Impact of China's Urban Employee Basic Medical Insurance on Health Care Expenditures and Health Outcomes

Feng Huang and Li Gan[1]

Abstract

At the end of 1998, China launched a government-run mandatory insurance program, the Urban Employee Basic Medical Insurance (UEBMI), to replace the previous medical insurance system. Using the UEBMI reform in China as a natural experiment, this study identify variations in patient cost sharing that were imposed by the UEBMI reform and examine their effects on the demand for health-care services. Using data from the 1991-2006 waves of the China Health and Nutrition Survey, we find that the increased cost sharing is associated with decreased outpatient medical care utilization and expenditures but not with decreased inpatient care utilization and expenditures. Patients from low- and middle-income households, or in less-serious medical situations are found to be more sensitive to prices. We observe little impact on patient health, as measured by self-reported poor health status.

[1] Huang: Shanghai University of Finance and Economics, huang.feng@mail.shufe.edu.cn; Gan: Department of Economics and Private Enterprise Research Center, Texas A&M University, College Station, TX 77843-4228, gan@econ.tamu.edu.

1. Introduction

The effect of health insurance on health care and health has been one of the most important and heated debate topics in health economics for decades. The majority of studies focus on the effect of health insurance provision *per se* (extensive margin) on the demand for health care and health outcomes[2].

Nonetheless, relatively few studies focus on the changes of cost sharing of the health insurance (intensive margin). One possible reason is the difficulty to identify the causal effects of cost-sharing without a controlled experiment due to unobserved characteristics in the presence of self-selection (for a review see Baicker and Goldman, 2011). The most influential RAND Health Insurance Experiment (1974-1981) offers the best experimental evidence on the effect of demand-side cost sharing on utilization and health outcomes (Manning *et al*., 1987; Newhouse, 1993; Aron-Dine *et al*., 2013), but such experiments are rarely available.

Subsequent work have sought to utilize the quasi-experiments to draw causal inferences on the effect of cost sharing (Chandra *et al*, 2010; Skipper, 2013; Shigeoka, 2014; Chandra *et al*, 2014). For example, Chandra, Gruber and McKnight (2010) analyzed the effects of an increased co-payment for supplemental insurance for retired public employees in California, but the change in co-payments that was studied was small and restricted to office visits and prescription drugs. Shigeoka (2014) used a reduction in cost sharing for patients older than 70 years of age in Japan to examine the causal effect on utilization, patient health and financial protection against risk. While the studies primarily focus on the developed economies, little is known on the effect of cost sharing in developing countries.

This study will provide insights into the sensitivity of medical consumption to its price in a developing country. In this paper, we use Urban Employee Basic Medical Insurance

[2] Many studies, including studies that have investigated the effects of Medicare and Medicaid coverage expansion in the US (Card et al., 2008; Finkelstein and McKnight, 2008; Cutler and Gruber, 1996; Currie and Gruber, 2001; Finkelstein et al., 2012) and of National Health Insurance (NHI) in Taiwan (Cheng and Chiang, 1997; Chen *et al*., 2007; Chang, 2012), as well as the New Cooperative Medical Scheme (NCMS) (Lei and Lin, 2009; Chen and Jin, 2012) and Urban Resident Basic Medical Insurance (URBMI) in mainland China (Lin *et al*., 2009; Liu and Zhao, 2014), have evaluated the effects of health insurance provisions *per se* (i.e., the extensive margin) on the demand for health care and on health outcomes.

(UEBMI) reform in China as a natural experiment to identify large variations in patient cost-sharing and to investigate their effects on the demand for health care services. Prior to the reform, China's previous medical insurance system for urban employees provided comprehensive benefits with minimal cost sharing (Liu, 2002). Nearly full insurance coverage led to health care services being over-utilized (Yip and Hsiao, 1997). To contain medical costs and widen the coverage, the Chinese government launched a reform of the health insurance system in 1998. This reform increased the cost sharing for patients through a combination of deductible, coinsurance and individual medical savings accounts (MSAs). Therefore, the UEBMI reform provides a unique opportunity to examine the price sensitivity of health care consumption behavior in China. To our knowledge, this study is the first to investigate how increased patient cost sharing in UEBMI affects utilization, expenditures and health among urban employees.

Few empirical studies have focused on the UEBMI reform since its inception in 1998 (Yip and Hsiao, 1997; Liu *et al*., 2002; Dong, 2003; Liu and Zhao, 2006; Ding and Zhu, 2007). The existing studies have limitations that must be considered. First, the UEBMI reform may have increased the health care access and expenditures for the uninsured because of the coverage expansion; in addition, the reform may also have decreased the demand for health care from former enrollees because of increased patient cost sharing. Failing to disentangle these two effects could lead to ambiguous results. Second, a simple pre-post comparison analysis could not identify the true effects of the UEBMI reform, because the results of such an analysis are confounded by other supply-side interventions. Finally, some previous studies have examined relatively small pilot areas or used short observation periods, and hence, the results of such studies may not be nationally representative.

This study offers several advantages over previous empirical studies. First, we use the uninsured population over the reform period as the control group to eliminate the potential influence of other changes during the same period. Second, to estimate the effects of cost sharing, rather than of new insurance provision, we restrict our treatment group to respondents who were UEBMI enrollees after the reform and previous insurance beneficiaries before the reform. We exclude individuals who were covered by UEBMI after the reform but who were previously uninsured. Third, the China Health and

Nutrition Survey (CHNS) was not updated to incorporate "UEBMI" as a new insurance option until the 2006 wave. Thus, we are unable to determine when the transition from previous system to UEBMI occurred for each individual. We employ two complementary methods to address this problem: first, we impute the probability of UEBMI enrollment for each individual based on geographical and time variations in enrollment, and second, we exclude the data from 2000 wave for individuals with ambiguous insurance status in that year. We find broadly similar results using these two methods. Finally, we use a nationally representative longitudinal data from CHNS and fully exploit the information from the pre-UEBMI period (from the 1991, 1993 and 1997 waves of CHNS) and the post-UEBMI period (from the 2000, 2004 and 2006 waves of the CHNS) so that we are able to provide more generalized evidence of the UEBMI reform.

We have two main findings. First, we find that increased cost sharing in UEBMI is associated with decreased medical utilization and expenditure. Examining the patterns of access and expenditures in more detail, we find that the probability of utilizing outpatient care decrease 6.9-7.0% and that the outpatient expenditures decline by 35.2-35.4% due to the UEBMI reform. In contrast, the effects of UEBMI on inpatient care utilization and expenditure are consistently insignificant and small, due to either smaller cost-sharing changes in inpatient care or to smaller response to cost-sharing for more serious medical conditions. This findings suggest that moral hazard has a great impact on the demand for health care in China, and that overuse has been mitigated by the UEBMI reform via the introduction of a cost sharing-mechanism to some extent. Second, we do not find that the greater patient cost sharing significantly affects health outcomes, measured by self-reported health status. Because health is a stock, it might still be too early to evaluate the long-term effects of cost sharing on self-reported health status.

The remaining sections are organized as follow. Section 2 briefly introduces the institutional background; Section 3 describes the data and presents the identification strategy; and Section 4 discusses the main results of our study. The final section discusses several policy implications of our findings.

2. Urban Employee Basic Medical Insurance

Before the reform, China's previous medical insurance system for urban employees primarily consisted of the Government Insurance Scheme (GIS) and Labor Insurance Scheme (LIS). Both schemes provided comprehensive benefits with minimal cost sharing for employees in public-sector, state-owned, and collectively owned enterprises and partial coverage for their dependents.

The nearly full insurance coverage of GIS and LIS coupled with a fee-for-service payment method on the supply side led to health care services being over-utilized, resulting in excessive escalation of health care costs and inefficient resource allocations. Although these two programs covered only 15 percent of the total population, by 1993, they accounted for 36% of total health spending and approximately two-thirds of all public spending on health (World Bank, 1996).

To contain medical costs and widen insurance coverage, the Chinese government launched a health insurance reform in 1998 by merging the GIS and LIS systems into the new UEBMI system. UEBMI is a government-run mandatory insurance program based on employment. UEBMI began as a pilot program in 1994 and rapidly expanded from 40 of 349 prefecture-level cities in 1998 to 339 cities in 2001 and to most cities in 2002. By the end of 2002, 69.3 million workers were covered by UEBMI; this number is equivalent to 96% (72.1 million) of the urban employees in the enterprise sector[3].

The UEBMI is the largest among social medical insurance plans in China and primarily financed by payroll taxes paid by both employers (6%) and employees (2%). The contributions of employers are divided into two accounts: 70% goes into a social pooling account (SPA), and 30% is deposited into individual medical savings accounts (MSAs). The funds paid by employees are deposited into their MSAs.

The SPA is primarily used for inpatient services and outpatient services for catastrophic illness and administrated by the local government. MSAs are primarily used for outpatient services, as well as for drug purchase from contracted providers. Before the

[3] Data resource is *China Labor and Social Security Yearbook, 2000-2006*. See Table 1 for more information.

SPA pays inpatient expenditures, however, patients must first pay a deductible (approximately 10% of annual wages) and coinsurance (usually 20-30%). When the maximum benefit (four times the average annual wage of a local urban worker) has been paid by an SPA or an individual's MSA is exhausted, then the individual must pay his or her expenses out of pocket. Unspent funds in MSAs can be carried over to the next year. Any remaining of an individual's MSA balance at death can become part of the person's estate.

MSAs were initiated in Singapore and then experimented in the United States, China, South Africa (Hanvoravongchai, 2002). MSAs can reduce the waste from the excessive use of generously insured care by providing incentives for patients to be more cost-conscious in their consumption of medical services (Keeler *et al.*, 1996). Compared with the GIS and the LIS, UEBMI increases cost sharing for patients through a combination of deductibles, coinsurance and individual medical savings accounts (MSAs). As the real coinsurance rate raises the effective price of medical care, insured individuals paid more out of pocket for medical services after the reform; thus, the utilization of medical services, and hence health outcomes, will change. However, few studies are available concerning how patient cost sharing in UEBMI affects utilization, costs and health.

In Figure 1, we plot the cost sharing changes that occurred during the reform period using CHNS data. Before the reform, approximately 30-40% of outpatient medical expenditures were paid out of pocket by LIS beneficiaries. After the reform, out-of-pocket payments accounted for a greater proportion of spending; this proportion was as high as 93% in 2006. In contrast, the share of inpatient expenditures paid by patients increased only modestly, from 20 to 30%, over the same period. Thus, MSAs, together with higher deductibles and coinsurance payments, increased the real level of patient cost sharing, particularly for outpatient care, and thereby created strong incentives for patients to save their own money by choosing health care services in a cost-conscious manner.

[Figure 1] (to be inserted here)

The LIS was replaced by the new UEBMI a decade ago. Nonetheless, the integration of GIS is not yet complete. Some central government agencies and several provincial government agencies have not participated in the UEBMI simply because government civil servants would prefer to enjoy nearly free medical care under the GIS (Xu, et al., 2007). Although cost sharing for GIS beneficiaries has increased slightly since the UEBMI reform and the out-of-pocket spending has also increased, the GIS remains the most generous public health insurance program.

Although UEBMI has expanded the coverage for employees, there are still a large number of uninsured urban residents due to no formal employment. To provide health protection for those people, the government launched an Urban Resident Basic Medical Insurance (URBMI) program in 2007. For uninsured rural residents, the New Cooperative Medical Scheme (NCMS) was implemented in 2003.

So far, China has achieved nearly universal health insurance coverage. In 2011, 1.28 billion people, which are more than 95% of the population of China (National Bureau of Statistics of China, 2012), were covered by public health insurance, namely, the UEBMI, URBMI and the NCMS. As stated by Yip *et al*. (2012), accomplishing nearly universal insurance coverage in such a short period of time is commendable, but transforming insurance coverage into cost-effective services is difficult. It is a real challenge for policymakers to develop a fair, affordable and sustainable system of social health insurance.

3. Data and Identification

3.1 Data

CHNS data used in this study are provided by the Chinese Center for Disease Control and Prevention and by the Population Research Center of the University of North Carolina in the USA. The first round of the CHNS was conducted in 1989. Eight subsequent waves followed, in 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011. The household and individual survey includes modules on respondent demographics, health, nutrition and income. Since 1991, detailed information has been collected on health care utilization and health-related behaviors. In this study, data from six CHNS waves surrounding the UEBMI reform are examined, including data from the 1991-1997 waves, which are collected before the reform, and data from the 2000-2006 waves, which are collected following the enactment of UEBMI.

The UEBMI reform may have impacted the medical care utilization and health outcomes differently in different population groups. After the reform, UEBMI provided insurance coverage for the previously uninsured and reduced their out-of-pocket spending. However, for individuals with former generous GIS or LIS coverage, the reform increased their cost sharing through coinsurance and MSAs. The aim of this study is to estimate the effects of increased cost sharing that occurred as a consequence of the UEBMI reform; therefore, we exclude individuals who were covered by UEBMI in wave 2006 but were uninsured before that time. The final sample consists of 1764 urban respondents in each pre- and post-UEBMI period. A total of 382 respondents who initially enrolled in GIS or LIS but switched to UEBMI in 2006 are classified as the treatment group, and 1382 respondents who never enrolled in any public health insurance throughout the entire study period are classified as the control group. The respondents in our sample were interviewed at least twice, i.e., at least once in each period, yielding an unbalanced panel of 7065 observations. The main variables and summary statistics are presented in Table 2.

3.2 Dependent Variables and Key Independent Variable

The main dependent variables in our study are medical utilization and medical expenditures. The utilization variables take a value of one when total spending, outpatient spending or inpatient spending is positive and take a value of zero otherwise. The expenditure variables are the amount of annual medical spending (in 2011 RMB).

The goals of the UEBMI reform were to curb the overutilization of health care services and to improve the efficiency and equity of medical resource allocation. Nonetheless, medical costs should not be contained at the expense of appropriate health care utilization and population health. However, defining appropriate care requires detailed information of the clinical situation and its intervention for each patient (Sanmartin *et al*., 2008), which is not available is CHNS data. Thus, we make a crude assumption that if patients are more likely to experience adverse health consequences after the reform, they may suffer from the lack of provision of necessary care as a result of increased cost-sharing; if not, they may just reduce the use of inappropriate care. For this purpose, we examine not only the effects of UEBMI on medical utilization and spending but also on health outcomes, which are measured using self-reports of poor health status.

The key explainable variable is whether an individual is enrolled in UEBMI. Ideally, after the enactment of UEBMI in 1998, the CHNS would have added UEBMI as a new medical insurance option[4]. Unfortunately, however, the survey did not update this question until the 2006 wave, nearly 8 years after the inception of UEBMI. Thus, we do know that all the treated were switched from the previous GIS/LIS system to the new UEBMI system by 2006, but we do not know when these transitions occurred. In 2000 and 2004 wave, urban employees who were actually covered by UEBMI could not indicate this in the CHNS; instead, they probably misreported to have their previous insurance plans.

We employ two complementary methods to correct for UEBMI misreporting. First, we follow Brown and Goolsbee's (2002) procedure by imputing the probability of UEBMI enrollment for each individual using geographical and time variations in the UEBMI coverage. We use official statistics to compute this measure. The numbers of UEBMI enrollees for each province in each year were published in the *China Labor and Social Security Yearbook 2000-2006*. As shown in Table 1, we calculate the coverage as the ratio of workers covered by UEBMI to total urban employment in an enterprise or an institution in a given province. We then match the UEBMI coverage data to the CHNS data and use this measure as the probability that the individual had transitioned from the previous GIS/LIS to the current UEBMI. For example, for those individuals in our treatment group from Liaoning province, the key independent variable *UEBMI* takes a value of 0.1662 for the 2000 wave and a value of 1 for the 2004 wave.

[Table 1] (to be inserted here)

The other approach we use is to exclude the observations with ambiguous insurance status. As previously mentioned, UEBMI expanded rapidly, from being implemented in

[4]Beginning in the 1991 wave, CHNS respondents were asked whether they had any medical insurance. If they answered yes, the respondents were then asked which of the following types of medical insurance they had: GIS, LIS, Cooperative insurance, and other insurance. In 2006 wave, the UEBMI replaced LIS as an option.

40 cities of a total of 349 prefecture-level cities in 1998 to 339 cities in 2001. As shown in Table 1, all surveyed provinces (except for Guizhou) have more workers covered by UEBMI than the reported local urban employment in 2004. Even in Guizhou province, the coverage rate is greater than 95%. Thus, it is reasonable to assume that the vast majority of urban employees with previous GIS/LIS had transitioned into the new UEBMI by this time[5]. For all treated individuals, the key independent variable *UEBMI* takes the values of 1 in the 2004 wave. However, the year 2000 is in the middle of the transition, and the extent to which individuals were enrolled in UEBMI at that time is unknown. Thus, we exclude all observations in the 2000 wave and instead use data from 2004 and 2006 wave for the post-UEBMI period. This exclusion cause our sample to shrink to 5013 observations. Moreover, this specification provides assurance that our results are not be driven by patients stockpiling drugs or seeking care in anticipation of the policy change. Such behavior may magnify the reduction in utilization and expenditures after the UEBMI reform and hence, lead to an upward bias. Therefore, we prefer this specification as our baseline model.

Following the literature (Chen *et al*., 2007; Ding and Zhu, 2007; Chang, 2012; Liu and Zhao, 2014), we also control for a set of demographic, socioeconomic and health characteristics in the model. The demographic characteristics that we consider are age, gender, marital status and residential area; the socioeconomic characteristics that we control for are education and household income level; and health status are measured by self-reporting, as well as chronic diseases (as measured by a diagnosis of hypertension, diabetes, heart disease and stroke).

3.3 Descriptive Statistics

Table 2 illustrates the outcomes and characteristics of the UEBMI beneficiaries (treated) and the non- beneficiaries (control) before and after the enactment of the UEBMI reform

[5] It is true that the coverage above 100% does not necessarily mean that every worker with LIS has transitioned into UEBMI because UEBMI also increases the coverage to the previously uninsured. However, it is much easier to persuade an employer to transition from self-insurance to social insurance and harder to ask an employer to provide new benefits. Thus, in the early stages, most UEBMI enrollees were former GIS/LIS enrollees

was enacted. There were differences in health utilization and expenditures between the treated and control group before the reform, but the gaps narrowed after the reform. Before the reform, the enrollees were 3.2% (0.089-0.057) more likely to use medical care and had 86% ((0.067-0.036)/0.036) higher total spending. After the reform, these numbers declined to 1.7% (0.144-0.127) and 44% ((0.196-0.136)/0.136), respectively. These expletory results are supported by the regression analyses discussed in next section.

Compared with the treatment group, respondents in the control group were more likely to be female, younger, and less educated and have lower household incomes. They were also less likely to suffer from chronic disease (e.g., hypertension and diabetes) but more likely to report poor health status. It is not surprising that individuals in disadvantageous socioeconomic conditions were more likely to be uninsured, because the urban public health insurance programs were primarily employment-based during the study period.

[Table 2] (to be inserted here)

3.4 Identification Strategy

The UEBMI reform in China aims to address the moral hazard by establishing a cost-sharing mechanism for patients, particularly through individual saving accounts that can be used to pay for outpatient treatment. To evaluate whether the reform has resulted in expectable achievements, we must investigate whether the reform has reduced the overuse of medical resources.

However, a simple pre-post comparison analysis could not identify the true UEBMI reform effects because the results were confounded by other supply-side interventions, such as changes in provider payment methods and price regulations. To isolate the insurance effect from the effects of other policies, we specify a reduced-form relationship and conduct a difference-in-difference (DID) analysis, with the uninsured as the control group and the insured as the treatment group. This strategy compares the post- and pre-reform changes in medical utilization and expenditures for the treatment group to the corresponding changes for the uninsured over the same period. These two changes produce a negative difference-in-difference if the UEBMI reform effectively controls the overuse of medical services. Unlike the voluntary URBMI and NCMS, UEBMI enrollment is mandatory, and individual choice has little influence on the UEBMI enrollment decision after an individual accepts a job. Therefore, it is reasonable to assume that the UEBMI reform is exogenous to individuals. To control for time-invariant unobservable, we take advantage of the longitudinal data and specify the individual fixed effects. We denote an individual by *i*, the residential province by *s*, and the year by *t*. Following the literature (Chen *et al*., 2007; Aron-Dine *et al*., 2013; Liu and Zhao, 2014), the baseline difference-in-difference model takes the following forms:

$$Y_{ist} = \beta_0 + \beta_1 UEBMI_{ist} + \beta_2 X_{ist} + \tau_t + \alpha_{st} + \mu_i + \varepsilon_{ist}$$

where an outcome Y_{ist} (i.e., medical utilization or expenditure) is the dependent variable. We transform the medical expenditure data, which were skewed, by taking the natural logarithm. The key explanatory variable $UEBMI_{ist}$ indicates individual *i*'s UEBMI enrollment status at time *t* (specifically, an interaction between an indicator variable for being in the treated group, who experience a substantial increase in cost sharing, and an indicator variable for being in the post-UEBMI period). X_{ist} is a vector of individual observable characteristics. We include year fixed effects (τ_t) and a full set of province-by-year interactions (α_{st}) to account for any effects of time trends or province-specific time trends. We also include individual fixed effects (μ_i) to control for time-invariant unobservable confounders. In all of our analyses, we cluster the standard errors on the household identifier.

The key identifying assumption here is that other factors exert the identical influences on the control group and treatment group so that all the changes in utilization and expenditures can only be attributed to the UEBMI reform. However, it has been reported that in Zhenjiang City, where the UEBMI is strictly regulated by local social insurance agency, hospital profits from insured patients are limited; thus, hospitals turn to the uninsured patients to increase their profits and give such patients unnecessary checkups and drugs (Development Research Center of the State Council, 2005). Such different influences alone will also lead to relative reduction in care use and costs for the insured, thus will cause us to overstate the effect of cost sharing. In contrast, a recent study by Lu

(2014) examines doctor's prescription decision using a field experiment in China and finds that when expecting revenues from drug prescription, doctors write 43% more expensive prescriptions to insured patients than to uninsured patients. Such behavior will then cause us to underestimate the effect of cost sharing. Taken together, the impacts of supply-side on utilization and expenditures are ambiguous and may offset each other.

4. Empirical Results

4.1 UEBMI effects on health care utilization and expenditure

Table 3 shows the treatment effects of the UEBMI reform on several measures of health-care utilization and expenditures. Each cell reports a coefficient of *UEBMI* and its standard error (in parentheses). Column 1 shows the fixed effects estimates of the intent-to-treat (ITT) effect of UEBMI for the target population. Columns 2 and 3 report the impact of the UEBMI reform using provincial UEBMI coverage data or dropping observations with ambiguous insurance status to correct for UEBMI misreports.

[Table 3] (to be inserted here)

In table 3, panel 1 examines the impact of UEBMI on medical utilization. The results indicate a 5.1-9.2 percentage point decrease in the probability of individual's utilization of formal medical services due to the UEBMI reform. As expected, the ITT estimate tends to underestimate the true effect of the reform because the ITT estimate assumes that all individuals in the treatment group had been treated since 2000. In fact, the UEBMI system was not available in all the cities until the end of 2002. Therefore, the ITT estimate mixes the effect of the new UEBMI with the effect of previous GIS/LIS.

Because the CHNS questionnaire was not updated until several years after the launch of UEBMI, we could not determine from the survey exactly when the GIS/LIS enrollees became UEBMI enrollees. Thus, to clearly identify the impact of the UEBMI reform, we employ two complementary strategies. First, we use provincial UEBMI coverage to proxy the possibility of UEBMI enrollment for each individual in that province for that year. The other approach we use is to exclude the observations with ambiguous insurance status. Thus, we exclude all observations from the 2000 wave and instead use 2004 and 2006 wave as the post-UEBMI period. We find broadly similar results using these plausible alternative models: the possibility of formal health care utilization decrease 8.7-9.2 percentage point because of the UEBMI reform.

Panel 2 and 3 show the results for outpatient care and inpatient care separately. As noted above, the UEBMI reform primarily increased the cost-sharing of outpatient care; in contrast, the cost sharing of inpatient care remained relatively stable. The results for outpatient care exhibit the same pattern as those for all health care. The probability of outpatient care utilization decreases by 6.9-7.0 percentage point due to the UEBMI reform. In contrast, the effects of UEBMI on inpatient care utilization are consistently insignificant and small, suggesting either there were smaller cost-sharing changes of inpatient care or smaller responses to cost-sharing for more serious medical conditions.

Panel 4-6 report results for logged medical expenditures. The ITT estimate suggests a 21.3% decline in average total medical spending for UEBMI target population. After correcting the misreports, there is a sizeable and statistically significant reduction of 35.7-39.1% total medical expenditures. A similar pattern is again observed for outpatient expenditures but not for inpatient expenditures. The UEBMI reform significantly decreases the outpatient expenditure by 35.2-35.4%. The increased cost-sharing associated with UEBMI has no impact on inpatient expenditure; this finding is consistent with the results of a study by Aron-Dine *et al*. (2013) using RAND health insurance experiment data.

Table 4 shows the estimation of the UEBMI reform and other characteristics' effect on health-care utilization and expenditures using the baseline specification (with 2004 and 2006 wave as post-UEBMI period). The estimation results of control variables are consistent with the literature. For medical utilization and expenditures, the most predictive variables have been reported to be self-perceived health status and the presence of any chronic disease (Chen *at el*., 2007). Using the worst self-evaluated health status as a reference, all other health dummy variables have highly significant negative coefficients in the model, which means that better health leads to decreased medical utilization and expenditures. Studies have shown that chronic diseases greatly increase the utilization of medical services (Liu *et al.*, 2003). We find that the total medical expenses of people with high blood pressure and heart disease are 55.4% and 160% greater, respectively, than those of people without these diseases. Finally, a 10% increase in household income results in a 0.58% increase in total medical expenditures.

[Table 4] (to be inserted here)

4.2 Heterogeneous effects of UEBMI

Table 5 shows the treatment effects of the UEBMI reform for different subgroups using the baseline specification. As shown above, the sensitivity of medical consumption to its price varies with patient's health conditions. If cost-sharing mechanisms in the UEBMI system lower the actual reimbursement rate, then insured patients reduce their excessive demands, we should find that such effect is stronger for less serious medical conditions, such as common cold. We further restrict the sample to those individual who ever had symptoms, e.g., fever, sore throat or cough during the previous four weeks. As shown in column 1, patients suffered from such less serious medical condition are more responsive because they are more likely to take some unnecessary care or drugs under such situation.

In column 2, we focus on working age adults and exclude the data for people older than 60 years of age. People are still covered by UEBMI when they retired but they are not covered when they become unemployed. We find that the UEBMI reform has broad negative effects on total and outpatient utilization and expenditure for working age adults, and their probability of outpatient care utilization decreases 6.6 percentage point and their outpatient expenditure falls by 25.4%. The results suggest that although working age adults may be less price sensitive than the elderly, the baseline results in Table 3 could not be driven only by the elderly. These findings are consistent with Skipper (2013) on the price elasticity of demand for prescription drugs in Denmark, which the elderly are more price sensitive in his study.

In column 3-5, we examine the differential effects of the UEBMI reform for low-income (30^{th} percentile or below), meddle-income (between the 30^{th} and 70^{th} percentile) and high-income (70^{th} percentile or above) households. The results show that the increased cost-sharing of UEBMI has stronger negative impacts for low- and meddle-income groups: their probabilities of utilizing outpatient care decrease 23.4 and 6.5 percentage point and their outpatient spending decline by 63.5 and 41.4%, respectively. However, the UEBMI reform has no significant effect on the outpatient care utilization and expenditures for high-income households. The MSA balances, which are mainly used for the outpatient services, are typically proportional to wages, and the low- and meddle-income groups are likely to use up their MSA funds more quickly and to incur larger out-of-pocket payment, as a result, the low- and meddle-income groups are more sensitive to changes in cost sharing. These findings are consistent with those of Liu and Zhao (2014), who investigate the effects of URBMI and find that the high-income group is less responsive to price changes.

[Table 5] (to be inserted here)

4.3 UEBMI effects on health outcome

We find that the UEBMI reform reduces health-care utilization and expenditures and reliefs moral hazard through cost-sharing mechanisms. Nonetheless, little is known about whether the reform has any detrimental effect on health status. To answer this question, we investigate the effects of the reform on health outcomes, as measured by self-reported poor health status. For the precision of dependent variable, we exclude all observations for which self-reported health status is unavailable[6].

In contract to the effects on utilization and expenditures, we do not find any evidence that the UEBMI reform affects health outcomes. As shown in Table 6, the UEBMI reform has a consistently negative but statistically insignificant association with self-perceived poor health status in different specifications. Nonetheless, the long-term health consequences of increased cost sharing are unclear. The RAND experiment also find that higher patient payment significantly reduce medical care utilization, without any adverse health outcome on average (Newhouse, 1993).

[Table 6] (to be inserted here)

---

[6] We create a binary variable indicating whether the self-reported health status is missing and we control this variable in previous analyses.

Taken together, these results suggest that greater patient cost-sharing instituted by the UEBMI reform has significantly reduced both the medical care utilization and expenditures, without any adverse health outcome. Much of the savings may be derived from reduced use of expensive high-tech diagnostic procedures or drugs, according to the observation by Yip and Hsiao (1997) from Zhenjiang, one of the polite cities of UEBMI. Hence, the increased cost-sharing can help reduce the scope for moral hazard and control the excessive medical demands to some extents.

5. Conclusion Remarks

It is difficult to identify the causal effects of cost-sharing without a controlled experiment due to unobserved characteristics in the presence of self-selection. This paper attempts to contribute to the literature by the UEBMI reform in China as a natural experiment to identify variations in patient cost sharing and examine its effect on demand for health care services. We exploit the changes in health care consumption and health status both across groups (treated vs. control) and across time (before and after the UEBMI reform) to estimate the causal effect of UEBMI reform.

There are two main findings of this study. First, we find that increased cost sharing in UEBMI is associated with decrease in medical care utilization and expenditures. After examining the patterns of access and expenditures in more detail, we find that the probability of utilizing outpatient care decreases by 6.9-7.0 percentage point and that outpatient expenditures decline by 35.2-35.4% due to the UEBMI reform. In contrast, the effects of UEBMI on inpatient care utilization and expenditures are consistently insignificant and small either because cost-sharing changes for inpatient care are smaller than those for outpatient care or because people exhibit smaller sensitivity to cost sharing for more serious medical conditions. These findings suggest that moral hazard has greatly impacts on the demand for health care in China and the overuse that occurred before the UEBMI system was implemented has mitigated to some extent after its implementation by the introduction of a cost-sharing mechanism.

Second, we do not find that the greater patient cost sharing significantly affects health outcomes, measured by self-reported poor health. Since health is a stock, it might be still too early to be able to determine the long-term effects of cost sharing on health outcomes.

The study also has strong policy implications. According to an article published in *The Lancet* (Hu et al., 2008), the most important health-related challenges that will be faced in the 21st century are how to finance, provide and organize health care. China has preliminarily established a social health insurance system that covers the largest population in the world. The development of a fair, affordable and sustainable system of social health insurance offers real challenges for policymakers. Our study indicates that a restraint mechanism of the public medical insurance with appropriate supply-side controls may be an effective method of mitigating the overconsumption of medical services and promoting the efficiency of medical resource allocation. Thus, the government should accelerate the integration of GIS into UEBMI to improve both efficiency and equity.

The results of this study should be interpreted with caution because they are subject to a number of limitations. First, we could not directly measure the coinsurance rate using CHNS data. Thus, in contrast with previous literature (Manning, 1987), we could not precisely estimate the price elasticity of health-care demand. Second, because UEBMI only began 16 years ago, it may still be too early to assess its long-term effects on health.

REFERENCES

Aron-Dine A, Einav L, Finkelstein A. 2013. The RAND health insurance experiment, three decades later. *Journal of Economic Perspective* **27**(1): 197-222.

Baicker K, Goldman D. 2011. Patient cost-sharing and healthcare spending growth. *The Journal of Economic Perspectives* **25**(2):47-68.

Brown JR, Goolsbee A. 2002. Does the internet make markets more competitive? Evidence from the life insurance industry. *Journal of Political Economy* **49**: 481-507.

Card D, Dobkin C, Maestas N. 2008. The impact of nearly universal insurance coverage on health care utilization: Evidence from Medicare. *American Economic Review* **98**(5): 2242-2258.

Chandra A, Gruber J, McKnight R. 2010. Patient cost-sharing and hospitalization offsets in the elderly. *American Economic Review* **100**(1):193-213.

Chandra A, Gruber J, McKnight R. 2014. The impact of patient cost-sharing on low-income populations: Evidence from Massachusetts. *Journal of Health Economics **33***(1): 57-66.

Chang S. 2012. The effect of Taiwan's National Health Insurance on mortality of the elderly: revisited. *Health economics*, **21**(11): 1257-1270.

Chen L, Yip W, Chang MC, Lin HS, Lee SD, Chiu YL, Lin YH. 2007. The effects of Taiwan's national Health Insurance on access and health status of the elderly. *Health Economics* **16**(3): 223–242.

Chen Y, Jin GZ. 2012. Does health insurance coverage lead to better health and educational outcomes? Evidence from rural China. *Journal of Health Economic*s **31**(1): 1-14.

Currie J, Gruber J. 2001. Public health insurance and medical treatment: the equalizing impact of the Medicaid expansions. *Journal of Public Economics* **82**(1): 63-89.

Cutler DM, Gruber J. 1996. The effect of Medicaid expansions on public insurance, private insurance, and redistribution. *American Economic Review* **86**(2): 378-383.

Development Research Center of the State Council. 2005. Appraisal and suggestion of China's health-care reforms.

Ding JH, Zhu ML. 2007. Welfare effects of public health insurance reform: the case of urban China. *Frontiers of Economics in China* **2**(3): 289-323.

Dong W. 2003. Health care financing reforms in transitional society: a Shanghai experience. Special Issue on Health and Equity. *Journal of Health, Population and Nutrition* 223-234.

Finkelstein A, McKnight R. 2008. What did Medicare do? The initial impact of Medicare on mortality and out of pocket medical spending. *Journal of Public Economics* **92**(7): 1644-1668.

Finkelstein A, Taubman S, Wright B, Bernstein M, Gruber J, Newhouse JP, Allen H, Baicker K. 2012. The Oregon Health Insurance Experiment: Evidence from the First Year. *The Quarterly journal of economics* 127(3): 1057-1106.

Grossman M. 2000. The human capital model. *Handbook of Health Economics*, vol. 1A, Elsevier, Amsterdam, pp. 347-408.

Hanvoravongchai P. 2002. Medical savings accounts: lessons learned from international experience. World Health Organization.

Hu S, Tang S, Liu Y, Zhao Y, Escobar ML, de Ferranti D. 2008. Reform of how health care is paid for in China: Challenges and opportunities. *The Lancet* **372**(9652): 1846-1853.

Keeler EB, Malkin JD, Goldman DP, Buchanan JL. 1996. Can medical savings accounts for the nonelderly reduce health care costs? *The Journal of the American Medical Association*, **275**(21), 1666-1671.

Lei X, and Lin W. 2009. The new cooperative medical scheme in rural China: Does more coverage mean more service and better health? *Health Economics* **18**: S25-S46.

Lin W, Liu GG, Chen G. 2009. The urban resident basic medical insurance: A landmark reform towards universal coverage in China. *Health Economics* **18**: S83-S96.

Liu Y. 2002. Reforming China's urban health insurance system. *Health Policy* **60**(2): 133-150.

Liu H, Zhao Z. 2014. Does health insurance matter? Evidence from China's urban resident basic medical insurance. *Journal of Comparative Economics* **42**(4):1007-1020.

Liu, Gordon G, Zhao ZY. 2006. Urban employee health insurance reform and the impact on out-of-pocket payment in China. *The International Journal of Health Planning and Management* **21**(3): 211-228.

Liu, Gordon G, Zhao ZY, Cai RH, Yamada T, Yamada T. 2002. Equity in health care access to: assessing the urban health insurance reform in China. *Social Science & Medicine* 55(10): 1779-1794.

Lu F. 2014. Insurance coverage and agency problems in doctor prescriptions: Evidence from a field experiment in China. *Journal of Development Economics* **106**: 156-167.

Manning, Willard G, Joseph P, Newhouse, Duan N, Emmett B, Keeler , Arleen L. 1987. Health insurance and the demand for medical care: Evidence from a randomized experiment. *American Economic Review* **77**(1) 251-277.

Newhouse, Joseph P. 1993. Free for all? Lessons from the RAND health insurance experiment. Harvard University Press.

Sanmartin, Claudia, Kellie M, Nicole C, Barbara C, Lindsay M, Eric B, Michael J, Dunbar et al. 2008. Appropriateness of healthcare interventions: concepts and scoping of the published literature. *International journal of technology assessment in health care* **24**(3): 342-349.

Shigeoka, H. 2014. The effect of patient cost-sharing on utilization, health and risk protection *American Economic Review* **104**(7): 2152-2184.

Skipper, N. 2013. On the demand for prescription drugs: Heterogeneity in price responses. *Health economics* **22**(7): 857-869.

Wagstaff A, Yip W, Lindelow M, Hsiao W. 2009. China's health system and its reform: A review of recent studies. *Health Economics* **18**: S7--S23.

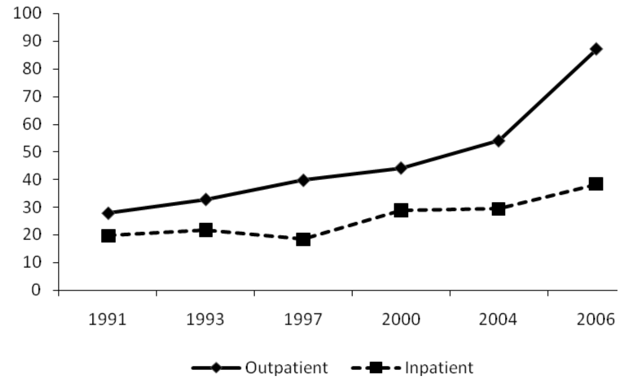
Wang H, Yip W, Zhang L, Hsiao WC. 2009. The impact of rural mutual health care on health status: Evaluation of a social experiment in rural China. *Health Economics* **18**: S65--S82.

World Bank. 1996. China: Issues and options in health financing. Washington: World Bank.

Xu L, Wang Y, Collins C, Tang S. 2007. Urban health insurance reform and coverage in China using data from national health services surveys in 1998 and 2003. *BMC health services research* **7**:37.

Yip W, Hsiao WC. 1997. Medical savings accounts: lessons from China. *Health Affairs* **16**(6): 244-251.

Yip W, Hsiao WC, Chen W, Hu S, Ma J, Maynard A. 2012. Early appraisal of China's huge and complex health-care reforms. *The Lancet* **379** (9818): 833-842.



Source: Based on 1991-2006 CHNS data. Insured employees were covered by the LIS from 1991-2004 and by UEBMI in 2006.

Figure 1. Out-of-pocket payments as a proportion of total medical expenditures by the insured

Table1. UEBMI coverage from 1999 to 2005

	1999	2000	2001	2002	2003	2004	2005
All	18.25%	36.89%	74.59%	96.08%	111.19%	124.58%	133.37%
Liaoning	8.81%	**16.62%**	55.94%	137.26%	138.63%	**153.87%**	170.03%
Heilongjiang	6.26%	8.79%	54.49%	71.94%	80.76%	102.62%	117.65%
Jiangsu	7.85%	48.48%	77.05%	122.01%	143.02%	174.54%	190.68%
Shandong	30.34%	37.44%	76.63%	97.38%	107.23%	117.57%	110.19%
Henan	5.38%	49.27%	79.37%	93.66%	100.32%	105.91%	113.61%
Hubei	5.02%	34.87%	61.49%	80.85%	94.19%	100.81%	106.66%
Hunan	1.75%	34.94%	111.49%	124.01%	136.20%	158.55%	154.66%
Guangxi	3.99%	4.89%	73.95%	95.23%	113.05%	128.49%	130.17%
Guizhou	0.00%	0.00%	20.93%	60.28%	86.32%	95.26%	106.89%

Note: We calculate coverage as the ratio of workers covered by UEBMI to urban employment in an enterprise or an institution in a given province. Data from the *China Labor and Social Security Yearbook, 2000-2006.*

Table 2. Summary statistics by period and treatment status

	Full sample	Pre-UEBMI (1991-1997)		Post-UEBMI (2000-2006)	
Variable		Treated	Control	Treated	Control
Dependent variables					
Any medical care	0.100	0.089	0.057	0.144	0.127
	(0.300)	(0.285)	(0.232)	(0.351)	(0.333)
Any outpatient care	0.080	0.081	0.051	0.106	0.098
	(0.272)	(0.273)	(0.220)	(0.308)	(0.298)
Any inpatient care	0.010	0.014	0.007	0.016	0.010
	(0.099)	(0.118)	(0.081)	(0.126)	(0.099)
Total medical spending (K)	0.100	0.067	0.036	0.196	0.136
	(1.090)	(0.629)	(0.398)	(1.515)	(1.399)
Outpatient spending (K)	0.045	0.022	0.017	0.072	0.066
	(0.586)	(0.265)	(0.232)	(0.780)	(0.765)
Inpatient spending (K)	0.047	0.043	0.016	0.103	0.059
	(0.906)	(0.572)	(0.315)	(1.266)	(1.159)
Explanatory variables					
Age	47.030	45.264	42.720	53.335	49.389
	(15.620)	(13.251)	(15.812)	(13.478)	(15.472)
Male	0.455	0.540	0.424	0.542	0.437
	(0.498)	(0.499)	(0.494)	(0.499)	(0.496)
Married	0.813	0.898	0.788	0.887	0.792
	(0.390)	(0.303)	(0.409)	(0.316)	(0.406)
Years of schooling	6.930	9.783	5.466	10.870	6.358
	(4.491)	(3.924)	(4.090)	(3.845)	(4.143)
HH income per capita (K)	6.001	5.444	3.871	13.664	5.734
	(6.680)	(2.865)	(3.431)	(10.962)	(6.192)
Chronic conditions (reference group: without such chronic disease)					
Hypertension	0.082	0.076	0.040	0.173	0.093
	(0.274)	(0.266)	(0.195)	(0.378)	(0.290)
Diabetes	0.018	0.017	0.004	0.066	0.015
	(0.131)	(0.129)	(0.065)	(0.248)	(0.122)
Heart Disease	0.004	0.001	0.001	0.014	0.005
	(0.066)	(0.038)	(0.034)	(0.117)	(0.072)
Stroke	0.009	0.001	0.002	0.024	0.013
	(0.095)	(0.038)	(0.039)	(0.154)	(0.113)
Self-reported health (reference group: missing this information)					
great	0.084	0.047	0.058	0.113	0.106
	(0.277)	(0.211)	(0.234)	(0.316)	(0.308)
good	0.361	0.255	0.274	0.465	0.433
	(0.480)	(0.436)	(0.446)	(0.499)	(0.496)
fair	0.253	0.132	0.148	0.346	0.348
	(0.435)	(0.338)	(0.355)	(0.476)	(0.476)
Poor	0.055	0.017	0.023	0.067	0.089
	(0.228)	(0.129)	(0.151)	(0.250)	(0.284)
Residential area (reference group: Suburb)					
city	0.220	0.612	0.104	0.612	0.110
	(0.414)	(0.488)	(0.306)	(0.488)	(0.313)
county	0.331	0.169	0.396	0.182	0.358
	(0.471)	(0.375)	(0.489)	(0.386)	(0.480)

Number of individuals	1764	382	1382	382	1382
Number of observations	7065	706	2577	869	2913

Note: Medical expenditure, household income are all inflated to the 2011 price level.

Table 3. Effects of UEBMI on medical care utilization and expenditure

		Pre-UEBMI (91-97) Post-UEBMI (00-06) (1)	Pre-UEBMI (91-97) Post-UEBMI (00-06) using coverage (2)	Pre-UEBMI (91-97) Post-UEBMI (04-06) (3)
Utilization	Total	-0.050**	-0.092***	-0.087**
		(0.023)	(0.025)	(0.027)
	Outpatient	-0.039**	-0.069**	-0.070**
		(0.018)	(0.021)	(0.023)
	Inpatient	-0.004	0.0003	-0.001
		(0.007)	(0.009)	(0.010)
Spending	Total	-0.213*	-0.391**	-0.357**
		(0.114)	(0.135)	(0.144)
	Outpatient	-0.199**	-0.354***	-0.352**
		(0.084)	(0.100)	(0.108)
	Inpatient	0.003	0.045	0.041
		(0.056)	(0.072)	(0.078)
N		7065	7065	5013

In each cell, we report the effect of UEBMI reform. Other control variables include individual characteristics such as age, marital status, education, household income, disease history and self-reported health status. We also control for province by wave dummy variable, year fixed effects, as well as individual fixed effects. Cluster-robust standard errors are reported in parenthesis.

*** $p<0.01$

** $p<0.05$

* $P<0.1$

Table 4. Estimation of UEBMI and other characteristics' effect on medical care utilization and expenditure: Pre-UEBMI (91-97) vs. Post-UEBMI (04-06)

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.087**	-0.070**	-0.001	-0.357**	-0.352**	0.041
	(0.027)	(0.023)	(0.010)	(0.144)	(0.108)	(0.078)
Age	-0.180	0.063	-0.097**	-0.930	0.154	-0.683**
	(0.118)	(0.100)	(0.041)	(0.630)	(0.486)	(0.316)
Married	-0.015	-0.020	-0.003	-0.064	-0.086	-0.042
	(0.021)	(0.019)	(0.009)	(0.112)	(0.087)	(0.067)
Years of schooling	-0.002	0.002	0.000	-0.006	0.006	-0.006
	(0.005)	(0.004)	(0.001)	(0.024)	(0.021)	(0.008)
Log(1+HH income per capita)	0.010**	0.008**	0.001	0.058**	0.045**	0.003
	(0.005)	(0.004)	(0.001)	(0.024)	(0.020)	(0.010)
Hypertension	0.098**	0.098***	0.026*	0.554***	0.356**	0.129
	(0.030)	(0.026)	(0.014)	(0.165)	(0.135)	(0.103)
Diabetes	0.032	0.113*	0.018	0.298	0.228	0.112
	(0.063)	(0.064)	(0.031)	(0.352)	(0.299)	(0.223)
Heart Disease	0.174	-0.063	0.175**	1.600**	0.263	0.983
	(0.109)	(0.070)	(0.087)	(0.793)	(0.484)	(0.616)
Stroke	0.031	0.041	0.034	0.442	0.166	0.341
	(0.083)	(0.069)	(0.054)	(0.570)	(0.415)	(0.434)
Great	-0.250***	-0.260***	-0.066**	-1.471***	-0.887***	-0.382**
	(0.037)	(0.039)	(0.020)	(0.208)	(0.182)	(0.143)
Good	-0.244***	-0.245***	-0.067***	-1.421***	-0.832***	-0.385**
	(0.036)	(0.037)	(0.020)	(0.201)	(0.176)	(0.138)
Fair	-0.177***	-0.200***	-0.056**	-1.058***	-0.663***	-0.330**
	(0.035)	(0.036)	(0.019)	(0.201)	(0.179)	(0.139)
N	5013	5013	5013	5013	5013	5013

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.

*** p<0.01

** p<0.05

* P<0.1

Table 5. Effects of UEBMI by population groups: Pre-UEBMI (91-97) vs. Post-UEBMI (04-06)

		Cold	16-59	Low HH income	Medium HH income	High HH income
		(1)	(2)	(3)	(4)	(5)
Utilization	Total	-0.290**	-0.070**	-0.019	-0.069	-0.067*
		(0.092)	(0.028)	(0.220)	(0.046)	(0.038)
	Outpatient	-0.245**	-0.066**	-0.234*	-0.065*	-0.046
		(0.078)	(0.024)	(0.124)	(0.039)	(0.031)
	Inpatient	0.037	-0.011	0.065	0.010	-0.010
		(0.023)	(0.009)	(0.108)	(0.017)	(0.012)
Spending	Total	-1.028**	-0.330**	0.166	-0.276	-0.325
		(0.453)	(0.146)	(1.184)	(0.234)	(0.203)
	Outpatient	-1.211***	-0.254**	-0.635**	-0.414**	-0.233
		(0.362)	(0.114)	(0.237)	(0.198)	(0.155)
	Inpatient	0.369**	-0.046	0.502	0.205*	-0.051
		(0.165)	(0.074)	(0.819)	(0.116)	(0.095)
N		1097	4031	1631	2016	1366

In each cell, we report the effect of UEBMI reform. Other control variables include individual characteristics such as age, marital status, education, household income, disease history and self-reported health status. We also control for province by wave dummy variable, year fixed effects, as well as individual fixed effects. Cluster-robust standard errors are reported in parenthesis.

*** p<0.01
** p<0.05
* P<0.1

Table 6. Effects of UEBMI on self-report poor health

	Pre-UEBMI (91-97) Post-UEBMI (00-06) (1)	Pre-UEBMI (91-97) Post-UEBMI (00-06) using coverage (2)	Pre-UEBMI (91-97) Post-UEBMI (04-06) (3)
UEBMI	-0.0180	-0.0281	-0.0337
	(0.0171)	(0.0182)	(0.0206)
Age	-0.127*	-0.126*	-0.0991
	(0.0687)	(0.0688)	(0.0888)
Married	-0.0282*	-0.0288*	-0.0301
	(0.0169)	(0.0169)	(0.0199)
Years of schooling	-0.000972	-0.000797	-0.00226
	(0.00302)	(0.00302)	(0.00341)
Log(1+HH income per capita)	-0.00876**	-0.00861**	-0.00989**
	(0.00366)	(0.00368)	(0.00445)
Hypertension	0.0596**	0.0594**	0.0632**
	(0.0229)	(0.0229)	(0.0269)
Diabetes	0.143**	0.144**	0.187**
	(0.0569)	(0.0569)	(0.0674)
Heart Disease	0.0702	0.0728	0.104
	(0.0937)	(0.0941)	(0.0979)
Stroke	0.458***	0.458***	0.473***
	(0.0785)	(0.0785)	(0.103)
N	5030	5030	3404

In each cell, we report the effect of UEBMI reform. Other control variables include individual characteristics such as age, marital status, education, household income, disease history. We also control for province by wave dummy variable, year fixed effects, as well as individual fixed effects. Cluster-robust standard errors are reported in parenthesis.

*** $p<0.01$
** $p<0.05$
* $P<0.1$

Appendix (online publication only)

Table A1. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs.Post-UEBMI (00-06)

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.050**	-0.039**	-0.004	-0.213*	-0.199**	0.003
	(0.023)	(0.018)	(0.007)	(0.114)	(0.084)	(0.056)
Age	-0.208**	-0.050	-0.053*	-0.893*	-0.273	-0.350*
	(0.086)	(0.074)	(0.028)	(0.462)	(0.354)	(0.203)
Married	-0.019	-0.018	-0.002	-0.101	-0.086	-0.030
	(0.017)	(0.016)	(0.007)	(0.094)	(0.077)	(0.051)
Years of schooling	-0.002	0.002	0.001	-0.002	0.008	-0.003
	(0.004)	(0.003)	(0.001)	(0.020)	(0.018)	(0.006)
Log(1+HH income per capita)	0.009**	0.008**	0.001	0.048**	0.035**	0.001
	(0.004)	(0.004)	(0.001)	(0.021)	(0.017)	(0.008)
Hypertension	0.088***	0.100***	0.020*	0.481***	0.334**	0.106
	(0.025)	(0.022)	(0.010)	(0.135)	(0.113)	(0.075)
Diabetes	-0.000	0.078	0.027	0.205	0.078	0.150
	(0.048)	(0.055)	(0.026)	(0.285)	(0.252)	(0.176)
Heart Disease	0.082	-0.086	0.123*	0.812	0.041	0.642
	(0.089)	(0.057)	(0.070)	(0.633)	(0.372)	(0.475)
Stroke	0.056	0.075	0.020	0.584	0.309	0.212
	(0.063)	(0.057)	(0.039)	(0.432)	(0.338)	(0.323)
Great	-0.238***	-0.218***	-0.052***	-1.350***	-0.819***	-0.305**
	(0.030)	(0.032)	(0.014)	(0.168)	(0.153)	(0.098)
Good	-0.226***	-0.208***	-0.054***	-1.309***	-0.781***	-0.316**
	(0.029)	(0.031)	(0.014)	(0.163)	(0.148)	(0.097)
Fair	-0.163***	-0.164***	-0.045***	-0.968***	-0.609***	-0.263**
	(0.029)	(0.030)	(0.013)	(0.163)	(0.148)	(0.096)
N	7065	7065	7065	7065	7065	7065

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** $p<0.01$
** $p<0.05$
* $P<0.1$

Table A2. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (00-06) using coverage

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.092***	-0.069**	0.000	-0.391**	-0.354***	0.045
	(0.025)	(0.021)	(0.009)	(0.135)	(0.100)	(0.072)
Age	-0.201**	-0.044	-0.054*	-0.862*	-0.245	-0.355*
	(0.086)	(0.074)	(0.028)	(0.460)	(0.354)	(0.204)
Married	-0.020	-0.019	-0.002	-0.108	-0.092	-0.029
	(0.017)	(0.016)	(0.007)	(0.094)	(0.077)	(0.051)
Years of schooling	-0.001	0.003	0.001	0.000	0.010	-0.003
	(0.004)	(0.003)	(0.001)	(0.020)	(0.018)	(0.006)
Log(1+HH income per capita)	0.010**	0.008**	0.000	0.051**	0.038**	0.000
	(0.004)	(0.004)	(0.001)	(0.021)	(0.018)	(0.008)
Hypertension	0.088***	0.100***	0.019*	0.482***	0.334**	0.105
	(0.025)	(0.022)	(0.010)	(0.135)	(0.113)	(0.075)
Diabetes	0.005	0.082	0.026	0.227	0.098	0.144
	(0.048)	(0.055)	(0.026)	(0.286)	(0.252)	(0.175)
Heart Disease	0.088	-0.082	0.123*	0.838	0.064	0.637
	(0.090)	(0.057)	(0.070)	(0.637)	(0.370)	(0.472)
Stroke	0.058	0.077	0.020	0.594	0.318	0.210
	(0.063)	(0.057)	(0.039)	(0.432)	(0.338)	(0.323)
Great	-0.236***	-0.216***	-0.052***	-1.343***	-0.813***	-0.307**
	(0.030)	(0.032)	(0.014)	(0.168)	(0.153)	(0.098)
Good	-0.224***	-0.207***	-0.054***	-1.302***	-0.774***	-0.318**
	(0.029)	(0.031)	(0.014)	(0.163)	(0.148)	(0.097)
Fair	-0.161***	-0.163***	-0.045***	-0.962***	-0.604***	-0.265**
	(0.029)	(0.030)	(0.013)	(0.163)	(0.149)	(0.096)
N	7065	7065	7065	7065	7065	7065

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** p<0.01
** p<0.05
* P<0.1

Table A3. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (04-06)

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.087**	-0.070**	-0.001	-0.357**	-0.352**	0.041
	(0.027)	(0.023)	(0.010)	(0.144)	(0.108)	(0.078)
Age	-0.180	0.063	-0.097**	-0.930	0.154	-0.683**
	(0.118)	(0.100)	(0.041)	(0.630)	(0.486)	(0.316)
Married	-0.015	-0.020	-0.003	-0.064	-0.086	-0.042
	(0.021)	(0.019)	(0.009)	(0.112)	(0.087)	(0.067)
Years of schooling	-0.002	0.002	0.000	-0.006	0.006	-0.006
	(0.005)	(0.004)	(0.001)	(0.024)	(0.021)	(0.008)
Log(1+HH income per capita)	0.010**	0.008**	0.001	0.058**	0.045**	0.003
	(0.005)	(0.004)	(0.001)	(0.024)	(0.020)	(0.010)
Hypertension	0.098**	0.098***	0.026*	0.554***	0.356**	0.129
	(0.030)	(0.026)	(0.014)	(0.165)	(0.135)	(0.103)
Diabetes	0.032	0.113*	0.018	0.298	0.228	0.112
	(0.063)	(0.064)	(0.031)	(0.352)	(0.299)	(0.223)
Heart Disease	0.174	-0.063	0.175**	1.600**	0.263	0.983
	(0.109)	(0.070)	(0.087)	(0.793)	(0.484)	(0.616)
Stroke	0.031	0.041	0.034	0.442	0.166	0.341
	(0.083)	(0.069)	(0.054)	(0.570)	(0.415)	(0.434)
Great	-0.250***	-0.260***	-0.066**	-1.471***	-0.887***	-0.382**
	(0.037)	(0.039)	(0.020)	(0.208)	(0.182)	(0.143)
Good	-0.244***	-0.245***	-0.067***	-1.421***	-0.832***	-0.385**
	(0.036)	(0.037)	(0.020)	(0.201)	(0.176)	(0.138)
Fair	-0.177***	-0.200***	-0.056**	-1.058***	-0.663***	-0.330**
	(0.035)	(0.036)	(0.019)	(0.201)	(0.179)	(0.139)
N	5013	5013	5013	5013	5013	5013

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** *p*<0.01
** *p*<0.05
* *P*<0.1

Table A4. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (04-06), cold sample

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.290**	-0.245**	0.037	-1.028**	-1.211***	0.369**
	(0.092)	(0.078)	(0.023)	(0.453)	(0.362)	(0.165)
Age	-0.278	-0.169	-0.044	-1.470	-0.509	-0.652
	(0.321)	(0.292)	(0.104)	(1.624)	(1.433)	(0.695)
Married	0.053	0.041	0.017	0.398	0.256	-0.039
	(0.066)	(0.055)	(0.017)	(0.277)	(0.231)	(0.081)
Years of schooling	-0.006	-0.001	0.002	-0.011	0.001	-0.002
	(0.016)	(0.014)	(0.004)	(0.086)	(0.079)	(0.025)
Log(1+HH income per capita)	-0.010	0.007	-0.002	-0.025	0.007	-0.016
	(0.016)	(0.014)	(0.003)	(0.066)	(0.064)	(0.021)
Hypertension	0.111*	0.138**	0.026	0.607*	0.381	0.036
	(0.063)	(0.062)	(0.030)	(0.338)	(0.297)	(0.211)
Diabetes	0.106	0.052	0.084	1.207	0.165	1.045*
	(0.149)	(0.156)	(0.076)	(0.770)	(0.603)	(0.612)
Heart Disease	0.546***	0.016	0.212	4.787***	1.699	1.721
	(0.121)	(0.266)	(0.153)	(0.854)	(1.897)	(1.157)
Stroke	-0.040	0.162	-0.072	-0.548	0.028	-0.261
	(0.138)	(0.143)	(0.046)	(0.651)	(0.611)	(0.368)
Great	-0.246**	-0.283**	-0.114**	-1.761***	-1.058**	-0.624**
	(0.091)	(0.089)	(0.039)	(0.464)	(0.432)	(0.257)
Good	-0.291***	-0.261***	-0.103**	-1.851***	-1.121***	-0.516**
	(0.067)	(0.067)	(0.035)	(0.338)	(0.334)	(0.205)
Fair	-0.209***	-0.192**	-0.092**	-1.366***	-0.795**	-0.526**
	(0.063)	(0.065)	(0.033)	(0.338)	(0.343)	(0.212)
N	1097	1097	1097	1097	1097	1097

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** $p<0.01$
** $p<0.05$
* $P<0.1$

Table A5. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (04-06), aged 16-59

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.070**	-0.066**	-0.011	-0.330**	-0.254**	-0.046
	(0.028)	(0.024)	(0.009)	(0.146)	(0.114)	(0.074)
Age	-0.165	0.034	-0.047	-0.825	-0.136	-0.358
	(0.120)	(0.106)	(0.046)	(0.637)	(0.487)	(0.363)
Married	-0.013	-0.015	0.001	-0.098	-0.117	0.009
	(0.023)	(0.019)	(0.009)	(0.123)	(0.091)	(0.075)
Years of schooling	-0.006	-0.001	0.001	-0.014	-0.000	-0.002
	(0.005)	(0.004)	(0.002)	(0.027)	(0.024)	(0.008)
Log(1+HH income per capita)	0.009*	0.006	0.001	0.052**	0.035	0.003
	(0.005)	(0.004)	(0.001)	(0.026)	(0.022)	(0.011)
Hypertension	0.097**	0.094**	0.011	0.452**	0.402**	0.011
	(0.039)	(0.034)	(0.015)	(0.200)	(0.170)	(0.108)
Diabetes	0.046	0.208**	-0.054**	0.269	0.480	-0.282**
	(0.088)	(0.077)	(0.021)	(0.490)	(0.346)	(0.129)
Heart Disease	0.114	-0.142**	0.111	1.187	-0.741**	1.071
	(0.161)	(0.070)	(0.131)	(1.197)	(0.323)	(1.154)
Stroke	0.192*	0.012	0.178	1.679*	0.395	1.412
	(0.106)	(0.075)	(0.111)	(0.908)	(0.385)	(0.917)
Great	-0.258***	-0.239***	-0.075**	-1.503***	-0.932***	-0.430**
	(0.047)	(0.042)	(0.027)	(0.263)	(0.223)	(0.184)
Good	-0.255***	-0.223***	-0.075**	-1.469***	-0.867***	-0.426**
	(0.046)	(0.042)	(0.026)	(0.259)	(0.221)	(0.179)
Fair	-0.191***	-0.189***	-0.066**	-1.124***	-0.726**	-0.386**
	(0.045)	(0.040)	(0.026)	(0.254)	(0.221)	(0.178)
N	4031	4031	4031	4031	4031	4031

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** $p<0.01$
** $p<0.05$
* $P<0.1$

Table A6. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (04-06), low income household

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.019	-0.234*	0.065	0.166	-0.635**	0.502
	(0.220)	(0.124)	(0.108)	(1.184)	(0.237)	(0.819)
Age	-0.164	0.114	-0.047	-0.654	-0.153	-0.440
	(0.218)	(0.195)	(0.078)	(1.202)	(1.011)	(0.594)
Married	0.023	0.019	0.008	0.143	0.072	0.024
	(0.035)	(0.033)	(0.011)	(0.158)	(0.144)	(0.067)
Years of schooling	0.001	0.002	-0.001	0.021	0.009	-0.011
	(0.010)	(0.007)	(0.002)	(0.051)	(0.045)	(0.013)
Log(1+HH income per capita)	0.016**	0.013**	0.001	0.089**	0.066**	0.008
	(0.007)	(0.005)	(0.002)	(0.032)	(0.025)	(0.014)
Hypertension	0.002	0.037	-0.006	-0.052	-0.191	-0.013
	(0.054)	(0.040)	(0.023)	(0.295)	(0.239)	(0.182)
Diabetes	0.116	0.164	0.033	0.735	0.140	0.410
	(0.115)	(0.134)	(0.046)	(0.735)	(0.536)	(0.480)
Heart Disease	0.131	-0.065	0.131	1.378	0.726	1.166
	(0.281)	(0.053)	(0.128)	(1.931)	(0.660)	(1.107)
Stroke	0.176	0.076	0.121	1.563	0.711	1.108
	(0.141)	(0.105)	(0.106)	(1.122)	(0.773)	(0.898)
Great	-0.289***	-0.307***	-0.066*	-1.845***	-1.234***	-0.458*
	(0.063)	(0.065)	(0.034)	(0.380)	(0.339)	(0.267)
Good	-0.260***	-0.256***	-0.070**	-1.731***	-1.032***	-0.500**
	(0.057)	(0.056)	(0.030)	(0.343)	(0.299)	(0.237)
Fair	-0.178**	-0.221***	-0.052	-1.247***	-0.835**	-0.382
	(0.056)	(0.056)	(0.032)	(0.343)	(0.316)	(0.250)
N	1631	1631	1631	1631	1631	1631

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** $p<0.01$
** $p<0.05$
* $P<0.1$

Table A7. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (04-06), medium income household

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.069	-0.065*	0.010	-0.276	-0.414**	0.205*
	(0.046)	(0.039)	(0.017)	(0.234)	(0.198)	(0.116)
Age	-0.175	-0.068	-0.120*	-0.934	0.110	-0.725
	(0.192)	(0.173)	(0.064)	(1.003)	(0.793)	(0.487)
Married	-0.080**	-0.057*	-0.010	-0.393**	-0.285**	-0.088
	(0.033)	(0.030)	(0.016)	(0.193)	(0.138)	(0.132)
Years of schooling	0.004	0.007	0.002	0.024	0.037	0.008
	(0.007)	(0.006)	(0.003)	(0.033)	(0.031)	(0.009)
Log(1+HH income per capita)	0.004	-0.001	0.001	0.018	-0.003	0.017
	(0.010)	(0.009)	(0.004)	(0.055)	(0.041)	(0.029)
Hypertension	0.188***	0.172***	0.043**	0.900***	0.535**	0.225
	(0.042)	(0.045)	(0.021)	(0.214)	(0.176)	(0.144)
Diabetes	0.029	0.123	0.067	0.273	0.192	0.257
	(0.121)	(0.111)	(0.055)	(0.564)	(0.522)	(0.317)
Heart Disease	0.139	-0.205*	0.299*	1.240	-0.633	0.889
	(0.136)	(0.106)	(0.169)	(0.943)	(0.453)	(0.913)
Stroke	-0.243*	0.009	-0.068	-1.117	-0.206	-0.621**
	(0.140)	(0.120)	(0.070)	(0.697)	(0.663)	(0.291)
Great	-0.267***	-0.221***	-0.084**	-1.407***	-0.755**	-0.406*
	(0.062)	(0.064)	(0.034)	(0.318)	(0.266)	(0.215)
Good	-0.277***	-0.220***	-0.085**	-1.406***	-0.754**	-0.410**
	(0.060)	(0.062)	(0.032)	(0.301)	(0.262)	(0.204)
Fair	-0.211***	-0.170**	-0.069**	-1.075***	-0.595**	-0.333*
	(0.060)	(0.060)	(0.031)	(0.308)	(0.256)	(0.200)
N	2016	2016	2016	2016	2016	2016

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** p<0.01
** p<0.05
* P<0.1

Table A8. Effects of UEBMI on medical care utilization and expenditure:
Pre-UEBMI (91-97) vs. Post-UEBMI (04-06), medium income household

	Utilization			Spending		
	Total	Outpatient	Inpatient	Total	Outpatient	Inpatient
	(1)	(2)	(3)	(4)	(5)	(6)
UEBMI	-0.067*	-0.046	-0.010	-0.325	-0.233	-0.051
	(0.038)	(0.031)	(0.012)	(0.203)	(0.155)	(0.095)
Age	-0.277	0.009	-0.089	-1.765*	-0.239	-0.968*
	(0.187)	(0.138)	(0.078)	(0.974)	(0.657)	(0.550)
Married	0.048	-0.028	-0.018	0.143	-0.024	-0.158*
	(0.045)	(0.033)	(0.013)	(0.228)	(0.168)	(0.091)
Years of schooling	-0.006	-0.003	0.002	-0.036	-0.024	0.001
	(0.007)	(0.006)	(0.003)	(0.036)	(0.030)	(0.018)
Log(1+HH income per capita)	-0.003	0.006	0.002	0.012	0.048	0.013
	(0.018)	(0.017)	(0.004)	(0.092)	(0.091)	(0.032)
Hypertension	0.099	0.091*	0.030	0.837**	0.817**	0.070
	(0.060)	(0.054)	(0.030)	(0.377)	(0.323)	(0.211)
Diabetes	0.032	0.091	-0.023	0.391	0.471	0.020
	(0.098)	(0.099)	(0.050)	(0.541)	(0.483)	(0.363)
Heart Disease	0.360**	0.098	0.137	2.804**	1.090	1.152
	(0.126)	(0.139)	(0.119)	(1.089)	(0.935)	(1.062)
Stroke	0.201*	-0.006	0.015	1.171	0.029	0.505
	(0.112)	(0.138)	(0.085)	(0.726)	(0.633)	(0.774)
Great	-0.125*	-0.232**	-0.043	-0.785*	-0.458	-0.155
	(0.074)	(0.081)	(0.045)	(0.414)	(0.345)	(0.291)
Good	-0.096	-0.200**	-0.037	-0.603	-0.340	-0.103
	(0.072)	(0.079)	(0.046)	(0.407)	(0.343)	(0.301)
Fair	-0.042	-0.149*	-0.040	-0.301	-0.188	-0.129
	(0.072)	(0.079)	(0.044)	(0.408)	(0.351)	(0.283)
N	1366	1366	1366	1366	1366	1366

All regressions include province by wave dummy variable, as well as year fixed effects. Cluster-robust standard errors are reported in parenthesis.
*** $p<0.01$
** $p<0.05$
* $P<0.1$