increased health care utilization is only beneficial if it also brings a positive effect on people's health. Otherwise, the

extra utilization would only be a waste if people are over-utilizing health care services when unnecessary. Although the scenario above is more prevalent in developed countries, it is also a growing problem in China, and one main goal of the Chinese health care reforms is to help people receive necessary health care.

China has undergone a health revolution in the 1950s, with the life expectancy rising from 46 in the 1950s to 71 in 2000 (Wagstaff et al., 2009; World Health Organization, 2009). Most of this decline was a result of an increased control over infectious disease and malnutrition. Instead, infectious diseases have been replaced by chronic diseases, which mostly cause mortality amongst the elderly. The Strauss study (2009) examines the correlations between socioeconomic status indicators and health status. For example, their findings show that many demographic factors such as education and income are positively correlated with better health. In addition, insurance policy related factors should also be positively correlated with better health if the insurance policy is efficient. Hence, we intend on taking Zhong's study a step further, and testing the effect of NCMS on the rural population's health status with the same CHARLS 2008 data set.

The Lei and Lin study (2009) further inspires us to do a study of the effect of NCMS policy-related factors on health care utilization and health status. In the paper Lei and Lin argue that despite its wide coverage in the rural area, NCMS does not have a significant effect on out-of-pocket expenditure for rural participants, health care utilization or health status, measured by self-reported health status and sickness and injury for the past month. The China Health and Nutrition Survey (CHNS) covered nine provinces of different geography, resources, economic development, and health indicators, and results for 2000, 2004, and 2006 were used in this study, totaling 23,328 rural participants. After studying key dependent variables in analysis of

utilization of preventive care and formal medical services in past month, diagnosed disease, self-reported health, and sickness or injury in past month, Lei and Lin found an increased utilization in preventive care, but no accompanied significant result for decreasing out-of-pocket spending, increasing formal medical care utilization, or improving health status. In fact, widespread increase of NCMS coverage only improved formal medical care utilization by 2.4% in the past month. In addition, it is hard to distinguish whether this increased usage is due to better medical access or increased medical needs because people are more ill. Therefore, Lei and Lin performed a separate study only looking at people reported being sick or injured in the past month, and found that only 11% of NCMS participants sought formal medical care, where as 18% of insured people sought medical care, which is a very striking finding. However, these results can conclude little because they are not significant at the 5% level. In addition, Lei and Lin's study contains shortfalls that remain to be studied. For example, they do not study whether non-utilizers of NCMS simply do not need medical services, or are unable to participate due to informational and financial barriers or distrust in the insurance system. In other words, they do not distinguish health care utilization that is necessary to improve people's health, which is what Chinese policy makers are most interested in now, from health care utilization in general. Therefore, we would like to conduct a similar study using the CHARLS data, adding more NCMS policy and demographic control variables to account for the different cases.

In addition to the moral hazards that may arise from delayed reimbursements in health insurance, the widespread practice of unnecessary medical services provided in China, especially in drug prescriptions, is also an issue that may affect the efficiency of China's health care system. The Eggleston study (2008) explores the corruptions within the Chinese health care system, as well as potential remedies. Starting in 2000, the Chinese central government changed its drug

pricing policy from standardizing entire range of prices for all pharmaceutical products to controlling the retail prices for only a few select products. In addition, China has an extensive supply of herbal medicine and supplemental treatments with secret ingredients and ambiguous effects. As a result, prices for certain medications differ when purchased through different channels or sold to different patients. Furthermore, due to the integration of the prescribing and dispensing of medication, hospitals earn over 40% of their profits through prescribing medication, and as a result, often prescribe unnecessary drugs or medical procedures to patients to gain more profit (Eggleston, 2008).

Pan et all. (2008) support Eggleston's view, stating that the Chinese health care system is also a major contributing factor to moral hazards in the medical system. Today, less than 2% of drug prescriptions in the entire China, and 0.06% of drug prescriptions in the village clinics are considered rational. Individual studies of patients undergoing appendicitis and pneumonia treatment also produced results suggesting that 20% of expenditures associated with these treatments are clinically unnecessary. In fact, there are usually relational contracts between doctors and providers, so the physician would derive income from selling treatments, and often take advantage of asymmetric information to recommend treatments that they would not recommend otherwise. As a result, Pan suggests that there should be a separation of the prescribing and dispensing of medication between a physician and independent apothecary or pharmacy as supposed to an integration within a single provider to avoid mixing incentives during treatment. For example, supplier-induced demand is more prevalent with health care insurers because doctors are more likely to prescribe unnecessary drugs or medical procedures to patients with health care since they are more likely to afford the services. As a result, insurers are more likely to incur higher hospital fees due to over-prescription of medicine and unnecessary

services, and experience the same amount of out-of-pocket spending. As a result, there needs to be a better government supervision system of medical insurance expenses and medication prices (Pan et all. 2008). Before that happens, it is very likely that these moral hazards may contribute to an over-utilization of health care services beyond the optimal point.

In short, while Zhong conducts a very comprehensive study on the effects of various NCMS policy and demographic factors on health care utilization, various moral hazards that occur in the health care systems suggest that health care utilization by itself is not a sufficient mechanism to assess health care systems. As a result, we would like to take into consider the concerns regarding moral hazards raised by health care scholars, and test the same health care policy and demographic factors on health status, which is another measurement of the enrollee's utility. We hope by this way we can further identify the insurance policy factors that have a positive effect on the health care system for future policy makers to take into consideration.

IV. Data

Our paper uses intensively the China Health and Retirement Longitudinal Study (CHARLS) data, a biennial survey in China conducted by the National School of Development (China Center for Economic Research) at Peking University. CHARLS aims to be representative of the Chinese residents aged 45 and older, with no upper age limit. The total sample size is estimated to be around 10,000 households and 17,000 individuals. Considering the enormous complexity involved in a national survey, CHARLS started with a pilot study that took place in two provinces in the fall of 2008 and the next wave will take place in 2011. The pilot study, funded by the National Institute on Aging, the World Bank and Natural Science Foundation of China, collected data from 48 communities/villages in16 counties/districts of 2 provinces, and covered 2,685 individuals living in 1,570 households. The two provinces are Zhejiang, a developed coastal province with a population of 54,428,891 and the highest rural and urban incomes per capital after Shanghai and Beijing in 2007, and Gansu, a poor northwestern province with a population of 25,575,254 and the one of the lowest rural and urban per capita income.

CHARLS is part of a set of longitudinal aging surveys that include surveys in the United State, England, nineteen countries in continental Europe, Korea, Japan, and India. Based on the Health and Retirement Study (HRS) and related aging surveys such as the English Longitudinal Study of Aging (ELSA) and the Survey of Health, Aging and Retirement in Europe (SHARE), it aims to set up a high quality, nationally representative and publicly available micro-database that provides a wide range of information about the households of the elderly and also individual information on the elderly respondents and their spouses.

The main body of CHARLS, the household survey, includes seven parts: (a) Demographic Background (b) Family (c) Health Status and Functioning (d) Health Care and

Insurance (e) Work, Retirement and Pension (f, g) Household and Individual Income, Expenditure and Assets (h) Interviewer Observation, of which part (d) is of special interest to our study. In addition, the community survey at the end includes ten parts: (a) Basic Information (b) Infrastructure and Public Facilities (c) Labor, Education, and Migration (d) Health Insurance and Health Facilities (e) Wage Level and Credit Availability (f) Governance and Organizations (g) History of Policy Changes (h) Price Level (s) Statistical Data (i) Interviewer's Observations, of which part (d) is of special interest to our study.

CHARLS' method of sampling is as following: county level units are chosen by Probability Proportional to Size (PPS), stratified by whether they were urban districts or rural counties and by region within each classification. Within each county, CHARLS randomly selects 3 village-level units by PPS; within each primary sampling units (PSUs), CHARLS then randomly selects 25-36 from a complete list of dwelling units generated from a map; then determines the number of households in each chosen dwelling unit. CHARLS randomly selects one with an age-eligible household, then determines the number of age-eligible members within a household and randomly selects one. Based on this sampling procedure, there were about 25-36 households in each community, and 1 or 2 individuals in each household who are interviewed depending on marital status in the household.

The reason we choose CHARLS as our data are as following: First, as the first Health and Retirement Study type survey in China, it contains high-quality and comprehensive information across many relevant disciplines we believe are of interest. Second, it focuses on the elderly population, who are more likely to utilize health care and to stay in their home town (rather than migrant into the city as temporary workers) and benefit from NCMS. Finally, we are inspired by the Zhong study (2010) that uses CHARLS data and finds a significant relationship between

patient reimbursement method health care utilization, to study the effect of various health care policy factors on health status, another determinant of whether a health care system is effective.

One weakness of the CHARLS data is its limited sample size. With only data from 2,685 individuals in two provinces, it is hard to get a comprehensive view of China's health care system. In addition, because the data is in the form of a questionnaire, we have many missing or potentially faulty data for various variables, especially NCMS policy related variables such as deductibles, coinsurance rates, and insurance caps, assuming that the most rural people are unfamiliar with their insurance program. In addition, although we aim to study the effect of NCMS on outpatient care, the CHARLS data does not distinguish between insurance policies for outpatient and inpatient care, so results we achieve can be attribute to both, which may have important implications for the design of the health insurance scheme.

V. Empirical Specification

Our study consists of two steps. The first part of our study is similar to Hai Zhong's study which tests the effect of different NCMS policy-related and demographic variables on health utilization measured by two separate dependent variables, probability of health care utilization and number of doctor visits (Zhong, 2010). The second part tests the effect of similar variables on health status while controlling for the length of enrollment time. We include all of the benefit design and demographic factors from the first part, except for "self-assessed health status" (since it is now the dependent variable tested for) and "illness level in last month" (since it is highly correlated with the former).

As mentioned above, factors that Zhong includes to examine their effects on health care utilization fall into two categories, policy-related and demographic factors. Among insurance-descriptive variables including deductibles, insurance cap, coinsurance and reimbursement method, he finds that immediate reimbursement significantly increases the amount of doctor visits and health care utilization. Also, he includes and quantifies many demographic independent variables, including age, education, living arrangement, gender, per capita annual household income, self-assessed health status, presence of illness and province, as controls for his study.

The reason that Zhong used two dependent variables, probability of utilization and total visits, as a proxy of health care utilization is that patient incentives are more crucial to the decision of whether to initiate contact with a doctor at all than the total amount of health care utilization, as the latter is more influenced by physician's role in medical choices (Zhong, 2011). Accordingly, it is more appropriate to use a logit regression for the first model and a negative binomial for the second.

We use Zhong's models measuring effect of NCMS policy-related variables on probability and number of times of health care utilization as our model prototypes.

Hai Zhong's Model

- (LOGIT) Probability of utilization = $\boldsymbol{\beta_1}$ **immediate reimbursement** + $\boldsymbol{\beta_2}$ **coinsurance** + $\boldsymbol{\beta_3}$ **deductible** + $\boldsymbol{\beta_4}$ **insurance cap** + β_5 *age* + β_6 *age* squared + β_7 education + β_8 living with a spouse + β_9 male + β_{10} income + β_{11} health status + β_{12} illness level + β_{13} Zhejiang + ε

- (NEGATIVE BINOMIAL) Total visits = $\boldsymbol{\beta_1}$ **immediate reimbursement** + $\boldsymbol{\beta_2}$ **coinsurance** + $\boldsymbol{\beta_3}$ **deductible** + $\boldsymbol{\beta_4}$ **insurance cap** + β_5 *age* + β_6 *age* squared + β_7 education + β_8 living with a spouse + β_9 male + β_{10} income + β_{11} health status + β_{12} illness level + β_{13} Zhejiang + ε

Our models mainly differ from Zhong's model in health insurance policy related factors. Under close examination, we find that several key variables, namely deductible, insurance cap and coinsurance rate, lack respectively 1175, 1507 and 1954 observations out of 2000 observations, which may significantly influence the regression results. To cope with the missing values of deductible and insurance cap, we simply add two dummy variables so that the total sample size can stay the same.

Coinsurance rate is a little trickier, however, because it only has 46 responses. We were informed by the people involved with CHARLS data design that the reason why not every respondent was asked about the coinsurance rate was that most people did not know it well but instead remembered how much their recent hospital visit cost and how much they paid out of their own pocket. Therefore, we construct a new variable, self payment, as a proxy of

coinsurance rate by dividing the out-of-pocket expenses over total expenses of the most recent outpatient visit in the last month. We then apply the average of self payment rate to everyone else in the same county that did not answer the question instead of creating a dummy variable. Since coinsurance rate is one of the most important benefit designs, we believe this replacement will bring about significant change to our result and should be highlighted here.

Furthermore, we also added a new variable, medical/total which represents the percentage of medication expenses in total costs, to the model to examine the effect of physician over-prescription, a common phenomenon under the current Chinese system that does not separate prescribing and dispensing and thus gives physicians strong incentives to over-prescribe, as discussed above.

To differentiate the effects of our new variables, self payment and medical/total, from that of simply taking out the coinsurance variable, we run two different regressions in our paper that represented these two steps. We name the one that does not include self payment and medical/total as Model 1 and the other Model 2. We believe these changes may lead to different findings from Zhong's and a more accurate regression of policy related factors on health care utilization.

As for demographic factors, we try to construct our variables according to Zhong's definitions as much as possible. However, due to certain ambiguities in his definitions, we have to come up with our own definitions for variables health status and illness level in last month. This difference of definition may also partially explain the divergence we see in our results.

Our Model (Part I)

- (LOGIT) Probability of utilization= $\boldsymbol{\beta_1}$ **immediate reimbursement + (**$\boldsymbol{\beta_2}$ **self payment +** $\boldsymbol{\beta_3}$ **medical/total) +** $\boldsymbol{\beta_4}$ **ded_missing +** $\boldsymbol{\beta_5}$ **deductible +** $\boldsymbol{\beta_6}$ **cap_missing +** $\boldsymbol{\beta_7}$ **cap** + β_8 age + β_9 age squared + β_{10} education + β_{11} living with a spouse + β_{12} male + β_{13} income + β_{14} health status + β_{15} illness level + β_{16} Zhejiang + ε

- (NEGATIVE BINOMIAL) Total visits= $\boldsymbol{\beta_1}$ **immediate reimbursement + (**$\boldsymbol{\beta_2}$ **self payment +** $\boldsymbol{\beta_3}$ **medical/total) +** $\boldsymbol{\beta_4}$ **ded_missing +** $\boldsymbol{\beta_5}$ **deductible +** $\boldsymbol{\beta_6}$ **cap_missing +** $\boldsymbol{\beta_7}$ **cap** + β_8 age + β_9 age squared + β_{10} education + β_{11} living with a spouse + β_{12} male + β_{13} income + β_{14} health status + β_{15} illness level + β_{16} Zhejiang + ε

While Zhong focuses his paper exclusively on health care utilization, we take a step further and test the effect of policy-related and demographic factors used in the previous models on health status, controlling for the length of enrollment in NCMS. The dependent variable, health status, is measured as the respondent's self-assessed health status and the higher the numerical value the better. (In the previous models, the variable "health status" is based on the same information except that it is further stratified into five categories: excellent, very good, good, fair and poor). Since health status is a long-term measure, we add enrollment length to control for the time difference. Moreover, we also take off variable "illness level" due to its high correlation with the dependent variable here.

Our Model (Part II)

- (ORDERED LOGIT) Health status= $\boldsymbol{\beta_1}$ **enrollment length** + $\boldsymbol{\beta_2}$ **immediate reimbursement**+ $\boldsymbol{\beta_3}$ **self payment** + $\boldsymbol{\beta_4}$ **medical/total** + $\boldsymbol{\beta_5}$ **ded_missing** + $\boldsymbol{\beta_6}$ **deductible** + $\boldsymbol{\beta_7}$ **cap_missing** + $\boldsymbol{\beta_8}$ **cap** + β_9 age + β_{10} age squared + β_{11} education + β_{12} living with a spouse + β_{13} male + β_{14} income + β_{15} Zhejiang + ε

A more detailed explanation of variables used in our study and the rationale for their inclusion can be found in the table below.

Table 1. Variables used in the analysis: definition and rationale for inclusion

Dependent Variables	
Utilization	Question: In the last month have you visited a public hospital, private hospital, public health center, clinic, or health worker's or doctor's practice, or have been visited by a health worker or doctor for outpatient care? Rationale: This variable indicates whether an individual at least had one doctor visits at any type of medical facility for outpatient treatment in the last month.
Total Visits	Question: How many times did you visit/been visited by […] during the last month? Rationale: This variable counts the total number of doctor visits at any type of medical facilities for outpatient treatment in the past month.
Health Status	Question: Would you say your health is excellent (5), very good (4), good (3), fair (2), or poor (1)? Rationale: This measures the self-assessed health status, and represent how the enrollees perceive their own health. Self-assessed health status is a well-validated general health measure strongly associated with health care utilization.

Independent Variables	
Immediate Reimbursement	Question: What is your method of reimbursement: Get reimbursement or pay first and get reimbursed later? Rationale: Enrollees who have immediate reimbursement will pay the difference between the total cost and amount insured up front. Enrollees who are reimbursed later will have to pay the entire medical cost upfront.
Self Payment	Question: What was the total medication cost for this visit? How much will you eventually pay out of pocket for the medications from this visit, including prescriptions you received? Rationale: This measures the percentage out of pocket spending. It is a replacement for the coinsurance value that we lack many data points for.
Medical/total	Question: What is the total medication cost for this visit? What is the total medicinal cost for this visit? Rationale: These two questions measure the percentage of total medication cost that consists of medicinal costs. This may be a good mechanism to detect over prescription of medicine.
Deductible	Question: What is your insurance deductible? Rationale: Deductible measures the minimum amount of payment one needs to make per medical visit. In general, a lower deductible should improve health care utilization.
Insurance Cap	Question: At most, how much would your insurance cover per year? Rationale: A higher insurance cap should improve health care utilization, especially for catastrophic events that have higher health care costs.
Age	Question: What month/year were you born in? Rationale: To calculate age of respondent at time of interview, which should affect health status and need for health care
Age Squared	Question: Age^2 Rationale: To take into account the nonlinear effect of age on health care utilization
Education	Question: What is the highest level of education you have attained: no formal education (illiterate), did not finish primary school but capable of reading and/or writing, sishu/home school, elementary school, middle school, high school, vocational school, two-three-year college/associate degree, four-year college/bachelor's degree, master's degree, doctoral degree/Ph. D, other. Rationale: Education has two opposing potential influences on health care utilization: higher education levels are linked with better health, which may negatively affect health care utilization; it may also lead to positive attitude to health care which may positively affect health care utilization

Living with a Spouse	Question: What is your marital status: Married with spouse present or living with a partner as if married, Married but not living with spouse temporarily for reasons such as work, Separated, Divorced, Widowed, Never married Rationale: Marital status should affect health status and need for health care
Male	Question: Male/Female Rationale: Male and female have different attitudes and needs for health care services
Income	Questions: What is your per capital annual household income? Rationale: Defined as sum of all market earnings across household, as well as the total value of nonmarket goods and services produced by household, pensions, government subsidies, and financial assistance. Income may positively affect health care utilization.
Illnesses Level	Question: In last month: Do you have to get up often during the night to urinate? If you have a cut or wound, does it take a long time to heal? Do you ever feel pain on the left side of your chest? Do you ever feel chest pains when climbing stairs/uphill or walking quickly? Do you have one of the following disabilities: physical disabilities, brain damage/mental retardation, vision problem, hearing problem, speech impediments Rationale: indicate whether respondent had minor, moderate, or severe illness in the past month. Illnesses are positively correlated with health care utilization, and the severity of the illness is especially vital to determining health care usage under financial constraints.
Zhejiang	Question: In which province did you set up your insurance? Rationale: Zhejiang is represented by dummy variable 1 and Gansu is 0
Enrollment Length	Question: When did this benefit begin? Month/Year? Rationale: The enrollment length should be positively correlated with health statuses, as it takes time for NCMS to improve health care services.

VI. Results

Table 2 compares the policy related factors between enrollees of NCMS and Urban Employees' Basic Medical Insurance (UEBMI), which is implemented widely among urban employed population, in the 2008 CHARLS sample. One thing worth noting is the limited number of UEBMI enrollees among CHARLS respondents compared to NCMS enrollees, which might cause some biases in the results. However, the table in general indicates less generous benefits for NCMS enrollees, most of whom already suffer from less income and lower socio-economic status than UEBMI enrollees. As shown by the table, only about 23.93% of the NCMS enrollees can immediately reimburse their health care expenses, which is half of that of Urban Employees' Basic Medical Insurance (UEBMI) enrollees (47.66%) owing to factors such as the insurer's technical ability, health care facilities and administrative concerns. At the same time, NCMS enrollees on average face a lower deductible (RMB 466.69) than that of UEBMI (RMB 660.67) , which is in fact misleading if taking into account the huge wealth gap between rural and urban population in China (Zhong, 1316). For the insurance cap variable, there exist several extremely high data points reported by both NCMS and UEBMI enrollees. After taking out the outliers, we find a much higher insurance cap for UEBMI enrollees than that of NCMS enrollees, which might further reduce the incentives for NCMS to utilize health services. Further, NCMS enrollees on average pay more out of their pocket for their health care services due to factors such as reimbursement policy; however, they tend to pay less for medication (even when compared with the medication costs percentage of UEBMI we get after taking out the two outliers, which is 85.98%) probably as a result of less over-prescription in rural health care system and less willingness to follow doctors' prescriptions.

All these variables have very high standard deviations, due to the diversity of program designs that exists among different counties and limited responses to many of the questions. Such high standard deviations may have partially explained the statistical insignificance we found in our regression results discussed later in this section.

Table 2. A comparison of policy related factors between NCMS and UEBMI enrollees

Variable	NCMS (2000 observations)	UEBMI (265 observations)
Immediate reimbursement (%)	23.93 (42.67)	47.66 (49.95)
Deductible	466.69 (1,859.73)	660.67 (887.00)
Insurance cap	71,895.89 (640,212.58)	1,627,803.638 (11,988,764.28)
Insurance cap (without outliers)	5,795.28 (13,217.85)	34,603.76 (48,417.71)
Self-payment percentage (%)	90.22 (11.79)	58.88 (45.48)
Medication costs percentage (%)	71.43 (23.15)	165.73 (331.27)

Table 3 shows the summary statistics of the key variables for our analysis. Most of the variables are constructed as dummy variables, except for enrollment time length, health status, age and annual per capita household income. Given that utilization is a dichotomous variable that indicates whether a person has visited any medical facilities for outpatient care in the last month, only 18.7% utilized health services in our sample. The average enrollment time is 3 years, as the program was introduced in 2003, gradually expanded over years and saw a fast growth recently due to the increasing financial support from central and local government. Health status, a key variable in our study, is measured by the self-assessment of respondents themselves, and the

bigger the numerical value the better one's health status. However, only 0.5% and 8.9% of them had severe or moderate illness in the past month, with 26.3% having minor or none illness and the rest not responding to the question. As discussed in Data Section, CHARLS data focuses on retired population, so we are observing an average age of 59.7 and 84% live with their spouses. Annual per capita household income and education level are both low, which is not surprising given the rural background of most NCMS enrollees.

Table 3. Summary statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
probability of utilization	1779	0.19	0.39	0	1
total visits	2000	0.40	1.46	0	28
health status	1781	3.79	1.04	1	5
age	2000	59.69	44.78	37	2008
no education	2000	0.48	0.50	0	1
elementary	2000	0.37	0.48	0	1
high	2000	0.15	0.36	0	1
college	2000	0.00	0.03	0	1
living with a spouse	2000	0.84	0.36	0	1
male	2000	0.48	0.50	0	1
income	1998	7943.05	20414.36	-304399.7	293500
health status_excellent	2000	0.02	0.14	0	1
health status_verygood	2000	0.10	0.30	0	1
health status_good	2000	0.18	0.38	0	1
health status_fair	2000	0.35	0.48	0	1
health status_poor	2000	0.25	0.43	0	1
illness level_minor	2000	0.26	0.44	0	1
illness level_moderate	2000	0.09	0.28	0	1
illness level_severe	2000	0.01	0.07	0	1
Zhejiang	2000	0.53	0.50	0	1
enroll length	1929	3.02	1.73	0	15

Table 4 compares the results of logit regression of the probability of utilization between our models and Zhong's model. From these models we are interested to see the effects of policy related factors and demographic factors on NCMS elderly enrollees' health care utilization. Due to the lack of coinsurance values, we replaced the coinsurance variable Zhong uses with a variable measuring self payment, as well as added a new variable measuring the ratio of medicinal costs over the total medical costs. In order to isolate and study the effects of removing the coinsurance rate, we have two models: one that solely removes the coinsurance variable, and the other that replaces it with self-payment and medicinal/total payment ratio. The two models produce generally similar results that are insignificant, and it is hard to identify a consistent pattern of difference between them.

The most significant difference we find in the results of our models from those of Zhong's is that immediate reimbursement has a much smaller and statistically insignificant effect on health care utilization, which sharply contradicts with Zhong's central conclusion. Also, the ambiguous and statistically insignificant effects of deductible and insurance cap in our model also differ greatly from Zhong's results in numerical value. We believe these differences are mainly due to our different definitions of policy related factors, as we see more similar results on demographic factors that we defined similarly to the way Zhong did. Furthermore, counter-intuitively, the more one pays out of her own pocket for her hospital visit and the more she has to pay for medication, the more she is likely to utilize health care. One possible explanation is that people who pay more for their health care services may better informed of the system and more encouraged to utilize their health care.

Similar to Zhong's results, we find that education has a positive but statistically insignificant effect on people's health care use probably because higher education usually is

associated with a more positive attitude to health care, outweighing its positive effect on the enrollee's health status, which should have an opposing negative effect on health care utilization. Variable college-level education is omitted in the model mainly because of the relatively low education level among NCMS enrollees. Living with a spouse, on the other hand, negatively affects people's health care utilization mainly due to the availability of care at home, but the effect is not statistically significant. The only significant result we get in our models is gender with a coefficient of -0.44. Since the coefficients in logistic regression are in terms of the log odds, this number suggests an odds ratio of -1.553, which means that holding everything else fixed males are 55.3% less likely to visit the hospital than females, possibly due to their different attitudes and needs for health care services, which also matches Zhong's findings. Moreover, both Zhong's and our models suggest that the poorer the health status and the worse one's illness was in last month the more likely one is to visit the hospital, even though our results are not as significant as Zhong's. Our results show a coefficient of 0.968, suggesting that it is 163.3% more likely for someone with poor self-assessed health status to visit the hospital compared to a healthy individual, which is significantly higher than the coefficients of an individual with good or fair self-assessed health status. With a p-value of 0.033, this effect is significant at the 10% level. Similarly, the coefficient for an individual with a severe illness has a coefficient value of 1.409 that is significantly higher than an individual with a moderate illness, and the coefficient has a p-value of 0.059, which is almost significant at the 10% level.

Table 4. Logit regression for probability of utilization

Probability of Utilization	Zhong	Model 1	Model 2
Policy Related Factors			
immediate reimbursement	0.563***	0.035	0.047
coinsurance			
coin_20-40%	0.745		
coin_0-20	1.437		
self payment			0.840
medical/total			0.205
deductible			
ded_missing		-0.010	-0.036
ded_201~400	-0.109	0.024	0.042
ded_401~600	-0.501	-0.054	-0.029
ded_601~800	0.038	0.522	0.496
ded_801~1000	-2.252**	-0.062	-0.056
ded_>1001		-0.179	-0.211
ded_1001-1200	-0.061		
ded_>1200	0.202		
insurance cap			
cap_missing		-0.043	-0.056
cap_5001~10000	0.035	-0.184	-0.232
cap_10001~15000	-0.082	1.897	1.847
cap_15001~20000	2.167**	0.233	0.213
cap_20001~25000	0.252	1.675	1.708
cap_250001~30000	2.945	-0.376	-0.392
cap_>30000	-0.138	0.123	0.114
Demographic Factors			
age	0.022	0.009	0.003
age squared	0.000	0.000	0.000
education			
elementary	0.203	0.221	0.226
high	0.319	0.340	0.330
college	(omitted)	(omitted)	(omitted)
living with a spouse	-0.092	-0.143	-0.140
male	-0.430***	-0.444***	-0.444***
income	0.001	0.000	0.000
health status			

hs_verygood	-0.353	-0.290	-0.310
hs_good	0.052	0.070	0.040
hs_fair	0.431	0.514	0.487
hs_poor	0.967*	0.992*	0.968*
illness level			
moderate	0.210	0.128	0.115
severe	0.647***	1.378	1.409
Zhejiang	-0.207*	-0.188	-0.176
constant	-2.215	-1.934	-2.635
Observations		1728.000	1728.000
LR chi2(28)		77.270	80.340
Prob > chi2		0.000	0.000
Pseudo R2	0.061	0.046	0.048

Note: *** indicates that coefficient is significant at 1% level; ** indicates that coefficient is significant at 5% level; and * indicates that coefficient is significant at 10% level.

Table 5 goes a step further and compares the results of negative binominal regression of the total times of health care utilization between our models and Zhong's. Again, our results on policy related factors differ quite significantly from Zhong's due to our different definitions of those factors. Neither his nor our results are statistically significant, too. A possible explanation is the change of physician's behaviors after patients' initial visit. As pointed out by previous study, health care providers such as physicians play a strong role in inducing health services demand, which may reduce the effects of those policy-related variables in our model (Blumenthal and Hsiao, 2005; Liu and Mills, 1999; Wagstaff and Lindelow, 2008). Also, our two models do not differ much, indicating a limited effect of adding variables "self payment percentage" and "medication costs percentage", which have higher positive effects on the times of utilization.

On the other hand, we see greater and more statistically significant results on demographic factors. Education has a positive and significant effect on the times of hospital visits in our models, despite the negative coefficient of college level education due to small number of observations. Living with a spouse again has a negative effect on the times of hospital visits, except that the effect is greater and statistically significant this time. Compare to the results we get before, men are not only less likely to utilize health care but also are much less likely to visit the hospital for several times. Another interesting factor is health status, which now produces greater and statistically significant results that suggest the better health the less hospital visits. Compared with its much smaller and less statistically significant effects in the previous model, health status plays a more important role in making people to visit the hospital more often when they are actually ill. In addition, Zhejiang residents utilize health services less, which we believe may result from more aged population and the better-off state in that province.

Table 5. Negative binominal regression for times of utilization

Times of Utilization	Zhong	Model 1	Model 2
Policy Related Factors			
immediate reimbursement	0.309	0.196	0.191
coinsurance			
coin_20-40%	0.822		
coin_0-20	0.523		
self payment			0.139
medical/total			0.282
deductible			
ded_missing		0.030	0.026
ded_201~400	-0.093	-0.193	-0.128
ded_401~600	-0.656	-0.515	-0.497
ded_601~800	-0.437	-0.350	-0.339
ded_801~1000	-1.308	0.301	0.296

ded_>1001		-0.477	-0.515
ded_1001-1200	0.269		
ded_>1200	0.000		
insurance cap			
cap_missing		-0.232	-0.200
cap_5001~10000	0.103	-0.285	-0.256
cap_10001~15000	0.001	1.465	1.390
cap_15001~20000	1.730	0.209	0.210
cap_20001~25000	0.329	0.055	0.221
cap_250001~30000	0.296	-0.766	-0.727
cap_>30000	-0.417	0.791	0.804
Demographic Factors			
age	0.039	0.018	0.010
age squared	0.000	0.000	0.000
education			
elementary	-0.125	-0.055	-0.038
high	0.290	0.486*	0.504*
college	(omitted)	-21.838	-19.039
living with a spouse	-0.570***	-0.529**	-0.523**
male	-0.485***	-0.594***	-0.610***
income	-0.004	0.000	0.000
health status			
hs_verygood	-0.753	0.909*	0.893*
hs_good	-0.221	1.473***	1.448***
hs_fair	0.417	2.106***	2.088***
hs_poor	0.938*	2.693***	2.663***
illness level			
moderate	-0.043	-0.642	-0.623
severe	0.178	-0.321	-0.262
Zhejiang	-0.453**	-0.477**	-0.412*
constant	-1.108	-2.629	-2.805
Observations		1954	1954
LR chi2(28)		165.320	167.290
Prob > chi2		0.000	0.000
Pseudo R2	0.046	0.061	0.061

Note: *** indicates that coefficient is significant at 1% level; ** indicates that coefficient is significant at 5% level; and * indicates that coefficient is significant at 10% level.

Table 6 displays the results of our second model that investigates the effect of both NCMS policy-related factors and demographic factors on NCMS enrollees' self-assessed health status while controlling for the length of enrollment. Our regression indicates very interesting results: the length of enrollment in NCMS seems to have a small positive effect on health status, with an odds value of 1.031, but the result is not statistically significant. As expected, immediate reimbursement has a notable positive effect on health status, with an odds value of 1.587 statically significant at the 1% level. This is expected because when the individual receives immediate reimbursement, the total expected health care cost will decrease. In addition, as mentioned earlier, many poor households may not be able to pay the entire medical bill on the spot and wait for the reimbursement later. This may deter some families from seeking health care services at all if the expected total cost is over their budget.

Immediate reimbursement in general has a greater effect on inpatient services because they tend to have higher costs. Although we were unable to find a significantly positive relationship between immediate reimbursement and health care utilization like Hai Zhong did in our previous regressions, our result shows a positive effect of immediate reimbursement on health status. However, our data does not allow us to separate individuals who have insurance covering inpatient and outpatient expenses from individuals who have insurance only covering inpatient expenses. As a result, our study may have overestimated the effect of immediate reimbursement for patients seeking outpatient care. In addition, it would have been more effective to regress the utilization variable against health status to assess the effect of health care utilization on health status, but because the utilization variable we use in our models is defined as visit to medical facilities in the last month not over the past year, the time interval is too short time to have an effect on health status.

As we expected, increasing deductible values brought an increasingly negative effect on health status as we progress up the higher deductible categories, most likely due to decreased seeking of medical treatment. However, none of these coefficients, other than the 601-800 value deductible category with a p-value of 0.057, are close to being even statistically significant at the 10% level. In addition, although our insurance cap values, which indicate the highest possible amount of insurance received for each individual, all have notably positive coefficients indicating a positive effect on health status, the combined result has a mixed effect because the positive effect on health status is not increasing with the insurance cap, and not all categories of insurance caps produce a statistically significant result.

Among demographic variables, living with a spouse and obtaining higher levels of education both have an increasingly positive effect on health status, though generally not statistically significant. Values for education come close to being statistically significantly significant. However, elementary school education obtains an odds value of 1.274 with a p-value of 0.027, which is significant on the 10% level and almost significant on the 5% level, and high school education obtains a slightly higher odds value of 1.296 with a p-value of 0.078, which is almost significant to the 10% level. Other demographic variables for this regression, however, produced really positive results, many of which are statistically significant at the 1% and 5% level. For example, being a male has an odds value of 1.373 with a p-value of 0.002, and living in Zhejiang province has an odds value of 2.119 with a p-value of 0.000. Interestingly household income has a statistically significant neutral effect on health status, which was contrary to our hypothesis.

Note: *** indicates that coefficient is significant at 1% level; ** indicates that coefficient is significant at 5% level; and * indicates that coefficient is significant at 10% level.

Table 6. Ordered logistic regression for health status

Health Status	Model
Policy Related Factors	
enrollment length	0.031
immediate reimbursement	0.462***
self payment	-0.215
medical/total	0.033
deductible	
ded_missing	0.024
ded_201~400	-0.298
ded_401~600	-0.319
ded_601~800	-0.679
ded_801~1000	-0.173
ded_>1001	0.090
insurance cap	
cap_missing	0.338
cap_5001~10000	0.644
cap_10001~15000	2.326***
cap_15001~20000	0.711**
cap_20001~25000	0.017
cap_250001~30000	0.586**
cap_>30000	1.100***
Demographic Factors	
age	-0.025***
age squared	0.000***
education	
elementary	0.242*
high	0.259
college	1.033
living with a spouse	0.158
male	0.317***
income	0.000**
Zhejiang	0.751***
Observations	1676
LR chi2(26)	236.65
Prob > chi2	0.000
Pseudo R2	0.0515

VII. Conclusion

Health care utilization is not a perfect mechanism for measuring the effectiveness of a health care system because increased health care utilization is only positive if it could increase the enrollees' utility, which could be measured as health status (Zhong, 2010). Therefore, in order to better improve the well-being of NCMS enrollees, it is necessary to examine factors that positively affect not only people's health care utilization but also their health status.

Our study results indicate that immediate reimbursement in health care brings a positive effect on health status, even though its positive and relatively small effect on health care utilization is not statistically significant, which contradicts Zhong's finding. Nonetheless, immediate reimbursement is the only statistically significant policy-related factor on the two major determinants of the effectiveness of a health care system that Zhong and we found using CHARLS data, and deserves the attention of policy makers when making future policy amendments.

In addition, the data we use is from CHARLS' first pilot study, and as a result, it does not contain many responses for some of our important variables, such as deductibles, coinsurance rates and insurance caps. Though these factors did not produce statistically significant effects on health care utilization and health status, possibly due to large standard deviation caused by small sample size, it does not necessarily mean that these factors do not matter. Fortunately, a new wave of CHARLS study of larger scale is on the way, and we believe further examination on these factors will provide deeper insights on their effects on health care utilization and health status.

Bibliography

Blumenthal D, Hsiao. World Privatization and Its Discontents- The Evolving Chinese Health Care System. *New England Journal of Medcine*. Volume 353:1165-1170.

Brown, Philip H. and Thomas Huff. 2011. "Willingness to Pay in China's New Cooperative Medical System." *Contemporary Economic Policy: Vol. 29, No. 1*: 88-100.

Eggleston, Karen. 2008. "Incentives in China's Health Care Delivery System." Shorenstein Asia-Pacific Research Center, FSI, Stanford. Retrieved from http://iis-db.stanford.edu/pubs/22317/SCID373.pdf

Giles, John and Wang, Dewen and Cai Wen. 2011. "The Labor Supply and Retirement Behavior of China's Older Workers and Elderly in Comparative Perspective." The World Bank Development Research Group. Retrieved from http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/10/24/000158349_20111024112519/Rendered/PDF/WPS5853.pdf

Hougaard, Jens Leth and Lars Peter Osterdal and Yi Yu. 2011 " The Chinese Health care System: Structure, Problems and Challenges." *Appl Health Econ Health Policy* 2011; 9 (1): 1-13.

Lei, Xiaoyan and Wangchuan Lin. 2009. "The New Cooperative Medical Scheme in Rural China: Does More Coverage Mean More Service and Better Health." *Health Economics* 18: S25-S46.

Lowry, Debra. 2009. "Aging, Social Change, and Elderly Well-Being in Rural China: Insights from Mixed-Methods Village Research." Population Studies Center: University of Michigan. Retrieved from http://www.psc.isr.umich.edu/pubs/pdf/rr09-691.pdf

Lu, Chunling and Yuanli Liu and Jian Shen. 2011. "Does China's Rural Cooperative Medical System Achieve It's Goals? Evidence From The China Health Surveillance Baseline Survey in 2001." Western Economic Association International. Retrieved from http://onlinelibrary.wiley.com/store/10.1111/j.1465-7287.2011.00252.x/asset/j.1465-7287.2011.00252.x.pdf?v=1&t=h13oanr7&s=aab9f26c691245619f4e3a2ef94231e65931e673

Mao Z. 2005. Pilot program of Ncms in China: system design and progress. *Background paper for the World Bank China Rural Health Study. World Bank Health, Nutrition and Population-China Rural*.

Pan,Xilong, Hassan H. DIB, Minmin Zhu, Ying Zhang, and Yang Fan. 2009. "Absence of Appropriate Hospitalization Cost Control for Patients with Medical Insurance: A Comparative Analysis Study." *Health Economics*. 18: 1146-1162.

Strauss, John and Hao, Hong and Lei, Xiaoyan and Li, Lin and Park, Albert and Yang, Li and Zhao, Yaohui. 2009. "Health Care and Insurance Among the Elderly in China: Evidence from the China Health and Retirement Longitudinal Study, Pilot" *Aging in Asia: Findings from New and Emerging Data Initiatives, Committee on Policy Research and Data Needs to Meet the Challenge of Aging in Asia, National Research Council*: Natioanal Academic Press, forthcoming.

Wagstaff A, Lindelow M. 2008. Can insurance increase financial risk? The curious case of health insurance in China. *Journal of Health Economics* 27: 990–1005.

Wagstaff A, Lindelow M, Gao J, Xu L, Qian J. 2009. Extending health insurance to the rural population: an impact evaluation of China's new cooperative medical scheme. *Journal of Health Economics* 28(1): 1–19.

Wen J. 2008. *Government Work Report*. State Council, China (In Chinese).

World Health Organization. "Implementing the New Coop- erative Medical Schemes in Rapidly Changing China: Issues and Options." *Office of the World Health Organization Representative in China*, 2004.

Yip W, Hsiao WC. 2008. The Chinese health system at a crossroads. *Health Affairs* 27: 460–46

Yip W, Hsiao WC. 2009. Non-evidence-based policy: how effective is China's new cooperative medical scheme in reducing medical impoverishment? *Social Science and Medicine* 68(2): 201–209.

You X, Kobayashi Y. 2009. The New Cooperative Medical Scheme in China. *Health Policy* 91: 1–9.

Zhao Z. 2006. Income Inequality, Unequal Health Care Access, and Mortality in China. *Population and Development Review* 32: 461–483.

Zhao Y, Strauss J, Park A, Sun Y, China Health and Retirement Longitudinal Study. 2009. Pilot, *User's Guide*, National School of Development, Peking University.

Zhong, Hai. 2010. "Effect of Patient Reimbursement Method on Health care Utilization: Evidence From China." *Health Economics* 20: 1312-1329.