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Fee-For-Service Health Insurance and Moral Hazard of Hospitals

실손의료보험의 의료기관별 도덕적 해이

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Abstract

Fee-For-Service Health Insurance and Moral Hazard of Hospitals

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The supply-side contribution to the surge of medical expense is overlooked in the Korean health insurance market. Commonly, the demand-side is accounted for the excessive increase in medical consumption. Previous studies suggest the moral hazard or adverse selection of Fee-For-Service Health Insurance (FESHI) policyholders as the source of the problem. However, this paper focuses on the moral hazard of medical institutions using Korea Health Panel (KHP) Data version 1.5 from year 2008 to 2016. Clinics and hospitals are more inclined to commit moral hazard by inducing frequent patient visits or large medical cost than specialized or general hospitals. Especially, the cost of outpatient and inpatient, decided by the hospital, show the supply-side moral hazard.

Key words: Fee-For-Service Health Insurance, Moral Hazard, Adverse Selection

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정찬욱 (2018-21882)

I. Introduction

Fee-For-Service Health Insurance (FESHI) was introduced to supplement the lack of coverage from National Health Insurance (NHI). Although the government continuously enforced plans to increase the coverage, the progress has slowed down. The coverage is stagnant around 63% for the past 10 years, which is well below the

OECD average 72.9%. In other words, individual out-of-pocket expense is more than 30% of the medical expense (KIRI, 2017)[1]. Thus, individuals turned to private health insurance: FESHI. In 2018, more than 66% of the population is privately insured by FESHI (KIRI, 2019).

Korea is experiencing a nationwide surge in medical expense influencing both the public and private sector. The public finance of NHI is suffering from deficits due to negative externality of FESHI policyholders. To make things worse, NHI deficit may lead to greater dependence on private health insurance. Hence, whether an individual is privately insured or not will determine his or her access to medical services. For the insurance companies, the FESHI loss ratio is nearly 130% in 2019 (KIRI, 2019).

The exponential growth of medical expense is inevitable considering two obvious reasons. One, Korea is projected to become a super-aging society in the near future. The older population need more medical care and every year health risk escalates at a faster rate. Two, the advancement in medical treatment naturally accompanies price inflation. However, insurance experts claim that increased use of FESHI and the fraudulent behavior of FESHI policyholders are major cause of medical expense increase.

[1] Korea's Out-of-pocket expense percentage was second highest among OECD countries in 2013 according to Korea Insurance Research Institute (KIRI).

The fraudulent behaviors of FESHI policyholders are blamed as one of the main contributing factors to increase in medical expense. First, studies such as Jung et al. (2006), Kim (2011), and Kim and Shin (2017) point out that policyholders exhibit moral hazard. Privately insured individuals with greater coverage will experience an increase in medical expense. Visits to hospitals will be more frequent and will choose to receive higher quality treatment. It means that an individual acts differently based on their insurance consumption.

On the contrary, Park and Jeong (2011), Kim and Lee (2013), and Kim (2014) find evidence of adverse selection. Individuals that buy private health insurance, especially FESHI, have great concern about their health and visit immediately after obtaining enhanced medical coverage. In short, previous studies have only focused on the demand-side: moral hazard and adverse selection of FESHI policyholders.

This paper examines the supply-side moral hazard of FESHI. It is not new that physicians act based on their own incentives to make money. Lundin (2000) explain that physicians show moral hazard in prescribing drugs to patients. Also, Seog (2010) theoretically proves that doctors commit moral hazard when determining the treatment for patients. Particularly, a selfish doctor can diagnose higher level of treatment to maximize his or her utility.

Moral hazard of medical institutions differ by size. Smaller medical institutions are more inclined to commit moral hazard on FESHI

policyholders for two reasons. First, the earnings of a doctor is directly related with the price and number of visits for clinics and hospitals while it is not for general and specialized hospitals. Clinics and hospitals are owned by one or a few doctors. Thus, the earnings belong to the doctors. This ownership and income structure can encourage doctors to commit moral hazard.

On the other hand, doctors employed at general and specialized hospitals lack the incentive to exploit FESHI policyholders. Doctors in large medical institutions receive fixed salary. Therefore, the medical utilization of patients is irrelevant to their income, which means moral hazard is less likely.

This paper empirically examines the moral hazard of hospitals that lead to increase in medical consumption of FESHI policyholders. In section 2 of this paper, I discuss the previous literatures relating to private health insurance of foreign and domestic cases. Section 3 provides the two hypothesizes. Information on the data, definition of variables, and summary statistics are provided in section 4. Empirical results are presented in section 5 in two parts: outpatient and inpatient. The final section provides concluding remarks and implications.

II. Literature Review

Moral hazard and adverse selection seems to be inevitable in the field of insurance. Private health insurance is no exception. The types of private health insurance varies among countries and even within. Thus, empirical results are different depending on the country, the type of private insurance, and even the data. In this section, moral hazard and adverse selection in foreign and domestic studies are discussed.

Foreign

Generally, there are studies that find evidence of moral hazard and adverse selection in health insurance. Klick and Stratmann (2007) health insurance mandate generated moral hazard in the United States. Chiappori et al. (1998) find moral hazard in demand for physician service by comparing two subgroups differentiated by 10% copayment rate. On the other hand, Browne (1992) find evidence of adverse selection where low risk individuals purchase less insurance in the individual health insurance market.

More closely related to this paper, following studies show that moral hazard and adverse selection influences the medical consumption of health insurance policyholders. Sommers et al. (2016) shows that Medcaid expansion or expanded private insurance lead to increase in outpatient visits in the United States. Using a French

survey, Buchmueller et al. (2004) find no evidence of adverse selection in individuals with supplementary insurance. However, these individuals tend to exhibit moral hazard by making more physician visits than those without. Sapelli and Vial (2004) show that moral hazard is negligible for hospitalization but quantitatively significant for outpatient in Chile. On the contrary, sign of adverse selection is prevalent but not moral hazard among Catalonians with private health insurance according to Hernandez (1999).

The controversial empirical results among foreign studies seems reasonable considering the distinct individual and environmental characteristics. Not surprisingly, Korean studies on private health insurance also show contradicting findings.

Domestic: Moral Hazard

The list of literatures that examine moral hazard of private health insurance starts with Jung et al. (2006). It merges National Health Insurance Service (NHIS) data and private insurance company data from to find evidence that privately covered individuals tend to have more physician visits than those without. On the other hand, Yoon (2008) argues that moral hazard cannot be found in Korea by using a several data from NHIS, Health Insurance Review & Assessment Service (HIRA), and demographic provided by Ministry of the Interior and Safety.

Other studies have further examined moral hazard of individuals covered by private health insurance. Kim (2011) uses Propensity Score Matching to solve endogeneity and manifests the existence of moral hazard. Especially, individuals with high income tend to show greater increase in medical service utilization than others. Lee and Nam (2013) finds evidence of moral hazard in private health insurance using Korea Health Panel (KHP) data from year 2008 to 2010. However, the cross-sectional empirical analysis does not fully distinguish the effects of moral hazard and adverse selection. Using KHP data from 2012 to 2014, Kim and Shin (2017) find increase in medical expenses through difference-in-differences model.

The previous studies only utilize short periods of the KHP data. This paper uses all 9 years of data available. Moreover, none of the results mention the moral hazard of hospitals, the main interest of my research. This paper can provide a new perspective into the issues regarding the private health insurance.

Domestic: Adverse Selection

Park and Jeong (2011) find adverse selection in private health insurance using 2008 KHP data. Kim and Lee (2013) also use KHP data from 2008 to 2009. Park and Jeong (2011) and Kim and Lee (2013) argue that evidence of moral hazard in private health insurance and FESHI is only valid because adverse selection was not

considered. The effect of medical expense increase is significantly influenced by adverse selection, not moral hazard.

In addition, Kim (2014) confirms adverse selection in FESHI policyholders. The increase in number of visits and hospitalization days is due to high risk individuals purchasing and then utilizing FESHI right away. However, the sample period is only 4 years from 2008 to 2011.

Again, the studies on adverse selection of private health insurance or FESHI does not use the full period of KHP. Nevertheless, the supply-side moral hazard is neglected. This paper not only examines the medical expense per year, but also the medical expense per visit. To identify supply-side's moral hazard, the cost per visit is more adequate. Therefore, the key contributions are examination of moral hazard of hospitals and the utilization of full sample period from 2008 to 2016.

III. Hypothesis

In order to find different level of moral hazard between medical institutions, one premise has to be answered. Do FESHI policyholders spend more and visit hospitals more often? Thus, the first hypothesis is: Do FESHI policyholders show moral hazard?

Hypothesis 1: Do FESHI policyholders show moral hazard?

The main question of this paper comes next. If FESHI policyholders do show moral hazard, is there a different among medical institutions classified by size? This hypothesis based on the fact that doctors have the incentive to exploit FESHI policyholders for their own benefit. First, the ownership and income structure of small medical institutions directly benefit the doctors. Therefore, I expect that smaller medical institutions such as clinic and hospitals will urge FESHI policyholders to receive costly treatment and make more visits.

> *Hypothesis 2*: Does moral hazard of FESHI policyholders vary among hospitals?

IV. Data

The source of my data is the Korea Health Panel Data Version 1.5 (KHP Ver. 1.5). Korea Institute for Health and Social Affair (KIHASA) and National Health Insurance System (NHIS) formed a consortium to construct this survey data. The first survey was performed in 2008 and is updated each year. KHP Ver. 1.5 is the result of 11 surveys accumulating data up to 2016.

KHP Ver. 1.5 includes at least 4,500 households each year from 2008 to 2016. It provides a wide range of data from demography to medical expense, number of hospital visits and health status. The two

essential data which is the focus of the paper are the type of insurance an individual holds and the type of hospital.

Fixed benefit private health insurance, fee-for-service private health insurance, and mixed private health insurance are the three types of private health insurance. For this paper, *feshi* represents the individuals of fee-for-service private health insurance, and mixed private health insurance. Individuals with mixed private health insurance can be considered as *feshi* because the structure is similar. Previous literatures, Kim (2014) excludes the mixed private health insurance holders which may have led to the conclusion of feshi policyholders' adverse selection.

KHP Ver. 1.5 provides total of 12 types of hospitals. This paper focuses on the most frequently visited four types: specialized hospital, general hospital, hospital, and clinic. As mentioned in the previous section, I expect that smaller medical institutions are more inclined to commit moral hazard.

The variables are defined in Table 1. The dependent variables represent the medical service demand such as outpatient and inpatient cost, number of visits, and inpatient days. The medical expense is used in logged terms.

The key variables are *feshi* and hospital *type* dummy variables. Feshi represents whether an individual is a fee-for-service health insurance policyholder. There are two kinds of hospital type dummy. *Type* distinguishes the four hospital types by size. Clinic and hospital

are small relative to general and specialized hospitals. The *clinic*, *hospital*, and *general* dummy variables are used in regression to compare with specialized hospital.

The control variables play an important role in buying a health insurance, especially those that show health status. Disabled, chronic, and emergency facility usage describe whether an individual is high risk or low risk in terms of health. Demographic information such as age, gender, marital status, education, employment, income quintile, and household income are used. Kim (2011) finds moral hazard of private health insurance policyholders differ from income levels. Age, marital status, and employment clearly influence one's decision to buy insurance. Older, married, and employed individuals are more likely to have private health insurance.

[Insert Table 1. Definition of Variables]

Table 2 is the summary statistics of the sample used in this paper. Total sample is 160,241 individuals, 117,216 and 43,025 for non-policyholders and policyholders respectively. Roughly 26.85% of the sample are insured with fee-for-service health insurance. The monotonous increase in number of policyholders from 2008 to 2 016 is aligned with the fact that more and more people are buying fee-for-service health insurance.

Underwriting effect is present in fee-for-service health insurance. Policyholders (*feshi* = 1) are younger and have low health risk. The average age difference is more than 12 years. The percentage of disabled individuals is only 1.4% for FESHI buyers compared to 6.7% of its counterparts. Similarly, the probability of an individual to have a chronic disease is lower for FESHI policyholders.

Employment, household income and income quintile variables show that the insured are, on average, economically better off. However, education level and FESHI consumption shows no definite connection.

[Insert Table 2. Summary Statistics]

V. Empirical Results

Empirical results are performed using OLS regression. The dependent variables represent the medical demand: number of visits, number of days hospitalized, cost, and cost per visit. The same variable has different meaning in outpatient and inpatient cases.

For outpatient, number of visits, cost, and cost per visits are explored. Number of visits is determined by individuals. More visit by FESHI policyholders can be interpreted as the demand-side moral hazard. On the other hand, cost is determined by doctors and hospitals. Larger price charged to FESHI policyholders can be interpreted as the demand-side moral hazard. Especially, cost per

visit is more closely related to the demand-side moral hazard. For total cost is cost per visit multiplied by number of visit, the effect is mixed. Therefore, total cost includes both aspects of moral hazard related to FESHI policyholder.

For inpatient, the medical demand variables can have different implications. Number of days hospitalized is a distinct feature of inpatient medical demand. In most cases, patients decide days hospitalized. On the other hand, number of visits and cost is determined by the doctors.

Outpatient

Table 1 shows the outpatient visit per year. First column is the total number of visits for individuals to all types of institutions. Feshi is positively significantly, meaning FESHI policyholders tend to make more frequent visits than the non-insured. This is also true for the smaller medical institutions: hospital and clinic. In contrast, feshi is negatively significant to visits to specialized hospitals. This means that FESHI has an effect on increasing medical demand.

[Insert Table 3. Outpatient visit per year]

Table 4 shows the outpatient cost per year. The feshi variable is significantly positive to outpatient cost for all columns except for

specialized hospital. This means that FESHI policyholders have greater outpatient cost than the non-insured. The effect is strongest for clinic. Compared to the larger medical institutions, the ownership and pricing mechanism is in effect to increase outpatient cost for FESHI policyholders. On the other hand, specialized hospital shows negatively significant relationship between feshi and cost. Thus, the overall increase in medical expense is driven by smaller medical institutions by exploiting the FESHI policyholders.

[Insert Table 4. Outpatient cost per year]

Table 5 shows the outpatient cost per visit. This variable is most directly related to the moral hazard of the supply-side. Frist column shows that FESHI policyholders pay more than the non-insured. Next, all medical institutions except general hospital shows evidence of moral hazard. We can infer from Table 5 that doctors do commit moral hazard for their own benefits.

[Insert Table 5. Outpatient cost per visit]

The *type* variable is used to analyze the difference between small and large medical institutions. Type is 1 for clinic and hospital and 0 for general and specialized hospitals. Still FESHI policyholder make

more outpatient visits, especially to clinic and hospital. It is totally true that people visit small hospitals more often for simple treatment. However, the interaction term (*feshi*type)* is negatively correlated with outpatient visit per year. This indicates that treatment group (*feshi*type*) experiences reduction in outpatient visits per year. Therefore, FESHI policyholder visiting small medical institutions do not exploit the extensive coverage.

For medical expenses, Table 6 suggests existence of supply-side moral hazard. When (*feshi*type*) is added, coefficient of *feshi* switches from positive to negative and *type* remains strongly positive to cost. The effect of FESHI policyholder is absorbed by (*feshi*type*) treatment group. The treatment group experiences increase in outpatient cost per year. This indicates that clinic and hospitals charge more to FESHI policyholders.

Outpatient cost per visit also hints existence of supply-side moral hazard. The treatment group (*feshi*type*) experiences increase in outpatient cost per visit. So, the clinic and hospitals are charging more to FESHI policyholders compared to specialized and general hospitals. The difference with cost per year is that coefficient of *type* is negatively significant. This is plausible because generally the price is higher in larger medical institutions. In conclusion, Table 6 suggests that clinic and hospital commits moral hazard on FESHI policyholders for their benefits.

[Insert Table 6. Outpatient demand by hospital type – 1]

To examine the effects of each type compared to specialized hospital, dummy variable for clinic, hospital, and general hospital is utilized in Table 7. In short, moral hazard is found for clinic, whereas the results are mixed for hospital and general hospital.

First column represents the outpatient visit per year. FESHI policyholders visit more often and individuals visit smaller hospitals more often than specialized hospital. The variable of interest is treatment group (*feshi*clinic*). The coefficient is negatively significant, showing that FESHI policyholders do not visit clinics because they have a large coverage relative to specialized hospitals. This result implies that FESHI policyholders do not show moral hazard.

Second column shows that the outpatient cost per year is larger for other types of hospitals compared to specialized hospital. The important finding is that treatment groups (*feshi*hospital*) and (*feshi*clinic*) show significantly positive correlation with outpatient cost. This implies that smaller medical institutions demand a greater medical expense.

Lastly, the most direct evidence of supplier' s moral hazard can be interpreted in the outpatient cost per visit column. The hospital dummies show negatively significant coefficients because specialized hospitals charge greater medical price. The interaction terms show

divergent results. Only (feshi*clinic) treatment group show significant and positive coefficient value. In other words, clinics are more inclined to impose higher price to FESHI policyholders than specialized hospitals. Therefore, clinic doctors are taking advantage of the patients covered by private health insurance.

[Insert Table 7. Outpatient demand by hospital type – 2]

To conclude, doctors from smaller hospitals, notably clinics, show signs of moral hazard on FESHI policyholders in case of outpatient treatment. The ownership structure and pricing mechanism are the plausible reasons for such consequence. Clinics tend to benefit from FESHI policyholders by increasing the outpatient medical expenses comparing to other types of hospitals.

Inpatient

Table 8 shows the inpatient visit per year. The results show weak relationship between feshi and number of inpatient visit. Still, clinic column shows marginal but positively significant coefficient. For inpatient visit is decided by doctors, Table 8 implies that clinic doctors show moral hazard.

[Insert Table 8. Inpatient visit per year]

Table 9 shows the inpatient days per year or in other words, hospitalization days. Days of hospitalization, in the short-term, is decided by patients. They choose whether to leave the hospital or stay for a longer period. Patients with FESHI in specialized hospitals tend to leave early while those in smaller medical institutions prefer to stay for a longer stretch. This is evidence of demand-side moral hazard in clinic and hospital. The reason may be that the price of staying in specialized hospital is too big of a burden even with the FESHI coverage.

[Insert Table 9. Inpatient days per year]

Table 10 shows the inpatient cost per year. Inpatient cost is determined by the doctor or hospital. Therefore if the coefficient of *feshi* is positive and significant, it is supporting evidence for supply-side moral hazard. First, FESHI policyholders spend more in total. The results vary among different types of hospitals. For specialized hospitals, insured patient are charged less. In contrast, FESHI policyholders pay more in general, hospital, and clinic. From table 10, evidence of supply-side moral hazard is found for smaller medical institutions.

[Insert Table 10. Inpatient cost per year]

Table 11 shows inpatient cost per visit. The results are barely significant. Only clinic shows significantly negative relationship between *feshi* and medical expense. This results is opposite to the inpatient cost per year. To scrutinize the reason for contrasting results in depth, next two tables use dummy variables to compare the medical institutions.

[Insert Table 11. Inpatient cost per visit]

The *type* variable is used to analyze the difference between small and large medical institutions. Type is 1 for clinic and hospital and 0 for general and specialized hospitals. The number of inpatient visits is statistically insignificant.

For days hospitalized, the treatment group (*feshi***type*) absorbs the *feshi* effect. In other words, FESHI policyholders tend to extend their stay in clinics and hospitals more so than in general and specialized hospitals. It is evidence of demand-side moral hazard of FESHI policyholders.

However, the inpatient cost and cost per visit suggests supply-side moral hazard. The treatment group (*feshi*type*) experience increase in medical cost. The negative coefficient of type is reasonable because larger medical institutions normally is more costly. Nevertheless, the doctors of clinics and hospitals are charging more to FESHI policyholders.

[Insert Table 12. Inpatient demand by hospital type - 1]

Table 13 shows the inpatient demand by hospital types by using dummy variables on each type of medical institutions. Again, inpatient number of visits is statistically insignificant. Inpatient number of days suggest FESHI policyholders' moral hazard when being hospitalized in clinic. Although the days hospitalized is less in clinic than specialized hospital, it's the opposite for the FESHI insured patients. They stay longer to enjoy the benefits of the insurance.

Supply-side moral hazard of smaller medical institutions is indicated in inpatient expense. Although the inpatient cost per visit is higher in specialized hospitals, this is not the case for FESHI policyholders. The medical expense is greater for the insured patients in clinic, hospital, and general hospital. The result strongly supports that smaller medical institutions are exploiting the patients with FESHI.

[Insert Table 13. Inpatient demand by hospital type – 2]

To conclude, clinic doctors in particular exhibit moral hazard on FESHI policyholders by charging more medical expense. FESHI policyholders also show moral hazard in clinics by staying longer than in larger hospitals. More importantly, clinic doctors charge greater medical expense to FESHI policyholders not only in total, but also per inpatient visit.

VI. Conclusion

This purpose of this paper is to explore the fee-for-service health insurance's contribution on the surge of medical expense in Korea. Previous explanations were focused on the demand side of FESHI. Moral hazard of private health insurance was first suggested by Jung et al. (2006) and Lee and Nam (2013) finds that ESHI policyholders show moral hazard by increasing use of medical expense. In contrast, Kim (2014) claims that the FESHI policyholder moral hazard is because adverse selection was overlooked. This paper confirms that moral hazard of FESHI policyholders is existent for KHP data from 2008 to 2016.

More importantly, moral hazard is not subjected to policyholders, but also to medical institutions. Namely, smaller institutions are prone to exploit FESHI policyholders for their own benefit. For both outpatient and inpatient, clinic demands more cost per year and cost per visit. The ownership structure and pricing mechanism are the rationale behind the fraudulent behavior.

To control the endogeneity issue between moral hazard and adverse selection, propensity score matching can be utilized. By selecting samples of insured and uninsured with similar characteristics, the robustness of the empirical results will be enhanced. Using difference-in-differences regression can take into account the long-term effect of FESHI coverage on moral hazard.

The results of imply that further monitoring actions should be considered to restrain the moral hazard of supply-side. First, imposing stronger provision on hospitals, especially smaller medical institutions is necessary. Either by establishing a new institute or enhancing the role of Health Insurance Review and Assessment Service. Second, price standardization of non-reimbursement cost should be strongly considered. Standardization will control the arbitrarily set prices of each hospitals.

Using KHP Ver. 1.5 data from 2008 to 2016, I find that medical institutions exploit FESHI policyholders for their own benefits. Smaller hospitals: clinics and hospitals, are do so more than larger ones: specialized and general hospitals. The ownership structure and

pricing mechanism may be the reasons for the varying moral hazard behavior of medical institutions.

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논문 초록

실손의료보험의 의료기관별 도덕적 해이

본 논문은 의료 수요 증가의 원인으로 의료 공급자의 도덕적 해이를 실증분석 한다. 기존 문헌에 의하면 대부분 의료 수요자 측면에서 과도한 의요 이용이 문제라는 점을 지적한다. 특히 실손의료보험 가입자가 도덕적 해이나 역선택을 범하면서 의료 이용 빈도 또는 심도를 높인다는 것이다. 하지만, 의료 공급자인 의료기관 또는 의사의 도덕적 해이가 의료 수요 증가로 이어질 수 있다는 점을 간과한다. 특히, 규모가 작은 의료기관이 큰 의료기관보다 실손의료보험 가입자에게 더 큰 비용을 부과하거나 잦은 방문을 유도할 것으로 예상한다. 병원 소유 구조와 소득 간의 관계, 그리고 가격 측정 과정이 상이하기 때문이다. 외래의 경우 의원과 병원에서 실손의료보험 가입자의 비용과 방문횟수가 증가한다. 입원의 경우에는 의원에서 실손의료보험 가입자의 비용이 증가한다.

국문색인어: 실손의료보험, 도덕적 해이, 역선택

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Table 1. Definition of Variables

Variables	Definition
outpatient visit	Number of outpatient visits in a year
outpatient cost	Log of total outpatient cost in a year
outpatient cost per visit	Log of total outpatient cost per visit in a year
inpatient visit	Number of inpatient visits in a year
inpatient days	Number of days hospitalized in a year
inpatient cost	Log of total inpatient cost in a year
inpatient cost per visit	Log of total inpatient cost per visit in a year
feshi	Fee-For-Service policyholder = 1, if else = 0
type	Clinic & Hospital = 1, General & Specialized = 0
clinic	Clinic = 1, if else = 0
hospital	Hospital = 1, if else = 0
general	General = 1, if else = 0
gender	Male = 1, Female = 0
married	Married = 1, if else = 0
disabled	Disabled = 1, if else = 0
chronic	Has chronic illness = 1, if else = 0
emergency	Has experience of using emergency facility = 1, if else = 0
age	Age
edu	Education level
employment	Employed = 1, if else = 0
income_q5	Income quintile
log_wealth	Log of total wealth of a family

Table 2. Summary Statistics, 2008 – 2016

	feshi = 0	feshi = 1
N	117,216	43,025
age	44.6	32.0
gender (m=1, f=0)	0.489	0.476
married (y=1, n=0)	0.551	0.480
disabled (y=1, n=0)	0.067	0.014
chronic (y=1, n=0)	0.540	0.418
emergency (y=1, n=0)	0.080	0.094
employment (y=1, n=0)	0.457	0.453
household income	3,980	5,318
income_q5 (N)		
q1	19,435	1,681
q2	23,715	6,282
q3	25,156	10,027
q4	24,731	12,456
q5	24,179	12,579
education (N)		
Up to elementary education	41,541	13,072
Up to middle school education	15,356	4,507
Up to high school education	35,153	13,760
University and above	25,166	11,686
year (N)		
2008	18,948	2,063
2009	16,478	2,442
2010	14,365	3,465
2011	13,265	3,765
2012	11,192	4,660
2013	9,956	4,873
2014	12,284	6,931
2015	10,803	7,327
2016	9,925	7,499
sample size	160,241	

Table 3. Outpatient visit per year

This table shows the OLS regression result for each hospital type using outpatient visit per year as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.62	5.53	−0.08	−5.27	0.02	0.94	0.16	7.16	0.44	4.96
gender	−2.57	−27.67	0.08	5.74	0.02	1.22	−0.16	−8.42	−1.79	−24.08
married	1.74	14.27	0.12	7.21	0.17	7.04	0.36	14.87	1.04	10.72
disabled	2.71	12.84	0.56	18.77	0.83	20.19	0.53	12.44	0.34	2.03
chronic	8.21	75.90	0.59	38.26	0.64	30.29	0.46	21.26	5.23	60.59
emergency	6.48	39.45	0.87	37.33	1.64	51.27	1.08	32.68	2.45	18.74
age	0.14	44.69	0.01	19.98	0.01	23.05	0.00	−0.16	0.07	29.55
edu	−3.31	−72.71	0.05	7.40	−0.11	−12.58	−0.15	−16.87	−2.69	−74.06
employment	−2.45	−22.68	−0.41	−27.04	−0.39	−18.66	−0.18	−8.21	−1.21	−14.07
income_q5	0.61	8.34	0.03	3.00	0.05	3.44	0.11	7.25	0.25	4.33
log_wealth	−1.77	−13.31	0.02	0.80	−0.15	−5.79	−0.19	−7.27	−1.14	−10.75
year fixed effect	Y									
N	160241									

Table 4. Outpatient cost per year

This table shows the OLS regression result for each hospital type using log of outpatient cost per year as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.71	27.83	−0.05	−2.12	0.17	6.76	0.34	13.64	0.64	23.10
gender	−1.24	−58.30	0.03	1.70	−0.22	−10.70	−0.52	−25.36	−1.42	−61.67
married	1.96	70.72	0.27	11.53	0.51	18.54	0.84	31.10	1.85	61.57
disabled	−0.23	−4.77	0.58	14.38	0.48	10.01	0.23	4.91	−0.96	−18.42
chronic	3.01	121.95	1.23	59.61	1.17	47.91	0.79	32.87	2.62	97.81
emergency	1.63	43.45	1.38	43.96	2.54	68.70	1.52	41.78	0.76	18.63
age	−0.01	−19.15	0.01	24.99	0.01	22.02	0.00	−0.19	−0.02	−30.57
edu	−0.79	−75.86	0.03	3.64	−0.17	−16.42	−0.20	−20.23	−0.94	−83.38
employment	−0.51	−20.72	−0.61	−29.45	−0.32	−13.28	−0.08	−3.47	−0.38	−14.43
income_q5	0.44	26.32	0.11	8.04	0.12	7.34	0.24	14.82	0.32	17.90
log_wealth	−0.29	−9.40	0.07	2.81	−0.15	−5.04	−0.34	−11.58	−0.24	−7.36
year fixed effect	Y									
N	160241									

Table 5. Outpatient cost per visit

This table shows the OLS regression result for each hospital type using log of outpatient cost per visit as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.05	6.77	0.05	2.48	−0.01	−0.62	0.04	2.27	0.06	9.44
gender	−0.13	−18.72	−0.06	−3.82	−0.20	−14.41	−0.23	−16.79	−0.18	−32.52
married	0.11	12.37	0.17	7.96	0.13	7.59	0.15	8.23	0.12	15.52
disabled	−0.07	−4.76	−0.31	−11.68	−0.11	−4.60	−0.11	−4.08	−0.17	−13.16
chronic	0.06	7.14	−0.18	−7.00	−0.02	−1.11	−0.04	−2.29	−0.04	−5.82
emergency	0.19	16.63	−0.13	−6.36	−0.13	−8.01	−0.12	−6.42	0.04	4.05
age	0.00	2.65	0.00	−0.85	0.00	2.64	0.00	8.93	0.00	−15.84
edu	0.18	52.27	0.02	3.02	0.10	15.49	0.11	16.18	0.13	46.22
employment	0.01	1.48	0.08	4.56	0.16	10.96	0.12	7.84	0.10	15.03
income_q5	0.14	27.09	0.07	4.97	0.08	7.04	0.07	6.27	0.11	24.33
log_wealth	0.00	0.16	0.04	1.94	0.03	1.55	0.03	1.64	−0.02	−2.35
year fixed effect	Y		Y		Y		Y		Y	
N	131035		16240		28511		28573		114650	

Table 6. Outpatient demand by hospital type – 1

This table shows the OLS regression using outpatient visit, log of outpatient cost, and log of outpatient cost per visit as dependent variable. Dummy variable *type* is 1 for clinic and hospital and 0 for general and specialized hospitals.

	visit				cost				cost per visit			
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.13	5.07	0.37	10.44	0.27	19.56	−0.07	−3.72	0.05	8.28	−0.07	−5.65
type	4.09	191.31	4.22	168.79	3.15	276.86	2.97	222.98	−1.28	−205.4	−1.3	−183.9
feshi * type			−0.48	−9.94			0.69	26.90			0.16	11.38
gender	−0.46	−21.08	−0.46	−21.09	−0.54	−45.75	−0.54	−45.78	−0.20	−36.79	−0.20	−36.94
married	0.40	13.94	0.40	13.94	0.86	56.32	0.86	56.35	0.18	24.80	0.18	24.80
disabled	0.57	11.41	0.57	11.42	0.08	3.13	0.08	3.13	−0.20	−18.65	−0.21	−18.85
chronic	−0.54	−21.32	−0.54	−21.32	−0.35	−25.57	−0.35	−25.58	0.11	18.46	0.11	18.75
emergency	0.05	3.07	0.05	3.07	0.17	21.53	0.17	21.54	0.11	29.99	0.11	29.96
age	0.02	34.53	0.02	34.53	0.00	5.23	0.00	5.23	0.00	−6.55	0.00	−6.78
edu	−0.73	−67.92	−0.73	−67.93	−0.32	−56.19	−0.32	−56.22	0.11	41.47	0.11	41.55
employment	1.73	67.77	1.73	67.78	1.45	106.79	1.45	106.85	−0.01	−1.23	−0.01	−1.14
income_q5	1.51	38.89	1.51	38.89	1.55	75.06	1.55	75.10	0.01	0.67	0.01	0.71
log_wealth	−0.23	−8.78	−0.23	−8.78	−0.11	−8.19	−0.11	−8.19	−0.01	−1.80	−0.01	−1.76
year fixed effect	Y				Y				Y			
N	640964				640964				187974			

Table 7. Outpatient demand by hospital type – 2

This table shows the OLS regression using outpatient visit, log of outpatient cost, and log of outpatient cost per visit as dependent variable. Dummy variable *clinic*, *hospital*, *general* is 1 for each type and 0 if else.

	visit		cost		cost per visit	
	coef.	t	coef.	t	coef.	t
feshi	0.38	8.10	−0.15	−6.51	0.00	0.10
general	0.39	11.70	0.72	42.82	−0.65	−53.69
hospital	0.25	7.55	0.54	32.16	−0.98	−79.98
clinic	8.59	256.76	6.11	362.58	−1.94	−186.5
feshi * general	−0.01	−0.16	0.17	5.08	−0.09	−3.41
feshi * hospital	0.35	5.39	0.60	18.37	−0.06	−2.57
feshi * clinic	−1.32	−20.42	0.95	29.18	0.10	4.69
gender	−0.46	−22.31	−0.54	−51.09	−0.19	−37.41
married	0.40	14.76	0.86	62.88	0.15	22.50
disabled	0.57	12.08	0.08	3.50	−0.24	−22.89
chronic	1.73	71.73	1.45	119.25	−0.04	−7.07
emergency	1.51	41.16	1.55	83.81	−0.05	−6.80
age	0.02	36.54	0.00	5.83	0.00	−9.62
edu	−0.73	−71.89	−0.32	−62.75	0.11	43.31
employment	−0.54	−22.56	−0.35	−28.55	0.12	21.43
income_q5	0.05	3.25	0.17	24.04	0.10	28.75
log_wealth	−0.23	−9.29	−0.11	−9.14	0.00	−0.39
year fixed effect	Y		Y		Y	
N	640964		640964		187974	

Table 8. Inpatient visit per year

This table shows the OLS regression result for each hospital type using inpatient visit per year as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	−0.49	−1.83	−0.03	−1.34	0.01	0.65	−0.52	−2.01	0.01	2.85
gender	0.22	1.01	0.05	2.98	0.02	1.75	0.18	0.83	−0.01	−4.69
married	0.19	0.67	0.06	2.96	−0.02	−1.30	0.19	0.68	0.01	2.81
disabled	3.57	7.06	−0.03	−0.78	0.32	10.22	3.09	6.27	0.00	0.26
chronic	0.70	2.70	0.09	4.42	0.07	4.24	0.52	2.05	0.01	3.57
emergency	3.56	9.05	0.57	19.31	0.66	27.16	2.23	5.82	0.05	10.72
age	−0.02	−2.88	0.00	5.67	0.00	5.57	−0.03	−4.09	0.00	11.69
edu	−0.06	−0.52	0.01	1.81	0.00	0.15	−0.08	−0.73	−0.01	−5.25
employment	−0.16	−0.63	−0.15	−7.64	−0.06	−3.82	0.09	0.36	−0.01	−3.79
income_q5	−0.05	−0.35	−0.01	−0.55	−0.01	−1.50	−0.04	−0.26	0.00	−0.07
log_wealth	0.02	0.07	0.01	0.63	−0.01	−0.39	0.02	0.10	−0.01	−2.12
year fixed effect	Y									
N	160407									

Table 9. Inpatient days per year

This table shows the OLS regression result for each hospital type using inpatient days per year as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.15	1.80	−0.06	−2.91	0.01	0.31	0.11	2.09	0.07	4.89
gender	0.17	2.46	0.11	6.64	0.10	4.27	0.06	1.33	−0.05	−4.13
married	−0.55	−6.03	0.10	4.88	−0.07	−2.08	−0.03	−0.53	0.02	1.42
disabled	3.50	21.99	0.27	7.33	0.90	16.32	1.28	12.25	0.06	2.02
chronic	0.60	7.32	0.16	8.29	0.16	5.53	0.26	4.96	0.06	4.05
emergency	6.76	54.56	1.42	50.06	2.89	67.73	1.37	16.86	0.24	10.74
age	0.06	26.94	0.01	11.20	0.01	18.90	0.01	5.68	0.00	7.24
edu	−0.15	−4.40	0.01	1.34	−0.06	−5.09	−0.01	−0.29	−0.02	−2.50
employment	−1.19	−14.58	−0.22	−12.05	−0.24	−8.72	−0.25	−4.62	−0.03	−2.37
income_q5	−0.15	−3.07	−0.01	−0.96	−0.07	−4.15	−0.04	−1.23	−0.01	−0.91
log_wealth	0.22	2.61	0.01	0.70	−0.03	−0.99	−0.04	−0.77	−0.01	−0.80
year fixed effect	Y									
N	160407									

Table 10. Inpatient cost per year

This table shows the OLS regression result for each hospital type using inpatient cost per year as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.24	10.39	−0.03	−2.18	0.07	4.50	0.13	8.94	0.08	6.98
gender	−0.10	−5.34	0.08	8.37	0.06	5.24	−0.11	−9.49	−0.12	−12.64
married	0.30	11.99	0.08	6.03	0.01	0.92	0.14	9.05	0.14	11.55
disabled	0.59	13.24	0.15	6.63	0.28	9.84	0.21	7.83	−0.02	−0.80
chronic	0.45	19.98	0.19	16.43	0.16	11.03	0.10	7.45	0.04	4.24
emergency	4.32	125.21	1.26	71.62	2.44	111.82	1.15	54.94	0.16	9.82
age	0.02	29.55	0.00	15.03	0.01	21.41	0.00	10.05	0.00	8.70
edu	−0.09	−9.62	0.00	−1.00	−0.06	−9.53	−0.04	−6.92	−0.01	−2.16
employment	−0.38	−16.63	−0.16	−14.19	−0.13	−9.12	−0.05	−3.86	−0.04	−3.42
income_q5	0.03	2.21	0.02	2.59	−0.02	−2.73	0.02	2.03	0.01	1.68
log_wealth	−0.14	−5.95	−0.01	−1.03	−0.04	−2.51	−0.06	−4.07	−0.06	−5.41
year fixed effect	Y									
N	160407									

Table 11. Inpatient cost per visit

This table shows the OLS regression result for each hospital type using inpatient cost per visit as the dependent variable. The dummy variable *feshi* is 1 for Fee-For-Service policyholders and 0 for others.

	Total		Specialized		General		Hospital		Clinic	
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t
feshi	−0.01	−0.51	−0.03	−0.55	0.05	1.04	0.04	0.93	−0.09	−2.13
gender	−0.09	−4.70	−0.04	−0.96	−0.11	−3.20	−0.24	−6.27	−0.16	−4.44
married	0.08	3.24	−0.01	−0.10	0.00	−0.03	0.05	1.12	0.21	4.95
disabled	−0.13	−4.08	−0.03	−0.50	−0.22	−4.23	−0.24	−3.79	−0.07	−0.99
chronic	0.07	2.72	−0.05	−0.69	−0.08	−1.68	0.07	1.32	−0.09	−1.89
emergency	−0.13	−6.53	−0.20	−4.45	−0.17	−5.25	−0.56	−13.59	−0.43	−8.67
age	0.01	9.31	0.01	5.20	0.01	7.40	0.01	5.89	−0.01	−5.92
edu	0.10	10.08	0.06	2.93	0.09	5.58	0.11	5.93	0.13	7.38
employment	0.06	2.88	0.17	3.61	0.13	3.40	0.16	3.77	0.04	1.14
income_q5	0.10	7.35	0.10	3.34	0.10	4.21	0.06	1.97	0.10	4.14
log_wealth	0.01	0.62	−0.02	−0.35	0.04	0.88	0.07	1.50	−0.06	−1.40
year fixed effect	Y		Y		Y		Y		Y	
N	16375		3260		6032		5209		3157	

Table 12. Inpatient demand by hospital type – 1

This table shows the OLS regression using inpatient visit, inpatient days, log of inpatient cost, and log of inpatient cost per visit as dependent variable. Dummy variable *type* is 1 for clinic and hospital and 0 for general and specialized hospitals.

	visit				days			
	coef.	t	coef.	t	coef.	t	coef.	t
feshi	−0.13	−2.02	−0.10	−1.12	0.04	2.11	−0.03	−1.52
type	0.03	0.65	0.05	0.84	−0.07	−5.26	−0.11	−6.87
feshi * type			−0.07	−0.56			0.14	4.57
gender	0.06	1.11	0.06	1.11	0.05	3.93	0.05	3.93
married	0.06	0.86	0.06	0.86	0.01	0.39	0.01	0.39
disabled	0.84	6.83	0.84	6.83	0.62	19.69	0.62	19.69
chronic	0.17	2.70	0.17	2.70	0.16	9.77	0.16	9.77
emergency	0.88	9.13	0.88	9.13	1.48	60.02	1.48	60.02
age	−0.01	−3.14	−0.01	−3.14	0.01	17.71	0.01	17.71
edu	−0.02	−0.64	−0.02	−0.64	−0.02	−2.62	−0.02	−2.62
employment	−0.03	−0.52	−0.03	−0.52	−0.19	−11.58	−0.19	−11.58
income_q5	−0.01	−0.39	−0.01	−0.39	−0.03	−3.29	−0.03	−3.29
log_wealth	0.01	0.09	0.01	0.09	−0.02	−1.04	−0.02	−1.04
year fixed effect	Y				Y			
N	641627				641627			

	cost				cost per visit			
	coef.	t	coef.	t	coef.	t	coef.	t
feshi	0.06	9.27	0.00	0.08	−0.01	−0.33	−0.07	−2.07
type	−0.05	−9.56	−0.08	−13.36	−0.48	−23.83	−0.51	−22.05
feshi * type			0.12	10.00			0.12	2.72
gender	−0.02	−3.63	−0.02	−3.63	−0.15	−7.31	−0.15	−7.31
married	0.09	12.91	0.09	12.92	0.08	3.31	0.08	3.25
disabled	0.15	12.43	0.15	12.43	−0.15	−4.83	−0.15	−4.87
chronic	0.12	19.41	0.12	19.41	−0.02	−0.71	−0.02	−0.64
emergency	1.25	129.03	1.25	129.04	−0.31	−14.78	−0.31	−14.78
age	0.00	27.86	0.00	27.87	0.00	6.99	0.00	6.89
edu	−0.03	−10.44	−0.03	−10.44	0.12	12.20	0.12	12.10
employment	−0.10	−15.05	−0.10	−15.05	0.10	4.74	0.10	4.80
income_q5	0.01	1.42	0.01	1.42	0.10	7.48	0.10	7.47
log_wealth	−0.04	−6.32	−0.04	−6.32	0.01	0.49	0.01	0.53
year fixed effect	Y				Y			
N	641627				18006			

Table 13. Inpatient demand by hospital type – 2

This table shows the OLS regression using inpatient visit, inpatient days, log of inpatient cost, and log of inpatient cost per visit as dependent variable. Dummy variable *clinic*, *hospital*, *general* is 1 for each type and 0 if else.

	visit		days		cost		cost per visit	
	coef.	t	coef.	t	coef.	t	coef.	t
feshi	−0.11	−0.88	0.03	0.87	−0.01	−1.09	−0.13	−2.26
general	0.01	0.13	0.29	12.91	0.21	23.29	−0.60	−19.57
hospital	0.19	2.20	0.21	9.30	0.10	10.98	−0.73	−22.30
clinic	−0.08	−0.88	−0.14	−6.10	−0.06	−6.60	−1.19	−32.41
feshi * general	0.02	0.10	−0.12	−2.86	0.03	1.67	0.14	2.06
feshi * hospital	−0.17	−0.99	0.02	0.43	0.17	10.14	0.13	2.02
feshi * clinic	0.05	0.30	0.14	3.18	0.10	5.70	0.23	3.06
gender	0.06	1.11	0.05	3.93	−0.02	−3.63	−0.16	−8.29
married	0.06	0.86	0.01	0.39	0.09	12.93	0.07	3.04
disabled	0.84	6.83	0.62	19.70	0.15	12.45	−0.17	−5.35
chronic	0.17	2.70	0.16	9.77	0.12	19.43	−0.06	−2.24
emergency	0.88	9.13	1.48	60.04	1.25	129.17	−0.33	−16.28
age	−0.01	−3.14	0.01	17.71	0.00	27.90	0.00	7.54
edu	−0.02	−0.64	−0.02	−2.62	−0.03	−10.45	0.12	11.99
employment	−0.03	−0.52	−0.19	−11.58	−0.10	−15.07	0.12	5.74
income_q5	−0.01	−0.39	−0.03	−3.29	0.01	1.42	0.10	6.93
log_wealth	0.01	0.09	−0.02	−1.04	−0.04	−6.32	0.01	0.36
year fixed effect	Y		Y		Y		Y	
N	641627		641627		641627		18006	