ARTICLE IN PRESS

Journal of Comparative Economics xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Journal of Comparative Economics

journal homepage: www.elsevier.com/locate/jce

Does health insurance matter? Evidence from China's urban resident basic medical insurance ☆

Hong Liu [a], Zhong Zhao [b,*]

[a] Central University of Finance and Economics, China
[b] Renmin University of China, China

ARTICLE INFO

Article history:
Received 14 March 2013
Revised 18 February 2014
Available online xxxx

JEL classification:
I13
G22
H43

Keywords:
Urban China
Health insurance
Health care utilization
Health expenditure

ABSTRACT

Liu, Hong, and Zhao, Zhong—Does health insurance matter? Evidence from China's urban resident basic medical insurance

In 2007, China launched a subsidized voluntary public health insurance program, the Urban Resident Basic Medical Insurance (URBMI), for urban residents without formal employment. We estimate the impact of the URBMI on health care utilization and expenditure by a fixed effects approach with instrumental variable correction, using the 2006 and 2009 waves of the China Health and Nutrition Survey. We explore the time variation of program implementation at the city level as the instrument for individual enrollment. We find that this program has significantly increased the utilization of formal medical services, including both outpatient care and inpatient care, but it has not reduced total out-of-pocket health expense. We also find that this program has improved medical care utilization more for children, members of the low-income families, and the residents in the relatively poor western region. *Journal of Comparative Economics* **xxx** (xx) (2014) xxx–xxx. Central University of Finance and Economics, China; Renmin University of China, China.

1. Introduction

Since the Chinese economic reform in 1978, China has been experiencing rapid economic growth. However, the economic success of China does not necessarily translate into social welfare gains for its citizens. For example, along with the economic growth, in rural areas we witnessed the dissolution of the Rural Medical Cooperative System, which was the cornerstone of

☆ We would like to thank seminar participants at Renmin University of China, Peking University, the University of Canberra, University of Nottingham Ningbo China, East China University of Science and Technology, Shanghai University of Finance and Economics, and the 4th CIER/IZA Annual Workshop on Research in Labor Economics. Comments from the editor Daniel Berkowitz and from three anonymous referees have greatly improved this paper. We are grateful to Hau Chyi, who provided valuable assistance in manipulating the CHNS data set. We acknowledge research grant support from the Natural Science Foundation of China (No. 71203244, No. 71173227 and No. 71233001), the Program for New Century Excellent Talents in University (Grant No. NCET-12-0993), and Beijing Higher Education Young Elite Teacher Project (Grant No. YETP0989). This research uses data from the China Health and Nutrition Survey (CHNS). We thank the National Institute of Nutrition and Food Safety, China Center for Disease Control and Prevention; the Carolina Population Center, University of North Carolina at Chapel Hill; the National Institutes of Health (NIH; R01-HD30880, DK056350, and R01-HD38700); and the Fogarty International Center, NIH, for financial support for the CHNS data collection and analysis files since 1989. We thank those parties, the China-Japan Friendship Hospital, and the Ministry of Health for support for the CHNS 2009 and future surveys. The authors alone are responsible for any findings and errors.

* Corresponding author.
E-mail addresses: irisliu2000@gmail.com (H. Liu), mr.zhong.zhao@gmail.com (Z. Zhao).

http://dx.doi.org/10.1016/j.jce.2014.02.003
0147-5967/© 2014 Association for Comparative Economic Studies Published by Elsevier Inc. All rights reserved.

Please cite this article in press as: Liu, H., Zhao, Z. Does health insurance matter? Evidence from China's urban resident basic medical insurance. Journal of Comparative Economics (2014), http://dx.doi.org/10.1016/j.jce.2014.02.003

the health care system in rural China. In urban areas, millions of workers lost their jobs and thus their employment-related health insurance during the retrenchment of state-owned enterprises starting from the mid-1990s. To improve the poor state of health care in China, the Chinese government has been trying to build up a universal public health insurance system in its recent health care reform. This ambitious public insurance system consists of three key programs: the Urban Employee Basic Medical Insurance (UEBMI) for the urban employed, initiated in 1998; the New Cooperative Medical Scheme (NCMS) for rural residents, established in 2003; and the Urban Resident Basic Medical Insurance (URBMI), covering urban residents without formal employment.[1] The last of these, the URBMI, is the focus of this paper.

After its launch in 2007, the URBMI was rapidly expanded from 79 cities in 2007 to 229 cities (about 50% of China's cities) in 2008, and to almost all cities by the end of 2009. This program covered 221 million persons in 2011 (NBS, 2012), amounting to around 16.5% of the Chinese population.

The main objective of this paper is to investigate the impact of the URBMI on health care utilization and expenditure. Understanding the effects of the URBMI, and comparing the effectiveness of the three major health care systems (UEBMI, NCMS, and URBMI), is an important endeavor. Each of these systems has its unique institutional setup, covers different populations, and has different levels of premiums and reimbursement. The comparison exercise will provide insights into resource allocation, the effectiveness of different components of the health care policy, the role of subsidies, etc. Study of the effectiveness of each individual program is an important step toward this kind of comparisons.[2] Nonetheless, there is little empirical research on the effectiveness of the URBMI, mainly because it started only a few years ago, and the proper data is limited. The only available study which examines the impact of the URBMI is Lin et al. (2009). Their study is based on cross-sectional data collected in December 2007, focusing on who are covered by the URBMI, who gain from it in medical expenditure, and whether the enrollees are satisfied with it.

Internationally, different aspects of public health care systems are widely studied in the literature. For example, Currie and Gruber (1996a,b, 1997, 2001) investigate the impact of the Medicaid expansion on health and health care in the United States, and find that the expansion has improved the health of newborn children and has increased health care utilization by their mothers. Card et al. (2008) find that the rise of Medicare coverage has decreased health disparity and increased health care utilization by the elderly in the United States. Cheng and Chiang (1997) and Chen et al. (2007) study the impact of the universal health care system in Taiwan, and find that it has significantly increased utilization of both inpatient and outpatient care services by Taiwanese elderly. Given the different development stages, subsidy levels, and copayment policies, it would be instructive to compare findings from developing countries, like China, with findings from the developed countries.

Different from public health insurance systems in most developed economies, the URBMI is a voluntary insurance program with heavy government subsidies. To estimate the impact of the URBMI, we use panel data from the China Health and Nutrition Survey (CHNS), which is a longitudinal survey project and has collected eight waves since 1989. The last two waves were collected in 2006 and 2009. This feature of the data and the timeline of the implementation of the URBMI allow us to better control for unobservables and possible selection bias (e.g., Heckman, 1990), which is especially important in the context of a health insurance plan with voluntary enrollment.

In this paper, we are interested in estimating the treatment effect on the treated of the URBMI, which is an important measure of the effectiveness of policy programs and a key policy variable with voluntary participation. Lei and Lin (2009) and Wagstaff et al. (2009) also estimate the treatment effect on the treated when they evaluate the impact of the NCMS, the voluntary health insurance program in rural China.

Our starting empirical strategy is the fixed effects approach at the individual level. Admittedly, individuals may select into the URBMI nonrandomly. While fixed effects can be used to control for time-invariant unobservables, it is still vulnerable to bias caused by time-variant unobservables. In order to control for this potential bias, we explore the time variation of the URBMI implementation at the city level as the instrumental variable to correct for possible endogeneity of individual URBMI enrollment status.[3] So our main empirical strategy is a fixed effects model with instrumental variable.

The remainder of the paper is organized as follows: In Section 2, we briefly introduce the current Chinese health insurance system, and pay special attention to the institutional setup of the URBMI. In Section 3, we describe the China Health and Nutrition Survey, define the main dependent variables and independent variables, and present descriptive statistics. In Section 4, we discuss our empirical strategies. Section 5 gives our main results for the whole sample as well as results for different age groups, income groups, genders, and regions. In that section, we also conduct several empirical tests to validate our instrumental variable. We conclude the paper with Section 6.

[1] The enrollment rates are 80.7% for the UEBMI, 90.0% for the NCMS, and 63.8% for the URBMI in 2008; these percentages increased to 92.4%, 96.6%, and 92.9% in 2010, respectively (Yip et al., 2012). In 2010, there were 237 million, 835 million, and 195 million enrollees of the UEBMI, the NCMS, and the URBMI, respectively. Overall, 1.27 billion out of a total of 1.34 billion persons were enrolled in these three public health insurance programs in 2010; see National Bureau of Statistics (NBS) (2011) and the National Development and Reform Commission (NDRC) (2011).

[2] Several studies (Wagstaff et al., 2009; Lei and Lin, 2009; Yip and Hsiao, 2009; Sun et al., 2009) investigate the impact of the NCMS on health care utilization and health care expenditure, and find that it has had a positive impact on health care utilization, but its impact on health care expenditure has been limited. Wang et al. (2006) focus on the question of adverse selection in the NCMS, and finds evidence of adverse selection. Liu et al. (2014) find that social learning has been playing an important role in the NCMS take-up decision. Chen and Jin (2012) examine the linkage between the NCMS and the health and education outcomes, and find that the NCMS does not affect child mortality or maternal mortality, but improves school enrollment of six-year-old children.

[3] We are grateful to one referee for suggesting this approach. Lei and Lin (2009), Wagstaff et al. (2009), and Chen and Jin (2012) rely on difference-in-differences (DID) methods in their studies on the impact of the NCMS. We also experimented with the DID method in the earlier version of this study, and the results are quantitatively similar.

2. Urban Resident Basic Medical Insurance

Before 1998, there were two principal health insurance schemes for the urban population in China: the Labor Insurance Scheme and the Government Employee Insurance Scheme. Both schemes were employment-based and mostly were for employees in public sector, state-owned, and collectively owned enterprises. The dependents of the urban workers, including their children, spouses, and parents, who had no employment-related health insurance, were eligible for partial coverage (Liu, 2002). Aiming to increase insurance coverage and to control health care costs, in 1998 the Chinese government launched a health insurance reform in urban China, and merged the dual system of labor insurance and government employee insurance into a new insurance scheme known as the Urban Employee Basic Medical Insurance (UEBMI) (Xu et al., 2007), which covers employees and retirees in both the public and private sectors. One notable feature of the new scheme is that it does not cover the dependents any more. There were an estimated 420 million urban residents who had been left uninsured because they had no formal employment (Yip and Hsiao, 2009).[4] To provide health protection for those urban residents not covered by the UEBMI, the Chinese government began to implement a large-scale health insurance program, the URBMI, in 2007.

The URBMI is a government-run voluntary insurance program operated at the city level. Following the broad guidelines issued by the central government, provincial and city governments have considerable discretion over the details. Basically, the URBMI mainly covers urban residents without formal employment, including children, the elderly, and other unemployed urban residents (State Council, 2007).

The URBMI is financed by individual contributions and government subsidies shared between central and local governments. In 2008, the minimum government subsidy was 40 RMB per enrollee per year, including a 20 RMB subsidy from the central government for the enrollees in the poorer central and western provinces. The average premium of the pilot cities in 2007 was 236 RMB for adults and 97 RMB for children. On average, the subsidies from central and local governments accounted for about 36% of the financing cost for adults, and 56% for children (Lin et al., 2009). The total amount of subsidies from all governmental sources had increased to 200 RMB per year by 2011 (NDRC, 2012).

As the URBMI was intended to reimburse mainly for catastrophic expenses, most cities cover inpatient services, and outpatient services for catastrophic or chronic diseases (e.g., diabetes, heart disease), but vary in their coverage of general outpatient care. With the progress of the URBMI program, there is an increasing trend toward covering general outpatient expenses in most areas. The average reimbursement level was around 45% in 2007,[5] and has also been increasing over time (Lin et al., 2009).

3. Data and variables

3.1. Data

We use data from the China Health and Nutrition Survey (CHNS), which is an ongoing longitudinal survey conducted by the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety in the Chinese Center for Disease Control and Prevention. These sampled provinces, including coastal, middle, northeastern, and western provinces, host approximately 45% of China's total population.

The content of the survey is comprehensive, covering a wide range of individual, household, and community characteristics. The household–individual survey collects detailed data on medical care usage, health status, health insurance, economic status, and socio-demographic characteristics for the sampled households and household members. The community survey provides unique information on public facilities, infrastructure, and health care provision at the community level.

The CHNS survey has collected eight waves of data (1989, 1991, 1993, 1997, 2000, 2004, 2006, and 2009) so far. For the purpose of this study, we mainly use the last two waves, and restrict the sample to residents with urban *hukou* (urban resident registration) living in urban areas. We further restrict the main sample to the target population of the URBMI, including children aged 0–18; current students aged over 18[6]; the elderly (age 60 and over) who either are retired or present no job information and are not covered by the UEBMI or by government employee medical insurance; and adults who are unemployed or are temporary workers and not covered by the UEBMI or by government employee medical insurance. These restrictions lead to a balanced panel of 628 respondents in each wave. The main variables and summary statistics are in Table 1.

3.2. Outcome variables

The main dependent variables are health service utilization and health expenditure. The respondents were asked whether they had used any medical care from a formal medical provider during the previous four weeks. If they answered yes, the

[4] The number 420 million is an overestimate. As noted in Footnote 1, there were 195 million enrollees of the URBMI, and there were only 70 million individuals not covered by any of the UEBMI, NCMS, and URBMI in 2010.

[5] For example, the reimbursement rates range from 40% to 90%, and the ceilings are from 25,000 RMB to 100,000 RMB, depending on the city, category of health care services, and service provider; see Lin et al. (2009).

[6] Since its inception in 2007, most cities have begun to provide insurance coverage for college students through the URBMI. However, some cities still cover college students through government employee health insurance with small premiums. In our study sample, we exclude current students aged over 18 who are insured in government employee medical insurance.

Table 1
Summary statistics.

	Full sample		Wave 2006		Wave 2009	
			Treated	Control	Treated	Control
Sample size	1256		335	293	335	293
Variable	Mean	Std. dev.	Mean	Mean	Mean	Mean
Dependent variables (in the last four weeks)						
Any formal medical care	0.154	0.361	0.155	0.150	0.188	0.116
Outpatient care	0.135	0.342	0.131	0.140	0.164	0.102
Inpatient care	0.014	0.119	0.015	0.007	0.021	0.014
Inpatient hospital days	0.096	1.099	0.048	0.027	0.179	0.123
Total health expense (k)	0.111	0.916	0.057	0.112	0.155	0.122
Out-of-pocket health expense (k)	0.070	0.754	0.031	0.096	0.067	0.091
Go to county or city hospital	0.089	0.285	0.096	0.082	0.101	0.075
Go to city hospital	0.052	0.222	0.036	0.058	0.051	0.065
Explanatory variables						
Individual characteristics						
Enrolled in URBMI	0.267	0.442	0.000	0.000	1.000	0.000
Education: primary school	0.189	0.392	0.197	0.222	0.194	0.143
Education: junior high school	0.311	0.463	0.254	0.307	0.313	0.375
Education: senior high school	0.142	0.349	0.164	0.089	0.182	0.123
Education: college	0.011	0.105	0.012	0.014	0.009	0.010
Total household income (k)	41.053	75.326	24.447	39.479	42.590	59.856
Age	43.179	24.230	45.499	37.316	48.489	40.317
Female	0.589	0.492	0.591	0.587	0.591	0.587
Married	0.559	0.497	0.624	0.505	0.600	0.491
Household size	3.601	1.497	3.609	3.604	3.618	3.570
Student	0.232	0.422	0.167	0.287	0.188	0.300
Community characteristics						
Any health facility	0.693	0.462	0.573	0.491	0.901	0.792
Treatment fee for a cold (k)	0.057	0.061	0.045	0.056	0.058	0.069
Community urbanicity index	83.358	10.331	81.671	82.626	84.758	84.419

Note: Health expenditure, household income, and average treatment fee for a cold are all inflated to the 2009 price level.

respondents were then asked whether it was an outpatient or an inpatient visit, and the number of inpatient hospital days. Accordingly, we create three binary variables indicating utilization of any formal medical care, outpatient care, and inpatient care, respectively, and a continuous variable of inpatient hospital days in the previous four weeks.

For respondents who had used formal care, the CHNS survey also asked about their choice of providers. Based on the responses, we construct two binary variables, indicating whether the respondent had chosen higher levels of providers such as county or city hospitals, or just chosen the highest level of provider, e.g., city hospitals.

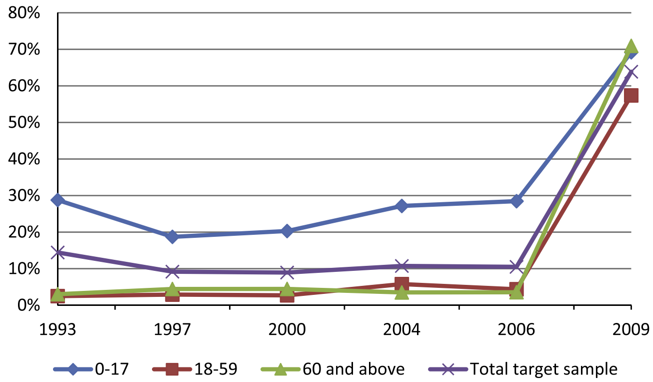
There are two measures for health service expenditures: total health expense for formal care in the previous four weeks, including all expenses such as fees and expenditures for registration, medicines, treatment, and hospital bed; and out-of-pocket health expenses which are not reimbursed by health insurance. They are both measured in terms of 2009 prices.

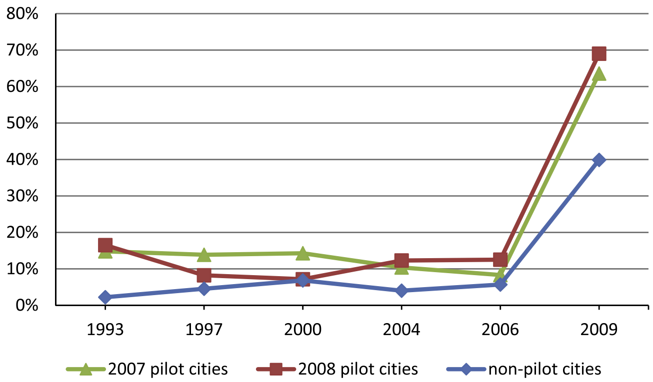
3.3. Key independent variables

The key independent variable is whether the respondent is enrolled in the URBMI. In Table 1, we compare the outcomes and characteristics of the enrollees (treated) and the non-enrollees (control) before and after the introduction of the URBMI in the city (viz., in 2006 and 2009). About 53% of the study sample was enrolled in the URBMI in 2009. Standard *t*-tests indicate that there was no significant difference in health service utilization and expenditure between the enrollees and the non-enrollees in 2006, but the enrollees were 6–7% more likely to utilize formal medical care, especially outpatient care, than the non-enrollees in 2009.

Two cities and four counties were sampled from each province in the CHNS, and a total of 54 cities or counties (we refer to both cities and counties as cities hereafter) from nine provinces each year in 2006 and 2009. We have their exact location information.[7] Combining the location information with the lists of the URBMI pilot cities authorized by China's Ministry of Labor and Social Security in 2007–2008, we are able to determine when each sample city in the CHNS implemented the URBMI.

[7] Although the CHNS does not release the exact location information for the sample areas, following the strategy in Chyi and Zhou (2014), we identify the sample cities and counties by comparing the reported total areas and populations of the counties or cities in the CHNS community survey data with the corresponding information from multiple yearbooks in China.





Notes:

(a) Data source: the CHNS 1993–2009.

(b) Sample universe: individuals with urban *hukou* living in an urban area, and also meeting the eligibility requirement for the URBMI.

(c) Other health insurance for the target population includes commercial insurance, dependents' medical insurance, health insurance for women and children, planned immunization insurance for children, etc.

(d) The URBMI was implemented in those non-pilot cities by the end of 2009.

Fig. 1. (a) Health insurance coverage for the target population from 1993 to 2009. (b) Health insurance coverage by cities from 1993 to 2009.

Among the 54 sample cities, 12 implemented the URBMI in 2007 and 36 in 2008. The remaining six cities implemented the URBMI in 2009.[8]

Fig. 1 shows health insurance coverage from 1993 to 2009, by subpopulation groups (Panel A) as well as by cities (Panel B). It is clear from the figure that the health insurance coverage rates of Chinese urban residents were very low and remained relatively constant throughout the period 1993–2006. After the starting of the URBMI in 2007, we see a sharp increase in health insurance coverage across different subpopulations as well as across different groups of cities.

According to our calculation from the CHNS data, most of the coverage increase is from the URBMI. We divide the sample cities into three groups according to which year (2007, 2008, or 2009) the city started the URBMI. Measured in 2009, the health insurance coverage rates of the URBMI target population were 64%, 69%, and 40% in 2007, 2008, and 2009 project cities, respectively; among them, 51%, 57%, and 26% were covered by the URBMI, respectively.

3.4. Other independent variables

We also control for other covariates affecting health care utilization and expenditure in our study. Individual- and household-level variables include education level (illiterate, primary school, junior high school, senior high school, and college), total household income (inflated to Chinese RMB in 2009), and other demographic variables including age, gender, marital status, household size, and student status. Community-level variables include a binary variable indicating the presence of a health facility in the neighborhood; the average treatment fee for a common cold in the neighborhood (inflated to Chinese RMB in 2009), which proxies for the local price level of health care service; and the natural logarithm of the community

[8] All cities were required to implement the URBMI by the end of 2009. In our sample, six sample cities (counties) initiated the URBMI in 2009. Among them, four sample cities started the URBMI in June or July, and two sample cities in December. The survey for the CHNS 2009 was conducted from August to November. Due to the limited time lag, it is reasonable to treat these six cities as non-pilot cities in our study.

urbanicity index developed by Jones-Smith and Popkin (2010), which reflects the development and urbanization level. As the URBMI may affect health expenditure through the price channel, we control for the average cold treatment fee in the regressions for health care utilization, but not in the regressions for health expenditure.

4. Empirical strategy

We aim at estimating the impact of the URBMI enrollment on health care utilization and expenditure, and focus on the average treatment effect on the treated (ATT). Due to the voluntary nature of the URBMI, the enrollees and the non-enrollees may be different in both observed and unobserved characteristics, which could lead to sample selection bias (e.g., Heckman, 1990). To address this problem, the main econometric approach we adopt here is to specify a fixed effects model and estimate it using the instrumental variable approach (FE-IV). The fixed effects model allows us to control for time-invariant unobservables, and the IV approach is used to correct for the remaining selection bias due to time-variant unobservables. Specifically, we estimate the following regression model using the 2006 and 2009 waves of the CHNS:

$$Y_{ikt} = \beta_0 + \beta_1 Enrolled_{ikt} + \beta_2 X_{ikt} + \beta_3 W_{kt} + \mu_i + \varepsilon_{ikt} \tag{1}$$

where i indexes individuals, k indexes communities, and t indexes years. Y_{ikt} is the outcome variable, i.e., health care utilization or expenditure, for individual i in community k at time t. $Enrolled_{ikt}$ is a binary variable indicating individual i's URBMI enrollment status at time t. X_{ikt} is a vector of individual i's observable characteristics at time t. The vector W_{kt} contains observed characteristics of community k at time t, and μ_i is an individual fixed effect accounting for all time-invariant factors that may affect health care utilization or expenditure; ε_{ikt} is a random error term. The coefficient β_1 of $Enrolled_{ikt}$ is our primary interest, i.e., the effect of the URBMI on the enrollees.

The instrumental variable is the time variation of the URBMI implementation at the city level. We have two measures for this variable. The first measure is a binary indicator showing whether the city has implemented the URBMI at time t. No sample cities introduced the URBMI in wave 2006 (all are coded as 0 in 2006). 48 out of the 54 sample cities were exposed to the program during the period 2007–2008; they are coded as 1 in 2009. Though the remaining 6 cities were required to start the URBMI by the end of 2009, they are regarded as non-pilot cities, coded as 0 in 2009. The second measure is a continuous variable with a range from 0 to 2 showing the duration of the URBMI implementation in each city at time t. Because of high collinearity, we use these two measures separately as the instrument in the FE-IV estimations. As a robustness check, we use two indicator variables for 2007 pilot cities and for 2008 pilot cities as the instruments in the 2SLS estimations based on the 2009 sample.

There are several arguments for the validity of our instrument. First, since only registered residents in the project cities are eligible for the program in most cases, individual take-up status is highly correlated with the introduction and the duration of the URBMI at the city level. In our sample, the health insurance coverage rates increased significantly along with the introduction of the URBMI in each city. The URBMI enrollment rate was significantly higher in 2007–2008 pilot cities than in non-pilot cities in 2009. Second, the URBMI pilot cities were mainly selected by the provincial governments, and the city governments implemented the URBMI following the policy guidelines issued by the central government. It is reasonable to assume that the selection of the URBMI pilot city is exogenous to individuals. In a later section, we also conduct several empirical tests to show the validity of our instrument.

5. Empirical results

5.1. URBMI enrollment and validity of the instrumental variables

The reliability of our empirical strategy, a fixed effects model with instrumental variable, depends on the validity of the instrument. Before we present our main estimation results, we examine and discuss the quality of our instrument – the time variation of the URBMI implementation at the city level.

We begin by analyzing factors that predict one's propensity to take up the URBMI. In Table 2, we report the first-stage results from the OLS estimation using cross-sectional data from the CHNS 2009 in columns (1)–(4)[9] as well as the fixed effects estimation using the panel 2006–2009 in columns (5)–(8) with standard error clustered at the individual level. The results show that the enrollment probability of the residents is positively and significantly associated with the URBMI status of their city with or without control for other covariates; see columns (1), (3), (5), and (7). The rest of the columns in Table 2 investigate whether there is a strong correlation between individual enrollment status and the URBMI duration in the city. It is clear from the estimates that the relationship is positive and strong.

The first-stage F-statistics on the instrumental variable are greater than 10 in all specifications, suggesting that both measures are strong instruments.

Other factors that influence the take-up of the URBMI are as expected. People with primary or secondary education are more likely to participate in the URBMI than the illiterate, but there is no significant difference between people with at least

[9] Focusing on urban residents who are the target population of the URBMI, we obtain a cross-sectional sample of 1402 respondents from the CHNS 2009. Of these, 628 were also interviewed in wave 2006. Column (1) of Table 3 presents the second-stage results of the 2SLS estimation based on the CHNS 2009.

Table 2
Estimation for URBMI enrollment decision.

	OLS using cross sectional data from CHNS 2009				FE using panel 2006–2009			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
URBMI pilot city	0.263***		0.328***		0.570***		0.554***	
	(0.037)		(0.042)		(0.021)		(0.030)	
URBMI duration in the city		0.063***		0.074***		0.418***		0.339***
		(0.021)		(0.023)		(0.021)		(0.025)
Primary school			0.084**	0.081**			0.114**	0.156***
			(0.040)	(0.041)			(0.054)	(0.057)
Junior high school			0.077**	0.076**			0.085	0.170**
			(0.037)	(0.038)			(0.064)	(0.068)
Senior high school			0.059	0.067			0.091	0.174
			(0.045)	(0.045)			(0.099)	(0.109)
College			-0.054	-0.041			0.182	0.143
			(0.073)	(0.076)			(0.204)	(0.232)
Log household income			0.023*	0.025**			0.033*	0.071***
			(0.013)	(0.013)			(0.019)	(0.020)
Age 18–54			0.109**	0.099*			−0.037	0.140
			(0.054)	(0.055)			(0.122)	(0.113)
Age 55 and above			0.274***	0.268***			0.206	0.489***
			(0.053)	(0.053)			(0.154)	(0.139)
Female			0.016	0.013				
			(0.026)	(0.026)				
Married			0.072**	0.081**			−0.081	−0.203*
			(0.036)	(0.036)			(0.107)	(0.116)
Household size			0.001	-0.003			0.029	0.015
			(0.010)	(0.010)			(0.019)	(0.021)
Student			0.085*	0.090*			−0.018	0.056
			(0.045)	(0.046)			(0.077)	(0.079)
Any health facility			0.099***	0.110***			−0.047	0.078**
			(0.037)	(0.037)			(0.037)	(0.039)
Cold treatment fee			0.180	0.214			0.078	0.604*
			(0.177)	(0.180)			(0.303)	(0.360)
Log community urbanicity			0.262**	0.275**			0.139	0.295*
			(0.126)	(0.127)			(0.162)	(0.168)
Constant	0.256***	0.415***	-1.443**	-1.301**	−0.007	−0.042***	−0.863	−1.890**
	(0.034)	(0.028)	(0.570)	(0.573)	(0.009)	(0.014)	(0.731)	(0.758)
Control of provincial dummies	No	No	Yes	Yes	–	–	–	–
Weak instrument test	$F = 49.48$	$F = 10.44$	$F = 61.45$	$F = 10.03$	$F = 712.70$	$F = 407.38$	$F = 484.15$	$F = 262.47$
N	1402	1402	1402	1402	1256	1256	1256	1256

Note: Clustered-robust standard errors are reported in parenthesis.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

high-school education and the illiterate in the likelihood of the URBMI take-up. Given that better-educated (high-school and above) people are usually employed and covered by other types of health insurance, the result is not surprising. Income and age are both positively and significantly associated with the URBMI take-up. The probability of taking up the URBMI increases with the presence of health facilities, medical care prices measured by average cold treatment fee, and the level of urbanicity in the community.

Although the choice of the URBMI pilot cities is beyond the control of individuals, the exogeneity of the instrument depends on the assumption that the pilot and non-pilot cities should not differ in observable or unobservable characteristics, other than the URBMI program, that are correlated with individual health care utilization and expenditure. In the main Eq. (1), first we include a set of community-specific factors that may be correlated with the outcomes, and second we also control for time-invariant unobserved heterogeneity at the city, community, and individual levels using fixed effects specifications. Moreover, in the 2SLS estimation using data from wave 2009, we employ both the indicator variable for 2007 pilot cities and the one for 2008 pilot cities as the instruments, and perform overidentification tests. The results presented in column (1) of Table 3 suggest that the exogeneity of our instruments cannot be rejected at the 10% level in any of the specifications. However, we admit that the exogeneity of the instrumental variables is fundamentally untestable. The overidentification test is based on the assumption that at least one instrument is exogenous, and thus is not a test of exclusion restriction per se. Therefore, we carry out the following two additional checks on the potential threats to our identification strategy.

Table 3
Tests of our instrumental variables and identification assumptions.

	Target sample	Working and retired sample with UEBMI		Target sample before the introduction of URBMI	
CHNS waves	2009	2009	2006–2009	2006	2004–2006
Dependent variables	2SLS	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)
1. Any formal health care	0.189**	0.009	0.016	−0.024	0.002
	(0.088)	(0.015)	(0.032)	(0.026)	(0.039)
Overidentification Test	$P = 0.266$				
2. Outpatient care	0.193**	−0.009	−0.016	−0.026	−0.015
	(0.086)	(0.014)	(0.029)	(0.025)	(0.036)
Overidentification Test	$P = 0.546$				
3. Inpatient care	0.021	0.015**	0.023	0.006	0.008
	(0.022)	(0.007)	(0.015)	(0.007)	(0.014)
Overidentification Test	$P = 0.450$				
4. Inpatient hospital days	0.185	0.283***	0.309	0.034	−0.062
	(0.311)	(0.106)	(0.197)	(0.048)	(0.157)
Overidentification Test	$P = 0.497$				
5. Total health expense	0.377	0.207***	0.251	0.025	0.076
	(0.314)	(0.073)	(0.198)	(0.063)	(0.437)
Overidentification Test	$P = 0.421$				
6. Out-of-pocket health expense	0.185*	0.066***	0.123*	−0.003	−0.088
	(0.108)	(0.022)	(0.073)	(0.017)	(0.135)
Overidentification Test	$P = 0.824$				
N	1402	2088	946	1565	1902

Notes:
(a) Clustered robust standard errors are reported in parenthesis.
(b) In each cell of column (1), we report the 2SLS estimates for individual URBMI enrollment, using both the indicator variable for the 2007 pilot cities and the one for the 2008 pilot cities as the instruments.
(c) In each cell of columns (2)–(5), we report the estimates for the indicator variable for the 2007–2008 pilot cities.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

One threat is that there are other time-varying differences between the pilot and non-pilot cities that are directly correlated with individual health care utilization and expenditure. For example, pilot and non-pilot cities may have different health policies other than the URBMI that have also been changing over this study period. To test for this, we conduct the FE estimations for all the outcome variables using the non-target sample, which include the working and retired sample insured in the UEBMI in the CHNS 2006–2009. The idea is that the URBMI target population and non-target population in the same city share same city-level heterogeneity (e.g., supply-side policies); this heterogeneity affects individual health care utilization and expenditure in a similar way for the target population and for the non-target population. The results in column (3) of Table 3 show that the non-target sample in pilot cities have no significant difference in health care utilization and expenditure from those in non-pilot cities, implying that there is no other unobserved time-changing city-level heterogeneity associated with health care utilization and expenditure from 2006 to 2009.

There could be another threat: that the target population in the pilot cities may be on different health tracks from those in the non-pilot cities, associated with their different health care utilization and expenditure during 2006–2009. To address this, we examine whether the target populations in the pilot and non-pilot cities had different outcome variables before the implementation of the URBMI, which started in 2007. Using the 2006 data, the OLS results in column (4) of Table 3 show that the target sample in the 2007–2008 pilot cities had no significant differences in health care utilization and total expenditure from those in the non-pilot cities, except that the former's out-of-pocket expenditure was about 25.5% less. Formally, we carry out a placebo test; e.g., we obtain the FE estimates of URBMI impact using the 2004–2006 panel data, assuming that the (nonexistent) URBMI program had been introduced in pilot cities during 2004–2006. In column (5), the FE results are consistent with the OLS results, which help us rule out the possibility of different time trends of unobservables between the URBMI pilot cities and non-pilot cities.

5.2. Main results

In Table 4, column (1) reports the FE estimates of the intent-to-treat (ITT) effect of the URBMI for the target population in the 2007–2008 pilot cities. Columns (2)–(4) present the ATT estimates for the impact of the URBMI enrollment on health care utilization and expenditure, using the FE models and the FE with instrumental variable correction.[10] We use the city-level URBMI status and the duration of the program separately as the instrumental variable.

[10] We report only coefficients of primary interest here, for ease of exposition, except for the estimation for any formal care (see Appendix Table A1); but the full set of regression results is available from the authors upon request.

Table 4
Effects of URBMI on health care utilization and expenditure.

	ITT	ATT	ATT	ATT
Instrumental variables	–	–	Indicator variable for 2007–2008 pilot cities	URBMI duration in the city
Dependent variables	Fixed effect	Fixed effect	FE-IV1	FE-IV2
	(1)	(2)	(3)	(4)
1. Any formal health care	0.054*	0.074**	0.097*	0.150**
	(0.029)	(0.032)	(0.052)	(0.064)
2. Outpatient care	0.045	0.069**	0.082	0.130**
	(0.029)	(0.031)	(0.050)	(0.062)
3. Inpatient care	0.011	0.006	0.021	0.025
	(0.011)	(0.013)	(0.018)	(0.022)
4. Inpatient hospital days	0.191*	0.139	0.346**	0.500**
	(0.100)	(0.109)	(0.165)	(0.204)
5. Total health expense	0.060	0.095	0.110	0.305**
	(0.095)	(0.074)	(0.123)	(0.152)
6. Out-of-pocket health expense	0.006	0.033	0.011	0.172
	(0.080)	(0.034)	(0.094)	(0.115)
N	1256	1256	1256	1256

Notes:
(a) Clustered-robust standard errors are reported in parenthesis of columns (1) and (2), and standard errors are reported in columns (3) and (4).
(b) In each cell of column (1), we report the estimates for the indicator variable for the 2007–2008 pilot cities. In each cell of columns (2)–(4), we report the estimates for individual URBMI enrollment.
Other control variables include individual characteristics such as education, household income, age, gender, marital status, household size, and student status; community characteristics such as the presence of any health facility, and the urbanicity index; wave dummies; and province dummies. We also control for the average cold treatment fee in the regressions for health care utilization, but not in the regressions for health expenditure.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Panel 1 in Table 4 reports the estimates for formal medical care use in the previous four weeks. The FE results show that enrollment in the URBMI is significantly associated with an increase in the probability of individuals' utilization of formal medical services, by 7.4 percentage points. As expected, the ITT estimate is not as strong as the FE estimate, but also significant at the 10% level. Consistent with the FE estimates, the FE-IV estimates show a similar positive effect of the URBMI enrollment on access to formal health care, but of somewhat larger magnitude (0.10–0.15), suggesting that participation in the URBMI has significantly increased the probability of individuals' use of formal medical care, by 10–15 percentage points.

Panels 2–4 examine outpatient care and inpatient care separately. Consistent with the results in panel 1, both the FE estimates and the FE-IV estimates indicate a significant increase, of about 7–13 percentage points, in the likelihood of outpatient care utilization among the URBMI enrollees. While the FE estimates are insignificant, the FE-IV estimates show that the URBMI enrollment has significantly increased the number of inpatient days, by 0.35–0.5 days, although there was no significant effect on the probability of hospital admission in the previous four weeks.

Panels 5–6 report results on health expenditures. The ITT estimates in panel 5 suggest a 60 RMB increase (about 54%) in total health expenditure in the URBMI pilot cities. The ATT estimates show that total health care expenditure was increased by 95–305 RMB due to the URBMI enrollment, but most of these results are insignificant except the one from the FE-IV2 estimation. In panel 6, we find no evidence that the URBMI take-up status has reduced out-of-pocket expenditure in the previous four weeks. On the contrary, we find that joining URBMI resulted in an increase in out-of-pocket health expenditures of about 11–172 RMB, although the coefficients are insignificant.

This finding that the URBMI has not reduced total out-of-pocket health spending is consistent with the study by Wagstaff and Lindelow (2008) on earlier urban health insurance schemes in China. There are three possible reasons. One is that the URBMI enrollment made people more likely to use formal medical care, as we find consistently in panel 1 of Table 4.

Another reason, supported by the results in Table 5, is that the URBMI also increased the probability of an individual enrollee seeking care from higher-level providers. In columns (1)–(4) of Table 5, the FE-IV estimation results show that the URBMI enrollees are more likely to go to a county or city hospital for formal health care, at a 5% significance level. The probability of choosing a city-level hospital also increased by 5.8–7.5 percentage points due to the URBMI enrollment. Health care from a higher-level provider is usually more expensive and is reimbursed less under the URBMI.

The third reason is that, as most providers in China are paid on a fee-for-service basis through a regulated price schedule (Liu and Mills, 1999; Wagstaff and Lindelow, 2008), providers may have incentives to shift the insured patients' demand from low-margin health services to high-margin services and drugs. As shown in columns (5) and (6) of Table 5, we find that the community-level average cold treatment fee in the URBMI pilot cities is about 61 RMB higher than that in the non-pilot cities, which is significant at the 5% level. One more year of the URBMI implementation is associated with an increase of 44 RMB in the average cold treatment fee. Assuming that people seldom increase the quantity of health care utilization for a common cold, the results provide some evidence for our speculation about the supply-side responses.

Table 5
Effects of URBMI on level of provider and health care price.

	Go to county or city hospital		Go to city hospital		Average cold treatment fee in the community	
	FE-IV1 (1)	FE-IV2 (2)	FE-IV1 (3)	FE-IV2 (4)	FE (5)	FE (6)
URBMI enrollment	0.091** (0.039)	0.096** (0.048)	0.075** (0.030)	0.058 (0.037)		
URBMI city					0.061** (0.027)	
Duration of URBMI in the city						0.044** (0.018)
Other individual characteristics	Yes	Yes	Yes	Yes	–	–
Community characteristics	Yes	Yes	Yes	Yes	Yes	Yes
N	1256	1256	1256	1256	144	144

Notes:
(a) Standard errors are reported in parenthesis.
(b) The instrument is an indicator variable for the 2007–2008 pilot cities in columns (1) and (3), and a continuous variable measuring the URBMI duration in the city in columns (2) and (4).
(c) Other control variables in columns (1)–(4) include individual characteristics such as education, log household income, age, gender, marital status, household size, and student status; community characteristics such as the presence of any health facility, average cold treatment fee, and urbanicity index; and province dummies.
(d) Other control variables in columns (5) and (6) include average age, proportion of females, average schooling years, average household income, presence of health facility, population density, and urbanicity index in the community.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

5.3. Heterogeneous effects of URBMI

In Table 6, we present the impacts of the URBMI enrollment for different subpopulations. First, in columns (1)–(3) we examine if the URBMI enrollment has differential effects for children (0–17 years old), the elderly (60 and above), and adults (18–59 years old). We find that the URBMI enrollment has significantly improved children's utilization of formal health care, including both outpatient and inpatient care. Consistent with the increased use of services, the total and out-of-pocket health expenditures for children have been significantly increased.

Adult enrollees have more inpatient hospital days (0.26 day) in the previous four weeks than adult non-enrollees, but the difference is only marginally significant ($P = 0.107$). Although the FE-IV estimates are insignificant, the FE estimates (unreported here) suggest that the elderly enrollees are more likely to use formal health care, especially outpatient care, at a 1% significance level. The endogeneity tests indicate that the exogeneity of the URBMI enrollment cannot be rejected at the conventional significance level in the FE estimations for the elderly subgroup. So the FE estimates are preferred estimates for this group of people.

In columns (4)–(6), we stratify the sample by household income level – below the 30th percentile, between the 30th and 70th percentiles, and above the 70th percentile – and obtain the FE-IV estimates for each subsample. The results reveal that participating in the URBMI has significantly improved the probability of utilizing formal health service and outpatient care for the low-income group. The medium-income group also benefits from participating in the program, and the program has significantly increased their inpatient hospital days, by 0.47 day. The total and out-of-pocket medical expenditures of the medium-income group have both been increased significantly. However, the effects of the URBMI enrollment are insignificant for the high-income group. These findings are different from those of Wang et al. (2005) on the NCMS, but are consistent with those of Currie and Gruber (1996b) on the United States.

In columns (7) and (8) of Table 6, we estimate the effect of the URBMI separately for males and females. We find that there is a positive effect of the URBMI enrollment on access to formal care and inpatient hospital days for males, but no such significant effect for female participants. A possible explanation is that males may have higher price elasticity of demand for medical care than females (Manning and Phelps, 1979).

In the last three columns, we investigate the differential effects of the URBMI by regions: eastern, central, and western. The results show that the URBMI participants in the relatively poor western region are significantly more likely to use formal care and outpatient care. For participants in central China, we find positive and statistically significant (at the 10% level) effects of the URBMI on inpatient hospital days, total health expenditure, and out-of-pocket expenditure. In relatively affluent eastern China, we find no significant effects of the URBMI.

5.4. Impact of URBMI on inequality in health expenditure

It is also important to examine the impact of the URBMI on the distribution of out-of-pocket medical expenditure for the target population, since one potential benefit of public health insurance such as the URBMI is to change the expenditure

Table 6
Effects of URBMI enrollment by population groups (FE-IV1).

Sample	0–17 (1)	18–59 (2)	60 and above (3)	Low HH income (4)	Medium HH income (5)	High HH income (6)	Male (7)	Female (8)	Eastern China (9)	Central China (10)	Western China (11)
1. Any formal health care	0.423**	0.039	0.124	0.206**	0.020	0.029	0.138*	0.079	−0.010	0.000	0.291***
	(0.208)	(0.068)	(0.091)	(0.093)	(0.070)	(0.132)	(0.074)	(0.072)	(0.184)	(0.089)	(0.080)
2. Outpatient care	0.341*	0.037	0.127	0.185**	0.010	0.006	0.102	0.075	−0.005	−0.017	0.264***
	(0.194)	(0.065)	(0.090)	(0.092)	(0.066)	(0.126)	(0.071)	(0.071)	(0.177)	(0.087)	(0.079)
3. Inpatient care	0.050	0.014	0.003	0.024	0.012	0.022	0.039	0.011	0.018	0.026	0.027
	(0.047)	(0.023)	(0.036)	(0.030)	(0.023)	(0.053)	(0.024)	(0.026)	(0.059)	(0.031)	(0.030)
4. Inpatient hospital days	1.183*	0.257	0.159	0.227	0.468**	0.372	0.595**	0.191	0.791	0.409*	0.270
	(0.679)	(0.159)	(0.337)	(0.252)	(0.233)	(0.553)	(0.292)	(0.190)	(0.932)	(0.211)	(0.167)
5. Total health expense	0.844*	−0.106	0.117	−0.189	0.364**	0.258	−0.152	0.298*	−0.024	0.419*	0.010
	(0.485)	(0.187)	(0.179)	(0.209)	(0.178)	(0.335)	(0.192)	(0.160)	(0.293)	(0.217)	(0.238)
6. Out-of-pocket health expense	0.461**	−0.175	0.087	−0.231	0.180**	0.323	−0.191	0.142	0.131	0.260*	−0.197
	(0.221)	(0.164)	(0.145)	(0.190)	(0.083)	(0.288)	(0.174)	(0.101)	(0.222)	(0.140)	(0.209)
Observations	360	562	334	530	478	248	516	740	328	506	422

Notes:
(a) Standard errors are reported in parenthesis.
(b) Other control variables include individual characteristics such as education, household income, age, gender, marital status, household size, and student status; community characteristics such as the presence of any health facility and the urbanicity index; wave dummies; and province dummies. We also control for average cold treatment fee in the regressions for health care utilization, but not in the regressions for health expenditure.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

distribution through risk sharing or altering the budget constraints unevenly for people with different levels of income. One approach to address this issue is to follow Abadie et al. (2002) and estimate quantile treatment effects for each centile of the spending. However, due to the data limitation that the CHNS only collects medical spending in the previous four weeks (about 90% of the target sample have no health expenditure) as well as the small sample size, it is hard to obtain consistent estimates of the changes in the distribution of out-of-pocket expenditures between 2006 and 2009.

As a compromise, we apply decomposition analysis of the concentration index (e.g., Wagstaff et al., 2003) to examine how income-related inequalities in out-of-pocket expenditure among the URBMI target population changed over the period 2006–2009, and whether the introduction of the URBMI accounted for the levels of and changes in inequalities in out-of-pocket expenditures between 2006 and 2009.

Following Wagstaff et al. (2003), we first estimate the concentration indices (CI) defined in Eq. (2) for out-of-pocket expenditure (y_i) in 2006 and 2009, then decompose the CI in each year according to Eq. (3), and further decompose the CI changes as expressed in Eq. (4):

$$CI = \frac{2}{n\mu}\sum_{i=1}^{n} Y_i R_i - 1 \tag{2}$$

$$CI = \sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) CI_k + \frac{GCI_\varepsilon}{\mu} \tag{3}$$

$$\Delta CI = \sum_k \eta_{kt}(CI_{kt} - CI_{kt-1}) + \sum_k CI_{kt-1}(\eta_{kt} - \eta_{kt-1}) + \Delta\left(\frac{GCI_{\varepsilon t}}{\mu_t}\right) \tag{4}$$

where μ and $\bar{x}_k$ are the means of y and x_k; R_i is the fractional rank of individual i in the income distribution; CI_k is the concentration index for x_k; $\eta_k = \beta_k \bar{x}_k / \mu$, is the elasticity of y with respect to x_k; and $GCI_\varepsilon = \frac{2}{n}\left(\sum_{i=1}^{n} \varepsilon_i R_i\right)$ is defined as a generalized concentration index for ε_i.

Eq. (4) is an Oaxaca-type decomposition, decomposing ΔCI into changes in inequality in the determinants of expenditure ($\Delta CI_x \times \eta$), changes in their elasticities ($\Delta\eta \times CI_x$), and changes in inequality in health expenditure that cannot be explained by systematic variation in x_k by income.

The results are reported in Table 7. The *CI*s were –0.035 in 2006 and –0.011 in 2009, suggesting that out-of-pocket expenditure risk was concentrated more among the poor in each year and that such inequality has been ameliorated during this period. The inequality in health insurance coverage disfavored the poor in each year, and contributed considerably to the inequality in out-of-pocket expenditure.

However, from 2006 to 2009 there was an appreciable decline in the inequality in health insurance coverage (0.033, column (7)) due to the introduction of the URBMI. It accounted for most of the decline in expense inequality associated with changes in respect of insurance coverage, while changes in the elasticities for health insurance were negligible. This finding

Table 7
Decomposition of concentration index and its change for out-of-pocket expenditure, 2006 and 2009.

	Decomposition of CI						Oaxaca-type decomposition of change in CI		
	2006 ($N = 1565$)			2009 ($N = 1416$)					
	Elasticities (1)	CI_x (2)	Contributions (3)	Elasticities (4)	CI_x (5)	Contributions (6)	$(\Delta CI_x \times \eta)$ (7)	$(\Delta \eta \times CI_x)$ (8)	Total (9)
Out-of-pocket expense			−0.035 (0.138)			−0.011 (0.249)			0.024
Insured	−0.179	0.187	−0.033	−0.219	0.035	−0.008	0.033	−0.007	0.026
Primary school	0.097	−0.035	−0.003	0.521	−0.085	−0.044	−0.026	−0.015	−0.041
Junior high school	0.246	0.040	0.010	−0.169	0.020	−0.003	0.003	−0.017	−0.013
Senior high school	0.112	0.057	0.006	−0.025	0.133	−0.003	−0.002	−0.008	−0.010
College	−0.034	0.224	−0.008	−0.030	0.155	−0.005	0.002	0.001	0.003
Log household income	0.304	0.210	0.064	1.140	0.185	0.211	−0.028	0.175	0.147
Age 18–54	0.879	0.011	0.010	−0.206	0.013	−0.003	0.000	−0.012	−0.012
Age 55 and above	1.177	−0.150	−0.177	−0.382	−0.115	0.044	−0.013	0.234	0.221
Female	−0.348	−0.005	0.002	−0.333	−0.011	0.004	0.002	0.000	0.002
Married	−0.191	0.002	0.000	0.603	0.018	0.011	0.010	0.002	0.011
Household size	0.181	0.059	0.011	−0.902	0.071	−0.064	−0.011	−0.064	−0.075
Student	0.424	0.185	0.078	−0.191	0.109	−0.021	0.015	−0.114	−0.099
Any health facility	−0.268	−0.021	0.006	0.523	−0.025	−0.013	−0.003	−0.016	−0.019
Log community urbanicity	11.975	0.002	0.019	−37.118	0.002	−0.080	−0.021	−0.079	−0.100
Residual			−0.019			−0.036			−0.017

is consistent with Wagstaff and Linderlow (2008) on earlier urban health insurance schemes in China as well as our main results on the URBMI that health insurance has not reduced the risk of health spending in urban China.

6. Concluding remarks

In this paper, we employ the FE-IV strategy to estimate the causal effects of the URBMI enrollment on health care utilization and spending for the non-working population in urban China, based on panel data drawn from the CHNS 2006–2009. We use the time variation of the URBMI implementation at the city level as the instrument for individual enrollment status, and conduct several empirical tests to show the validity of this instrument. Our major results are that the URBMI enrollment has significantly increased the utilization of formal medical services, including both outpatient care and inpatient care, and total health expense. However, we find no evidence that it has reduced out-of-pocket expense in the previous four weeks.

As crucial steps towards universal health insurance coverage in China, the URBMI and NCMS are very similar in nature: they are both heavily subsidized voluntary health insurance programs with a primary focus on the coverage of catastrophic expenses and an increasing trend toward outpatient reimbursement in the benefit package. The individual contribution for the URBMI is lower than that for the UEBMI, but is higher than that for the NCMS because of the greater expense of health services in urban areas (Lin et al., 2009). However, the financing of both URBMI and NCMS is limited, which leads to relatively low real reimbursement rates for both programs.

Since its inception in 2003, a number of studies have evaluated the impact of the NCMS, and most of them find that it significantly improved the enrollees' utilization of outpatient services and inpatient services (Wagstaff et al., 2009; Yu et al., 2010; Babiarz et al., 2012). These studies are consistent with our findings on the impact of the URBMI on health care utilization.

Our finding that the URBMI has not reduced out-of-pocket spending in the previous four weeks is not surprising, and is consistent with the existing literature on the impact of the NCMS (Wagstaff et al., 2009; Lei and Lin, 2009; Yip and Hsiao, 2009; Sun et al., 2009, 2010; Shi et al., 2010). This may result from three channels, including the increase of formal health care utilization, the fact that the URBMI appears to make people more likely to use higher-level providers, and physician-induced demand of the insured patients for high-margin care. These findings are also consistent with previous literature on earlier urban health insurance schemes in China (Wagstaff and Lindelow, 2008). However, since the URBMI only started in 2007, it is still too early to tell its long-term effects, such as the aggregate effect examined in Finkelstein (2007), which is six times larger than the effect estimated from individual studies like ours.

We also investigate heterogeneous effects of the program for different age groups, income groups, genders, and regions. The program has improved medical care utilization more for children, members of low-income families, and urban residents in the relatively poor western region. Our findings on the low-income families are consistent with the results of Lin et al. (2009), who find that the poor participants in the URBMI are more likely to feel relieved of a medical financial burden, and also consistent with the results of Cheng et al. (2013), who show that the poor NCMS enrollees have seen a significant increase in health care access. Our findings on the differential effects of the URBMI across regions are also consistent with the literature on the NCMS (Liu and Tsegai, 2011; Cheng et al., 2013).

This study is subject to several data limitations. First, the CHNS only collects inpatient services information for the previous four weeks at the time of the survey. Since inpatient service is a rare event, collecting information only in the previous four weeks instead of a longer time (e.g., 12 months in most surveys) results in few inpatient incidences, which may prevent us from accurately estimating the impact of the URBMI on utilization of inpatient services. This may be the reason why we find that the URBMI enrollment has no significant effect on the probability of using inpatient services, but a significant positive effect on inpatient hospital days. In fact, our FE-IV estimates for the probability of using inpatient care are positive, though they are not significant, due to the small sample size.

Second, our data do not have multiple outcomes within a domain. For example, for the domain of hospital utilization, we only have one outcome, viz., inpatient hospital days. This data limitation prevents us from adding further credibility to our main results by summarizing multiple findings across related outcomes within the same domain, i.e., calculating standardized treatment effects as Finkelstein et al. (2012) do in their study on the Oregon health insurance experiment.

Third, we only study a limited set of outcome variables, and cannot explore the frequency of formal medical care use, health expenditure per outpatient visit or inpatient spell, the structure of medical expenditure, health outcomes, or other supply-side responses. Research on those issues promises to be fruitful in the future.

Appendix A

See Table A1.

Table A1
Effect of URBMI on formal medical care use.

	Wave 2009		Waves 2006–2009		
	OLS (1)	Probit (2)	Linear FE (3)	FE-IV1 (4)	FE-IV2 (5)
Enrolled in URBMI	0.042**	0.042**	0.074**	0.097*	0.150**
	(0.019)	(0.018)	(0.032)	(0.052)	(0.064)
Primary school	0.000	−0.002	−0.073	−0.078	−0.089
	(0.031)	(0.025)	(0.058)	(0.053)	(0.054)
Junior high school	−0.013	−0.011	−0.064	−0.071	−0.090
	(0.027)	(0.024)	(0.065)	(0.065)	(0.067)
Senior high school	−0.012	−0.010	−0.052	−0.060	−0.079
	(0.030)	(0.028)	(0.093)	(0.094)	(0.095)
College	−0.033	−0.025	0.073	0.067	0.052
	(0.046)	(0.047)	(0.170)	(0.195)	(0.196)
Log household income	−0.010	−0.008	−0.034*	−0.037*	−0.043**
	(0.009)	(0.008)	(0.018)	(0.019)	(0.020)
Age 18–54	−0.084**	−0.090***	0.044	0.036	0.017
	(0.040)	(0.034)	(0.073)	(0.124)	(0.126)
Age 55 and above	0.021	0.002	0.023	0.003	−0.042
	(0.041)	(0.036)	(0.099)	(0.152)	(0.156)
Female	−0.006	−0.006			
	(0.018)	(0.018)			
Married	−0.026	−0.017	0.140	0.145	0.157
	(0.026)	(0.023)	(0.102)	(0.102)	(0.103)
Household size	−0.019***	−0.019***	−0.001	−0.001	−0.001
	(0.007)	(0.007)	(0.021)	(0.019)	(0.019)
Student	−0.084**	−0.071***	0.017	0.013	0.003
	(0.033)	(0.023)	(0.066)	(0.079)	(0.080)
Any health facility	0.002	0.002	−0.037	−0.043	−0.058
	(0.025)	(0.026)	(0.032)	(0.034)	(0.035)
Cold treatment fee	0.059	0.052	−0.010	−0.030	−0.077
	(0.084)	(0.115)	(0.243)	(0.297)	(0.300)
Log community urbanicity	0.025	0.019	−0.137	−0.155	−0.197
	(0.098)	(0.093)	(0.140)	(0.159)	(0.162)
Constant	0.053		0.786		
	(0.437)		(0.644)		
Control of provincial dummies	Yes	Yes	-	-	-
(Pseudo) R^2	0.062	0.083			
Observations	1402	1402	1256	1256	1256

Notes:
(a) Marginal effects are reported in column (2).
(b) Robust standard errors are reported in parenthesis in columns (1)–(3), and standard errors are reported in columns (4) and (5).
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

References

Abadie, Alberto, Angrist, Joshua, Imbens, Guido, 2002. Instrumental variables estimates of the effect of subsidized training on the quantiles of trainee earnings. Econometrica 70 (1), 91–117.
Babiarz, Kimberly S., Miller, Grant, Yi, Hongmei, Zhang, Linxiu, Rozelle, Scott, 2012. China's new cooperative medical scheme improved finances of township health centers but not the number of patients served. Health Affairs 31 (5), 1065–1074.
Card, David, Dobkin, Carlos, Maestas, Nicole, 2008. The impact of nearly universal insurance coverage on health care utilization: evidence from medicare. American Economic Review 98 (5), 2242–2258.
Chen, Yuyu, Jin, Ginger Z., 2012. Does health insurance coverage lead to better health and educational outcomes? Evidence from rural China. Journal of Health Economics 31 (1), 1–14.
Chen, Likwang, Yip, Winnie, Chang, Ming-Cheng, Lin, Hui-Sheng, Lee, Shyh-Dye, Chiu, Ya-Ling, Lin, Yu-Hsuan, 2007. The effects of Taiwan's national health insurance on access and health status of the elderly. Health Economics 16 (3), 223–242.
Cheng, Shou-Hsia, Chiang, Tung-Liang, 1997. The effect of universal health insurance on health care utilization in Taiwan. Journal of the American Medical Association 278 (2), 89–93.
Cheng, Lingguo, Liu, Hong, Zhang, Ye, Shen, Ke, Zeng, Yi, 2013. The Impact of Health Insurance on Health Outcomes and Spending of the Elderly: Evidence from China's New Cooperative Medical Scheme. Working Paper. SSRN. <http://ssrn.com/abstract=2280202>.
Chyi, Hau, Zhou, Bo, 2014. The effect of tuition reforms on school enrollment in rural China. Economics of Education Review 38, 104–123.
Currie, Janet, Gruber, Jonathan, 1996a. Health insurance eligibility, utilization of medical care and child health. Quarterly Journal of Economics 111 (2), 431–466.
Currie, Janet, Gruber, Jonathan, 1996b. Saving babies: the efficacy and cost of recent changes in the Medicaid eligibility of pregnant women. Journal of Political Economy 104 (6), 1263–1296.
Currie, Janet, Gruber, Jonathan, 1997. The technology of birth: health insurance, medical interventions and infant health. NBER Working Paper Series 5985.
Currie, Janet, Gruber, Jonathan, 2001. Public health insurance and medical treatment: the equalizing impact of the Medicaid expansions. Journal of Public Economics 82 (1), 63–89.
Finkelstein, Amy, 2007. The aggregate effects of health insurance: evidence from the introduction of Medicare. Quarterly Journal of Economics 122 (1), 1–37.
Finkelstein, Amy, Taubman, Sarah, Wright, Bill, Bernstein, Mira, Gruber, Jonathan, Newhouse, Joseph P., Allen, Heidi, Baicker, Katherine, 2012. The Oregon health insurance experiment: evidence from the first year. Quarterly Journal of Economics 127 (3), 1057–1106.
Heckman, James, 1990. Varieties of selection bias. American Economic Review 80 (2), 313–318.
Jones-Smith, Jessica C., Popkin, Barry M., 2010. Understanding community context and adult health changes in China: development of an urbanicity scale. Social Science and Medicine 71 (8), 1436–1446.
Lei, Xiaoyan, Lin, Wanchuan, 2009. The new cooperative medical scheme in rural China: does more coverage mean more service and better health? Health Economics 18 (S2), S25–S46.
Lin, Wanchuan, Liu, Gorden G., Chen, Gang, 2009. Urban resident basic medical insurance: a landmark reform toward universal coverage in China. Health Economics 18 (S2), S83–S96.
Liu, Yuanli, 2002. Reforming China's urban health insurance system. Health Policy 60 (2), 133–150.
Liu, Xingzhu, Mills, Anne, 1999. Evaluating payment mechanisms: how can we measure unnecessary care? Health Policy and Planning 14 (4), 409–413.
Liu, Dan, Tsegai, Daniel, 2011. The New Cooperative Medical Scheme (NCMS) and Its Implications for Access to Health Care and Medical Expenditure: Evidence from Rural China. ZEF Discussion Papers on Development Policy No.155. Center for Development Research, Bonn.
Liu, Hong, Sun, Qi, Zhao, Zhong, 2014. Social learning and health insurance enrollment: evidence from China's new cooperative medical scheme. Journal of Economic Behavior and Organization 97, 84–102.
Manning, Willard G., Phelps, Charles E., 1979. The demand for dental care. The Bell Journal of Economics 10 (2), 503–525.
National Bureau of Statistics, 2011. Statistical Communiqué of the People's Republic of China on the 2010 National Economic and Social Development (in Chinese). <http://www.stats.gov.cn/eNgliSH/NewsEvents/201102/t20110228_26426.html>.
National Bureau of Statistics, 2012. Statistical Communiqué of the People's Republic of China on the 2011 National Economic and Social Development (in Chinese). <http://www.stats.gov.cn/eNgliSH/NewsEvents/201302/t20130222_26962.html>.
National Development and Reform Commission, 2011. Report on China's Economic, Social Development Plan to the Annual People's Congress (in Chinese). <http://news.xinhuanet.com/politics/2011-03/17/c_121199854.htm>.
National Development and Reform Commission, 2012. Report on China's Economic, Social Development Plan to the Annual People's Congress (in Chinese). <http://news.xinhuanet.com/politics/2012lh/2012-03/16/c_111664815.htm>.
Shi, Wuxiang, Chongsuvivatwong, Virasakdi, Geater, Alan, Zhang, Junhua, Zhang, Hong, Brombal, Daniele, 2010. The influence of the rural health security schemes on health utilization and household impoverishment in rural China: data from a household survey of western and central China. International Journal for Equity in Health 9, 7.
State Council, 2007. Instructions on Establishing Pilot Program of the Urban Resident Basic Medical Insurance. State Council Document No. 20, China (in Chinese). <http://www.gov.cn/zwgk/2007-07/24/content_695118.htm>.
Sun, Xiaoyun, Jackson, Sukhan, Carmichael, Gordon, Sleigh, Adrian C., 2009. Catastrophic medical payment and financial protection in rural China: evidence from the new cooperative medical scheme in Shandong province. Health Economics 18 (1), 103–119.
Sun, Xiaoyun, Sleigh, Adrian C., Carmichael, Gordon A., Jackson, Sukhan, 2010. Health payment-induced poverty under China's new cooperative medical scheme in rural Shandong. Health Policy and Planning 25 (5), 419–426.
Wagstaff, Adam, Lindelow, Magnus, 2008. Can insurance increase financial risk? The curious case of health insurance in China. Journal of Health Economics 27 (4), 990–1005.
Wagstaff, Adam, van Doorslaer, Eddy, Watanabe, Naoko, 2003. On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. Journal of Econometrics 112 (1), 207–223.
Wagstaff, Adam, Lindelow, Magnus, Gao, Jun, Xu, Ling, Qian, Juncheng, 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.
Wang, Hong, Yip, Winnie, Zhang, Licheng, Wang, Lusheng, Hsiao, William, 2005. Community-based health insurance in poor rural China: the distribution of net benefits. Health Policy Plan 20 (6), 366–374.
Wang, Hong, Zhang, Licheng, Yip, Winnie, Hsiao, William, 2006. Adverse selection in a voluntary rural mutual health care health insurance scheme in China. Social Science & Medicine 63 (5), 1236–1245.
Xu, Ling, Wang, Yan, Collins, Charles D., Tang, Shenglan, 2007. Urban health insurance reform and coverage in China using data from national health services surveys in 1998 and 2003. BMC Health Service Research 7, 37.
Yip, Winnie, Hsiao, William, 2009. China's health care reform: a tentative assessment. China Economic Review 20 (4), 613–619.
Yip, Winnie, Hsiao, William, Chen, Wen, Hu, Shanlian, Ma, Jin, Maynard, Alan, 2012. Early appraisal of China's huge and complex health-care reforms. Lancet 379 (9818), 833–842.
Yu, Baorong, Meng, Qingyue, Collins, Charles, Tolhurst, Rachel, Tang, Shenglan, Yan, Fei, Bogg, Lennart, Liu, Xiaoyun, 2010. How does the new cooperative medical scheme influence health service utilization? A study in two provinces in rural China. BMC Health Services Research 10, 116.

Please cite this article in press as: Liu, H., Zhao, Z. Does health insurance matter? Evidence from China's urban resident basic medical insurance. Journal of Comparative Economics (2014), http://dx.doi.org/10.1016/j.jce.2014.02.003