Health insurance, pension and health status of middle-aged and elderly in China

Purpose of research

As one of the most significant social transformations of the twenty-first century, population aging has significant implication for the welfare of the middle-aged and elderly. According to the World Population Ageing Report 2017 released by the United Nations, the Chinese population aged 60 years or over numbers 0.23 billion in 2017, and nearly one in four persons aged 60 years or over in the world in 2017 lived in China. It is well known that health is a critical factor in determining one's welfare and standard of living (Bloom & Canning, 2003), especially for the middle-aged and elderly who face growing longevity risk and morbidity risk. Health status may alter people's labor supply (Currie & Madrian, 1999; Hokayem & Ziliak, 2014), life expectancy (Chakraborty, 2002) as well as other individual characteristics and choices. Thus, improving the health status of middle-aged and elderly has become an essential public health policy objective for China.

Health insurance and pension are two of the most important social security tools to provide financial protection for the middle-aged and elderly. The existing literature primarily focuses on the impact of health insurance on health status, and most researches attribute the positive impact on health to better utilization of health care.[1] Relatively less attention has been paid to the impact of pension on health status. Existing literature shows that pension affects people's health through a couple of channels, such as nutrition intake and reduced stress level.[2] In essence, health insurance not only enables people to utilize healthcare service at a reduced price, but also reduces people's precaution savings for morbidity risk, leading to more investment in preventative care and fitness potentially. In comparison, pension reduces people's precaution savings for longevity risk and makes it possible for more investment in preventative care, out-of-pocket healthcare expenditure, better nutrition intake, and less stress level. Therefore, it is essential to consider these two types of insurance and their impact on health jointly.

We contribute to the literature in three aspects. First, we jointly study the impact of health insurance and pension on the health status of the middle-aged and elderly Chinese. In specific, we would be able to compare the impact of the various programs as well as the different channels of impact. Second, we establish a theoretical model on the impact of health insurance and pension on health status, and it serves as a foundation for our empirical analysis. Third, we use a reliable and rich dataset collected for the middle-aged and elderly in China to test our hypotheses empirically.

Theoretical model and hypotheses development

Following Chakraborty (2002) and Fanti & Gori (2012), we build a general equilibrium OLG closed economy with rational and identical two-period lived individuals, identical firms and a government that finances Pay-As-You-Go public pension and public health insurance scheme at a balanced budget. In our model, the representative agent invests in health when young (shown as self-treatment and fitness expenditure in our data) to get better health status, and to further avoid getting sick and live longer after retirement. Intuitively, health insurance and pension reduce people's precaution savings during the work period to manage longevity risk and morbidity risk, therefore, they may enable more investment in health. Thus, we expect to show that health insurance and pension may improve people's health by promoting personal health investment. We build the basic theoretical model, as shown in Appendix A, with the closed-form expression solution pending to be solved. Based on our model, we propose the following three hypotheses:

[1] See Currie & Gruber (1996), Card & Finkelstein (2007), Card & Maestas (2008), Wagstaff et al. (2009), and Cheng & Zhang (2012).

[2] See Duflo (2000), Case (2001), Jensen & Richter (2004) and Cheng et al. (2016).

Hypothesis Ⅰ: Pension has a positive impact on middle-aged and elderly people's health outcomes.
Hypothesis Ⅱ: Health insurance has a positive impact on middle-aged and elderly people's health outcomes.
Hypothesis Ⅲ: Pension and health insurance jointly improve middle-aged and elderly people's health by promoting personal health investment.

Program and Data

Chinese pension and health insurance system

In China, the pension system consists of three pillars, i.e., public pensions (the first Pillar), employer-provided private pensions (the second pillar), and individual private pensions (the third pillar). Among the three pillars, the public pension is the dominating one, while the second and the third pillar are still at a relatively early stage, supplementing the first pillar.[3] In specific, the first pillar could be further divided into two parts, i.e., the Employee Basic Pension and the Resident Basic Pension. The former is a compulsive program covering employees in enterprises, government and public institutions, while the latter is a voluntary program covering residents in both urban and rural areas. By 2017, more than 900 million people engage in public pension plans with accumulated funds of more than 730 billion Yuan.

Similar to the pension system, China establishes a multi-pillar public health insurance system covering both urban and rural residents over the years. The basic health insurance system consists of two programs, the Employee Medical Insurance program and the Resident Medical Insurance program. Altogether, the public health insurance program covers roughly 1.2 billion people in 2017.[4] Besides the public health insurance plans, there are commercial health insurance plans which target those who are interested in purchasing supplemental or customized health insurance coverage.

Data source and sample construction

The empirical analysis utilizes data from the China Health and Retirement Longitudinal Study (CHARLS), which is a nationally representative survey conducted by Peking University. CHARLS surveyed respondents aged 45 years or older through a face-to-face computer-assisted personal interview, covering 450 villages (or urban communities) from 150 counties (or urban districts) in 28 provinces of mainland China, except for Hainan, Ningxia, and Tibet. Respondents in the CHARLS survey was drawn using proportional to size sampling method, with records of 14,076 households (59,697 individual observations). The three waves of national surveys were conducted every two years since 2011. The second and third waves aimed to follow the same respondents in the first wave. Besides, a supplementary life history survey was conducted in 2014 to interview the alive respondents from former waves. CHARLS (2011, 2013 & 2015) collects rich information on the household level and individual level, including various health status measurements, health care utilization, medical expense, income information, house equities, and various demographic characteristics.

We construct our sample based on CHARLS (2011, 2013 & 2015) dataset by excluding records with missing values in the key variables listed in Appendix Table B. We also exclude respondents with missing values in sample weight, which is the inverse probability weight for each respondent to correct for non-responses (Zhao et al., 2016). In summary, our sample consists of 21,091 valid individual observations. Details on variable definition and summary statistics of all three waves of CHARLS data are presented in Appendix Table B and C respectively.

[3] By 2017, almost 80,000 employers, mostly government, public institutions, and large enterprises have established employer-provided private pension program, covering 23.31 million employees, according to the Statistical Bulletin on the Development of Human Resources and Social Security in 2018.

[4] Statistical Bulletin on the Development of Human Resources and Social Security in 2017, 2018.

Empirical model

To estimate the effects of pension and health insurance on the health outcomes of middle-aged and elderly Chinese and multiple transmission channels between these two forms of insurance and health outcomes, we specify the empirical model in the following form:

$$Y_{it} = \beta_0^1 + \beta_1^1 Pension_{it} + \beta_2^1 Health\_insurance_{it} + \beta_3^1 X_{it} + \varepsilon_{it}^1 \quad (1)$$

$$Z_{it} = \beta_0^2 + \beta_1^2 Pension_{it} + \beta_2^2 Health\_insurance_{it} + \beta_3^2 X_{it} + \varepsilon_{it}^2 \quad (2)$$

$$Y_{it} = \beta_0^3 + \beta_1^3 Pension_{it} + \beta_2^3 Health\_insurance_{it} + \beta_3^3 X_{it} + \beta_4 Z_{it} + \varepsilon_{it}^3 \quad (3)$$

where the subscripts i and t represent individuals and waves. Y_{it} is a set of health measurement variables, and Z_{it} is a set of health care utilization, medical expenses, and individual health investment variables as listed in Appendix Table B. $Pension_{it}$ and $Health\_insurance_{it}$ represent our key independent variables of interest. The vector X_{it} contains a set of individual and household characteristics as listed in Appendix Table B. In addition, we include the province dummies and year dummies to control the regional differences and time effect respectively. For categorical control variables, we always omit the largest category from the models as it serves as the baseline category. Moreover, we use the natural logarithm of income from work, house value and intra-family transfer to better fit the linear models, and we add 1 Yuan to the value before we take the natural logarithm.

Following Baron & Kenny (1986) and Edwards & Lambert (2007), we use the causal steps procedure to test the mediation effect of Z_{it}, the mediator variable, which requires four conditions to be satisfied to establish the mediation effect with the causal steps procedure as outlined by Baron & Kenny (1986): (a) pension enrollment and health insurance enrollment should be related to Y_{it} in Equation (1), such that β_1^1 and β_2^1 are significant; (b) pension enrollment and health insurance enrollment should be related to Z_{it}, the mediator variable, in Equation (2), such that β_1^2 and β_2^2 are significant; (c) Z_{it}, the mediator variable, should be related to Y_{it} in Equation (3), such that β_4 is significant; and (d) the relationship between pension enrollment and health insurance enrollment and Y_{it} in Equation (3) should be insignificant or significantly smaller than the relationship between pension enrollment and health insurance enrollment and Y_{it} in Equation (1).

Preliminary results

Appendix Table D shows the preliminary regression results of Equation (1) and (2). As expected, we find that health insurance and pension enrollment improve people's life satisfaction and mental state. However, people who participate in health insurance have more chronic diseases and lower self-reported health status. This finding may occur because people with health insurance usually undergo a more thorough physical examination when they feel physical discomfort, which informs them more about their potential illnesses, as noted by Cheng & Zhang (2012). Moreover, we also find people participating in health insurance have higher medical expenditure, more frequent health care utilization, more personal health investment (in the form of higher self-treatment and fitness expenditure) and lower out-of-pocket ratio. These results confirm the fact that people pay more on their health as a result of public health insurance enrollment. On the contrary, pension enrollment shows a significant impact on people's self-treatment expenditure only. Moreover, Appendix Table E shows the preliminary regression results of Equation (3). It shows that health care utilization, medical expense, and health investment are important channels through which health insurance and pension affect the mental health of middle-aged and elderly people.

Appendix A: The theoretical model

Consider a general equilibrium OLG closed economy with rational and identical two-period lived individuals, identical firms and a government that finances Pay-As-You-Go public pension and public health insurance scheme at a balanced budget. The population is increasing at the exogenous fertility rate n. Each generation overlaps for one period with the previous generation and then overlaps for one period with the next generation. Time is discrete and indexed by $t = 0, 1, 2 \ldots$ The life of a typical agent is divided into two periods, childhood and adulthood. During childhood, the agent does not make economic decisions and lives to the next period with certainty. During adulthood, the agent works and takes care of children before retirement. Young adult is assumed to live to retirement for sure, and the retiree would live with an endogenous survival probability π_t, which is dependent on the health status that further being determined by the health investment over the lifetime. During the retirement period, the agent lives on both saving and public pension benefit, facing with an endogenous morbidity risk. The endogenous morbidity m_t is also dependent on the health status.[5]

The representative young individual at time t draws utility from $c_{y,t}$ consumption when young, $c_{o,t+1}^1$ consumption when old if sick, and $c_{o,t+1}^2$ consumption when old if healthy. Thus, the lifetime utility of a young individual at time t is given by:

$$U = U(c_{y,t}) + \beta\pi_t\left[m_t U(c_{o,t+1}^1) + (1 - m_t)U(c_{o,t+1}^2)\right] \quad (1)$$

Here β is the intertemporal discount factor measuring the utility gain from his consumption when old, π_t is the endogenous probability of living till the end of the retirement period. We assume that the survival probability of old people working at time t is endogenous and determined by health status, which is augmented by personal health investment h_t. The relationship between survival probability of old people and personal health investment is described by the strictly increasing function $\pi_t = \pi(h_t)$.[6] Following Chakraborty (2002) and Fanti & Gori (2012), we model this relationship as:[7]

$$\pi_t = \pi(h_t) = 1 - e^{-h_t} \quad (2)$$

where $\pi(0) = 0, \pi_h' = e^{-h_t} > 0$, $\lim_{h\to\infty} \pi(h_t) = 1$ and $\pi_h'' = -e^{-h_t} < 0$. Similarly, we assume that the relationship between morbidity and personal health investment is:

[5] Without loss of generality, we assume the young people are in good health status, and thus have zero morbidity risk. We argue this assumption is reasonable since the incidence of most diseases increase rapidly as people reach middle-age. In specific, the morbidity risk of critical illness rises sharply after the age of 48, according to the experience morbidity table of critical diseases in China's life insurance industry (2006-2010) released by China Insurance Regulatory Commission.

[6] Definitely, individual's other characteristics will also affect sick people's mortality, for example, their dietary habit. In this paper, we attribute all the factors that potentially affect sick people's mortality to the individual health investment.

[7] Although we chose different forms of functions, our specifications share similar properties, such as all are monotone increasing and bounded function.

$$\mathrm{m}_t = m(h_t) = 1 - \mathrm{m}_0 + \mathrm{m}_1 e^{-h_t} \tag{3}$$

where $m(0) = 1 - \mathrm{m}_0 + \mathrm{m}_1, \mathrm{m}_0 > \mathrm{m}_1 > 0, m_h' = -\mathrm{m}_1 e^{-h_t} < 0$, $\lim_{h\to\infty} \pi(h_t) = 1 - \mathrm{m}_0$ and $\pi_h'' = \mathrm{m}_1 e^{-h_t} > 0$.

Young people join the workforce endowed with one unit of labor, which is inelastic and receive wage w_t per unit of labor. Before they get their net income, young people need to contribute τw_t to the public pension program. Moreover, they also need to contribute $\lambda_t w_t$ to the public health insurance program. Besides, they will inherit the estate from the deceased. Here we assume that young people share the estate equally, shown as $\frac{(1-\pi_{t-1})[s_{t-1}R_t-(1-\varphi)D]}{n}$, where φ is the reimburse rate of public health insurance and D is the medical expenditure. After paying the premium, the net income can be used for consumption ($c_{y,t}$), saving (s_t), raising children ($\mathrm{q}w_t$) and health investment (h_t). Raising children is costly for young parents, and the amount of resources needed for young parents to care for each child is $\mathrm{q}w_t$, with $0 < q < 1$ (Fanti & Gori, 2012; Cippiani & Pascucci, 2018). Moreover, young people could increase their survival probability to retirement period and decrease their morbidity risk by investing in their health (h_t). Therefore, the budget constraint of a young individual of period t is as follows:

$$c_{y,t} = (1 - \tau - \lambda_t - qn)w_t + \frac{(1-\pi_{t-1})[s_{t-1}R_t - (1-\varphi)D]}{n} - s_t - h_t \tag{4}$$

After retirement, people live with the amount of resources saved when young plus expected interests accrued from time t to time $\mathrm{t}+1$ at the rate r_{t+1}^e and the expected pension benefit p_{t+1}^e. During the retirement period, people may suffer from a disease with the morbidity risk of m_t. If the retiree gets sick, he/she needs to spend D to cure the disease, and φD can be reimbursed by the public health insurance. Hence, the budget constraint of the old people with the disease at time $\mathrm{t}+1$ is:

$$c_{o,t+1}^1 = s_t R_{t+1}^e + p_{t+1}^e - (1-\varphi)D \tag{5}$$

Where $R_{t+1}^e = 1 + r_{t+1}^e$. Similarly, the budget constraint of the old people without disease at time $\mathrm{t}+1$ is:

$$c_{o,t+1}^2 = s_t R_{t+1}^e + p_{t+1}^e \tag{6}$$

By taking the actual and expected prices for labor and capital as given, the representative individual chooses an optimal saving and medical expenditure to maximize the expected lifetime utility. The first order conditions can then be written as:

$$-U'(c_{y,t}) + \beta\pi_t\left[\mathrm{m}_t \mathrm{U}'(c_{o,t+1}^1) + (1-\mathrm{m}_t)\mathrm{U}'(c_{o,t+1}^2)\right]R_{t+1}^e = 0 \tag{7}$$

$$-U'(c_{y,t}) + \beta\pi_h'\left[\mathrm{m}_t \mathrm{U}(c_{o,t+1}^1) + (1-\mathrm{m}_t)\mathrm{U}(c_{o,t+1}^2)\right] + \beta\pi_t\left[m_h'\mathrm{U}(c_{o,t+1}^1) - m_h'\mathrm{U}(c_{o,t+1}^2)\right] = 0 \tag{8}$$

Equation (7) describes the tradeoff between extra consumption when young and additional saving in order to consume its proceeds when old. Equation (8) describes the tradeoff between investing more in health to have lower mortality and higher survival probability in the next period and losing consumption due to the additional health investment.

A continuum of identical firms act competitively on the market. The aggregate production at time t combines capital

(K_t) and labor (L_t) to produce output (Y_t) under Cobb-Douglas technology, i.e. $Y_t = AK_t^{\alpha} L_t^{1-\alpha}$, where A is a scale parameter, and the output elasticity of capital α follows $0 < \alpha < 1$. By assuming that output is sold at the unit price and capital depreciates to zero at the end of every period,[8] profit maximisation implies that the gross return to labor and capital are the marginal products of labor and capital, respectively.

$$w_t = (1-\alpha)Ak_t^{\alpha} \tag{9}$$

$$R_t = 1 + r_t = \alpha A k_t^{\alpha-1} \tag{10}$$

where $k_t \coloneqq K_t/L_t$ is the stock of capital per effective labor.

For labor market, each young people supply one unit of labor to the firms with no elasticity, which indicates that $L_t = N_{y,t}$, where $N_{y,t}$ is the number of young people at time t and the population evolve according to the equation $N_{y,t} = nN_{y,t-1} = nN_{o,t}$, where $N_{o,t}$ is the number of old people at time t. The market-clearing condition in the capital market is realized when the firm's demand for capital equals people's supply of savings. The amount of capital available today equals to the amount of resources saved in the previous period. Thus, we can obtain the following market-clearing condition:

$$K_t = s_{t-1} N_{y,t-1} \tag{11}$$

The government redistributes resources across generations by the PAYG public pension and public health insurance programs. At time t, therefore, current workers finance pension program and healthcare reimbursement for current retirees, shown as follows:

$$N_{o,t} \pi_{t-1} p_t = N_{y,t} \tau w_t \tag{12}$$

$$N_{o,t} \mathrm{m}_t \varphi D = N_{y,t} \lambda w_t \tag{13}$$

Additionally, we assume the absolute risk aversion attitude of a representative individual is constant, which indicates that the utility function satisfies that $-\frac{U''}{U'} = c$, where c is a constant. We therefore employ the common form of utility function with constant absolute risk aversion as follows:

$$\mathrm{U(C)} = \frac{1}{\theta} - \frac{1}{\theta} e^{-\theta C} \tag{14}$$

The necessary conditions for the maximization problem of the young people (equation 7, 8), the factor prizing conditions (equation 12, 13), the balanced budget condition of the public pension system (equation 15) and public health insurance (equation 15), and the capital market clearing condition (equation 14) define a decentralized competitive equilibrium.

[8] Note that this hypothesis is not unrealistic as we assume that one period consists of 30 years (see Fanti & Gori (2012)).

Appendix Table B: Variable definition

Variable name	Definition
Health status measurement	
Health_status	Self-reported health status of the respondent, in which 1=very poor, 2=poor, 3=fair, 4=good, 5= excellent.
Satisfaction	Self-reported life satisfaction level, in which 1=not at all satisfied, 2= not very satisfied, 3= somewhat satisfied, 4= very satisfied, 5= completely satisfied.
Disability_count	The number of disability that the respondent suffers from, including physical disabilities, brain damage/mental retardation, vision problem, hearing problem, and speech impediment.
Chronic_count	The number of chronic diseases that the respondent is diagnosed.
Mental_state	Respondent's self-rating depression scale score, which considers ten aspects of the respondent's subjective feeling about life, and the maximum score is 40. The higher the score, the poorer the mental state.
Insurance participation	
Pension	A dummy variable indicating whether the respondent will receive any positive pension benefits.
Health_insurance	A dummy variable indicating whether the respondent enrolled in any public or private health insurance program.
Health care utilization	
Outpatient_freq	The frequency of outpatient visit in the last month.
Inpatient_freq	The frequency of inpatient treatment in the last year.
Medical expense	
Outpatient_total	Respondent's total cost of outpatient care in the last month.
Outpatient_OOP	Respondent's out-of-pocket payment for outpatient care in the last month.
Outpatient_ratio	Respondent's self-paid ratio for outpatient care in the last month, defined as out-of-pocket payment divided by total cost.
Inpatient_total	Respondent's total cost of inpatient care in the last year.
Inpatient_OOP	Respondent's out-of-pocket payment for inpatient care in the last year.
Inpatient_ratio	Respondent's self-paid ratio for inpatient care in the last year, defined as out-of-pocket payment divided by total cost.
Total_cost	Respondent's total medical expense in the last year.
OOP	Respondent's out-of-pocket payment for the medical expense in the last year.
OOP_ratio	Respondent's self-paid ratio for the medical expense in the last year, defined as out-of-pocket payment divided by total cost.
Individual health investment	
Self_treatment	A dummy variable indicating whether the respondent did self-treatment in the last month, such as prescription drug purchase over the counter and tonics purchase.
Fitness_expenditure	Respondent's expenditure on personal fitness in the last year, including fitness exercises, fitness equipment, and health product.

Self_treat_total	Respondent’s total cost of self-treatment in the last month, for example, prescription drug purchase over the counter.
Self_treat_OOP	Respondent’s out-of-pocket money for self-treatment in the last month.
Self_treat_ratio	Respondent’s self-paid ratio for self-treatment in the last month, defined as out-of-pocket payment divided by total cost.
Demographic factors	
Age	Respondent’s self-reported age.
Male	A dummy variable indicating the respondent is male.
Married	A dummy variable indicating the respondent is married.
Hukou_nonagri	A dummy variable indicating the respondent has non-agricultural Hukou registration status.
Han	A dummy variable indicating the respondent is of the race of Han.
Education	The highest education level completed by the respondent, in which 0=no formal education, 1=can read and write, 2=elementary school, 3=secondary school or above.
Family_size	The number of people who routinely share meals in the respondent’s home.
Retired	A dummy variable indicating the respondent is retired, and receive a pension benefit.
Income	Respondent’s income from work including wage and business income for self-employed respondents, net agricultural income for respondents participating in farming, and income from part-time jobs.
Financial_asset	Respondent’s net financial asset considering cash, deposit, government bond, stocks, funds, and loans.
House_value	The total value of the respondent’s house.
Smoking	A dummy variable indicating the respondent is a smoker.
Drinking	A dummy variable indicating whether the respondent drinks more than once a month.
Living_arrangement	The respondent's current living arrangement, in which 1=alone, 2=with spouse only, 3=with spouse and child/children, 4=with child/children only, and 5=others.
Transfer_from_children	The total economics transfer that the respondent received from his/her child/children in the last year.
Transfer_to_children	The total economics transfer that the respondent gave to his/her child/children in the last year.

Appendix Table C: Summary statistics of all three waves of CHARLS data

Variable	$Mean_w$	S.D.	Min	Max	$Mean_w$	S.D.	Min	Max	$Mean_w$	S.D.	Min	Max
	2011 wave (N=8,197)				2013 wave (N=7,712)				2015 wave (N=5,182)			
Health_status	3.07	0.90	1	5	3.14	0.93	1	5	3.30	0.97	1	5
Satisfaction	3.04	0.71	1	5	3.10	0.72	1	5	3.44	0.74	1	5
Disability_count	0.16	0.48	0	5	0.11	0.40	0	4	0.11	0.39	0	3
Chronic_count	1.04	1.21	0	8	1.31	1.38	0	9	1.44	1.45	0	9
Mental_state	17.92	6.29	10	40	17.37	5.62	9	40	16.80	5.83	10	40
Pension	0.16	0.38	0	1	0.35	0.48	0	1	0.38	0.49	0	1
Health_insurance	0.94	0.23	0	1	0.97	0.18	0	1	0.90	0.30	0	1
Self_treatment	0.45	0.50	0	1	0.54	0.50	0	1	0.48	0.50	0	1
Outpatient_freq	0.38	1.34	0	30	0.48	1.51	0	30	0.32	1.27	0	31
Inpatient_freq	0.10	0.40	0	9	0.15	0.55	0	14	0.11	0.49	0	12
Outpatient_total	110.87	849.86	0	36000	172.67	1230.16	0	37972.48	172.47	1777.49	0	73406.1
Outpatient_OOP	87.27	682.31	0	36000	124.23	977.18	0	36047.74	108.58	1083.41	0	42097.32
Outpatient_ratio	0.15	0.36	0	1	0.16	0.35	0	0.9493122	0.12	0.30	0	0.9175764
Inpatient_total	546.14	3919.09	0	160000	1069.04	5846.43	0	142396.8	873.50	5553.13	0	183515.3
Inpatient_OOP	373.78	3212.60	0	140000	619.25	4141.36	0	135179	501.58	3643.26	0	110109.2
Inpatient_ratio	0.05	0.20	0	1	0.06	0.20	0	0.9493122	0.05	0.18	0	0.9175764
Total_cost	74.51	230.58	0	6000	104.17	437.33	0	19081.17	123.23	557.00	0	18351.53
OOP	70.88	220.28	0	6000	91.07	351.59	0	18023.87	105.17	503.20	0	16838.93
OOP_ratio	0.44	0.49	0	1	0.49	0.47	0	0.9493122	0.42	0.45	0	0.9175764
Fitness_expenditure	1876.53	11312.41	0	432000	3141.03	16661.58	0	455669.8	2943.14	22925.59	0	880873.3
Self_treat_total	1420.97	9016.98	0	432000	2110.03	12868.11	0	432572.9	1804.51	14328.44	0	547265.1
Self_treat_OOP	0.18	0.38	0	1	0.19	0.36	0	0.9493123	0.15	0.32	0	0.9175764
Self_treat_ratio	441.95	1451.07	0	50000	139.32	972.37	0	36047.74	183.46	1217.74	0	42097.32
Age	56.14	7.55	36	81	57.10	7.88	37	83	58.46	7.67	41	81
Male	0.47	0.50	0	1	0.47	0.50	0	1	0.47	0.50	0	1

Married	0.92	0.27	0	1	0.92	0.27	0	1	0.92	0.27	0	1
Hukou_nonagri	0.22	0.38	0	1	0.25	0.40	0	1	0.24	0.39	0	1
Han	0.93	0.27	0	1	0.92	0.27	0	1	0.92	0.27	0	1
Education	1.77	1.17	0	3	1.85	1.16	0	3	1.91	1.15	0	3
Family_size	3.37	1.65	0	14	3.33	1.62	0	10	3.37	1.75	0	10
Retired	0.36	0.47	0	1	0.45	0.50	0	1	0.51	0.50	0	1
Income	9309.33	31757.95	0	2179000	10535.54	25714.30	0	1067027	11226.68	26069.78	0	1000158
Financial_asset	4391.54	28821.14	-109950	1050000	11327.14	56028.79	-104376.9	1984062	12768.84	45581.04	-100887.5	918952.7
House_value	143953.20	203950.10	0	4500000	183389.30	273767.40	0	4746561	204411.50	345126.70	0	10600000
Smoking	0.30	0.46	0	1	0.30	0.46	0	1	0.31	0.47	0	1
Drinking	0.34	0.47	0	1	0.37	0.48	0	1	0.37	0.48	0	1
Living_arrangement	3.63	1.34	1	5	3.03	1.51	1	5	2.35	1.15	1	5
Transfer_from_children	1618.44	6654.16	0	200200	3852.21	16572.02	0	949312.1	8094.04	33867.33	0	1413068
Transfer_to_children	1372.82	11231.45	0	480000	5001.21	175023.80	0	15200000	11954.06	58103.30	0	2752729

Note: We report the mean values weighted by the inverse probability for respondents ($Mean_w$) in order to correct for non-respondent error. The sample mean values without weight are largely consistent with $Mean_w$ and are available upon request.

Appendix Table D: The regression results of Equation (1) and (2)

	Health status measurement variables							Healthcare utilization variables	
	Health_status	Satisfaction	Disability_count	Chronic_count	Mental_state			Outpatient_freq	Inpatient_freq
Pension	0.0453	0.116***	-0.0494	0.0574*	-0.0331*			0.0289	0.100
	(0.0347)	(0.0365)	(0.0609)	(0.0336)	(0.0181)			(0.0480)	(0.0674)
Health_insurance	-0.188***	0.165**	-0.0803	0.316***	-0.0616**			0.280***	0.520***
	(0.0583)	(0.0655)	(0.0949)	(0.0556)	(0.0310)			(0.0887)	(0.130)
N	21091	21091	21091	21091	21091			21091	21091
	Medical expenses and self-paid ratio								
	Outpatient_total	Outpatient_OOP	Outpatient_ratio	Inpatient_total	Inpatient_OOP	Inpatient_ratio	Total_cost	OOP	OOP_ratio
Pension	0.0171	0.0169	-0.00331	0.0430	0.0400	-0.00685	0.0279	0.0276	-0.00558
	(0.0375)	(0.0362)	(0.00830)	(0.0412)	(0.0388)	(0.0164)	(0.0611)	(0.0590)	(0.00859)
Health_insurance	0.226***	0.202***	-0.0725***	0.295***	0.267***	-0.131***	0.498***	0.454***	-0.0989***
	(0.0551)	(0.0539)	(0.0101)	(0.0588)	(0.0556)	(0.0360)	(0.0918)	(0.0894)	(0.0136)
N	21091	21091	3739	21091	21091	1856	21091	21091	4984
	Health investment								
	Self_treatment	Fitness_expenditure	Self_treat_total	Self_treat_OOP	Self_treat_ratio				
Pension	-0.0331*	-0.123***	0.0800**	0.0374***	-0.00678**				
	(0.0181)	(0.0410)	(0.0401)	(0.0145)	(0.00284)				
Health_insurance	-0.0616**	0.131**	0.199***	0.0683***	-0.0155***				
	(0.0310)	(0.0635)	(0.0682)	(0.0243)	(0.00332)				
N	21091	21091	21091	21091	10336				

Note: We omit respondents with zero expense when using the self-paid ratio as the dependent variable, given the self-paid ratio is undefined for these respondents. It should be noted that we assume these respondents' self-paid ratio to be zero in the summary statistic to obtain a consistent sample size.

Appendix Table E: The regression results of Equation (3)

	Dependent variable: Satisfaction															
Pension	0.126***	0.118***	0.117***	0.118***	0.118***	0.116	0.118***	0.118***	0.403***	0.118***	0.119***	0.169**	0.119***	0.123***	0.125***	0.199***
	(0.0365)	(0.0365)	(0.0366)	(0.0365)	(0.0365)	(0.0856)	(0.0365)	(0.0365)	(0.140)	(0.0365)	(0.0365)	(0.0768)	(0.0365)	(0.0365)	(0.0365)	(0.0529)
Health_insurance	0.176***	0.170***	0.176***	0.180***	0.179***	0.613***	0.177***	0.176***	0.483*	0.187***	0.186***	0.583***	0.162**	0.183***	0.181***	0.265***
	(0.0654)	(0.0655)	(0.0655)	(0.0654)	(0.0654)	(0.204)	(0.0655)	(0.0655)	(0.268)	(0.0654)	(0.0654)	(0.169)	(0.0655)	(0.0654)	(0.0654)	(0.0970)
Self_treatment	-0.327***															
	(0.0281)															
Outpatient_freq		-0.0662***														
		(0.0108)														
Inpatient_freq			-0.241***													
			(0.0306)													
Outpatient_total				-0.0578***												
				(0.00681)												
Outpatient_OOP					-0.0614***											
					(0.00713)											
Outpatient_ratio						-0.187										
						(0.149)										
Inpatient_total							-0.0443***									
							(0.00594)									
Inpatient_OOP								-0.0475***								
								(0.00645)								
Inpatient_ratio									0.0330							
									(0.179)							
Total_cost										-0.0424***						
										(0.00415)						
OOP											-0.0446***					
											(0.00434)					

OOP_ratio												-0.0316				
												(0.110)				
Fitness_expenditure													0.0198***			
													(0.00624)			
Self_treat_total														-0.0788***		
														(0.00624)		
Self_treat_OOP															-0.217***	
															(0.0172)	
Self_treat_ratio																-0.101
																(0.161)
N	21091	21091	21091	21091	21091	3739	21091	21091	1856	21091	21091	4984	21091	21091	21091	10336

	Dependent variable: Mental state															
Pension	-0.0426**	-0.0346*	-0.0335*	-0.0345*	-0.0346*	-0.0410	-0.0350*	-0.0350*	-0.0557	-0.0347*	-0.0348*	-0.0351	-0.0329*	-0.0411**	-0.0427**	-0.0655**
	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0439)	(0.0181)	(0.0181)	(0.0640)	(0.0181)	(0.0181)	(0.0384)	(0.0181)	(0.0181)	(0.0181)	(0.0258)
Health_insurance	-0.0735**	-0.0666**	-0.0722**	-0.0773**	-0.0763**	-0.203**	-0.0737**	-0.0734**	-0.00484	-0.0852***	-0.0842***	-0.176**	-0.0618**	-0.0810***	-0.0792**	-0.0514
	(0.0311)	(0.0310)	(0.0311)	(0.0311)	(0.0311)	(0.0909)	(0.0311)	(0.0311)	(0.126)	(0.0311)	(0.0311)	(0.0772)	(0.0310)	(0.0311)	(0.0311)	(0.0467)
Self_treatment	0.347***															
	(0.0144)															
Outpatient_freq		0.0755***														
		(0.00744)														
Inpatient_freq			0.206***													
			(0.0194)													
Outpatient_total				0.0656***												
				(0.00330)												
Outpatient_OOP					0.0687***											
					(0.00344)											
Outpatient_ratio						0.0309										

						(0.0784)										
Inpatient_total							0.0397***									
							(0.00288)									
Inpatient_OOP								0.0429***								
								(0.00310)								
Inpatient_ratio									0.116							
									(0.0912)							
Total_cost										0.0454***						
										(0.00203)						
OOP											0.0475***					
											(0.00212)					
OOP_ratio												0.0472				
												(0.0575)				
Fitness_expenditure													0.00159			
													(0.00315)			
Self_treat_total														0.0909***		
														(0.00319)		
Self_treat_OOP															0.240***	
															(0.00882)	
Self_treat_ratio																0.0303
																(0.0827)
N	21091	21091	21091	21091	21091	3739	21091	21091	1856	21091	21091	4984	21091	21091	21091	10336

Note: We report regression results using satisfaction and mental state as dependent variables only, which are the two variables showing to be significantly affected by the health insurance and pension in Equation (1).

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