The effects of patient cost-sharing on health expenditures and investments: Evidence from Japanese healthcare insurance system*

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Abstract

Health insurance is one of the important systems in public health. Much previous research investigated the effects of patient cost-sharing on utilization of healthcare services and health status. However, few studies have investigated the mechanism behind the previous knowledge with the consideration of behavioral parameters. Using the Japanese representative household panel survey with information on preference parameters, health expenditure, and investments other than insured medical treatment, this study investigated the effects of patient cost-sharing on the allocation of health expenditure and preventive health behavior. The results suggest that the health expenditure rises due to the reduced co-insurance rates, and the difference between the expenditure from insured medical treatment and voluntary treatment expanded. On the other hand, cost-sharing did not significantly affect the preventive behaviors very much. This paper helps policymakers better understand the cost-sharing in universal health insurance.

Keywords: Health insurance, Cost-sharing, Preventive behavior, Health expenditure
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1. Introduction

To equally provide healthcare services or avoid expanding health disparities, public health insurance has been introduced in many countries. Health insurance surely contributed to mitigating these issues, while related problems are still there. Insurance structurally contains the moral hazard in general. In the context of health insurance, numerous studies have found that the demand for healthcare services is influenced by the type of health insurance, in addition to an individual's health status, and some literature also suggests that health insurance does not always have a direct impact on health status. (Shigeoka 2014: Fukushima et al. 2016; Komura and Bessho 2025) These previous studies have surely provided us with informative knowledge, yet the mechanism is still unclear. This study aims to fill the gap by revealing an individual's comprehensive health investment under the universal health insurance.

One of the pioneering evaluations of health insurance is the RAND Health Insurance Experiment, a gigantic RCT from 1971 to 1986.[1] In the experiment, several groups with different cost-sharing were created, and subjects were randomly assigned to one of these groups. The results suggested that the number of hospital visits and medical expenses increased as the co-insurance rate went down, while the effects of cost-sharing on health were limited. Almost the same knowledge was obtained from the Oregon Health Insurance Experiment, in which the non-insured group could be created due to the natural experiment.[2] Once the people become insured, utilization of healthcare services increases, while physical health status does not significantly improve. In addition, quasi-experimental studies conducted even in countries with universal health insurance and an aging society report consistent results as well. Shigeoka (2014) exploited the Japanese situation in which the co-insurance rate was changed from 30% to 10% once people reach age 70 and compared those around the age. The paper found that the reduced patient cost-sharing affects the number of hospital visits, while the effects on health are not significant. The same design was also conducted in Fukushima et al. (2016) and Kato et al. (2022), and similar results were reported in these studies. Also, Komura and Bessho (2025) reported that these previous results were consistent in long-run analyses as well.

This study contributes to the literature by considering the mechanism of patient behaviors with the control for behavioral parameters. Specifically, the two types of behavioral paths were investigated. The first one is the substitution of health expenditure outside hospitals. When the price of medicine based on prescriptions by doctors drops, an individual may substitute the purchase of medicine outside the hospital, like a drug store, with insured medical treatment. The

[1] Please see Newhouse (1993) for detailed descriptions of RAND Health Insurance Experiments

[2] Please see Finkelstein et al. (2012) for detailed descriptions of Oregon Experiments

second potential path is related to health behavior before they get sick. If healthcare costs decrease, people may neglect their efforts to stay healthy.[3]

One of the strengths of this study is the control for behavioral parameters. Previous literature, such as Fukushima et al. (2016) and Kato et al. (2022), has already investigated the effects on health expenditure. However, few studies have taken into consideration time preference, as well as the myopic view, while patients' behaviors highly depend on these parameters. Moreover, in this study, the subsample analyses divided by these parameters were conducted as well. These analyses can fill the gap by using the rich information on the preference parameter.

To achieve the objectives, I exploited the Japanese case in which the sophisticated identification and rich dataset were available. The identification strategy is Regression Discontinuity at age 70, almost the same as Shigeoka (2014), Fukushima et al. (2016), and Kato et al. (2022).[4] As mentioned above, in Japan, the co-insurance rate of health insurance changes from 30% when people reach 70. After the estimation, the following four results were obtained: first, the health expenditure based on the prescription increased due to the reduced patient cost-sharing. Second, the effects on expenses for voluntary treatment outside hospitals were sometimes significant but limited. Third, the gap between prescription-based medical expenses and voluntary medical expenses widened. Finally, the price of medicine did not significantly affect the preventive behaviors very much. The results suggest that the reduced patient cost-sharing increases health expenditure both inside and outside the hospital, but its difference widens. Considering the limited effects on health from previous studies, this study shows that some medical treatments can be substituted for voluntary medicine without a prescription.

Setting the amount of cost-sharing is one of the important issues in policymaking related to health insurance in terms of public health, financing, and so on. This paper sheds light on the allocation of health expenditure and helps policymakers better understand the cost-sharing at universal health insurance.

The rest of this paper can be summarized as follows. Section 2 provides the empirical strategy of this study. Section 3 reports the estimation results, and Section 4 concludes.

2. Empirical Strategy

2.1 Data

The data source of this study comes from the Japan Household Panel Survey (JHPS). These JHPS datasets were originally collected and constructed by Panel Data Research Center at Keio University. JHPS is a panel survey carried out annually over a period of 10 years since 2009,

[3] This kind of behavior is often called "Ex-ante moral hazard".

[4] In Kato et al. (2022) suggested that the effects were heterogeneous by income.

collecting prospective information of Japanese individuals on socioeconomic characteristics, health expenditures, health status, and health investments. This study uses 2009-2013 waves and conducts secondary analyses. Since this study exploits the RD design to identify the causal impacts, the overall sample was restricted to those aged from 66 to 74. The unbalanced panel datasets were constructed, and its final sample size overall is 2007.

2.2 Variables

The main outcome of this study is health expenditure. From the questionnaire, I used the following questions:

Q6. Did you pay for the treatment of disease or injury last year? Please circle the numbers that apply. If you did, please write the amount of copayment for the last year.
(* Even if you received a high-cost medical care benefit, please write the amount that you paid at the medical institution.)

	Paid?	How much did you pay on your own last year?
(a) Expenses for treatment at hospital/clinic (Expenses paid at hospital/clinic, prescription charge, etc.)	1. Yes 2. No	☐☐☐☐☐ thousand yen
(b) Expenses for treatment other than above (Contact lenses, cold medicine purchased at drugstore, etc.)	1. Yes 2. No	☐☐☐☐☐ thousand yen

For the health investments, the statement: "Did you pay any money for the prevention of diseases and health maintenance in the last year? If yes, please specify the amount paid." was adopted. I created a dummy variable that takes 1 if the subject answered "Yes" to the first question, and 0 otherwise.

2.3 Identification

To investigate the effects of reduced patient cost-sharing on health expenditure and health investment, this study adopted the Regression Discontinuity to one of the representative Japanese panel datasets. The situation where the co-insurance rate changes from 30% to 10% at age 70 allows us to compare those aged over and under 70. Also, "donut hole" RD was adopted in some models due to the questionnaire explained in the previous section. The estimation equation can be described as follows:

$$y_{iat} = \beta treatment_{iat} + f(a) + X_{iat}^{T}\gamma + \varepsilon_{it} \ , \qquad (1)$$

Where y_{iat} indicates the outcome of this study, annual health expenditure inside and outside hospitals, and health investment for individual i, at age a, in survey year t. $treatment_{iat}$ is a dummy variable which takes 1 if the respondents are over 70, 70 years and a month, 70 years and six months, 70 years and eleven months, and 71.[5] Because $f(a)$ is a smooth function of the running variable. X is a vector of control variables, such as gender, the entire annual income of

[5] This means that five types of treatment dummy were created.

the household, marital status, and the number of household members. ε_{it} is an error term.

2.4 Descriptive statistics

If we see the descriptive statistics, the mean values of the amount of copayment for the last year at hospitals were 59.87 for those aged over 70 or the 10 % co-insurance group, while 77.15 for those aged under 70 or the 30% group. The annual health expenditure was 6.38 on average among those aged over 70 and 9.00 among those under 70.

3 Estimation results

First, I report on the significant jump in the amount of co-payment for the last year. Figure 1 indicates the comparison between those aged 69 years 11months or under and those aged 70 years and 0 months. According to the figure, if there are months where the co-insurance rate is 10%, medical expenses will increase. Second, the estimation results of the "donut hole" RD are shown in Table 1.[6] These results are a comparison between those under 70 and over 71. According to the table, health expenditure at hospitals significantly increased due to the reduced patient cost-sharing, regardless of whether inside or outside hospitals. However, the magnitude of the effects was much greater for insured medical treatment. Also, the difference in health expenditure between inside and outside the hospital was significantly positive. The effects were heterogeneous in terms of demographic and socio-economic background, such as gender and educational background. Since we already know that health status may not be improved, affected by the co-insurance rates, the results can be considered that substitution for voluntary medicines is one of the options to prevent a financial crisis in universal health insurance.[7] Finally, the effects on preventive behaviors were not observed.

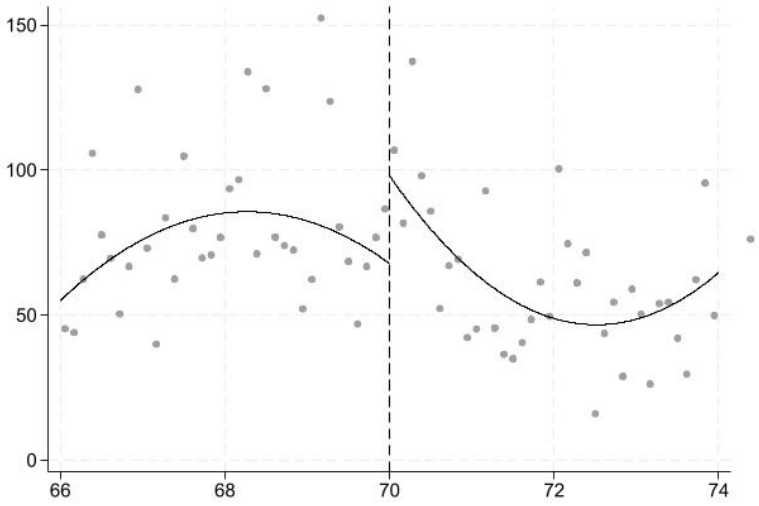

Figure 1 The effects of reduced cost-sharing on the amount of co-payment at hospitals

[6] Since the questionnaire included the phrase "last year", samples where the co-insurance rate changed mid-year were excluded.

[7] Please note that this is only one of the options, and I do not conduct any cost-benefit analyses.

Table 1: Estimation results for health expenditure and the amount of co-payments

VARIABLES	① health expenditure in hospital	② co-payments in hospitals	③ co-payments outside hospitals	④: ①−③ Difference in health expenditure	⑤: ②−③ Difference in co-payments
β	360.8**	-9.793	7.402*	353.2**	-17.87
	(154.8)	(28.74)	(4.071)	(154.3)	(28.43)
Observations	1,772	1,772	1,772	1,772	1,772
observations left	256	256	256	256	256
observations right	230	230	230	230	230
bias observations left	329	374	414	329	374
bias observations right	294	325	358	294	325
bandwidth	0.923	0.917	0.932	0.926	0.940
bias bandwidth	1.189	1.380	1.561	1.194	1.405

4 Conclusion

This study examined the impact of patient cost-sharing on health expenditures, including voluntary treatment and health investments. The results suggest that the expenditure rises due to the reduced patient cost-sharing. Also, the difference between the expenditure from insured medical treatment and voluntary treatment expanded. This study has several limitations. First, since the questionnaire measures the entire expenditure in the last year, the results may be biased, especially among those aged 70. Second, I did not analyze the long-run effect, though previous studies such as Komura and Bessho (2025) focused on it. Third, all information is self-reported, and measurement errors may occur, especially in health expenditure. Despite these limitations, the results may provide policymakers with significant implications for universal health insurance.

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