

How Do Households Respond to Hospitalization?

Evidence from Chinese Monthly Panel Data

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Abstract

Hospitalization is one major economic risk to households in developing countries. Using diary monthly panel data from China, we examine how households respond to hospitalization. We find that health insurance covers about 30 percent of the hospitalization cost while saving and cash accounted for more than 60 percent. No significant change in consumption and debt and family transfer do not help to respond to hospitalization. What's more, we figure out household behaviors change facing different burdens of hospitalization on households and different types of households and the impact of hospitalization on heterogeneous households. The results also provide new evidence to explain higher saving rates in China and suggest that hospitalization might widen the gap among households in income, wealth, and health.

Keywords: Hospitalization; Consumption; China; Monthly Panel

1. Introduction

Adverse health shocks are major sources of economic risks for households across the world. How households respond to adverse health shocks is of central interest to economic scholars and policymakers because the answer is important to improve the social security system and anti-poverty programs. There has been an established literature examining the impact of health shocks on a series of outcomes of households and individuals, such as health status, employment, and earnings (Anand et al., 2022; Autor et al., 2019; Kostøl & Mogstad, 2015; Low & Pistaferri, 2015). Partly because of detailed comprehensive data availability, most of the previous studies investigate the question in the context of developed countries like the US, northern European countries, and Scandinavian countries.¹

Nevertheless, the results based on different contexts across countries are not so consistent, which calls for the research agenda for the developing world. Among developing countries, illness-induced poverty is a crucial issue in the context of the relatively poorer economy and less mature social security systems. Specifically, the WHO shows that more than a hundred million people all over the world get poor due to illness, while about 97 percent are patients from Africa and Asia (WHO, 2017). Even in a country like China with an almost universal coverage health insurance system, about 42 percent of poverty households get poor because of illness in 2017.² Therefore, it remains an open question to what extent the findings and conclusions based on the results using the data from developed countries would change in a different context, especially when the health and social insurance system is less generous. Despite limited data access, there is still a strand of literature showing how health shocks change household behaviors or outcomes such as unearned income like gifts, remittances, and pensions, and reduces the household total income, and food consumption, based on yearly survey data from the developing countries (Cortes et al., 2021; Gertler & Gruber, 2002; Kumara & Samararatunge, 2017; Mommaerts et al., 2020; Wagstaff, 2007). Given that the cost of hospitalization varies across different regions and countries, it is natural to ask whether and how the responses to the various hospitalization differ. However, the answer to the above question is still far from satisfactory.

¹ For example, Dobkin et al. (2018) use individual credit card data and survey data for households and find that for non-elderly adults with health insurance in the US, hospitalization increases bankruptcy and reduces earnings, income, and consumer borrowing. Kolsrud et al., (2020) use the administrative data from Sweden and present the evidence that health shocks bring large relative increase in health expenditures but relatively smaller consumption declines because of generous social transfers. Bonekamp & Wouterse (2021) use the data from Dutch and have similar findings. However, there are some mixed findings. For another, Meyer and Mok (2019) find that disability induces a significant reduction in households' earnings and consumption, and a lower level of spousal labor supply; while Fadlon and Nielsen (2021) find that fatal events lead to increases in spouses' labor supply due to the significant income losses, and non-fatal shocks have no effects on spousal labor supply with the support of insurance coverage.

² See <http://politics.people.com.cn/n1/2016/0621/c1001-28466949.html> for more details.

Using the latest monthly household panel data from China with rich information on household incomes and expenditures in various categories, we try to answer the following questions. First, what effects on relevant medical expenses are incurred by hospitalization in China, and how do the households respond to the hospitalization in terms of labor supply and other expenditures? Second, what is the protective role of property liquidation and inter-household transfers when hospitalization occurs? Finally, given the large variation in hospitalization expenses, how do the household respond differentially when facing different levels of burden hospitalization and how do the responses differ by household socio-economic status? Answering these questions can shed some light on the current debate about the economic consequences of hospitalization.

Our monthly household diary data are from the Urban Households Survey (UHS) collected by the National Bureau of Statistics of China between Jan. 2014 and Dec. 2016. The data have both time-variant information such as detailed incomes and consumption by categories, labor supply, household size, and time-invariant info, including the demographic characteristics of household members. Compared to previous studies using annual data to estimate the economic consequences of health shocks, the UHS data have some advantages as followed. First, from a monthly panel, we can figure out the direct response of households to hospitalization, while the estimation using annual data may include the effect of other events in this year. Second, the UHS contains more specific categories of consumption and income, such as expenditure on food, transportation, education, entertainment, etc., and income from salary, asset liquidation, transfer, debt, etc. This allows us to have a detailed and comprehensive discussion about the impact of hospitalization on consumption and income, which will also help us capture the dynamic effect within the household. Third, rich household information allows us to investigate behavior changes in the household as a whole as well as some family members.

Following the previous literature such as Dobkin et al. (2018), we examine the consequences of hospitalization by an event study approach. Following the event study approach (Dobkin et al., 2018), we find that in Chinese households, a hospital admission increases medical expenditure by 6,095 yuan in the month of hospitalization happened, accounting for 93.5% of monthly household income, and 870 yuan and 341 yuan in the next two months respectively. Health insurance covers 32% of medical expenditure, while the rate in developed countries is about 80% to 90%. Although the cost of inpatient admission in China is much less than it is in developed countries, out-of-pocket spending is still a heavy burden, 4,721 yuan in the three months in our sample. Households' income increases asset liquidation, inter-household transfer, and debt when the event happens to respond to hospital admission. In our

sample, informal insurance like family transfers and debt only covers about 2% of medical expenditure in China, which is inconsistent with literature showing that developing countries' households would get help from informal insurance (Gertler & Gruber, 2002; Wagstaff, 2007). At the same time, households' income decreased in the last two months, which is mainly driven by the reduction in salary income, which means households not only have medical expenditure but also have less labor supply due to being sick or taking care of patients in the household. Instead of a reduction in consumption, there is an increase in total consumption after hospital admission happened. Hospitalization incurs more expenditure on food, transportation, and care and less consumption of entertainment, cloth, cigarette, and alcohol. Even though households' consumption is smooth, it's still a welfare loss because households increase necessary consumption and decrease about 30% of entertainment consumption, which means households experience consumption downgrading. The households finance the cost mainly by saving and cash to respond to hospitalization, accounting for approximately 62%. The results indicate that the household safety net matters more than the public safety net in China. That's new evidence to explain that Chinese households have higher saving rates because of precautionary saving for adverse health shocks.

We also show that when the hospital admission burden increases, households increase their income to respond to hospital admission, but these are limited. Especially, the household's salary income varies from a reduction to an increase, when the medical expenditure burden is heavy enough. Also, household consumption reduces while the burden becomes heavier. Saving and cash still decreases while the burden gets heavier and still is the main response to cover the cost of hospitalization. These results provide a bridge to compare the behaviors among countries. Also, households with lower income and low education levels are more likely to dissave money, or take on debts and work harder while households with higher income and high education levels reduce labor supply to recover or take care of family members.

Our paper contributes to filling in the gap of the short-term impact of health shocks on households by using monthly data and also provides evidence of detailed economic consequences of hospitalization by using currency accounting data. Second, we show how a developing country's household responds to hospital admission and build a bridge to compare the behaviors among countries by studying the changes facing the different levels of burden hospitalization. What's more, we provide new evidence to explain the higher saving rates in Chinese households by suggesting that it's necessary to have precautionary savings for adverse health shocks.

The structure of the paper is as follows. Section 2 introduces the background in China. Section 3 describes the data and the empirical methodology. Section 4 provides the main results. Section 5 discusses the heterogeneity, and Section 6 provides robustness checks. Section 7 concludes with a discussion of the findings, policy implications, and suggestions for further research.

2. Background

Global health expenditure more than doubled over two decades, reaching \$8.5 trillion in 2019, or 10% of global GDP³. In China, total health expenditure as a percentage of GDP keeps increasing, from 5.3% in 2000 to 7.12% in 2020. Out-of-pocket as a share of total health expenditure decreased from 60% in 2000 to about 28% in 2019, while the share of social health expenditure (social insurance) increased from approximately 25% to 45% during the same period⁴. Out-of-pocket payments as a share of current health expenditure in the US is only 9% in 2020, and 68.12% are covered by health insurance⁵.

In 2020, close to 96% of the population has been covered by basic health insurance in China. China's basic social health insurance system contains the Urban Employee Basic Health insurance (UEBMI) program, a compulsory scheme, that was established for the urban residents who work in the formal in 1998, the New Cooperative Medical Scheme (NCMS) was established in 2003 and Urban Resident Basic Health insurance (URBMI) launched in 2007. The NCMS and URBMI were integrated into a unified urban and Rural Resident Basic Health insurance (URRBMI) in 2016 to improve the equity between rural and urban residents. URRBMI is a voluntary scheme and was established for the rest of the urban residents without formal jobs or unemployed such as children, students, the senior, and the young employed. There are gaps among different health insurance programs. First, UEBMI is financed by payroll taxes from employers (6%) and employees (2%), while URRBMI is financed by insured residents and local government. And the average annual premiums of UEBMI and URRBMI in 2020 are about 6200 Yuan and 833 Yuan, respectively. Second, there are differences in the insurance benefits, e.g., the covered items, the reimbursement rate, and the annual limit. The average reimbursement rate was about 10% lower, the annual limit is less, and healthcare coverage is smaller for URRBMI than that for UEBMI. Third, UEBMI insured also have

³ World Health Organization. (2021). Global expenditure on health: public spending on the rise?.

⁴ National Bureau of Statistics of China: Yearbook of Health in the People's Republic of China

⁵<https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical>

individual accounts to pay outpatient expenses and medicine(Yip et al., 2019). For UEBMI, most of the outpatient services are paid by the individual account which is transferred from the payroll taxes from employers (about 2%) and employees (2%). And some chronic diseases and serious diseases like cancer have a higher reimbursement rate than other outpatient care or the same reimbursement rate as inpatient care. The average reimbursement rate of most inpatient cares among the insured is about 40% in 2016 and has increased by 11.78% since 2010.

In China, when people are sick, they come to the hospital for outpatient visits for the first time to get a preliminary diagnosis. If doctors suggest patients be hospitalized then patients will get certificates for inpatient, signed and confirmed by doctors, and without those patients can't get inpatient services. That means doctors decide whether patients need to be hospitalized. With certificates, patients decide whether they get inpatient admission service. With the universal coverage of health insurance, most people can seek care when getting ill. According to the Sixth National Health Service Survey (NHSS), the share of the sick without seeking medical care is less than 10% in 2018. Therefore, whether to be hospitalized is mostly dependent on doctors.

What's more, the cost of hospital admission in China is much lower than it is in developed countries. The unit cost per inpatient admission in China is only about \$1,609 in 2016, while the cost in the U.S. is \$22,543 and about \$6,000 in west Europe which are all approximately 5 times more than the cost in China(Moses et al., 2019). However, even though the cost of hospitalization is lower in China, the burden in China is higher. According to Mommaerts et al. (2020), out-of-pocket expenditure accounted for 63.61% of total hospitalization expenditure in China, while the proportion is only 27.3% in the US. Also, out-of-pocket expenditure accounted for 14.39% of the yearly household income, while the proportion is only 3.27% in the US. Meanwhile, China has a much higher inpatient rate compared to developed countries, the age-standardized utilization inpatient admissions rate is 0.18 per capita higher than 0.17 per capita in the US and 0.1 per capita, which is the global average inpatient admission rate.

3. Data and methodology

3.1 Data

The data used in this study are the Urban Household Survey (UHS) from January 2015 to December 2016, conducted by the National Bureau of Statistics of China. It is a rotating household monthly panel data. One-third of the replaced every year and the full sample is changed every three years.

We have access to data gathered from 35,634 households in 52 cities in the following four provinces: Liaoning, Shanghai, Guangdong, and Sichuan. The four provinces account for about 20 percent of the total population of mainland China. The households are randomly drawn in the city and are asked to maintain a diary monthly record of all incomes and expenditures. Besides, the data also provides the demographic characteristics of each member of the household such as gender, age, education level, ethnicity, etc.

To start, we focus on the events of hospitalizations with a total expenditure of more than 1,000 *yuan*. We choose this threshold as it is almost the minimum cost of a basic inpatient care procedure. In Section 4.3, we will use various thresholds to construct the events. 4,155 household hospitalization accounted for 11.7% of households we accessed. Figure 1 shows the distribution of hospitalization expenditure in our sample. 61% of households in our sample spend less than 5,000 *yuan* on hospital admission and the mean medical expenditure is 7,858 *yuan*.

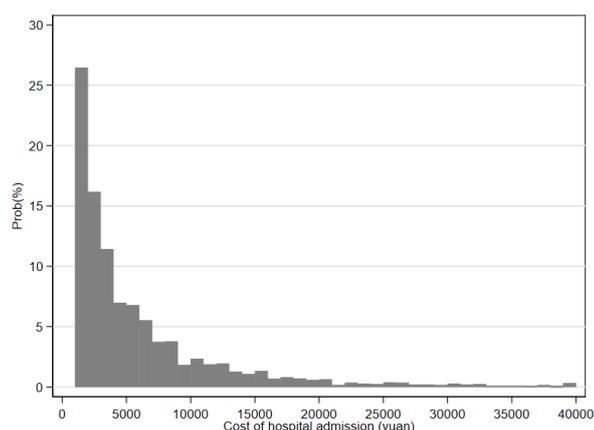


Figure 1 The distribution of hospitalization expenditure

In our sample, we restrict the age of the household's heads to ages between 30 to 80 years. Those households with heads aged below 30 or above 80 are special and including them may have sample selection issues. In addition, we also restrict our analysis to the household size with fewer than eight members. Importantly, we further restrict the households without reporting hospitalization over the last three months and can be tracked for two months after hospital admission. We do this because the event study approach requires households to have observations before and after the hospitalization. Since the data are a 23-monthly panel, the event study estimates the short-term (i.e., three months) impact of hospitalization in the sample period.

Our primary focus is on an ordinary household in China. After age and the other restrictions, our baseline sample consists of 3,984 households with 4,174 events, which indicates some households experienced two or three hospitalizations, and there are 25,044 observations at all. Table 1 shows the difference in mean characteristics

between the households in our sample and the households without hospital admissions. About 11.83% of households in UHS have been hospitalized from 2015 to 2016. Column 1 shows the characteristics of households without hospitalization and Column 2 shows the characteristics of households in our sample. As Table 1 shows, the household members' mean age in our sample is 45.10, which is higher than households without hospitalization. Approximately 95% of members in the households are covered by a health insurance program. Also, by conducting a regression, we analyze which household characteristics affect hospital admission (as Appendix Table A1 shows). Households with more family members, older mean age and whose head is older, female, more educated, and with health insurance have a larger probability to be hospitalized.

Table 1 Summary statistics for households characteristics

	Without hospitalization (1)	With hospitalization (2)
Head member		
Age	51.59	54.23
Male	0.81	0.80
Education		
Elementary school	0.11	0.08
Junior high school	0.24	0.16
Senior high school	0.11	0.08
College	0.07	0.06
Missing	0.47	0.62
Health insurance		
UEBMI	0.34	0.40
URRBMI	0.60	0.55
Other	0.03	0.04
Uninsured	0.04	0.02
Household		
Age	42.16	45.10
Male	0.51	0.50
Old	0.12	0.18
Adult	0.52	0.46
Health insurance coverage	95%	96%
Num. of households	29685	3984

We use UHS to analyze the impact of hospitalization on household income, expenditures, and savings, including salary income, asset liquidation, transfer income, out-of-pocket expenses on medical care, and those on education, entertainment, and other goods, and household saving and cash. All outcomes are derived from self-reports in UHS data. We censor all outcomes at the 99th percentile.

Table 2 presents how our sample's detailed classification of household income and expenditure varies after hospital admission. As Table 2 shows, hospital admission incurs about 6,000 *yuan* in the month event happened, and about 70% is out-of-pocket spending. There is an increase in total income to respond to hospitalization, especially asset liquidation, inter-household transfer, debt, and government transfer, and a decrease in salary income. Also, food, transportation, and care consumption increase a little while entertainment expenditure decreases.

Table 2 Summary statistics for key outcomes

<i>Yuan</i>	r=-1	r=0	r=1
	(1)	(2)	(3)
Medical expenditure			
Inpatient care	47.91	5839.32	962.70
Outpatient care	347.49	678.36	383.58
Health insurance coverage	42.71	2005.08	440.20
Out of pocket	352.70	4512.60	906.09
Income			
Total income	6632.97	6890.58	6620.51
Labor income	3696.19	3686.92	3596.51
Asset liquidation	559.87	620.68	564.91
Inter-household transfer	239.95	323.12	236.19
Debt	11.00	43.51	13.90
Government transfer	69.66	84.01	78.66
Consumption			
Total consumption	3008.19	3102.15	3221.66
Food	1073.40	1094.74	1147.42
Transportation	195.08	223.14	202.06

	Care	457.42	565.55	514.00
	Living	276.77	287.20	317.07
	Education	265.51	250.85	294.04
	Cloth	252.05	238.60	254.38
	Cigarette and alcohol	125.73	118.55	130.56
	Entertainment	262.46	201.98	262.49
	Saving and cash	4917.44	1271.84	4360.91
	Households	3984	3984	3984
	Events	4174	4174	4174
	Observations	25044	25044	25044

Notes: Column (1) $r = -1$ is defined as one month before hospitalization in Equation (1) in Section 3.2. Column (2) $r = 0$ is defined as the month event happened in Equation (1) in Section 3.2. Column (3) $r = 1$ is defined as one month after event hospitalization in Equation (1) in Section 3.2.

3.2 Methodology

We estimate both nonparametric and parametric event study models.

Nonparametric Event Study—We estimate the impact of hospitalization using the nonparametric event study model followed by Dobkin et al. (2018) and Miller et al. (2021), our baseline specification is:

$$Y_{ht} = \gamma_t + \delta_c + X_{ht}\alpha + \sum_{r=-3, r \neq -1}^3 \mu_r 1(t = t_h^* + r) + \varepsilon_{ht} \quad (1)$$

Where γ_t and δ_c stand for calendar month fixed effects and county fixed effects, respectively. X_{ht} represents a vector of other potential control variables of household h in month t , including household size categorical dummies and the demographic characteristics of the household head such as gender, age, education, etc.

t_h^* is the month for household h , when the event happens. In other words, in the calendar month t_h^* , the household h occurs an amount of medical care cost over 1,000. r is the number of months since the event. In the month of the household experiencing the hospitalization, r equals 0. The key coefficients of interest, the μ_r (s), represent the differences in outcome variable relative to the outcomes at the omitted indicator of one month before hospitalization ($r = -1$). All the standard errors are clustered at the household level.

Interpretation: To interpret the nonparametric event study coefficients on indicators for the time after the hospitalization as the causal effect of the hospital admission should require the identifying assumption that, conditional on experiencing hospitalization during our observation window and the included controls, the timing of

the hospital admission is uncorrelated with the outcome. That means, the hospitalization is anticipated or caused by adverse health effects by unemployment which also influence the household's income and consumption would violate this assumption. We restrict households experiencing their first hospitalization in the last three months designed to reduce the chance that the household member is on a downward trend before the hospital admission. And also, the results of the nonparametric event study allow us to examine the pattern before the event happened and to check whether there is a trend in outcomes before hospitalization. We also focus on hospitalizations that are more unanticipated for robustness check in Section 6 by restricting households experiencing no hospitalization for one year. What's more, we report robustness results in which we limit to households with no member experiencing a job loss in the observation window to exclude the effect of unemployment.

Parametric Event Study—We also estimate the parametric event study to calculate the effect of hospital admission on households. Our regression function is guided by the pattern seen in the nonparametric event studies. Our baseline specification is

$$Y_{ht} = \gamma_t + \delta_c + X_{ht}\alpha + \theta r + \sum_{r=0}^3 \mu_r 1(t = t_h^* + r) + \varepsilon_{ht} \quad (2)$$

Equation (2) allows for a linear pre-trend in event time r . The key coefficients of interest, the $\mu_r(s)$, present the change in outcome following an index admission relative to any preexisting linear trend (θ).

Interpretation: The parametric event study allows for a linear trend in event time which is motivated by the results from the nonparametric event study which suggest that a linear trend captures the secular trends. For the parametric event study, the identification assumption is conditional on the experience of hospital admission and the included controls, the timing of hospitalization is uncorrelated with deviations of the outcome from a linear trend in event time. This identification also requires that there are no factors correlated with outcomes that happen simultaneously with the hospitalization like unemployment as we discuss before.

4. Empirical results

4.1 Main results

Figure 2 shows the impact of hospitalization on medical expenditure and out-of-pocket spending. For each outcome, we plot the estimated coefficients on event time (μ_r s) from the nonparametric event study regression (equation (1)). And it's not straightforward to read the coefficients in Figure 2, therefore we calculate the effects of

hospital admission formally based on parametric event study coefficients shown in Table 3. A hospital admission increases medical expenditure by 6,095 *yuan* in the month of hospitalization happened, accounting for 93.5% of monthly household income, and 870 *yuan* and 341 *yuan* in the next two months respectively. The medical expenditure in China is much less than the cost of inpatient service in developed countries like the U.S. Health insurance covers 33% of medical expenditure, while the rate in developed countries is about 80% to 90%. Although the cost of inpatient admission in China is much less than it is in developed countries, out-of-pocket spending is still a heavy burden for China's households. The impact of hospitalization on out-of-pocket spending is 4,721 *yuan* in the three months in our sample.

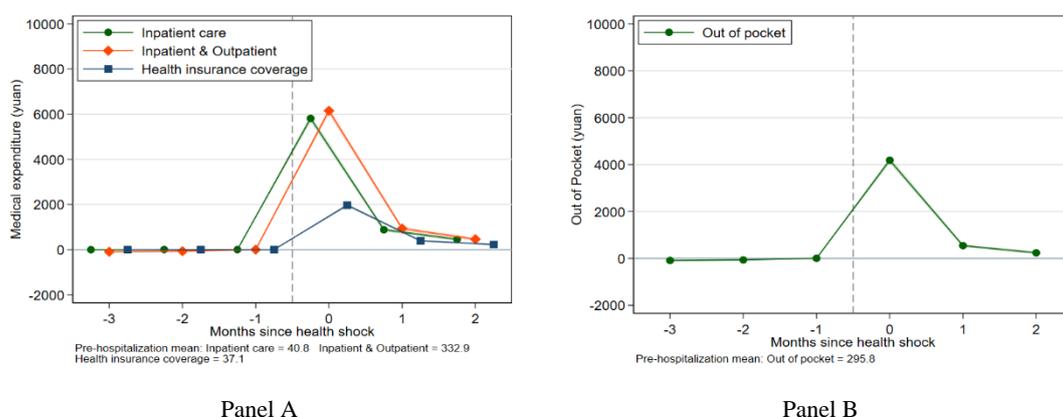


Figure 2 Impact of hospitalization on medical expenditure

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.

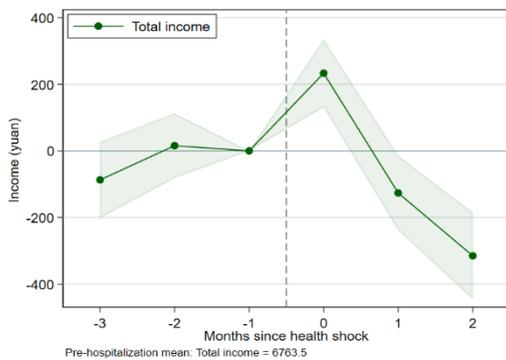
Table 3 Impact of hospitalization on medical expenditure

VARIABLES	(1)	(2)	(3)	(4)
	Inpatient care	Inpatient & Outpatient	Health insurance coverage	Out of pocket
$r = 0$	5,793.18*** (97.81)	6,094.97*** (98.81)	1,962.53*** (45.13)	4,132.44*** (82.31)
$r = 1$	901.32*** (59.11)	869.85*** (63.89)	399.24*** (26.18)	470.62*** (48.72)
$r = 2$	462.58*** (49.92)	341.00*** (57.18)	222.29*** (22.82)	118.72*** (45.83)
Pre-hospitalization mean	40.8	332.9	37.1	295.0

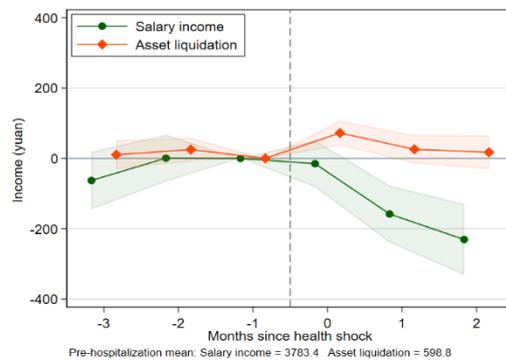
Number of households	3,984	3,984	3,984	3,984
Observations	25,044	25,044	25,044	25,044
R-squared	0.32	0.34	0.22	0.28

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

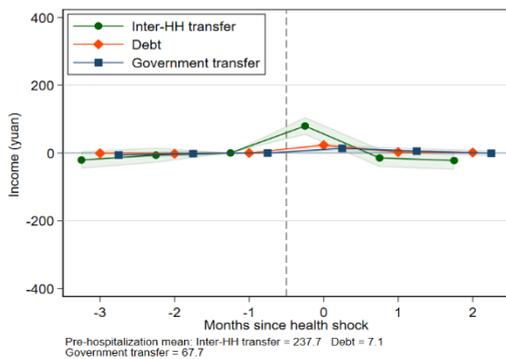
The nonparametric estimation of the effect of hospitalization on household income is shown in Figure 3 (the results of parametric regression are shown in Table 4). Households' income increases by 173 *yuan* by asset liquidation, inter-household transfer, and debt when the event happens to respond to hospital admission. Although previous literature suggests that informal insurance like remittances and family transfers is necessary to smooth consumption and respond to the hospitalization in developing countries (Beuermann, 2016; Wagstaff, 2007), in our sample, informal insurance only covers about 2% (68 *yuan*) of medical expenditure in China. At the same time, households' income decreases in the last two months, which is mainly driven by the reduction in salary income, 506 *yuan*, as Table 4 shows. Therefore, when hospitalization occurred, households not only have medical expenditure but also have less labor supply due to being sick or taking care of patients in the household.



Panel A



Panel B



Panel C

Figure 3 Impact of hospitalization on income

Notes: The points in the figure represent the estimated effects of event time (i.e. μ_r s, the in equation (1)). The shadows present the 95 percent confidence intervals.

Table 4 Impact of hospitalization on income

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Total income	Salary income	Asset liquidation	Inter-HH transfer	Debt	Government transfer
$r = 0$	186.85** (78.42)	-52.34 (50.26)	71.85*** (26.84)	68.16*** (19.71)	32.69*** (4.53)	10.35 (6.31)
$r = 1$	-197.73* (107.39)	-204.10*** (72.74)	22.85 (35.99)	-35.45 (26.32)	3.10 (4.17)	-0.13 (8.27)
$r = 2$	-420.43*** (140.68)	-301.81*** (96.98)	32.47 (48.85)	-52.87 (33.22)	1.02 (5.27)	-10.62 (10.71)
Pre-hospitalization mean	6,763.5	3,783.4	598.8	295.0	7.1	67.7
Number of households	3,984	3,984	3,984	3,984	3,984	3,984
Observations	25,044	25,044	25,044	25,044	25,044	25,044
R-squared	0.42	0.464	0.13	0.18	0.07	0.07

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 4 presents how households' consumption varies after hospitalization estimated by nonparametric estimation (the results of parametric regression are shown in Table 5). Instead of a reduction in consumption, there is an increase in total consumption after hospital admission happened. Hospitalization incurs more expenditure on food, transportation, and care and less consumption of entertainment, cloth, cigarette, and alcohol. These results suggest that even though households' consumption is smooth, it's still a warfare loss because households increase necessary consumption, like more high-protein food (as Figure 4E shows), transportation, and hospitalization care, and decrease about 30% of entertainment consumption, which means households experience consumption downgrading.

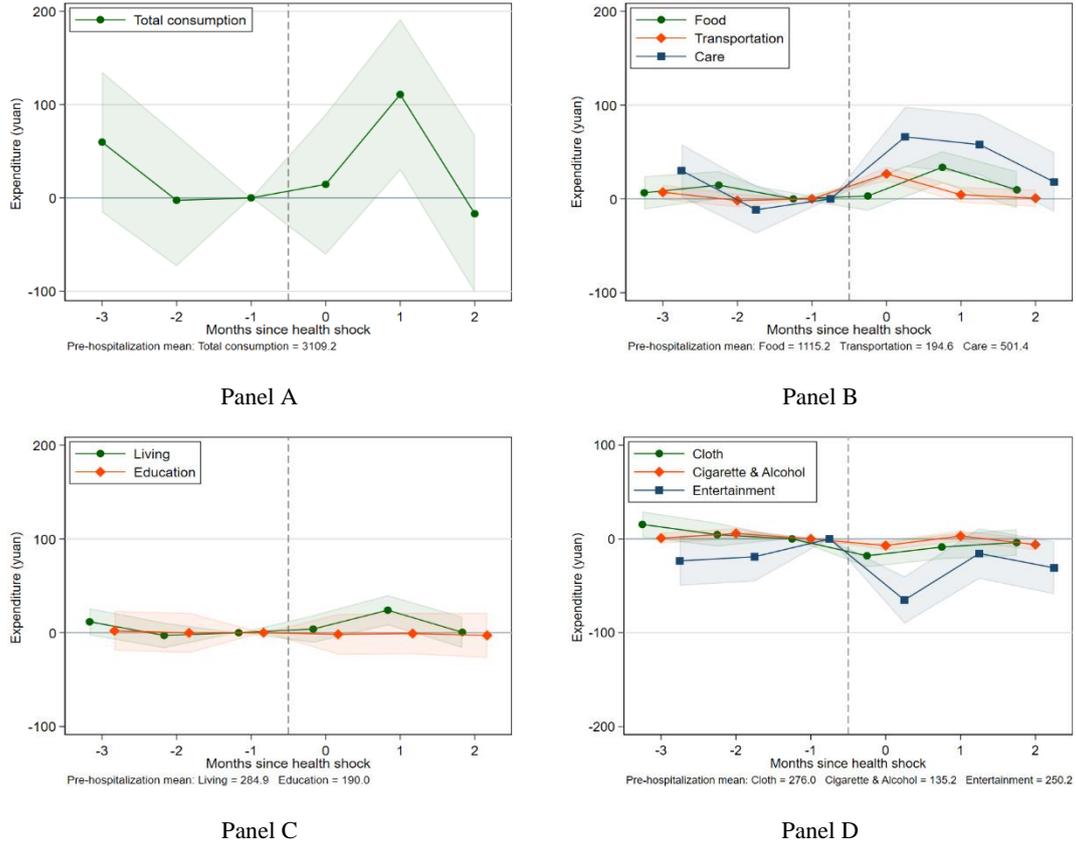


Figure 4 Impact of hospitalization on consumption

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.

Table 5 Impact of hospitalization on consumption and saving & cash

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Total consumption	Food	Transportation	Care	Living	Education	Cloth	Entertainment	Cigarette & Alcohol	Saving & Cash
$r = 0$	55.09 (58.00)	1.97 (12.02)	32.52*** (5.96)	94.17*** (23.42)	12.61 (10.97)	-2.39 (17.03)	-5.84 (9.88)	-75.15*** (20.70)	-8.23** (4.08)	-3,705.58*** (118.71)
$r = 1$	181.42** (77.78)	34.39** (16.44)	12.79 (7.85)	101.01*** (29.53)	39.17*** (14.93)	-1.85 (22.04)	11.09 (13.48)	-35.26 (28.04)	1.23 (5.73)	-629.96*** (124.45)
$r = 2$	83.33 (99.44)	10.08 (21.71)	11.82 (10.21)	82.20** (36.33)	23.19 (18.93)	-4.78 (28.82)	24.78 (17.94)	-64.79* (35.93)	-6.52 (7.39)	-526.06*** (157.93)
Pre-hospitalization mean	3109.2	1115.2	194.6	501.4	284.9	190.0	276.0	250.2	135.2	5045.3

Number of households	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984
Observations	25,044	25,044	25,044	25,044	25,044	25,044	25,044	25,044	25,044	25,044
R-squared	0.32	0.40	0.25	0.17	0.13	0.10	0.18	0.10	0.13	0.38

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure 5 presents the effect of hospitalization on household savings and cash estimated by nonparametric estimation (the results of parametric regression are shown in Table 5 Column (10)). The households finance the cost mainly by saving and cash, accounting for approximately 62%, and decrease by 3,706 *yuan* in the month hospitalization happened, which have nearly no difference between event months and after-event months as Column (10) in Table 5 shows. The results indicate that the household safety net matters more than the public safety net. The findings are consistent with literature studying precautionary savings in China. Households need to save more to respond to adverse health shocks.

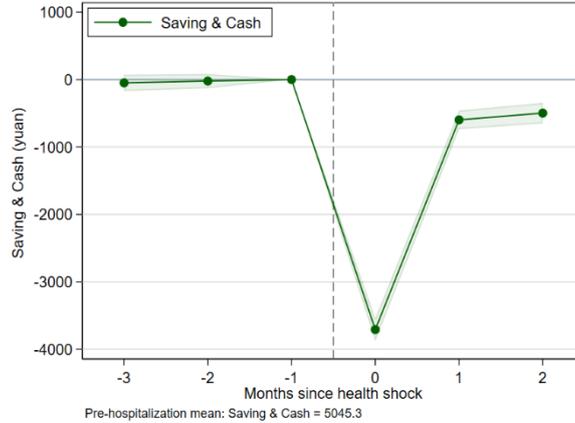


Figure 5 Impact of hospitalization on saving and cash

In summary, we calculate the “balance sheet” of households’ hospital admission in China by estimating the coefficients of equation (3) which is rewritten from equation (2) in Section 3.2. The regression results are shown in TabelA2. We present $\Delta = \mu_0 + \mu_1 + \mu_2$ in Table 6 Column (1) if the coefficients are significant and larger than 100 *yuan* and Column (2) presents the proportion of each item of cost caused by hospitalization.

$$Y_{ht} = \gamma_t + \delta_c + X_{ht}\alpha + \theta r + (\mu_0 + \mu_1 + \mu_2)1(t = t_h^*) + \mu_1[1(t = t_h^* + 1) - 1(t = t_h^*)] + \mu_2[1(t = t_h^* + 2) - 1(t = t_h^*)] + \varepsilon_{ht} \quad (3)$$

The hospitalization costs about 7,000 *yuan* for direct medical expenditure, and it also incurs some indirect costs such as food, transportation, and care, accounting for 4.7% of the total cost of hospitalization. The household's wage earnings decrease by approximately 558 *yuan*, accounting for 7.1% of the total cost in the three months (about 23.8% of the total cost after the event month). Therefore, when hospitalization occurred, households not only have medical expenditure but also have less labor supply as opportunity cost. What's more, the cost of hospitalization is mostly covered by saving and cash, accounting for 67.1%, and 31.9% of the cost is covered by health insurance.

Table 6 Impact of hospitalization

		$r \geq 0$	
Yuan		(1)	(2)
	Medical expenditure	7157	88.4%
Cost	Consumption	381	4.7%
	Salary income	558	6.9%
	Health insurance	2584	31.9%
	Saving & Cash	5430	67.1%
Finance	Reduce consumption	/	/
	Other Income	/	/
	Transfer	/	/

Notes: Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. The regression results are shown in TableA 2. The table shows the coefficients which are significant (p-value is less than 0.1) and large than 100 *yuan*.

5. Heterogeneity

5.1 Different levels of burden

Generally, the burden of medical expenditure is represented by how much out-of-pocket (OOP) payments account for a household's income or household's capacity to pay (Wagstaff et al., 2007). There are particular characteristics of hospital admission in China. First, as the results show, medical expenditure for inpatient care is lower and the hospital admission rate is higher than in developed countries. Second, the reimbursement rate is lower than it is in developed countries but higher than it is in developing countries. Therefore, the average burden of

hospitalization cannot compare to the previous literature. Considering that, we estimate the effect of different levels of burden hospitalization on households and show the trend of variation. We evaluate the medical expenditure burden by out-of-pocket payments divided by yearly household income and yearly household income is counted by 12 times the average monthly income before hospitalization ($r < 0$ in Equation (2)). Figure 6 shows the distribution of the medical expenditure burden. Above 50% of households' burden is lower than 5% and the median is 4.86%.

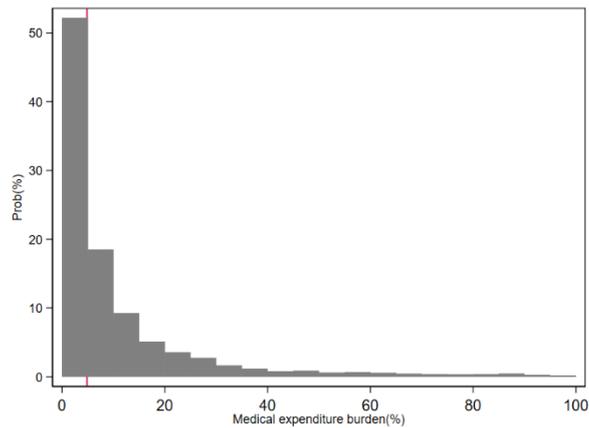
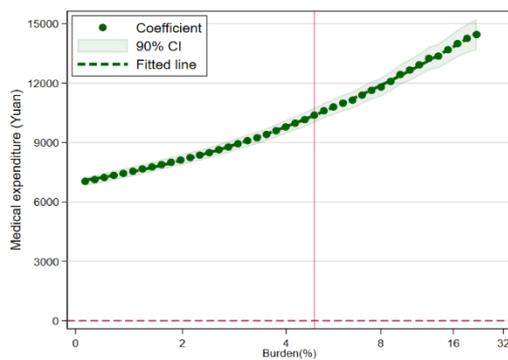
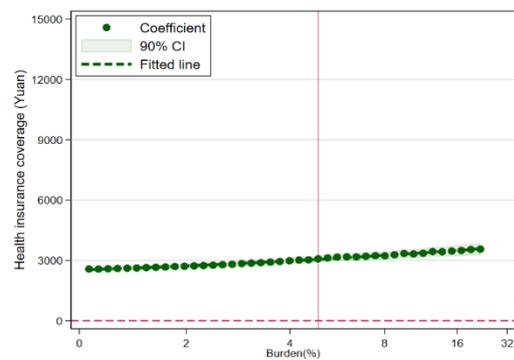


Figure 6 The distribution of hospitalization expenditure

We also test what characteristics of households affect the medical expenditure burden. As the results show (Appendix Table A2), the burden is related to the household's income, the household head's age, and the province household lived. Repeated the regression of equation (3), we present the results in Figure 7 and Figure A1. Each plot in Figure 7 and Figure A1 is the estimated coefficients $\Delta = \mu_0 + \mu_1 + \mu_2$ in sample households whose medical expenditure burden is larger than the burden rate on the x-axis.



Panel A



Panel B

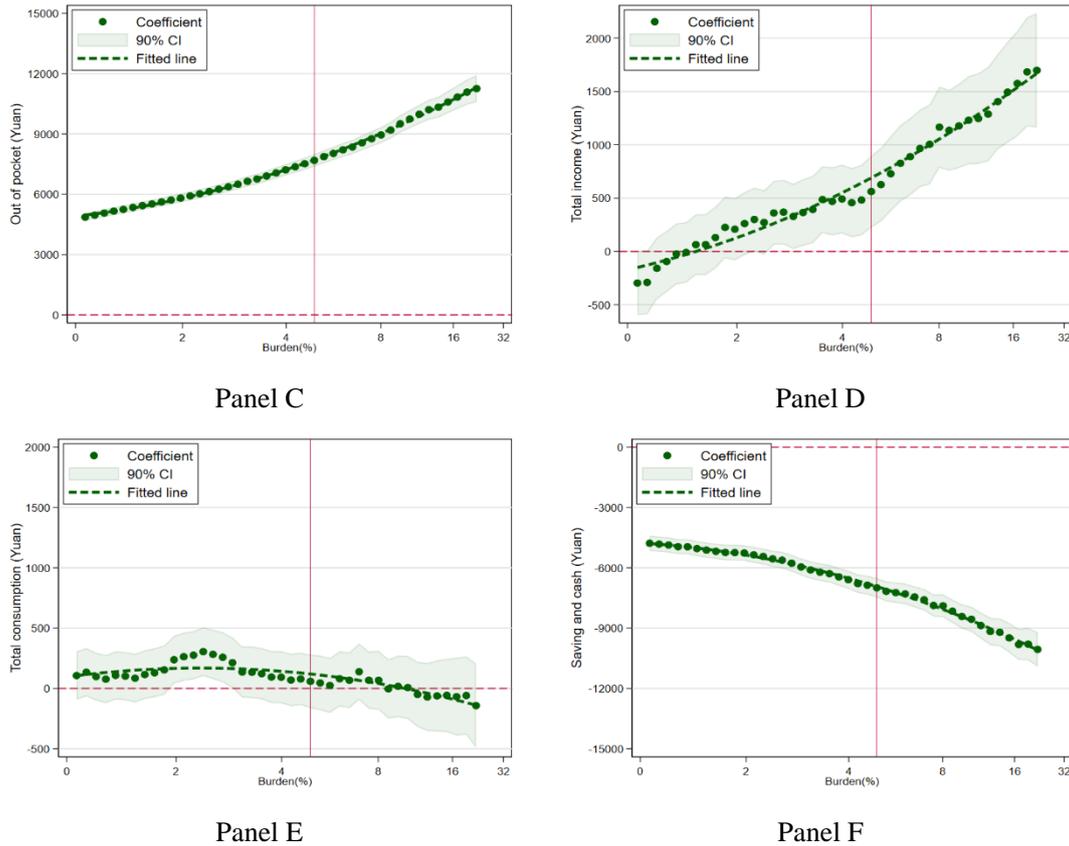


Figure 7 Impact of different burdens of hospitalization on households

Notes: Each plot is the coefficient Δ estimated by Equation (3) in sample households whose medical expenditure burden is larger than the burden rate on the x-axis. The red line is the median of the medical expenditure burden rate.

When the burden increases, out-of-pocket spending increases, and even health insurance coverage increases, the reimbursement rate still decreases. Meanwhile, if the hospitalization burden becomes heavier, households increase their income to respond to hospital admission by inter-household transfer, debt, government transfer, and asset liquidation, but these are limited (as Figure A1 shows). Especially, the household's salary income varies from a reduction to an increase, when the medical expenditure burden is heavy enough, which means there will be no time for household members to recover or take care of their families. Also, household consumption reduces while the burden becomes heavier, although, food and transportation expenditure still increase, the cost of education, entertainment, living, and cloth decreases. What's more, spending on care increases at first and decreases when the burden gets serious (larger than the median) but still above zero (as Figure A2 shows). As Figure 7 presents, saving and cash still decreases while the burden gets heavier and still is the main response to cover the cost of hospitalization.

Table 7 presents the “balance sheet” of high-burden and low-burden hospital admission. We define a high-burden household as the burden rate is higher than the 75 percentile in our sample and define a low-burden household as the rate is lower than the 25 percentile. For high-burden households, there is no reduction in salary income to respond to medical expenditure, while the reduction of salary income is the opportunity cost accounting for 31.6% of expenditure for hospital admission in low-burden households.

Table 7 Impact of different burdens of hospitalization on households

Yuan		$r \geq 0$	
		(1)	(2)
<i>Panel A High-burden</i>			
Cost	Medical expenditure	13830	100.0%
	Consumption	/	/
Finance	Salary income	/	/
	Health insurance	3476	25.1%
	Saving & Cash	10129	73.2%
	Reduce consumption	432	3.1%
	Other Income	/	/
	Transfer	450	3.3%
<i>Panel B Low-burden</i>			
Cost	Medical expenditure	2873	68.4%
	Consumption	/	/
	Salary income	1325	31.6%
Finance	Health insurance	2000	47.7%
	Saving & Cash	3116	74.2%
	Reduce consumption	/	/
	Other Income	/	/
	Transfer	/	/

Notes: Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. The regression results are shown in TableA 3 and TableA 4. The table shows the coefficients which are significant (p-value is less than 0.1) and large than 100 *yuan*.

5.2 Income

We also consider the impact of hospital admissions on households of different income levels, the low-income household, and the high-income household. The households are sorted according to the average monthly income before the hospitalization. We define the households ranked above 75 percentile as the high-income group and the households ranked below 25 percentile as the low-income group. The regression results by income are reported in TableA 5 and TableA 6. We conclude the “balance sheet” for high-income households and low-income households in Table 8. High-income households spend more on hospitalization and recovery. Nevertheless, the high-income group reduces the labor supply, while the low-income households do not decrease their wage earnings and increase other income to respond to hospital admission. Especially, the increased income covers about 3% of the medical expenditure in the low-income group although health insurance already nearly covers about 33% of the expenditure. The low-income group needs to keep the labor supply to fill in the cost of hospitalization. The results indicate that because of hospitalization, the low-income family neither could afford a higher cost of hospitalization nor do they have enough time to get recovery.

Table 8 Impact of hospitalization on high-income and low-income households

Yuan		$r \geq 0$	
		(1)	(2)
<i>Panel A High-Income</i>			
Cost	Medical expenditure	7060	74.7%
	Consumption	/	/
	Salary income	2396	25.3%
Finance	Health insurance	2609	27.6%
	Saving & Cash	8417	89.0%
	Reduce consumption	/	/
	Other Income	/	/
	Transfer	/	/
<i>Panel B Low-Income</i>			
Cost	Medical expenditure	6878	100.0%
	Consumption	/	/
Finance	Salary income	/	/
	Health insurance	2270	33.0%
	Saving & Cash	4072	59.2%
	Reduce consumption	/	/
	Other Income	227	3.3%
	Transfer	/	/

Notes: Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. The regression results are shown in TableA 5 and TableA 6. The table shows the coefficients which are more significant and large than 100 *yuan*.

5.3 Education

What's more, we discuss the different responses to hospitalization between high-educated households and low-educated households. We define high-educated households as the household heads with a high school education or higher degree and low-educated households as the household heads with a junior high school education or lower degree. The regression results are reported in Table 9. As we can see, high-educated households face opportunity costs, which is the salary income reduction, when hospital admission happened. That indicates the high-educated households reduce labor supply to recover or take care of family members.

Table 9 Impact of hospitalization on high-educated and low-educated households

		$r \geq 0$	
Yuan		(1)	(2)
<i>Panel A High-educated</i>			
Cost	Medical expenditure	7072	86.9%
	Consumption	/	/
	Salary income	1071	13.1%
Finance	Health insurance	2528	31.0%
	Saving & Cash	5214	64.0%
	Reduce consumption	/	/
	Other Income	541	6.6%
	Transfer	/	/
<i>Panel B Low-educated</i>			
Cost	Medical expenditure	7506	94.0%
	Consumption	480	6.0%
	Salary income	/	/
Finance	Health insurance	2564	32.1%
	Saving & Cash	5510	69.0%
	Reduce consumption	/	/

Other Income	/	/
Transfer	/	/

Notes: Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. The regression results are shown in TableA 7 and TableA 8. The table shows the coefficients which are significant (p-value is less than 0.1) and large than 100 *yuan*.

6. Robustness

We choose the hospitalizations which cost more than 1,000 yuan in one month for analysis. To check whether the standard of medical expenditure affects the results, we change thresholds to 0, 500, 1500, and 2000, and estimate the coefficients of equation (3). As TableA9-12 show, the structures of cost and finance of hospitalization are almost the same with different thresholds, which means the households' behaviors are not changed by the choices of the threshold. The cost of hospitalization includes medical expenditure, the reduction of salary income, and consumption of food, care, and transportation. Over 60% of the cost are covered by saving and cash in households and about 30% of the expenditure are covered by health insurance. There is no reduction in consumption to respond to hospitalization. Also, transfer income contributes little to overcoming the adverse health shock.

We also consider the different windows of event study, and we keep the samples from $r = -4$ to $r = 4$. TableA 13-15 present results from the parametric event study by repeating equation (2) and the corresponding figures are in Figure A 3-6. The results are similar to our main results which means our conclusions are robust.

What's more, we focus on hospitalizations that are more unanticipated for robustness check by restricting households experiencing no hospitalization for one year to repeat the nonparametric and parametric event study (the regression of equation (1) and equation (2)). The results are presented in FigureA7-10 and TableA16-18. About 31% of households in our sample firstly experienced hospitalization for one year. As the results show, the behaviors to respond to hospitalization are the same as the main results in Section 4.1.

To exclude the possible existing effect of unemployment, we restrict households with no members who experienced a job loss before hospitalization and repeated the nonparametric and parametric estimation using equation(1) and equation (2). Only 3% of our sample experienced unemployment in our observation window. And

the results are reported in Figure A11-14 and Table A19-21, and the effect of hospitalization on households still exists and the responses are robust.

7. Discussion and Conclusion

This paper studies China's households' response to hospitalization, especially different behaviors when experiencing different burdens of hospitalization and the impact of hospitalization on heterogeneous households among different socioeconomic statuses. We use monthly data, The China Urban Household Survey, for the period 2015-2016, and the event study method to estimate the impact of hospital admission on Chinese households.

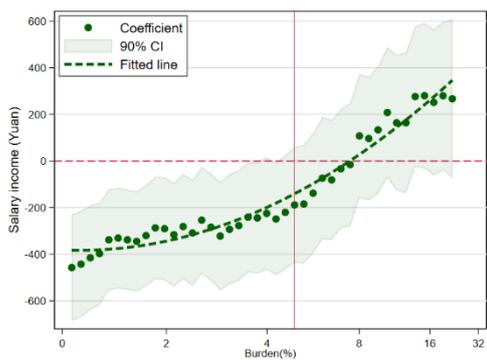
The paper has some key findings. First, hospitalization costs about 7,000 *yuan* for direct medical expenditure, and it also incurs some indirect costs such as food, transportation, and care, accounting for 4.7% of the total cost of hospitalization. The household's wage earnings decrease by approximately 558 *yuan*, accounting for 7.1% of the total cost in the three months. Therefore, when hospitalization occurred, households not only have medical expenditure but also have less labor supply as an opportunity cost to get recovery or take care of family members. Second, wage earnings reduction became a heavier burden for households. However, when the hospitalization burden becomes heavier, households increase their income, especially, the household's salary income varies from a reduction to an increase. Also, instead of a reduction in consumption, there is an increase in total consumption after hospital admission happened. These results suggest that even though households' consumption is smooth, it's still a warfare loss because households increase necessary consumption, which means households experience consumption downgrading. What's more, the cost of hospitalization is mostly covered by saving and cash, accounting for 67.1%, and 31.9% of the cost is covered by health insurance. The results indicate that even with universal coverage of medical insurance, savings is still one of the important sources to resolve the health shock. That provides new evidence to explain the high saving rates in Chinese households to have precautionary savings to respond to unanticipated adverse health shocks.

When the burden increases, out-of-pocket spending increases, and even health insurance coverage increases, the reimbursement rate still decreases. Meanwhile, if the hospitalization burden becomes heavier, households increase their income to respond to hospital admission by inter-household transfer, debt, government transfer, and asset liquidation, but these are limited. Especially, the household's salary income varies from a reduction to an increase, when the medical expenditure burden is heavy enough, which means there will be no time for household members

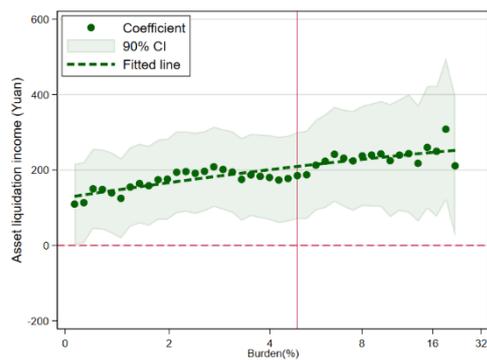
to recover or take care of their families. Also, household consumption reduces while the burden becomes heavier, although, food and transportation expenditure still increase, the cost of education, entertainment, living, and cloth decreases. What's more, spending on care increases at first and decreases when the burden gets serious. Saving and cash still decreases while the burden gets heavier and still is the main response to cover the cost of hospitalization. That will lead widen the gap among households in income, wealth, and health. These results suggest less advantageous households will suffer much more after health shocks. Those households are usually characterized by lower income and lower educated.

Our analysis throughout this paper provides necessary policy arrangements to be considered to improve the health insurance system. Even with universal coverage of public health insurance, out-of-pocket spending is still a heavy burden for Chinese households. In developed countries like the US, about 28% of total national health expenditure is covered by private health insurance and public health insurance accounted for 40%. However, in China, private health insurance only accounts for less than 10%. Also, providing catastrophic illness aids to the patients to increase their affordability and smooth consumption is necessary to prevent getting poor due to illness, especially in developing countries.

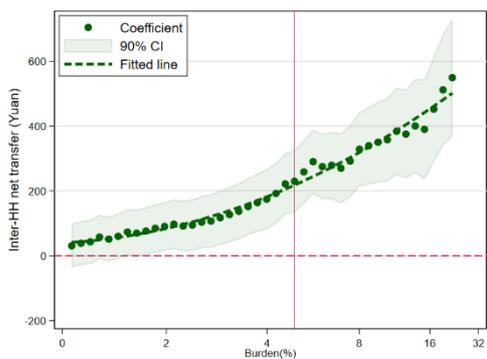
Appendix



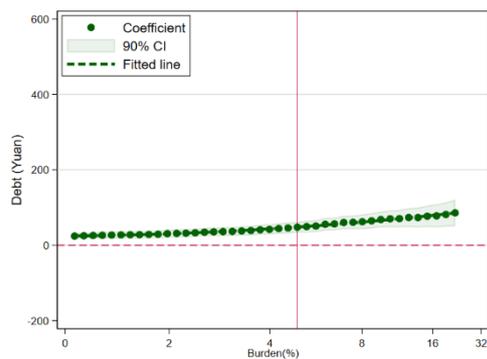
Panel A



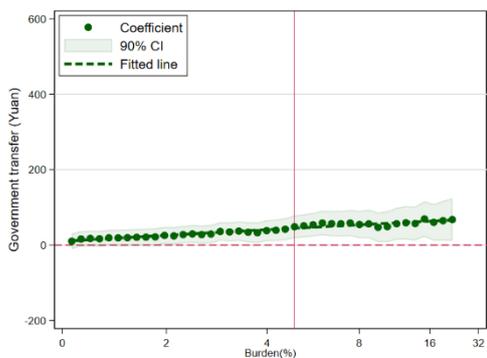
Panel B



Panel C

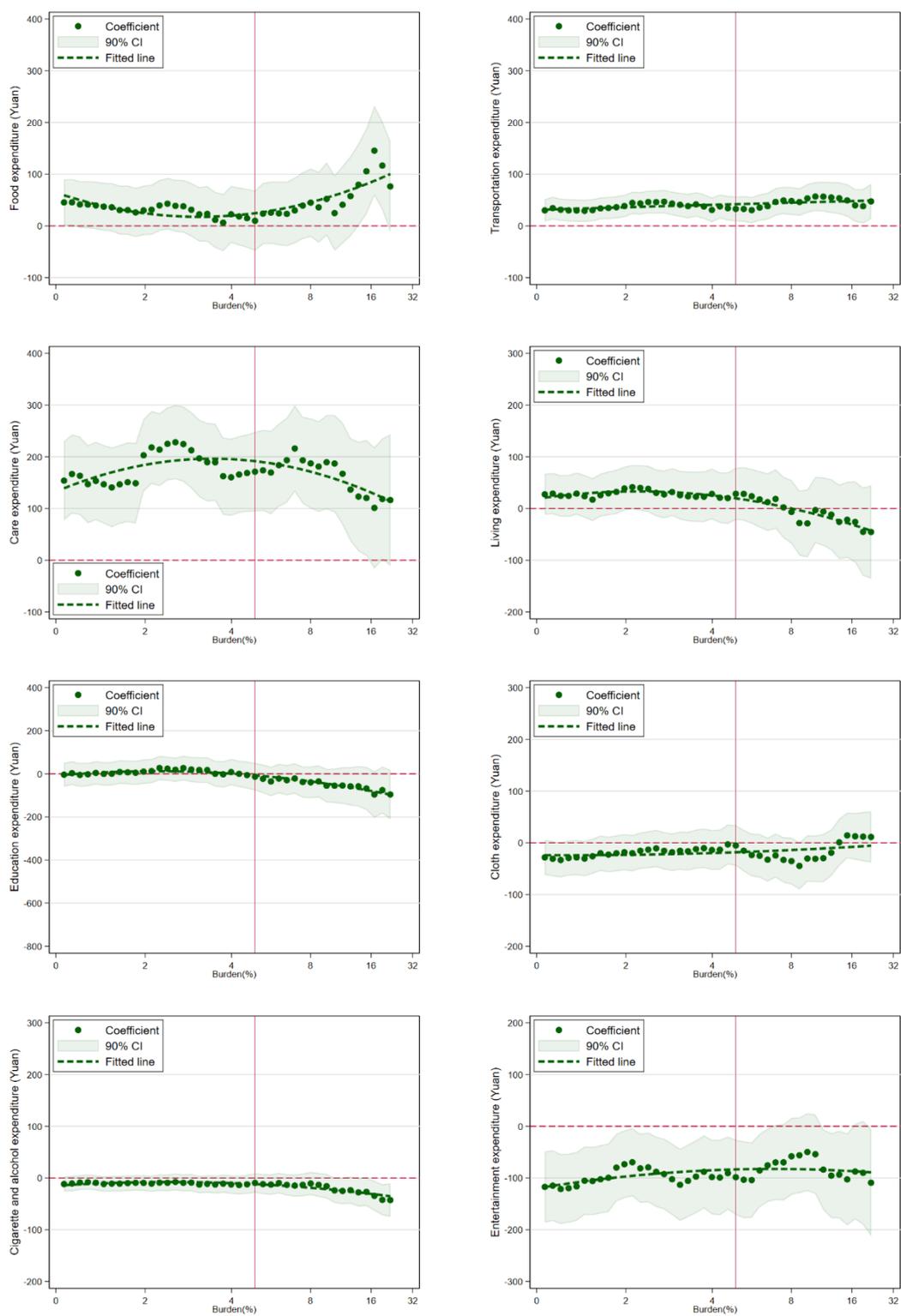


Panel D

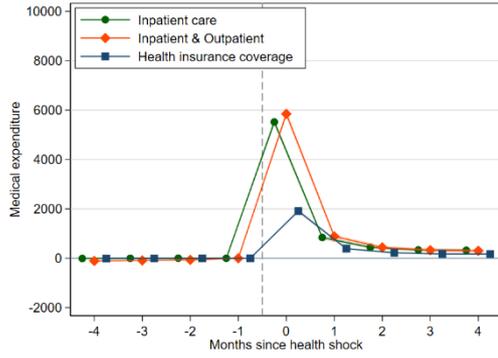


Panel E

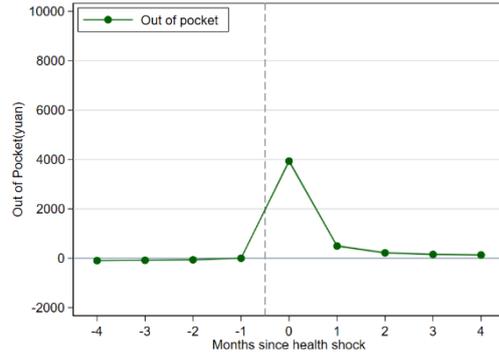
FigureA 1 Impact of different burdens of hospitalizations on households income



FigureA 2 Impact of different burdens of hospitalization on household expenditure



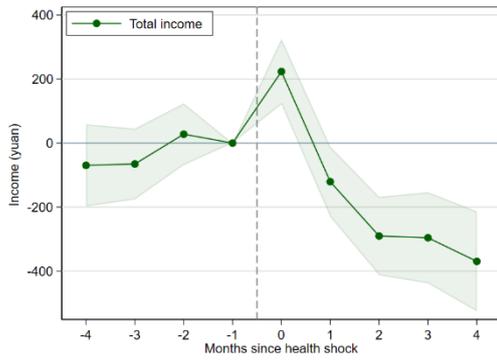
Panel A



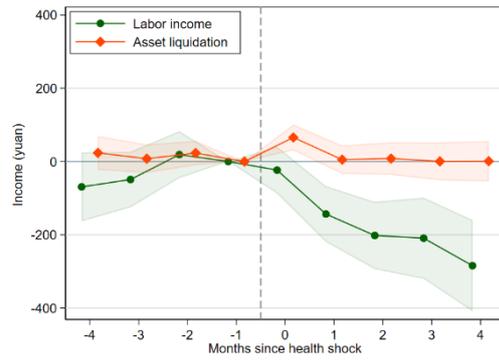
Panel B

FigureA 3 Impact of hospitalization on medical expenditure($-4 \leq r \leq 4$)

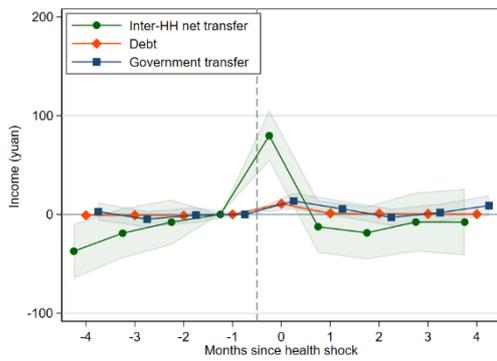
Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



Panel A



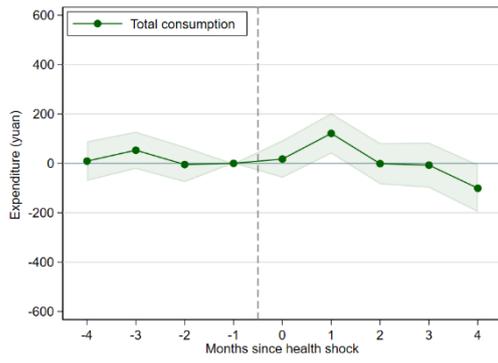
Panel B



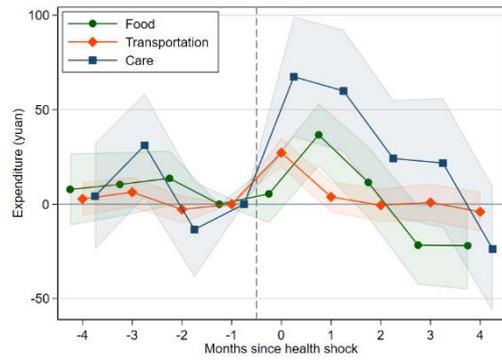
Panel C

FigureA 4 Impact of hospitalization on income ($-4 \leq r \leq 4$)

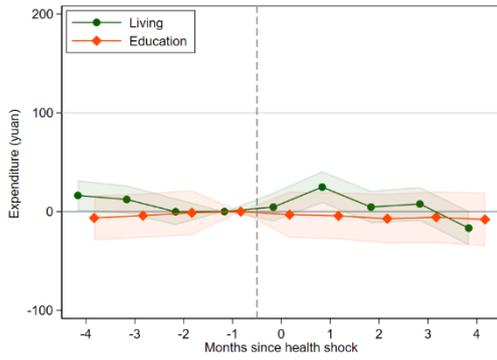
Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



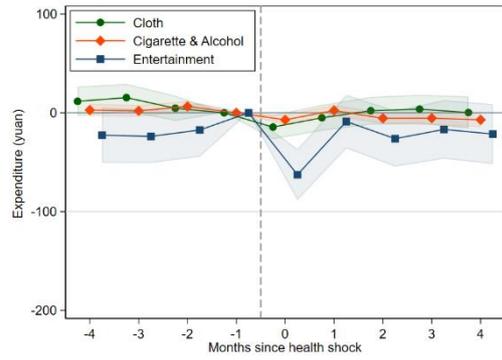
Panel A



Panel B



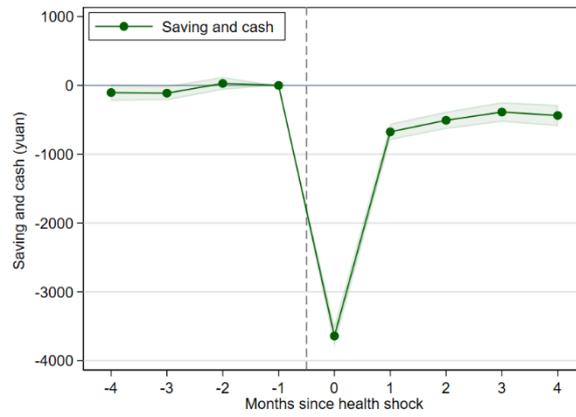
Panel C



Panel D

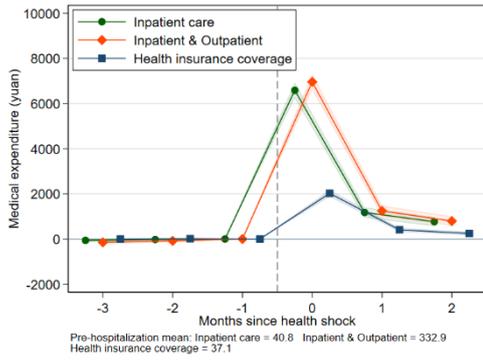
FigureA 5 Impact of hospitalization on consumption($-4 \leq r \leq 4$)

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.

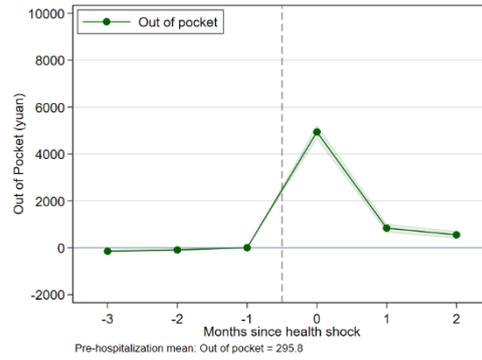


FigureA 6 Impact of hospitalization on saving and cash($-4 \leq r \leq 4$)

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



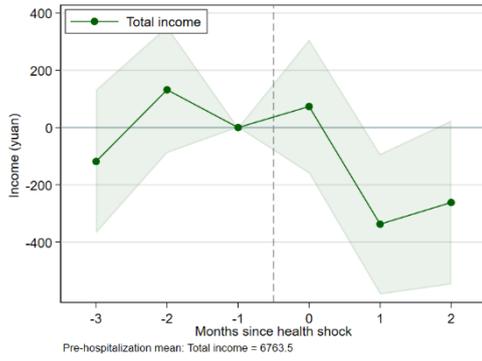
Panel A



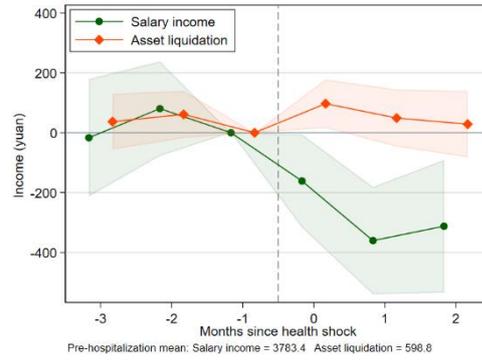
Panel B

FigureA 7 Impact of hospitalization on medical expenditure(households without hospitalization for more than one year)

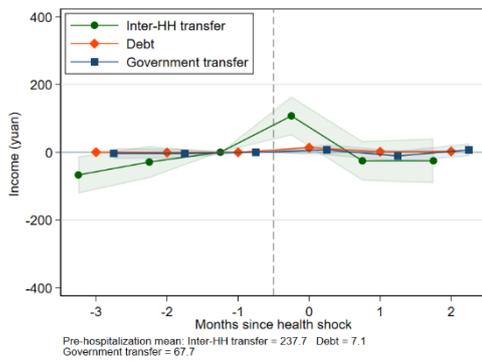
Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



Panel A



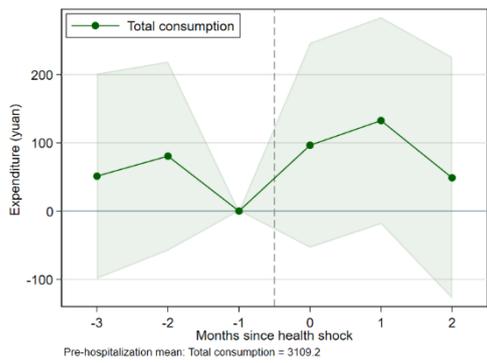
Panel B



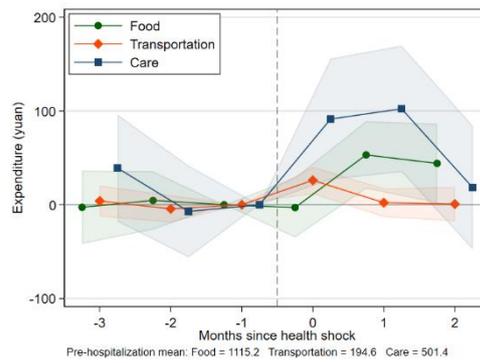
Panel C

Figure A 8 Impact of hospitalization on income (households without hospitalization for more than one year)

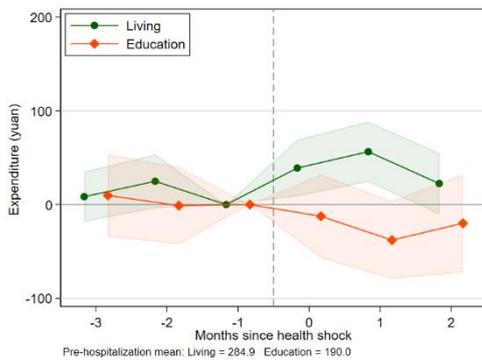
Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



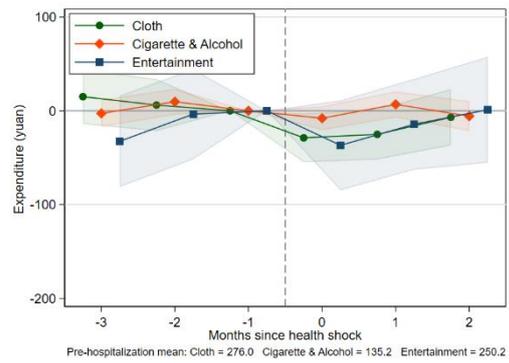
Panel A



Panel B



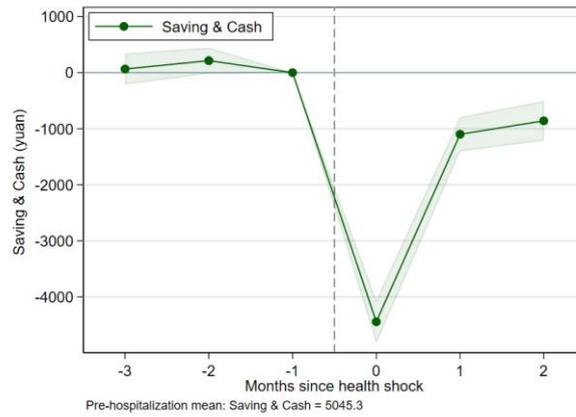
Panel C



Panel D

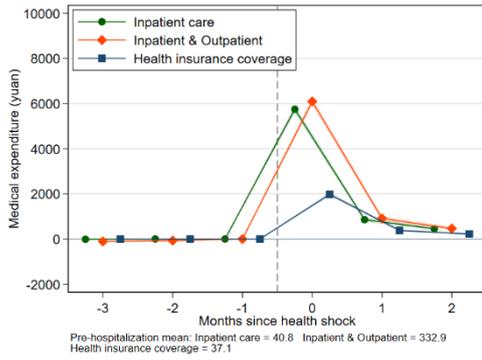
FigureA 9 Impact of hospitalization on consumption(households without hospitalization for more than one year)

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{\gamma s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.

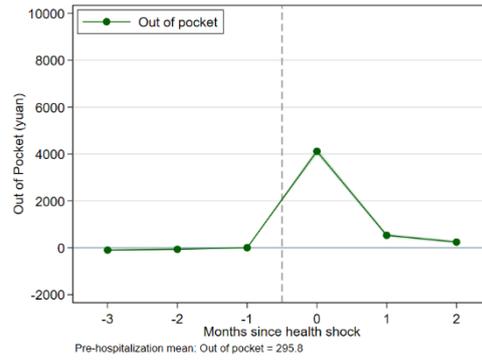


FigureA 10 Impact of hospitalization on saving and cash(households without hospitalization for more than one year)

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{\gamma,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



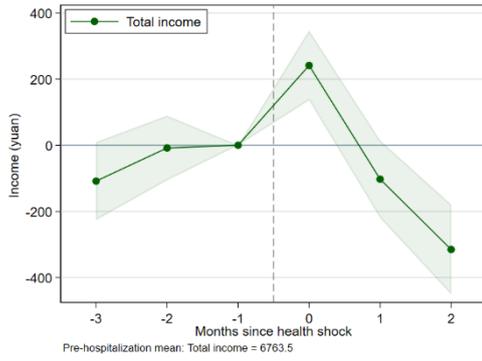
Panel A



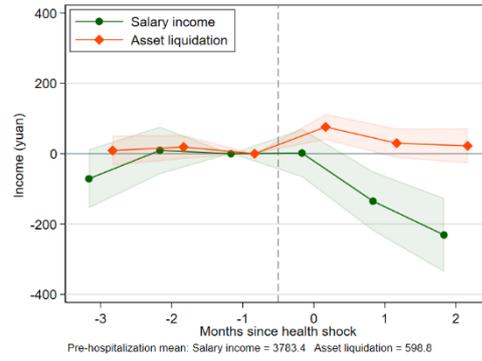
Panel B

FigureA 11 Impact of hospitalization on medical expenditure(households without unemployment)

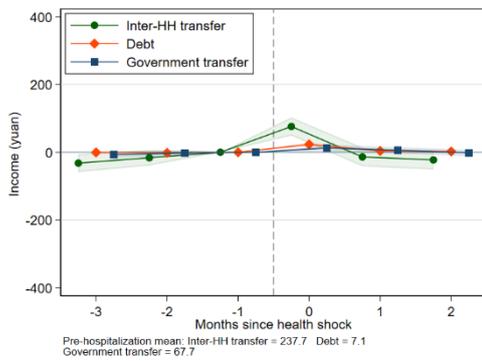
Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



Panel A



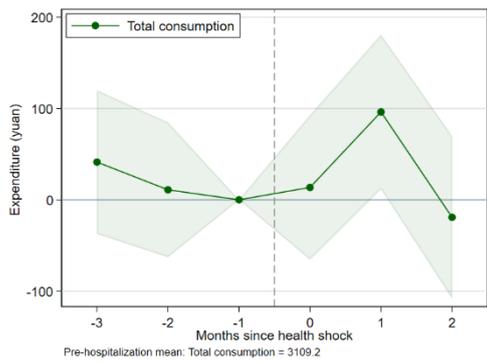
Panel B



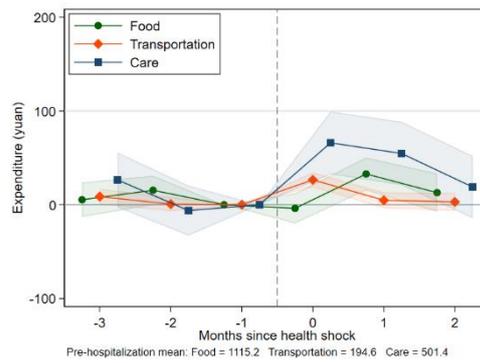
Panel C

FigureA 12 Impact of hospitalization on income(households without unemployment)

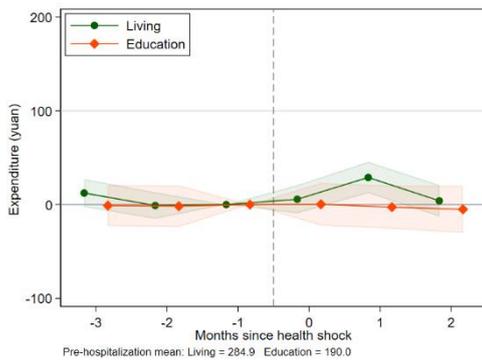
Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{\gamma s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



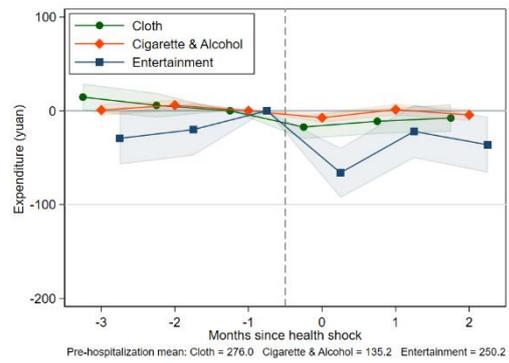
Panel A



Panel B



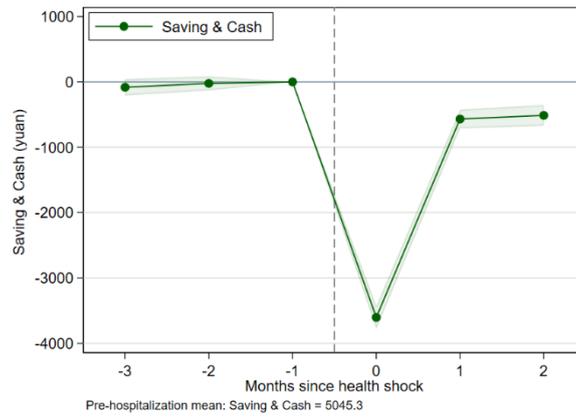
Panel C



Panel D

FigureA 13 Impact of hospitalization on consumption(households without unemployment)

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{\gamma,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.



FigureA 14 Impact of hospitalization on saving and cash(households without unemployment)

Notes: The points in the figure represent the estimated effects of event time (i.e. $\mu_{r,s}$, the in equation (1)). The shadows present the 95 percent confidence intervals.

TableA 1 Household characteristics of hospitalization

VARIABLES	(1) sample
Mean age	0.002*** (0.000)
Number of family members	0.022*** (0.002)
Household's head age	0.000* (0.000)
Household's head gender	0.013*** (0.004)
Household's head of education	
Junior high school	0.011 (0.007)
Senior high school	0.019** (0.008)
College	0.051*** (0.009)
Missing	0.079*** (0.006)
Household's head of health insurance	0.023** (0.010)
Observations	33,669
R-squared	0.020

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TableA 2 Impact of hospitalization on households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	7,157.08*** (145.60)	380.94*** (97.76)	-558.25*** (209.48)	2,584.06*** (62.40)	-5,429.88*** (317.98)	-61.10 (164.02)	127.17 (103.93)	16.26 (76.67)
Number of households	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984
Observations	25,044	25,044	25,044	25,044	25,044	25,044	25,044	25,044
R-squared	0.324	0.375	0.464	0.222	0.355	0.177	0.128	0.192

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 3 Impact of high burden hospitalization on households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	13,829.617*** (422.304)	233.389 (142.237)	262.430 (264.810)	3,475.564*** (166.093)	-10,128.749*** (559.358)	-431.832* (253.590)	178.138 (163.873)	449.957*** (159.497)
Number of households	985	985	985	985	985	985	985	985
Observations	6,090	6,090	6,090	6,090	6,090	6,090	6,090	6,090
R-squared	0.458	0.457	0.562	0.216	0.372	0.204	0.269	0.246

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 4 Impact of low burden hospitalization on households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	2,872.564*** (101.183)	131.227 (282.051)	-1,325.420** (610.868)	2,000.425*** (89.885)	-3,115.725*** (796.303)	-694.334 (431.523)	151.689 (280.271)	-244.293* (147.684)
Number of households	964	964	964	964	964	964	964	964
Observations	6,096	6,096	6,096	6,096	6,096	6,096	6,096	6,096
R-squared	0.492	0.405	0.594	0.392	0.514	0.230	0.352	0.357

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 5 Impact of hospitalization on high-income households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	7,060.275*** (338.094)	452.973 (291.890)	-2,395.501*** (673.161)	2,609.155*** (142.435)	-8,416.626*** (933.427)	-695.039 (474.056)	-184.932 (317.371)	-237.062** (119.440)
Number of households	990	990	990	990	990	990	990	990
Observations	6,258	6,258	6,258	6,258	6,258	6,258	6,258	6,258
R-squared	0.337	0.285	0.467	0.283	0.354	0.166	0.347	0.353

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 6 Impact of hospitalization on low-income households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	6,878.225*** (293.081)	132.610 (124.585)	297.332 (196.563)	2,270.212*** (121.126)	-4,071.815*** (422.989)	-336.460 (239.900)	227.209* (126.119)	480.726*** (183.721)
Number of households	909	909	909	909	909	909	909	909
Observations	5,604	5,604	5,604	5,604	5,604	5,604	5,604	5,604
R-squared	0.379	0.312	0.228	0.228	0.258	0.159	0.136	0.214

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 7 Impact of hospitalization on high-educated households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	7,072.468*** (370.123)	516.232 (314.702)	-1,070.670* (632.320)	2,527.609*** (160.925)	-5,837.349*** (911.779)	-347.768 (504.730)	540.749** (246.692)	101.430 (158.397)
Number of households	739	739	739	739	739	739	739	739
Observations	4,794	4,794	4,794	4,794	4,794	4,794	4,794	4,794
R-squared	0.367	0.421	0.620	0.299	0.507	0.243	0.314	0.411

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 8 Impact of hospitalization on high-educated households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	7,505.833*** (264.985)	480.033*** (147.914)	-477.634 (329.460)	2,563.753*** (114.362)	-5,510.051*** (524.253)	129.683 (239.252)	122.677 (211.568)	137.336 (150.324)
Number of households	1,404	1,404	1,404	1,404	1,404	1,404	1,404	1,404
Observations	9,036	9,036	9,036	9,036	9,036	9,036	9,036	9,036
R-squared	0.349	0.465	0.545	0.231	0.447	0.175	0.322	0.277

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 9 Impact of hospitalization on households(Threshold = 0)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	3,737.286*** (82.523)	25.406 (81.971)	-356.285** (175.934)	1,291.312*** (33.674)	-3,216.401*** (255.667)	-223.428 (139.572)	-58.605 (93.083)	-106.704* (60.005)
Number of households	5,709	5,709	5,709	5,709	5,709	5,709	5,709	5,709
Observations	36,330	36,330	36,330	36,330	36,330	36,330	36,330	36,330
R-squared	0.233	0.359	0.460	0.138	0.389	0.176	0.126	0.193

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 10 Impact of hospitalization on households(Threshold = 500)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	5,627.878*** (112.778)	111.359 (94.926)	-478.295** (199.523)	2,084.648*** (49.462)	-4,233.866*** (296.049)	-184.579 (157.983)	90.826 (99.612)	-7.229 (68.802)
Number of households	4,618	4,618	4,618	4,618	4,618	4,618	4,618	4,618
Observations	29,184	29,184	29,184	29,184	29,184	29,184	29,184	29,184
R-squared	0.291	0.365	0.460	0.188	0.371	0.175	0.121	0.197

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TableA 11 Impact of hospitalization on households(Threshold = 1,500)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	8,464.587*** (176.071)	279.715*** (100.269)	-708.053*** (210.666)	3,108.458*** (78.193)	-6,371.020*** (338.654)	-263.856 (172.264)	126.173 (113.117)	110.558 (80.807)
Number of households	3,543	3,543	3,543	3,543	3,543	3,543	3,543	3,543
Observations	22,314	22,314	22,314	22,314	22,314	22,314	22,314	22,314
R-squared	0.348	0.377	0.465	0.237	0.355	0.179	0.139	0.201

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 12 Impact of hospitalization on households(Threshold = 2,000)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Medical expenditure	Consumption (Cost)	Salary income	Health insurance	Saving and cash	Reduced consumption	Other income	Transfer
Δ	9,591.458*** (202.275)	266.416** (111.012)	-653.710*** (224.821)	3,569.246*** (92.606)	-6,809.795*** (367.974)	-235.450 (188.788)	137.484 (117.654)	230.509*** (87.378)
Number of households	3,237	3,237	3,237	3,237	3,237	3,237	3,237	3,237
Observations	20,274	20,274	20,274	20,274	20,274	20,274	20,274	20,274
R-squared	0.371	0.376	0.464	0.253	0.356	0.179	0.149	0.206

Notes: All columns report effects based on parametric estimations of equation (3). Medical expenditure contains the sum of inpatient and outpatient expenses. The cost of consumption includes food, transportation, and care. Reduce consumption contains the sum of education, clothes, durable goods, and so on. Other income contains asset liquidation. Transfer contains inter-households transfer, debt, and government transfer. Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TableA 13 Impact of hospitalization on medical expenditure($-4 \leq r \leq 4$)

VARIABLES	(1)	(2)	(3)	(4)
	Inpatient care	Inpatient & Outpatient	Health insurance coverage	Out of pocket
$r = 0$	5,511.355*** (84.223)	5,822.453*** (84.909)	1,906.510*** (42.526)	3,915.944*** (70.010)
$r = 1$	832.367*** (49.983)	827.426*** (53.905)	380.630*** (23.905)	446.796*** (39.507)
$r = 2$	430.604*** (39.480)	347.573*** (45.265)	207.925*** (19.514)	139.648*** (34.626)
$r = 3$	322.926*** (40.311)	200.251*** (47.480)	156.409*** (19.331)	43.842 (36.948)
$r = 4$	306.796*** (42.668)	138.928*** (51.618)	149.050*** (20.792)	-10.122 (40.892)
Number of households	3,984	3,984	3,984	3,984
Observations	36,092	36,092	36,092	36,092
R-squared	0.339	0.352	0.213	0.294

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 14 Impact of hospitalization on income($-4 \leq r \leq 4$)

VARIABLES	(1) Total income	(2) Salary income	(3) Asset liquidation	(4) Inter-HH transfer	(5) Debt	(6) Government transfer
$r = 0$	174.873** (71.776)	-66.918 (45.119)	65.882*** (24.674)	65.221*** (18.170)	10.948*** (1.448)	15.135*** (5.688)
$r = 1$	-199.430** (89.756)	-214.374*** (60.453)	10.887 (30.643)	-39.218* (21.826)	0.967 (1.155)	7.421 (6.847)
$r = 2$	-399.164*** (110.452)	-300.359*** (76.080)	19.329 (38.485)	-57.569** (26.191)	0.589 (1.390)	-0.746 (8.357)
$r = 3$	-434.774*** (133.493)	-335.123*** (92.069)	17.083 (46.804)	-58.823* (31.584)	0.073 (1.736)	4.443 (9.943)
$r = 4$	-538.566*** (156.069)	-437.407*** (107.089)	23.238 (53.982)	-71.103* (37.468)	-0.433 (1.971)	11.868 (11.876)
Number of households	3,984	3,984	3,984	3,984	3,984	3,984
Observations	36,092	36,092	36,092	36,092	36,092	36,092
R-squared	0.417	0.458	0.126	0.178	0.057	0.417

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 15 Impact of hospitalization on consumption and saving & cash ($-4 \leq r \leq 4$)

VARIABLES	(1) Total consumption	(2) Food	(3) Transportation	(4) Care	(5) Living	(6) Education	(7) Cloth	(8) Entertainment	(9) Cigarette & Alcohol	(10) Saving & Cash
$r = 0$	25.287 (51.028)	2.780 (10.472)	30.030*** (5.464)	76.616*** (20.753)	12.753 (9.640)	-5.743 (15.442)	-10.791 (8.786)	-65.544*** (17.825)	-8.852** (3.576)	-3,708.143*** (97.315)
$r = 1$	138.019** (63.655)	36.105*** (13.235)	8.463 (6.560)	75.078*** (23.991)	39.111*** (12.429)	-9.193 (18.569)	3.244 (11.051)	-19.312 (22.434)	0.992 (4.575)	-787.327*** (91.675)
$r = 2$	24.463 (77.196)	13.079 (16.723)	5.797 (8.108)	45.305 (27.709)	25.033* (14.924)	-14.272 (22.824)	15.016 (14.155)	-44.219 (27.754)	-6.482 (5.564)	-665.334*** (108.881)
$r = 3$	27.668 (91.027)	-17.987 (20.066)	9.064 (9.832)	48.935 (33.276)	34.247* (17.588)	-15.006 (26.046)	21.284 (16.430)	-42.451 (32.083)	-5.996 (6.840)	-591.220*** (128.320)
$r = 4$	-56.918 (104.722)	-16.038 (23.099)	5.864 (11.337)	9.344 (37.063)	15.961 (20.147)	-19.450 (29.715)	22.462 (19.524)	-54.756 (37.123)	-7.172 (7.999)	-686.842*** (148.901)
Number of households	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984	3,984
Observations	36,092	36,092	36,092	36,092	36,092	36,092	36,092	36,092	36,092	36,092
R-squared	0.312	0.399	0.242	0.170	0.120	0.097	0.175	0.096	0.126	0.366

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 16 Impact of hospitalization on medical expenditure(households without hospitalization for more than one year)

VARIABLES	(1)	(2)	(3)	(4)
	Inpatient care	Inpatient & Outpatient	Health insurance coverage	Out of pocket
$r = 0$	6,476.500*** (212.784)	6,805.467*** (213.261)	2,058.100*** (93.536)	4,747.367*** (185.302)
$r = 1$	1,142.029*** (140.490)	1,131.787*** (147.107)	415.153*** (57.561)	716.634*** (112.999)
$r = 2$	694.420*** (120.396)	593.807*** (130.385)	239.765*** (53.578)	354.041*** (98.706)
Number of households	1,216	1,216	1,216	1,216
Observations	7,296	7,296	7,296	7,296
R-squared	0.334	0.354	0.243	0.292

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TableA 17 Impact of hospitalization on income(households without hospitalization for more than one year)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Total income	Salary income	Asset liquidation	Inter-HH transfer	Debt	Government transfer
$r = 0$	37.203 (178.737)	-139.252 (117.539)	113.301** (57.323)	76.830* (42.791)	19.566*** (4.635)	7.072 (11.838)
$r = 1$	-453.166** (229.829)	-352.476** (160.162)	65.078 (72.518)	-88.075 (55.985)	3.084 (4.155)	-11.270 (14.985)
$r = 2$	-412.506 (291.648)	-299.632 (205.584)	72.654 (93.371)	-123.924* (70.343)	4.513 (5.862)	6.078 (20.533)
Number of households	1,216	1,216	1,216	1,216	1,216	1,216
Observations	7,296	7,296	7,296	7,296	7,296	7,296
R-squared	0.504	0.571	0.224	0.341	0.155	0.128

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 18 Impact of hospitalization on consumption and saving & cash (households without hospitalization for more than one year)

VARIABLES	(1) Total consumption	(2) Food	(3) Transportation	(4) Care	(5) Living	(6) Education	(7) Cloth	(8) Entertainment	(9) Cigarette & Alcohol	(10) Saving & Cash
$r = 0$	110.285 (114.433)	-2.999 (24.352)	30.867*** (10.998)	114.957** (45.827)	38.723* (21.255)	1.581 (36.146)	-20.715 (21.242)	-57.302 (38.944)	-12.604 (9.717)	-4,516.251*** (245.918)
$r = 1$	175.644 (146.172)	53.104 (33.540)	9.259 (14.266)	142.708** (59.277)	66.154** (27.174)	-20.270 (44.101)	-12.173 (28.094)	-51.432 (50.843)	-0.150 (13.046)	-1,345.032*** (235.030)
$r = 2$	118.336 (188.745)	41.368 (43.559)	11.974 (19.101)	79.546 (70.922)	39.005 (33.364)	3.084 (59.554)	15.367 (36.695)	-56.499 (66.231)	-12.218 (17.279)	-942.407*** (292.299)
Number of households	1,216	1,216	1,216	1,216	1,216	1,216	1,216	1,216	1,216	1,216
Observations	7,296	7,296	7,296	7,296	7,296	7,296	7,296	7,296	7,296	7,296
R-squared	0.364	0.482	0.334	0.197	0.180	0.139	0.230	0.126	0.215	0.425

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 19 Impact of hospitalization on medical expenditure(households without unemployment)

VARIABLES	(1)	(2)	(3)	(4)
	Inpatient care	Inpatient & Outpatient	Health insurance coverage	Out of pocket
$r = 0$	5,739.468*** (98.857)	6,044.690*** (99.962)	1,974.743*** (46.550)	4,069.947*** (82.497)
$r = 1$	842.754*** (57.888)	807.816*** (63.159)	373.184*** (25.603)	434.632*** (48.619)
$r = 2$	434.411*** (49.958)	307.416*** (57.589)	211.943*** (23.031)	95.473** (46.707)
Number of households	3,862	3,862	3,862	3,862
Observations	24,228	24,228	24,228	24,228
R-squared	0.330	0.349	0.227	0.284

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 20 Impact of hospitalization on income(households without unemployment)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Total income	Salary income	Asset liquidation	Inter-HH transfer	Debt	Government transfer
$r = 0$	172.261** (78.769)	-48.377 (51.841)	75.770*** (27.567)	60.059*** (20.020)	23.554*** (3.342)	8.786 (6.407)
$r = 1$	-225.930** (107.926)	-220.806*** (74.569)	34.185 (37.395)	-45.832* (26.900)	4.038 (3.163)	-1.438 (8.311)
$r = 2$	-492.744*** (142.104)	-352.513*** (99.943)	31.105 (50.868)	-70.735** (33.841)	2.059 (4.004)	-12.765 (10.745)
Number of households	3,862	3,862	3,862	3,862	3,862	3,862
Observations	24,228	24,228	24,228	24,228	24,228	24,228
R-squared	0.429	0.470	0.141	0.192	0.071	0.429

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TableA 21 Impact of hospitalization on consumption and saving & cash (households without unemployment)

VARIABLES	(1) Total consumption	(2) Food	(3) Transportation	(4) Care	(5) Living	(6) Education	(7) Cloth	(8) Entertainment	(9) Cigarette & Alcohol	(10) Saving & Cash
$r = 0$	37.390 (59.702)	-5.363 (12.308)	32.068*** (6.011)	85.613*** (24.379)	14.120 (11.353)	0.183 (17.370)	-9.561 (10.186)	-79.059*** (21.167)	-8.811** (4.123)	-3,652.140*** (120.934)
$r = 1$	140.696* (79.307)	34.001** (16.929)	14.575* (7.978)	87.466*** (30.426)	43.521*** (15.448)	-3.437 (22.348)	3.852 (13.931)	-49.730* (28.512)	0.203 (5.773)	-656.083*** (126.258)
$r = 2$	45.971 (101.789)	16.698 (22.422)	17.152* (10.424)	64.951* (37.616)	24.799 (19.415)	-6.295 (29.360)	14.613 (18.586)	-78.635** (36.673)	-5.079 (7.450)	-641.968*** (161.678)
Number of households	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862
Observations	24,228	24,228	24,228	24,228	24,228	24,228	24,228	24,228	24,228	24,228
R-squared	0.321	0.400	0.251	0.174	0.151	0.108	0.188	0.104	0.139	0.390

Notes: All columns report effects based on parametric estimations of equation (2). Pre-hospitalization means are calculated using the three months values before hospitalization. Standard errors (clustered on the household) are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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