華民研究中心
Huamin Research Center

Research Report #20
February 2015

Repression in health service utilization and expenditure of the elderly in China

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Using the data from the China Health and Retirement Longitudinal Survey, we employed counterfactual propensity score matching to examine repression of health service utilization and expenditure of the elderly in China. The results showed that whether the poor elderly in China visited a doctor when suffering an illness was not affected by income, but that their expenditures on medical treatment were significantly suppressed by income. The subgroup analysis further indicated that the medical demands of the female elderly, the older elderly, and the rural elderly were more likely to be suppressed by their income compared to their counterparts, respectively.

Keywords: Poverty, elderly, repression, health service, propensity score matching

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1. Introduction

In health economics, a widely accepted principle is the horizontal equality of health; that is, people with the same health demands ought to be treated equally, regardless of the individual characteristics of income, geographical location, and ethnicity (Morris, Sutton, & Gravelle, 2005). However, in reality, it is difficult to ensure this fairness, particularly for income effect. Poor people face a higher incidence of diseases and lower level of health care (Xie, 2011). Studies have shown that health issues are a major cause of poverty for the elderly in China (Qiao, Zhang, & Sun, 2006; Wang, 2010; Yang, 2010). With the increase in age, the loss of health capital and the recession in physiological function are inevitable facts; therefore, the elderly have more health care needs. However, due to the weak position of the elderly in terms of both family and society, these demands are often suppressed or ignored. The empirical results of Kochar (1999) show that compared with medical expenditures for young adults, medical expenditures on older people do not increase with household income. Thus, the elderly are more likely to fall into a vicious cycle of impoverishment due to sickness and poverty. The purpose of this paper is to assess whether the utilization of health care is suppressed by income of the elderly in China, and if the income constraint is released, to what extent is their potential medical demand. Findings of this paper should shed light on the suppressed need of the poor elderly and on the direction of improving the health care system in China, such as the establishment of the elderly health insurance system in China.

2. Literature review and theoretical framework

The repression in medical demand is defined here as the medical demand that cannot be satisfied due to personal financial constraint. It reflects the inequality in health care utilization due to income. Empirical studies have shown that the income-related inequality in health service utilization existed (Allin, Masseria, & Mossialos, 2011; Doorslaer & Masseria, 2004; Doorslaer, Masseria, & Koolman, 2006; Hurley & Grignon, 2006;). Based on the household data from 1998 to 2006 in England, Allin et al. (2011) found a significant inequality in medical service utilization of specialist treatment and dental care for the elderly 65 years of age and over. With the same demand, the rich elderly used more specialist treatment and dental care services than the poor elderly, while almost no inequality is found in the utilization of the medical services of general practitioners. However, in an international comparative study that includes data from Denmark, Belgium, Spain, Greece, Australia, and Germany, researchers showed that the medical care utilization of general practitioners was actually in favor of poor people; that is, for the same demand, poor individuals receive more services provided by general practitioners (Doorslaer, et al., 2006).

Based on these studies, scholars have concluded that in developed countries, the utilization of general practitioners and hospital treatment is fair or in favor of the poor, while the inequality in the utilization of specialist treatment favors the rich (Doorslaer et al., 2004; Hurley & Grignon, 2006).

Some scholars hold that for the countries with universal health care, the inequality of medical service utilization may also stem from the inappropriate cognition of people of low socioeconomic status with respect to their own medical demand, the available medical services, and the doctor-patient relationship (Dixon, Le Grand, Henderson, Murray, & Poteliakhoff, 2007; King & Mossialos, 2005). Compared to people of low socioeconomic status, people of high socioeconomic status have more advantages in the utilization of the health care system, and they can better understand their needs, select the available services, and obtain specialist referrals from their general practitioners (Dixon et al., 2007). The existing private health insurance may increase the inequality in health care utilization. In the population covered by private health insurance, most people are of high socioeconomic status and can more easily access specialist treatment with less waiting time (King & Mossialos, 2005).

In contrast, the empirical findings in China were slightly different. Wang et al. (2012) used the data from Zhejiang and Gansu provinces in the China Health and Retirement Longitudinal Survey (CHARLS), and utilized the concentration index (CI) to assess the inequality of medical care utilization. Wang found a pro-rich inequality of health care utilization in Gansu Province in both outpatient and inpatient treatment. In Zhejiang Province, which is relatively richer, this inequality is manifested as pro-poor in inpatient treatment and as pro-rich in outpatient treatment. Based on the data of the China Health and Nutrition Survey, Xie (2011) indicated a pro-rich inequality of health and medical care in China. The health of higher income individuals is better, and they utilize more medical services. The overall extent of inequality in the health of people in rural areas is higher than it is in urban areas. Income is the most important factor that causes the inequality of medical service utilization, and it accounts for 13-20% of the inequality of health care utilization. Scholars attribute the inequality of medical service utilization in China to the subsidy policy. Wei and his colleague found that the medical subsidy in China disproportionately subsidizes the rich instead of the poor (Wei & Gustafsson, 2005). In addition, they indicated that

the inequality in the health care utilization is largely due to regional differences: between rural and urban areas, and between the eastern and western regions.

In short, empirical studies suggest that low-income individuals tend to use fewer medical services and that the situation in developed countries is slightly different. That is, high-income individuals are more inclined to use high-end private health services, while poor individuals are more inclined to take advantage of low-end, public basic health services. In the rich provinces in China, such as Zhejiang, an inequality of medical service utilization in different income groups is also found. These phenomena are all considered to be an inequality in health service utilization, in which the same medical demand receives different medical services. However, there are many limitations related to the research in this area, such as how to define and control the same medical demand, a large heterogeneity in the health condition and physiological function of each individual, and the endogeneity that exists in the health and medical service itself. The question of how to find study objects with the same medical demand to compare the different levels of health care utilization in relation to income is an unresolved issue in the literature. Using a simple regression technique to assess this effect may result in a biased estimation in the model. The model may have missing variables (such as the concept of health, good attitude, and lifestyle) that also affect income and health service utilization. In this paper, we plan to use the counterfactual propensity score matching approach to solve this problem.

3. Method

3.1 Data

The data for this paper came from the 2011 China Health and Retirement Longitudinal Survey (CHARLS). CHARLS is a national survey that targets middle-aged individuals and the elderly in China. It used a random sampling method to select households with individuals aged 45 years old and above. The survey was conducted in 28 provinces, 150 countries/districts, and 450 villages/urban communities across the country. The details of the sampling method can be found in the survey report (Zhao et al., 2013). The data contains broad topics such as socioeconomic status and individual health information, which fulfill the needs for our research. Particularly, the data has a very rich set of morbidity measures and detailed therapy measures that enable us to control for variables related to health conditions of the elderly in different income quintiles and greatly reduce the bias.

3.2 Sample

We limited our sample to persons aged 50 and above as women's legal retirement age is 50 years old in China. Due to importance of income variable in our analysis, we excluded those elderly whose income were outliers. We first calculated the interquartile range (IQR) for household income per capita, and then deleted cases with income above upper adjacent (i.e. the third quartile+1.5*IQR) and below lower adjacent (i.e. the first quartile - 1.5*IQR). In our sample, this means we deleted the upper adjacent outliers of greater than 100,000 Yuan per capita and the lower adjacent outliers of lower than -132 Yuan per capita. We further deleted cases with missing data on any covariates used to predict their propensity score. Our final sample size was 12,643, including 1,969 elderly aged over 70 years old, 3,589 elderly aged between 60 and 69, and 7,065 elderly aged between 50 and 59. There were 6,694 women and 5,941 men, 10,185 elders came from rural areas and 2,450 were from urban areas.

3.3 Measures

Health service utilization and expenditures

Health service utilization was measured by two binary variables. For outpatient service, utilization was measured as whether elderly had outpatient visits after they got ill in the past four weeks. For inpatient service, the utilization was measured as whether elderly had inpatient service utilization after doctor suggested hospitalization in last year. Health service expenditures were measured by four continuous variables. For outpatient expenditures, total outpatient expenditures and total out-of-pocket outpatient expenditure in the past four weeks were used. Total inpatient expenditures and total out-of-pocket inpatient expenditure in the last year were measured as the expenses for inpatient expenditures.

Income

Elderly's income was measured as the per capita disposable household income, in which the household was defined as families living together and sharing income and expenditures. We chose the per capita disposable household income rather than the elderly's individual income due to the fact that in China, the family is the unit for distributing health expenditures. Elderly mainly live with adult children and share income and expenditures with them in China. We divided income into five quintiles.

Predictors of income quintiles

We used 18 covariates to model an elderly's propensity to be in different income quintiles. We used both theory and previous empirical research (Knight, & Song, 2003; Mincer, 1974; Schultz, 1960) to identify background characteristics that had effects on an elderly's propensity to be in different income quintiles. The covariates include demographic variable such as gender and age, and human capital variables such as education, years of

work experience and squared years of work experience. In addition, we used a series of health variables as covariates, including self-reported health status, self-reported childhood health status, disabilities, chronic disorders, infectious disorders, activities of daily living (ADL), instrumental activities of daily living (IADL), depression index, and body mass index (BMI). Scholars argued that the model should include as many as covariates, even weakly related to the treatment, in order to reduce the selection bias when predicting propensity score (Rubin, 1997; Morgan, et al., 2010). Therefore, we also include other covariates that may affect income and health service utilization and expenditures, including whether the elderly participated in any health insurance, marital status, number of children, number of sons, and highest education level of the household. All the measures and descriptive statistics are shown in Table 1.

3.4 Analytic Strategies

Mean differences

We used a t-test to explore whether there was any mean difference in the elderly's health service utilization and expenditures among different income quintiles. Without controlling any covariates, the result of the t-test was confounded by selection bias. The differences obtained from t-test, therefore, served as a point of reference for the findings found from propensity score matching analysis.

Propensity score matching

Propensity score matching (PSM) was used to contrast the health care utilization and expenditures of elderly who were in different income quintiles but displayed approximate propensity scores. Their propensity scores were calculated based on the 18 covariates mentioned above. Propensity score matching is a two-stage process. Stage one involves the use of a logistic regression model to calculate all respondents' propensity scores for being in different income quintiles. The equation of propensity score could be specified as follows (Rosenbaum & Rubin, 1983)

$$logit(p) = \log\left(\frac{1}{1-p}\right) = \mu + \beta x \quad (1)$$

Where p is the probability that the individual respondent is in the higher income quintile; x is a vector of characteristics correlated with income quintiles; β is a vector of parameters to be estimated; and μ is the intercept term corresponding to being in different income quintiles. Equation (1) can be re-written in terms of the propensity score as follows

$$\hat{p} = \frac{1}{1+e^{\hat{\beta}x}} \quad (2)$$

Where $\hat{p}$ and $\hat{\beta}$ are estimated via Maximum Likelihood using Stata.

The estimated propensity scores obtained in Stage 1 were then utilized to match elderly who were and who were not placed in the bottom quintile, using nearest neighbor matching, in Stage 2. The elderly who were in the bottom quintile were treated as comparison group and the elderly who were in the higher quintile were treated group. We then calculated average treatment effect for the treated (ATT) by using score of treated group minus score of comparison group. This is a better indicator to access the effectiveness of treatment compared to the average treatment effects for the whole population obtained from OLS regression analysis (Heckman, 1996; Morgan, et al., 2010). We use the ATT to assess the repressed medical demand of bottom-quintile elderly in our sample. With sensitivity analyses, stratification and Kernel matching were also used and the results were similar to the ones using nearest neighbor matching.

4. Results

4.1 Descriptive analysis

Table 2 presented the descriptive statistics of health service utilization, and Table 3 listed means and standard deviations of health service expenditures. Both tables were from the observed data. The results showed that there were no significant differences of health service utilization among the five income quintiles. However, there was a significant tendency that when income increased, the outpatient and inpatient expenditures increased accordingly. The results indicated that elderly who were in the bottom quintile spent less on health services than elderly who were in higher income quintiles. For example, the difference of inpatient expenditure between elderly in the bottom quintile and elderly in the top quintile was 387.18 Yuan (188.43 vs. 575.61 Yuan, respectively).

4.2 PSM estimates

Table 4 presents four logistic models used to estimate the propensity scores for different income quintiles. The logistic models suggested that elderly who: were living in rural areas, were older, had lower education levels, and had bad health conditions were more likely to have a low income and be categorized in the bottom quintile. Table 5 reported that there was no significant difference in health care utilization between the bottom quintile and the higher quintiles after assuming the bottom quintile had equal income with higher income quintiles. The results are consistent with the ones in Table 2.

However, when we compared the health care expenditures of elderly in different income quintiles, as shown in Table 6, we found that the bottom-quintile elderly spent significantly less on health care expenditure, which we consider as the health care expenditure repression. With respect to matching the bottom quintile to the second quintile, we found both ATT of total outpatient expenditures in one month and out-of-pocket outpatient expenditures in one month of the elderly in the bottom quintile were positive. The av-

erage outpatient total expenditures in one month of the elderly in the bottom quintile were repressed by 117.82 Yuan. The average out-of-pocket outpatient expenditures in one month of the elderly in the bottom quintile were repressed by 105.55 Yuan. When matching the bottom quintile to the third quintile, we found similar results. The outpatient total expenditures and out-of-pocket outpatient expenditures of the elderly in the bottom quintile were repressed significantly as well.

When matching the bottom quintile to the fourth or top quintiles, the effects were substantial. The total inpatient expenditures, total outpatient expenditures, and total out-of-pocket outpatient expenditures all were repressed significantly and positively. Especially when we matched the bottom quintile with the top quintile, all categories of expenditures of the elderly in the bottom quintile were repressed significantly, with total annual inpatient expenditures repressed by 587.06 Yuan, annual out-of-pocket inpatient expenditures by 294 Yuan, monthly total outpatient expenditures by 25.34 Yuan, and monthly out-of-pocket outpatient expenditures by 26.22 Yuan.

Gender differences on repression of health care expenditures

Table 6 also presents significant differences between males and females in effects of income on health care expenditures. We found that for males, regardless of income quintiles, there was no significant effect of repression on health care expenditures, except for total inpatient expenditures. However, when we matched the bottom quintile to the other quintiles, the health care expenditures of female elderly in the bottom quintile were repressed significantly. Matching the bottom quintile with the second quintile, the total outpatient expenditure was repressed by 163.2 Yuan, and out-of-pocket outpatient expenditure was repressed by 150.16 Yuan. When matching to higher income quintiles, the outpatient expenditures of the elderly in the bottom quintile were repressed as well. The results depict that in Chinese families, the elderly women suffer more income -related repressions in health service expenditure compared to elderly men. This is closely related to the economically disadvantaged position of women in Chinese families.

Age differences on repression of health care expenditures

As age increased, the health condition worsened and the physiological function of the elderly also declined. Due to the dually disadvantageous position of the elderly in family and society; the demands may be repressed and ignored (Kochar 1999). As shown in table 7, when we matched the bottom quintile with the second quintile, there was no significant difference in 50-59 and 60-69 groups. For the 70 and above group, there were significant and negative differences in both the total outpatient and total out-of-pocket outpatient expenditures. A possible explanation is that the bottom-quintile elderly in 70 and above were covered by a medical assistance system, while their second-quintile comparatives were excluded from the assistance system, resulting in the second -quintile elderly having fewer health expenditures than the bottom-quintile elderly. However, when matching bottom quintile to the third quintile, the total outpatient expenditures were repressed by 54.98 Yuan and out-of-pocket outpatient expenditure repressed by 47.44 Yuan. Similarly, for the 60- 69 group, the outpatient expenditures were repressed by 115.27 Yuan. For the 70 and above group, the inpatient and outpatient expenditures of the elderly in the bottom quintile were both repressed significantly. The results indicated that with the increasing age, the repression effects of income on health care expenditures increased significantly.

Urban/rural differences on repression of health care expenditures

For elderly in urban areas, higher income did not have significant impacts on health expenditures, except for the total inpatient expenditure and total out-of-pocket inpatient expenditures of the top quintile. However, for the rural area, the repression was substantial. Except for the matching with the forth quintile, the matching of any higher-income quintiles to the bottom quintile resulted in a significant repression in health service expenditure (see table 8). When the treated quintile was the second quintile, the total outpatient expenditure and out-of-pocket outpatient expenditure of the elderly in the bottom quintile were repressed by 26.98 Yuan and 26.53 Yuan respectively. The repressed outpatient expenditure was generated in the form of out-of-pocket pay, not covered by health insurance. When the treated quintile was the third quintile, the total outpatient and out-of-pocket outpatient expenditures of the elderly in the bottom quintile were also repressed significantly. When the treated quintile was the top quintile, the total outpatient expenditure of the elderly in the bottom quintile was repressed significantly by 435.27 Yuan, but there was no significant repression in total inpatient expenditures. The results may be due to the fact that the inpatient expenditures are mainly covered by health insurance. There were also significant repression in total outpatient expenditure and out-of-pocket outpatient expenditure, and the repression range decreased, which also indicates that the system of rural health insurance is pro-rich.

5. Conclusions

Using PSM, we matched the elderly in different income groups with similar health conditions, education level, age, and other characteristics to examine their health care utilization and expenditures. The results show that whether an elderly visited a doctor when suffering from an illness has no significant relationship with the income constraint. Even for the poorest

elderly, in the case where their income model is similar to the richest elderly, whether they seek medical treatment when ill does not significantly change. However, expenditures on medical treatment are significantly affected by income. The repression of low-income elderly is significant in both outpatient and hospitalization expenditures. The proportion of reimbursement for outpatient expenses in many medical insurance policies is very small in China, and this may lead an elderly person to not seek further treatment when they feel they have a minor illness. The subgroup analysis shows that the medical demands of the female elderly, the older elderly, and the rural elderly are more likely to be repressed by income compared to their counterparts, respectively. The corresponding policy issue is how to meet the medical needs of these vulnerable groups. Although health insurance coverage is currently high, 93.52%, the medical needs of these groups are still significantly suppressed by income. These findings force us to profoundly rethink the current medical system and system of health care in China.

With the rise of the elderly population in China, the health care needs will sharply increase. Paying adequate attention to health insurance, particularly for vulnerable groups, should influence medical reforms made in the future. Simultaneously, the reimbursement policy of the health insurance system and the out-of-pocket expenses incurred by the patients themselves need to be reformed. Based on the findings of this paper, we have two specific policy recommendations. First, a specialized elderly health care system needs to be established. Currently, there is no health insurance specifically for the elderly available in China. Although the elderly are covered by three major health care systems (medical insurance for urban residents, medical insurance for urban workers, and new rural cooperative medical care), the medical demand of the poor elderly is still found to be repressed. Therefore, we can learn from the medical insurance system in developed countries to establish a health insurance program that is implemented specifically for the elderly, based on the characteristics of the elderly population, thereby meeting the medical demands of the elderly. For example, in the U.S., the insured objects of Medicare, implemented in 1965, are elderly over 65; in Japan, the elderly health insurance system is implemented for seniors over the age of 70 and for the paralyzed elderly over 65 years of age. These are insurance systems that specifically protect the elderly at different stages based on their age level. China can also establish a similar health program for the elderly to release the repression of medical demand for the poor elderly.

Secondly, health insurances should increase level of reimbursement for the treatments of general outpatient diseases, as well as lower the proportion of out-of-pocket payment for outpatient treatment. Outpatient demands of the poor elderly are significantly repressed by income, which is in part due to insurance policy in China. If the poor elderly relinquish outpatient treatment for minor illnesses due to income, a minor illness may consequently gradually worsen into a serious illness, which would result in greater health care demands on family and society. If it is somehow difficult to allow everyone to be reimbursed for outpatient costs at the current stage, consideration may be given to starting implementation with the more vulnerable groups such as female elderly, the older elderly, and the rural elderly.

Table 1. Descriptive statistics of variables.

	Mean	S.D.
Inpatient care [%]	67	—
Outpatient care [%]	74	—
Inpatient expenditure (RMB)	289.50	3255.32
Out of pocket inpatient expenditure (RMB)	153.58	2003.00
Outpatient expenditure (RMB)	54.43	554.83
Out of pocket outpatient expenditure (RMB)	40.14	354.07
Urban [%]	20	—
Education [%]		
Illiterate	27.72	—
Can read and write	18.73	—
Elementary school	22.12	—
Junior middle school or above	31.42	—
Married [%]	85	—
Male [%]	49	—
Age	62.23	8.23
Years of work experience	15.92	4.23
Squared years of work experience	271.27	174.34
Insurance	94	—
Self-reported health status [1-5]	4.01	0.88
Self-reported childhood health status [1-5]	2.77	1.09
Have disabilities [%]	18	—
Have chronic disorders [%]	71	—
Have infectious disorders [%]	6	—
Activities of Daily Living (ADL) [%]	50	—
Instrumental Activities of Daily Living (IADL) [%]	16	—
Depression	19.88	5.08
Body Mass Index (BMI)	23.51	11.72
Area [%]		
Eastern	21.95	—
Central	23.22	—
Western	54.83	—

Note. Figures in table are means or percentages and standard deviations.

Table 2. Heath care utilization of the elderly.

	Inpatient Care	Outpatient Care
Bottom quintile	62.40	72.90
Second quintile	63.30	71.90
Third quintile	58.70	72.30
Fourth quintile	73.50	74.00
Top quintile	73.90	76.80
Total	66.20	73.40

Note: Figures in table are percentages.

Table 3. Means and standard deviation of health care expenditure and income of the elderly.

Income quintile	Inpatient expenditure	Out of pocket inpatient expenditure	Outpatient expenditure	Out of pocket outpatient expenditure	Per capita income
Bottom	188.43	122.42	40.33	34.17	385.94
	(2123.05)	(1698.68)	(278.67)	(247.85)	(267.81)
Second	210.70	150.43	57.43	44.71	1808.39
	(1959.69)	(1537.37)	(699.95)	(473.21)	(556.89)
Third	182.02	115.05	53.8*	47.33*	4323.57
	(1562.2)	(1142.73)	(327.25)	(282.93)	(922.85)
Forth	290.77*	150.97	52.92	39.51	8506.98
	(3110.98)	(1579.48)	(719.94)	(462.98)	(1604.13)
Top	575.61***	229*	67.67**	34.99	21830
	(5695.03)	(3318.25)	(588.66)	(217.27)	(12481.6)
Total	289.5	153.58	54.43	40.14	7370.28
	(3255.32)	(2003)	(554.83)	(354.07)	(9580.34)

Note: Figures in table are means; Standard errors are in parentheses.
*p<0.1, **p<0.05, ***p<0.01. Significance test is compared to the bottom quintile

Table 4. Logit regression of income quintiles

	Second /Bottom/ quintile	Third/Bottom/ quintile	Forth/Bottom/ quintile	Top/Bottom/ quintile
Urban	0.517***	0.969***	1.777***	2.478***
	(-2.63)	(-4.99)	(-9.06)	(-12.26)
Education (illiterate)				
Can read and write	0.070	0.030	0.251*	0.400**
	(-0.53)	(-0.23)	(-1.69)	(-2.20)
Finished primary	-0.100	0.170	0.090	0.479***
	(-0.68)	(-1.21)	(-0.56)	(-2.68)
Junior high and above	0.020	0.260	0.383**	0.835***
	(-0.10)	(-1.58)	(-2.21)	(-4.24)
Married	-0.0789**	-0.040	-0.020	-0.060
	(-2.23)	(-1.10)	(-0.52)	(-1.28)
Male	-0.184*	0.010	0.268**	0.578***
	(-1.71)	-0.050	-2.250	-4.220
Age	-0.0106*	-0.0210***	-0.0298***	-0.0197***
	(-1.80)	(-3.52)	(-4.67)	(-2.66)
Years of work experience	0.0643*	0.050	0.060	0.212***
	-1.660	-1.320	-1.490	-3.270
Squared years of work experience	0.000	0.000	0.000	-0.00557***
	(-1.58)	(-1.51)	(-1.34)	(-3.23)
Insurance	-0.0733	0.0163	0.121	0.348
	(-0.36)	(0.08)	(0.53)	(1.32)
Self-reported health status	0.070	-0.030	-0.060	-0.216***
	-1.080	(-0.56)	(-0.86)	(-3.03)
Self-reported childhood health status	0.010	0.000	-0.070	-0.242***
	-0.150	-0.080	(-1.50)	(-4.29)
Have Disabilities	0.100	-0.220*	-0.307**	-0.385**
	-0.840	(-1.79)	(-2.25)	(-2.21)
Have Chronic disorders	0.080	0.070	0.160	0.353**
	-0.710	-0.590	-1.320	-2.560
Have Infectious disorders	0.000	-0.200	-0.070	-0.110
	(-0.00)	(-1.00)	(-0.33)	(-0.41)
ADL	-0.289***	-0.351***	-0.524***	-0.700***
	(-2.61)	(-3.18)	(-4.46)	(-5.15)
IADL	0.130	0.010	0.020	-0.230
	-1.000	-0.060	-0.120	(-1.11)
Depression	0.000	-0.010	-0.020	-0.0456***
	-0.520	(-1.46)	(-1.58)	(-3.55)
BMI	0.010	0.010	0.000	0.0569***
	-0.950	-0.550	-0.230	-3.590
Area (eastern area)				
Central area	0.070	0.020	-0.457***	-0.565***
	-0.490	-0.150	(-2.84)	(-3.16)
Western area	-0.050	-0.070	-0.060	-0.298**
	(-0.37)	(-0.56)	(-0.49)	(-2.07)
_cons	-0.580	0.290	-0.310	-3.460***
	(-0.79)	-0.370	(-0.38)	(-3.50)
N	1844	1890	1821	1784

Note: Standard errors are in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 5. Estimated effect of income on the elderly's health care utilization.

	Treated	Controls (Bottom quintile)	ATT (Treated-Bottom)	S.E.	T-stat
Second quintile					
Inpatient care	0.63	0.61	0.02	0.08	0.24
Outpatient care	0.73	0.72	0.01	0.05	0.15
Third quintile					
Inpatient care	0.66	0.69	-0.03	0.10	-0.33
Outpatient care	0.73	0.75	-0.02	0.07	-0.33
Forth quintile					
Inpatient care	0.76	0.70	0.05	0.11	0.51
Outpatient care	0.72	0.62	0.10	0.07	1.35
Fifth quintile					
Inpatient care	0.76	0.69	0.06	0.14	0.47
Outpatient care	0.78	0.83	-0.06	0.12	-0.46

Note: The bottom quintile is the control group and the other quintiles are the treated groups; ATT=average treatment effects on the treated.

Table 6. Estimated effects of income on the elderly's health care expenditure: whole and by gender.

	Whole	Male	Female
	ATT	ATT	ATT
Second quintile			
Inpatient expenditure	1537.68	3525.00	-4.29
Out of pocket inpatient expenditure	1295.40	2571.18	-9.07
Outpatient expenditure	117.82***	52.70	163.20**
Out of pocket outpatient expenditure	105.55***	59.20	150.16**
Third quintile			
Inpatient expenditure	137.29	-1832.14	2608.20
Out of pocket inpatient expenditure	105.69	-1562.50	1999.84
Outpatient expenditure	26.32**	-24.70	111.46**
Out of pocket outpatient expenditure	22.38***	51.93	100.20**
Forth quintile			
Inpatient expenditure	136.81**	49.16	-57.23
Out of pocket inpatient expenditure	49.77***	-71.94	-21.17
Outpatient expenditure	34.35	51.58	-31.51*
Out of pocket outpatient expenditure	17.83**	8.33	-15.56
Fifth quintile			
Inpatient expenditure	587.06**	682.63*	525.14*
Out of pocket inpatient expenditure	294.99*	438.87	197.92*
Outpatient expenditure	25.34*	0.39	42.97**
Out of pocket outpatient expenditure	26.22**	20.95	28.90**

Note: *p<0.1, **p<0.05, ***p<0.01.
The bottom quintile is the control group and the other quintiles are the treated groups.

Table 7. Estimated effects of income on elderly's health care expenditure: by age.

	50-59	60-69	70+
	ATT	ATT	ATT
Second quintile			
Inpatient expenditure	361.90	365.00	-1535.71
Out of pocket inpatient expenditure	283.81	313.50	-371.25
Outpatient expenditure	100.99	4.34	-155.65*
Out of pocket outpatient expenditure	110.51	16.67	-158.65*
Third quintile			
Inpatient expenditure	96.98	432.61	2642.86**
Out of pocket inpatient expenditure	116.33	353.04	782.14***
Outpatient expenditure	54.98**	115.27***	35.11*
Out of pocket outpatient expenditure	47.44**	105.14***	27.25*
Forth quintile			
Inpatient expenditure	827.27**	689.66*	2900.00
Out of pocket inpatient expenditure	693.94**	379.31	412.00*
Outpatient expenditure	-101.98	169.34*	624.14
Out of pocket outpatient expenditure	19.69	137.18**	-13.79
Fifth quintile			
Inpatient expenditure	181.72	1862.74**	718.45**
Out of pocket inpatient expenditure	59.87	1115.74*	179.61*
Outpatient expenditure	-497.98***	401.19***	44.14
Out of pocket outpatient expenditure	-77.51	293.11**	49.37*

Note: *p<0.1, **p<0.05, ***p<0.01.
The bottom quintile is the control group and the other quintiles are the treated groups.

Table 8. Estimated effects of income on elderly's health care expenditure: by locations.

	Urban	Rural
	ATT	ATT
Second quintile		
Inpatient expenditure	2.62	0.00
Out of pocket inpatient expenditure	36.01	0.00
Outpatient expenditure	26.99*	-227.27
Out of pocket outpatient expenditure	26.53*	-1.82
Third quintile		
Inpatient expenditure	6.78	1983.87
Out of pocket inpatient expenditure	35.79	1365.05
Outpatient expenditure	26.53*	-133.01
Out of pocket outpatient expenditure	24.17**	-12.58
Forth quintile		
Inpatient expenditure	-61.03	436.67
Out of pocket inpatient expenditure	-34.14	56.67
Outpatient expenditure	0.90	-134.07
Out of pocket outpatient expenditure	5.11	-10.27
Fifth quintile		
Inpatient expenditure	435.27*	539.92**
Out of pocket inpatient expenditure	321.74	201.90*
Outpatient expenditure	36.66**	-164.76
Out of pocket outpatient expenditure	30.10**	-12.44

Note: *p<0.1, **p<0.05, ***p<0.01.
The bottom quintile is the control group and the other quintiles are the treated groups

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