경제학석사 학위논문

Distortion in Physician Service Market Induced by Fee-For-Service Health Insurance

- Empirical Evidence of Time-varying Adverse Selection -

실손의료보험의 의료서비스 시장 왜곡
–시간의 흐름에 따라 변하는 역선택의 실증적 증거–

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Abstract

There have been findings that the Fee-For-Service Health Insurance increases the use of medical care by causing moral hazard on the part of subscribers. On the other hand, some argue that the increase in medical use is driven by not moral hazard but adverse selection. This paper uses the dynamic insurance status data of Korea Health Panel from 2008 to 2013 to verify the cause behind increased medical care consumption.

Compared to existing subscribers, new subscribers use more healthcare service right after being insured. This increase in medical use that only appears in the first period of insurance represents the effect of adverse selection that changes over time. To build an efficient health care system, it is important to identify the exact source of the increased use of medical care caused by Fee-For-Service health insurance. This study provides implications for the development of the physician service market and the private health insurance industry, as well as government health policy in the long run.

Keyword : Fee-For-Service Health Insurance, Private Health Insurance, Health care utilization, Moral Hazard, Adverse selection, Korea Health Panel

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Chapter 1. Introduction

Korea is one of the countries where the medical service market is growing rapidly, and the medical expenses are becoming a heavier burden on its people. The health care system in Korea is more universal compared to other countries because anyone can benefit from the national health insurance coverage. However, the coverage rate is relatively low compared to other countries with public health insurance systems, which is why the private sector has played a significant role. Many people are joining Fee-For-Service Health Insurance to enjoy benefits not provided by the public sector.

Generally, people tend to increase their health care utilization after purchasing health insurance. Such an increase has a negative impact on both the public and private sectors. If private health insurance increases the use of medical care, the public sector will bear additional financial burden because the medical expenses are partially supported by the government. In the private sector, increased use of medical service reduces the revenues of the insurance company. It is therefore necessary to grasp, in depth, the causes of increased medical use. This increase is widely known as the result of moral hazard. However, some argue that the increase partly results from adverse selection (D.Kim, 2014)[1].

This paper identifies the role of adverse selection in the

[1] D.Kim. "Effects of Fee-For-Service Health Insurance on Medical Consumption." Korean Insurance Journal 98. (2014): 61-90.

increase of health care utilization after purchasing fee-for-service health insurance. By using dynamic insurance status data, this paper investigates how adverse selection affects the increase in health care utilization of the insured. By identifying the cause of the increase in medical care utilization, the paper provides policy implications.

This paper begins in Chapter 2 with brief background on Health Spending and Public Health Insurance System in Korea. Chapter 3 introduces previous studies used same dataset as this paper. Chapter 4 describes the dataset used for the analysis. Chapter 5 considers the econometric model to test hypothesis. Then, Chapter 6 presents the main results and the results of additional analyses. The last chapter summarizes the main findings and policy implications.

Chapter 2. Background

2.1 Health Spending in Korea

Korea is among the OECD countries with a low proportion of health expenditure to GDP. According to the OECD Health Statistics 2015, Korea's health expenditure as a percentage of GDP is 29th among 34 OECD member countries. Despite being at a low level, the medical expenditure in Korea is growing rapidly; the growth rate of medical expenditures in 2014 is about 5.7%. The coverage of the public sector in medical expenditures is the lowest among OECD member economies, reported as 56% in 2013, compared to the OECD average of 73%.

Since 1989, Korea has administered the National Health Insurance Service to provide health benefits to all citizens. However, Korea's National Health Insurance is a "low-burden-low-pay system," and even its sustainability is threatened by its financial instability (D.Kim & B.Lee, 2013). According to an annual report[2] provided by National Health Insurance Service (hereafter NHIS), the NHIS coverage rate from 2008 to 2014 is around 62% to 63%. Although the coverage rate is higher than that reported by OECD (56% in 2013), it still falls short of the OECD average of 73%. (Table 1)

Since the share of the public sector is low and medical expenditures are rising rapidly, the burden on households is

[2] NHIS Annual Report (2008, 2009, 2010, 2011,2012, 2013 and 2014)

increasing. As a result, there is a growing need for the private sector to share the medical burden.

Table 1 NHIS Coverage rate (2008 ~2014)

Year	2008	2009	2010	2011	2012	2013	2014
Coverage rate[3]	62.2%	65%	63.6%	63%	62.5%	62%	63.2%

2.2 Private Health Insurance market in Korea

There are two main types of private health insurance that are sold in Korea. The first is a lump-sum health insurance in which the contracted amount is compensated in the case of a contracted disease or accident. It mainly consists of cancer insurance, life insurance, stress disorder insurance, and disaster insurance. If a disease or accident does not occur, the insurance premium that had been paid can be refunded at the expiration date. As of June 2016, 41.66 million people are covered by lump-sum insurance. This amounts to 82% of the total population of 50.8 million people, as estimated by Statistics Korea.

The second type is a fee-for-service health insurance. It reimburses subscribers for actual costs incurred at each hospital visit. Subscribers have to pay a renewed premium for each renewal of the contract. The insurance premium is calculated based on the average usage of the age group and the sex group to which a subscriber belongs, regardless of how much he or she has used medical care in the previous period and how much compensation he or she has

[3] $\left(\frac{Reimbursement\ by\ NHIS+Refund}{Total\ payment}\right) \times 100$

received. Subscribers can also receive the benefits of a lump-sum insurance by paying additional premiums. As of September 2016, 34.56 million people are covered by fee-for-service health insurance, which is roughly 68% of the population. In fact, the number of new subscribers is increasing by 3 million every year, and a large proportion of subscribers are in their 30s and 40s.[4]

This paper concentrates on the fee-for-service health insurance because this is the type of insurance that actually affects consumption of health care. A subscriber of fee-for-service health insurance is reimbursed for most parts of the medical cost not covered by NHIS.

NHIS divides all medical care activities into two categories, namely the fundable and the non-fundable, and supports only a part of the medical expenses classified as fundable. The fundable includes most essential treatments, and the non-fundable include treatments that are performed additionally at the physician's or patient's choice. All NHIS-eligible citizens must pay 20% to 50% of the total expense[5] as out-of-pocket payment if they receive fundable care. Fee-for-service health insurance subscribers are reimbursed for their out-of-pocket payment by their insurance company. In addition, 90% to 100% of the cost of non-fundable care is covered by fee-for-service health insurance. Figure 1 provides a visual comparison between the fee-for-service health insurance subscribers and the

[4] Credit Information Big Data Analysis Result, Korea Credit Information Services, 2016 (in Korean)
[5] Coinsurance rate varies based on type of hospital, type of care, etc.

others in terms of medical cost coverage. Because of this reimbursement system, insured consumers have the incentive to use more medical care, and those among the uninsured who use a lot of medical service are led to purchase fee-for-service health insurance.

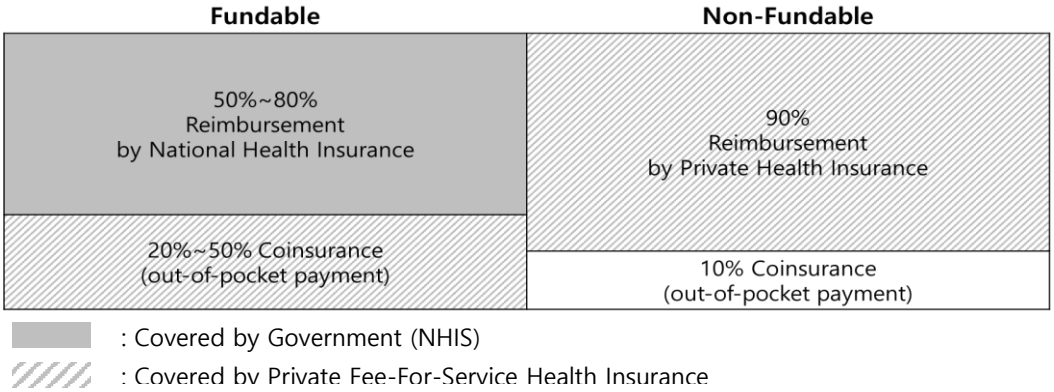


Figure 1 Reimbursement system of Fee-For-Service Health Insurance

Chapter 3. Literature Review

There have been a number of previous works on moral hazard and adverse selection driven by health insurance in the medical service market. This chapter introduces the studies that analyze moral hazard and adverse selection in the Korean physician services market by using the same data as this paper, Korea Health Panel.

Lee(2012) [6] analyzes both moral hazard and adverse selection of private health insurance. The data from Korea Health Panel in 2008 and 2009 are used. Lee(2012) considers the impact of private health insurance as a whole, rather than focusing only on fee-for-service health insurance. The analysis of moral hazard is based on cross - sectional analysis using only the data in 2008, and the number of chronic diseases is used to control the effect of adverse selection. An analysis of the adverse selection is carried out by analyzing the impact of health care access in 2008 on the probability of enrolling in private health insurance in 2009. The results show that both adverse selection and moral hazard exist, but because there is no panel data, there is a risk of bias in the results. In addition, two distinct private health insurances, lump-sum health insurance and fee-for-service health insurance, are not distinguished.

D.Kim & B.Lee (2013) consider adverse selection caused by fee-for-service health insurance. The paper analyzes the

[6] S.Lee. "The Effects of Private Health Insurance on Policyholders' Medical Demand: Empirical Separation between Moral Hazard andAdverse Selections." Master's Thesis. Graduate School of Business .Yonsei University (2012)

characteristics of respondents in Korea Health Panel of 2008 and 2009, using Logistic Regression Model. They find that people with higher medical demand are more likely to join fee-for-service health insurance. There is a significant increase in the likelihood of enrolling in fee-for-service health insurance if health status is low and health expenditure or demand for medical services is high. This study points out that previous findings that private health insurance causes moral hazard may have been misinterpretations, since they did not fully consider the effect of adverse selection. Fee-for-service health insurance subscribers have higher-than-average health risk levels, so that analyzing moral hazard without controlling for these characteristics can lead to high medical demand due to adverse selection being mistaken for coming from moral hazard. (D.Kim & B.Lee, 2013)

D.Kim (2014) looks at the increase in healthcare utilization after entering fee-for-service health insurance. Kim(2014) uses the Korea Health Panel (2008-2011) to analyze the extent of health care utilization of new subscribers after they sign up. Kim(2014) constructs more data than in previous studies[7] and use the Panel Fixed Effect Model to control unobservable characteristics of individuals. The analysis shows that the use of medical care increases at first, but the effect decreases remarkably after one year. The paper concludes that there is no evidence that fee-for-service health insurance leads to moral hazard in the long term, and that the

[7] D.Kim & B.Lee (2013)

short term increase in medical use is due to adverse selection.

Chapter 4. The data

4.1 Sample construction

This paper uses eight waves of the Korea Health Panel (version 1.2.1), covering the years 2008 – 2013. The data is from the Korea Institute for Health and Social Affairs and National Health Insurance Service. Although the data covers 6 years, it provides 8 waves in total because the data was collected twice a year in 2008 and 2010.

This paper separates annual data[8] into half-year data based on the date of survey and the date of utilization of health care, which provides us with 12 waves in total. This paper uses semi-annual data to determine the point in time when an individual purchases fee-for-service health insurance. Of course, potential measurement errors can be caused by separating data with arbitrary baselines. There may be problems with samples that have changed insurance status within a year. In particular, the data for second half of the years 2009, 2011, 2012 and 2013 includes observations with potential errors.

The number of observations with potential errors is reported in Table 2. It is clear that the 1,574 observations from the first half of the year actually bought insurance in that period, while 452 of observations from the second half of the year data could have potential measurement errors in insurance status. The analysis

[8] 2009, 2011, 2012 and 2013

results after excluding the problematic sample are reported in Chapter 6.3.

Table 2 Observations with potential errors in Data set

Response period		First half of the year (Jan~Jun)		Second half of the year (Jul~Dec)		
	Year	observation	%	observation	%	subtotal
Uninsured -> Insured	2009	224	51.1%	214	48.9%	438
	2011	174	67.7%	83	32.3%	257
	2012	662	98.5%	10	1.5%	672
	2013	218	90.1%	24	9.9%	242
	total	1,278	79.5%	331*	20.5%	1,609
	Year	observation	%	observation	%	subtotal
Insured -> Uninsured	2009	87	54.7%	72	45.3%	159
	2011	12	28.6%	30	71.4%	42
	2012	126	89.4%	15	10.6%	141
	2013	71	94.7%	4	5.3%	75
	total	296	71%	121*	29%	417

*The results of robustness check without the observations with potential measurement errors is reported in later chapter.

4.2 Sample and descriptive statistics

Excluding minors and the elderly population, we sample respondents aged 20−59 in the first half of 2008 to construct the panel data. Those aged 60 or older are most likely to be denied insurance, and because of their high medical use, they can lead to underestimation of the effect of insurance coverage. Minors are also excluded from the analysis because they are less likely to sign up for insurance themselves. However, our sample does include those aged 60 or older from 2009. Since there is a possibility of underestimation if a sample over 60 years old is included, we conduct a robustness

check after narrowing down the age window to 20 to 54. The results are reported in Chapter 6.3.

Table 3, on the next page, shows the descriptive statistics. Samples are divided into two groups, Uninsured and Insured, to compare the mean values of the variables. The insured are those who have signed up for a fee-for-service health insurance at least once, and the uninsured are those who have never joined. On average, the insured have higher values in variables related to the level of medical use. The annual trend of Descriptive Statistics for major variables, used as dependent variables, is shown graphically in the Appendix.

Table 3 Descriptive Statistics[9]

Variable	Full sample	Uninsured	Insured
Outpatient visit	14.237	9.871	10.588
Inpatient visit	0.142	0.104	0.137
ER visits	0.106	0.073	0.091
Inpatient days	1.488	1.064	1.170
Inpatient days by accident	0.382	0.331	0.429
Inpatient days via ER	0.259	0.182	0.147
ER visits by accident	0.031	0.025	0.028
ER visits: Surgical treatment	0.006	0.004	0.006
ER visits: Non-Surgical treatment	0.093	0.064	0.079
Outpatient payment (KRW)	246,221	232,880	301,708
Inpatient payment (KRW)	96,056	88,512	127,434
ER payment (KRW)	4,050	3,834	4,946
Age	39.7	43.1	42.4
City	0.442	0.478	0.471
Marital Status	0.510	0.718	0.780
Sex	0.482	0.484	0.445
Employed	0.220	0.350	0.480
Disabled	0.053	0.044	0.015
Birth	0.007	0.013	0.015
Subsidy	0.050	0.036	0.012
Education (years)	10.169	13.407	14.273
Economic Activity	0.427	0.666	0.714
No. of chronic diseases	1.271	0.996	0.987
Log(Annual income)	4.250	9.354	10.753
Lump-sum Health Insurance	0.593	0.703	0.685
Insurance premium (KRW)	11,190	0	74,091
Observation	92,871	74,870	18,001

[9] All values are annualized by doubling

Chapter 5. Econometric Model

5.1 Testing for Assumptions

A fee-for-service health insurance increases the likelihood of medical use for two major reasons, moral hazard and adverse selection. Moral hazard is defined as a reduction in risk-averse behavior of insured individuals after being insured (Ligon and Thistle, 2008). Adverse selection refers to the behavior of insured individuals who are likely to have poor health status due to the information asymmetry between the insurer and the insured, or who set a high rate of coverage at the time of enrollment (D.Kim & B.Lee, 2013). This paper divides these concepts into four factors that affect the level of medical use after having insurance. The four factors are as follows.

1) **Time-invariant moral hazard:** Occurs in individuals who have unobservable fixed effects become inattentive and more likely to use medical care after enrollment.
2) **Time-invariant adverse selection:** Occurs in individuals who originally had steady medical demand before enrollment. This includes those who are weak or who frequently go to hospital.
3) **Time-varying moral hazard:** Occurs in individuals whose demand for medical care changes after enrollment, so that the extent of moral hazard varies by time.
4) **Time-varying adverse selection:** Occurs in individuals whose

demand for medical care changes before buying insurance, and who buys the insurance when their demand for medical care is high, so that the extent of adverse selection is high.

The two time-invariant factors are not considered because they can be controlled using the panel data. This paper shows the effect of time-varying adverse selection on the increased use of healthcare after enrolling in fee-for-service health insurance, using time-varying moral hazard and time-varying adverse selection.

Two assumptions are needed to confirm that time-varying adverse selection plays a role in the increase of medical use, traditionally explained by moral hazard.

Assumption1. There does not exist time-varying moral hazard after controlling individual fixed effects by panel fixed effect model.

Assumption2. There exists time-varying adverse selection. (An individual signs up for private health insurance when his or her demand for health care service increases.)

These two assumptions can be empirically verified by the following methods.

$$y_{it} = \alpha + \beta\, insured\, period_{it} + \theta' X_{it} + a_i + u_t + \epsilon_{it} \quad (1)$$

$$y_{it} = \alpha + \sum_{k=3}^{K} \beta_k I(insured\, period_{it} = k) + \theta' X_{it} + a_i + u_t + \epsilon_{it} \quad (2)$$

To test the first assumption, the sample is limited to the existing insured. The existing insured are defined as being insured for at least two terms. In both equations, y_{it} is the measure of health care utilization, X_{it} is a vector of other control variables, and a_i and u_t are individual fixed effect and time fixed effect, respectively.

Equation (1) captures the average change in utilization of health care service (y_{it}) for insured periods $(insured\ period_{it})$ and equation (2) captures changes in each period t. Using panel fixed effect model, it can be shown that there is no difference in utilization of health care across insured periods. By testing β in equation (1) and β_k in equation (2) for insignificance, this paper concludes that the existing insured do not have an increasing or decreasing pattern in health care utilization as their insured period goes on.

Table 5 and Table 6 are the results of equation (1) for extensive margin and intensive margin, respectively. For all dependent variables, there is no pattern of average change in health care utilization. Table 7 and Table 8 are the results of equation (2) for extensive margin and intensive margin. They also show no significant change of health care utilization for all dependent variables. Thus it is ensured that the extent of moral hazard that the insured have after purchasing insurance is not time-varying.

$$\Pr(\text{Insurance}_{it} = 1) = \alpha + \beta' \ y_{it-1} + \theta' \ X_{it} + a_i + u_t + \epsilon_{it} \quad (3)$$

To test the second assumption, it is necessary to figure out

how health care utilization in the last period affects the probability of being insured in the present. Many studies have proved the existence of adverse selection by using Logistic Regression Model. However, they do not consider time-invariant individual effect. With individual fixed effects, the adverse selection effect cannot be clearly shown. Hence, this paper focuses on the within variation of health care utilization and the probability of being insured, while previous literature focuses on the difference in the probability of being insured between different groups of people separated by the degree of health care utilization in the last term. This is because it is more desirable to analyze how an individual's time-varying demand for health care service affects the probability of being insured, rather than to compare decisions among individuals.

In order to show the time-varying adverse selection using within variation, this paper uses Conditional Logistic Regression Model from Chamberlain (1982).

The estimation results of equation (3) are presented in Table 9. Columns (1)-(6) show the effects of lagged variables of the number of hospital visits on the probability of being insured. Column (7) shows the effect of lagged health care payment on the probability of being insured. Columns (2)-(4) use detailed ER visit variables, such as the number of ER visits caused by accident, the number of surgical treatment taken in ER, and the number of non-surgical treatment taken in ER, instead of the total number of ER visits per year. Columns (5)-(6) use detailed inpatient days variables, such as

the number of inpatient days via ER and the number of inpatient days caused by accident, instead of the total number of inpatient days per year.

All models in Table 9 show that the utilization of outpatient and inpatient health care service in the last term increases an individual's possibility of being insured in the present term. Both extensive and intensive increases in health care utilization raise the possibility of being insured. However, the number of ER visits does not have any impact on the possibility of having a fee-for-service insurance. This is because an individual does not expect to have accidents or any emergent health care service. The number of inpatient days is also insignificant. The negative signs of the coefficients of the number of chronic diseases and Lagged dummy variables for disability and age squared imply the underwriting effect of insurers. Private insurance companies usually screen high-risk-applicants. Therefore, an individual with many chronic diseases, disability, or old age has difficulty in passing the screening process of the insurance company. For this reason, when an individual has more chronic diseases or disabilities, the probability of being insured in the next term decreases.

In conclusion, the results of Conditional Logistic Regression Model shown in Table 9 shows that an individual signs up for private health insurance, especially fee-for-service health insurance, when his or her demand for health care service increases. Hence, there exists time-varying adverse selection in health care utilization.

5.2 Testing for Hypothesis

If the two assumptions above are satisfied, following hypothesis claims the existence of time-varying adverse selection effect in the increase in health care utilization after insurance purchase.

Hypothesis. The newly insured increases health care utilization immediately after they enroll. Therefore, health care utilization of the newly insured is larger than that of the existing insured because of time-varying adverse selection.

Using insurance status for two terms (t, t-1), the sample is separated into the following four groups (Table 4).

Table 4 Four types based on insurance status

t / t-1	Insurance=1	Insurance=0
Insurance=1	Existing Insured(D_1)	Canceler(D_3)
Insurance=0	Newly Insured(D_2)	Never-insured

1) Individuals who are insured in both the present and the last term are in group D_1, Existing Insured.
2) Individuals who are insured in the present but not in the last term are in group D_2, Newly Insured.
3) Individuals who do are not insured in the present but were insured in the last term are in group D_3, Canceler.
4) The remaining individuals are in Never-Insured group.

An individual can move from group to group depending on his or her insurance status at t and $\mathrm{t}-1$. The purpose of this paper is to prove the hypothesis by comparing the health care utilization of an individual between when he or she is in D_1 group and D_2 group. The econometric model for the hypothesis is, therefore, given by

$$\mathrm{y_{it}} = \alpha + \beta_1 D_{1it} + \beta_2 D_{2it} + \beta_3 D_{3it} + \theta' X_{it} + a_i + u_t + \epsilon_{it} \quad (4)$$

where $\mathrm{y_{it}}$ is the measure of health care utilization, D_1, D_2 and D_3 are dummy variables that represent if an individual i is in D_1, D_2 or D_3, at time t, X_{it} is a vector of control variables, a_i is individual specific effect, and u_t is time specific effect.

Using Panel Fixed Effect Model, the difference in health care utilization between when an individual belongs to each group and when an individual is never insured can be estimated. In order to measure how much more the newly insured uses health care service than the existing insured, $\beta_2 - \beta_1$ should be estimated. After estimating each coefficient of equation (4), the following hypothesis test is necessary.

$$H_0: \beta_2 - \beta_1 = 0$$

$$H_1: \beta_2 - \beta_1 > 0$$

If the null hypothesis is significantly rejected, it can be concluded that the time-varying adverse selection affects the newly insured's behavior after enrolling in insurance. The reason why the health care utilization of the newly insured is larger than that of the existing insured is that people are more likely to have insurance when their

demand for health care service is high, and they try to satisfy their demand at the very first term of being insured. In this way, this paper shows empirically the existence of time-varying adverse selection, conventionally mistaken as moral hazard.

Chapter 6. Results

6.1 Main results

Table 10 and Table 11 show the estimation results of equation (4). The dependent variables are the same as those used for testing Assumption 1. In almost all models, the health care utilization is larger at the first term of being insured than other terms ($\beta_2 > \beta_1$).

With regards to extensive margin (Table 10), according to the results of one-sided test of $\beta_2 - \beta_1$, the number of ER visits and the number of ER visits by accident show significant adverse selection effects, which is unexpected because emergency health care utilization and accident are not predictable. This means that the increased demand for health care service before buying insurance is partly relieved through ER visits. To clarify, this paper separates the number of ER visits from accident into two parts, surgical treatment and non-surgical treatment. The type of treatment that is administered when visiting Emergency Room because of an accident can signal how serious the accident was. A surgical treatment means that the accident was serious and unpredictable.

Column (5) shows the result of equation (4) for the number of surgical treatment after visiting ER by accident. There is no significant difference between the newly insured and the existing insured, meaning there is no adverse selection effect on this dependent variable, as expected. Conversely, the number of non-surgical treatment after visiting ER by accident shows significant

adverse selection effect. It is clear that most of the effects on the number of ER visits and the number of ER visits by accident are explained by the number of non-surgical treatments. Therefore, it can be concluded that the high demand for health care service before having insurance can be relieved not only through outpatient and inpatient visits, but also ER visits.

When it comes to intensive margin (Table 11), only log(outpatient payment) shows a significant adverse selection effect. It is shown that the insured spend 0.426%p[10] more in the first term than in other terms. The higher expenditure reflects the fact that individuals take additional selective treatments. Therefore, the surge of payment in the first term of being insured could be a signal of higher need for health care that they had before buying insurance. Any dependent variable regarding the number of inpatient days does not show significant differences. This is because the number of stays in hospital is usually at the doctor's discretion and does not depend on patient's insurance status.

Despite the insignificance, the effects of adverse selection $(\beta_2 - \beta_1)$ on the number of inpatient days via ER and the number of inpatient days by accident are smaller than its effect on the total number of inpatient days. This is because admission through emergency room and admission due to accident are unpredictable.

[10] All values are annualized by doubling.

6.2 Heterogeneous Effect

There may be heterogeneous effects for different conditions. The extent of time-varying adverse selection can vary according to medical conditions and demographic differences. In this section, the sample is grouped by sex, age-group, disability, or chronic diseases.

By Sex group: Men v. Women (Table 12 & 13)

It is shown that women are more likely to have higher adverse selection effects than men in the number of ER visits, the number of ER visits by accident, the number of non-surgical treatments taken after visiting ER, and log(ER payment). Men show significant effects in the number of inpatient days, the number of inpatient days by accident, log(outpatient payment), and log(inpatient payment). Overall, the adverse selection effect is greater for women than for men. This difference is seen in the number of visits by women and the amount paid by men at each hospital visit.

By Age group: 20s~40s v. 50s~60s (Table 14 & 15)

Samples are divided into two groups by age, 20s-40s and 50s-60s, and analyzed for heterogeneous effects. For 20s - 40s, the effect of adverse selection is stronger in outpatient and inpatient. Outpatient and inpatient admissions have significant adverse selection effects in both extensive and intensive margins. On the other hand, for 50s - 60s, the effect of adverse selection is profound in emergency treatment. There is a significant adverse selection effect on the dependent variables related to emergency treatment,

such as the number of visits to the emergency room, the number of visits to the emergency room due to accident, the number of surgical and non-surgical treatments, and the cost of emergency room. It can be seen that relatively older people in the 50s-60s age group tend to relieve the high medical demand that they had before buying insurance through emergency medical service, unlike the 20 to 40-year-olds.

By Disability (Table 16 & 17)

When the samples are classified and analyzed according to disability, they do not show any special pattern, unlike the other cases. For respondents with disabilities, there exist adverse selection effects in outpatient visits and frequency of surgical treatment after visiting the emergency room. For those without disabilities, adverse selection is found in the number of inpatient visits and emergency room visits, and also in outpatient and emergency costs. Adverse selection in outpatient costs also appears for the disabled, and the effect of adverse selection is greater than in the absence of disability. This analysis shows that the adverse selection due to high medical demand of the disabled is significant only in outpatient clinic, contrary to the belief that the size of adverse selection would be higher for the handicapped, who are expected to have higher medical demand. If there is a disability, buying insurance is itself difficult due to underwriting of insurance companies. If a subscription is made, the disability of the subscriber is likely to be a kind of disorder that does not significantly affect medical utilization.

This may be why we do not observe a specific pattern.

By Chronic disease status (Table 18 & 19)

Samples are classified according to whether they have chronic diseases and analyzed for heterogeneous effects. Panel A includes respondents with at least one chronic disease, and Panel B includes those with no chronic disease. Those who have chronic illnesses show adverse selection in the number of inpatient visits, the number of emergency room visits due to accident, and the number of days of hospitalization through the emergency room. Those who do not have chronic illnesses show adverse selection effect only in inpatient days and outpatient cost. In terms of the number of dependent variables for which adverse selection is indicated, adverse selection is more likely to occur for chronic disease holders, who are expected to have higher medical demand. However, there is no specific pattern that depends on the presence of chronic diseases.

6.3 Robustness check

This paper conducts two additional analyses for robustness check. First, in the sample configuration, the time point of the enrollment was estimated using the survey date, and the annual data was divided into the first and the second half of the year. In this process, we cannot be certain whether individuals who were surveyed in the second half bought the insurance in the first half or the second half, so potential measurement errors may occur.

Robustness check is conducted by excluding the observations that are problematic. If there is a potential problem with an observation, we exclude the individual in all subsequent waves. We find that the results are not significantly affected by this exclusion. It can thus be seen that the potential measurement error problem in the initial data is not serious. (Table 20 & 21)

In the second robustness check, the main sample of adults aged 20–59 years in 2008 is reduced to adults aged 20–54 in 2008. As a result of narrowing the age window, the effect of adverse selection becomes stronger because the population over the age of 60 is now excluded from all panels. The significance and coefficient values differ slightly, but the overall effect is similar. Considering the heterogeneous effect of adverse selection on different age groups, adverse selection becomes more prominent as the elderly population is excluded. (Table 22 & 23)

Chapter 7. Conclusion

This paper analyzes the causes of increased healthcare usage by holders of fee-for-service health insurance, by using the Korea Health Panel, which consists of 6 years. Thanks to the advantages of panel data, this paper is able to discern how healthcare utilization changes as individuals' insurance status changes over time. This paper provides a more rigorous treatment of the findings of a previous study (D.Kim, 2014) that the increase in medical use after insurance coverage includes the effects of adverse selection as well as moral hazard.

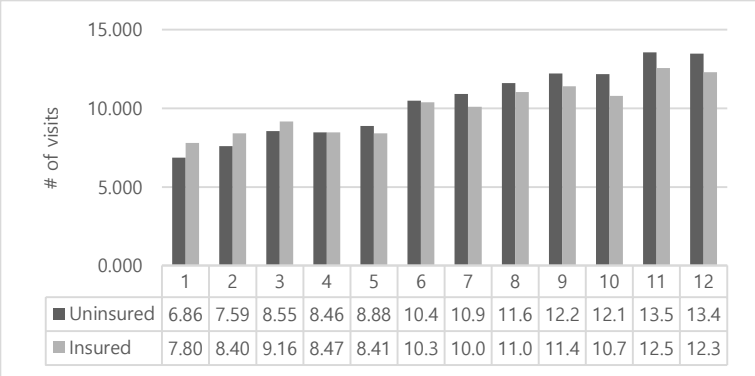
The sample is divided into new subscribers and existing subscribers by comparing the insurance status in two adjacent periods. We find differences in medical use that depends on whether the subscriber is a new or an existing subscriber. Specifically, there is an increase in the use of medical care in the first period of being insured. This shows that there is time-varying adverse selection which affects medical use in the first period of subscription.

Previous studies have not shown differences in behavior by separating subscribers into new and old, and by using two periods of insurance coverage. In this regard, this paper contributes a new methodology to the field. A shortcoming, however, is that the increase in use of medical services does not empirically identify the portions of moral hazard and adverse selection. Additional research may analyze how much of the increase in health care after insurance

is due to adverse selection, and how much is due to moral hazard.

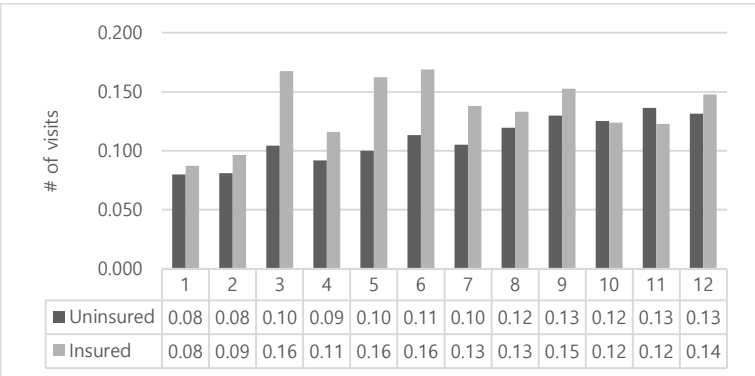
Appendix

Figure 2 Annualized number of outpatient visits



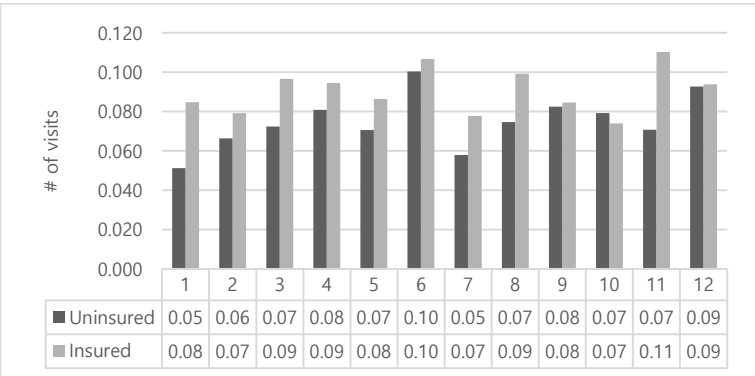
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	6.86	7.59	8.55	8.46	8.88	10.4	10.9	11.6	12.2	12.1	13.5	13.4
Insured	7.80	8.40	9.16	8.47	8.41	10.3	10.0	11.0	11.4	10.7	12.5	12.3

Figure 3 Annualized number of inpatient visits



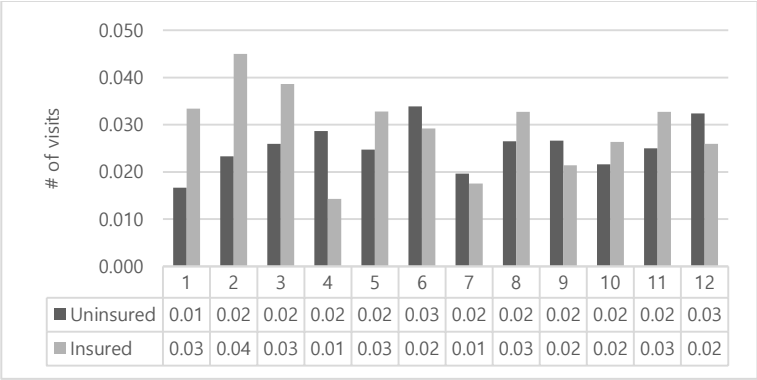
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.08	0.08	0.10	0.09	0.10	0.11	0.10	0.12	0.13	0.12	0.13	0.13
Insured	0.08	0.09	0.16	0.11	0.16	0.16	0.13	0.13	0.15	0.12	0.12	0.14

Figure 4 Annualized number of ER visits



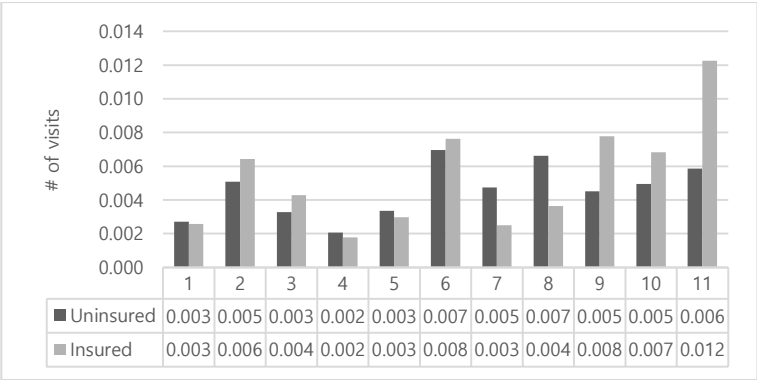
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.05	0.06	0.07	0.08	0.07	0.10	0.05	0.07	0.08	0.07	0.07	0.09
Insured	0.08	0.07	0.09	0.09	0.08	0.10	0.07	0.09	0.08	0.07	0.11	0.09

Figure 5 Annualized number of ER visits by accident



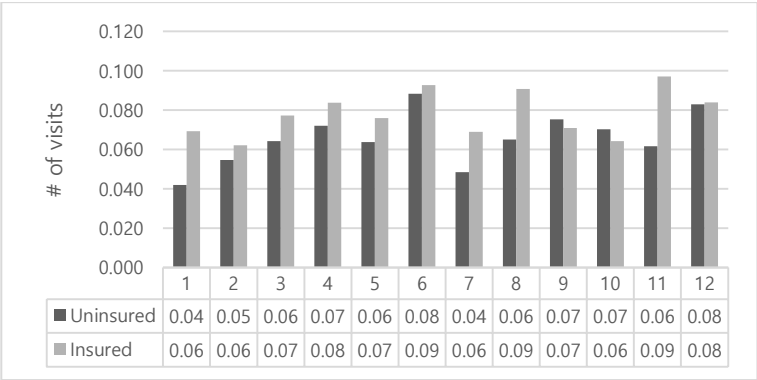
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.03
Insured	0.03	0.04	0.03	0.01	0.03	0.02	0.01	0.03	0.02	0.02	0.03	0.02

Figure 6 Annualized number of ER visits by accident & surgical treatment



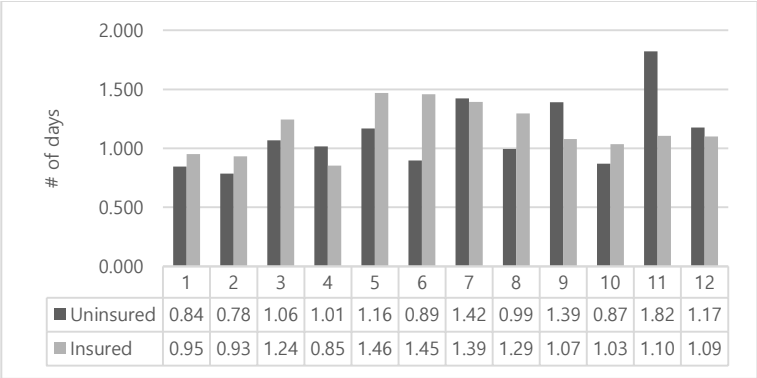
	1	2	3	4	5	6	7	8	9	10	11
Uninsured	0.003	0.005	0.003	0.002	0.003	0.007	0.005	0.007	0.005	0.005	0.006
Insured	0.003	0.006	0.004	0.002	0.003	0.008	0.003	0.004	0.008	0.007	0.012

Figure 7 Annualized number of ER visits by accident & non-surgical treatment



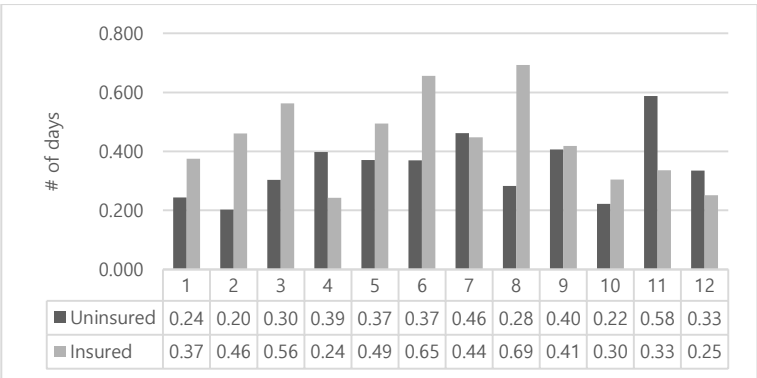
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.04	0.05	0.06	0.07	0.06	0.08	0.04	0.06	0.07	0.07	0.06	0.08
Insured	0.06	0.06	0.07	0.08	0.07	0.09	0.06	0.09	0.07	0.06	0.09	0.08

Figure 8 Annualized number of inpatient days



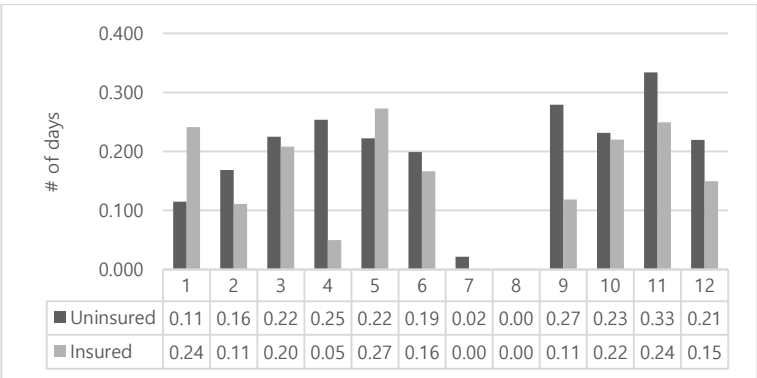
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.84	0.78	1.06	1.01	1.16	0.89	1.42	0.99	1.39	0.87	1.82	1.17
Insured	0.95	0.93	1.24	0.85	1.46	1.45	1.39	1.29	1.07	1.03	1.10	1.09

Figure 9 Annualized number of inpatient days by accident



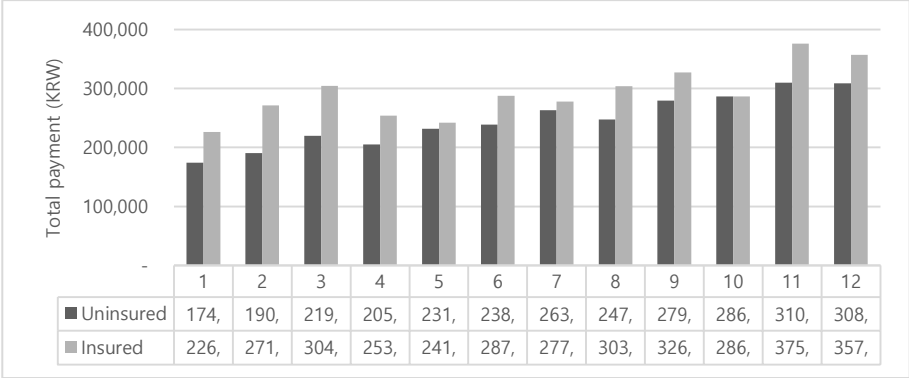
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.24	0.20	0.30	0.39	0.37	0.37	0.46	0.28	0.40	0.22	0.58	0.33
Insured	0.37	0.46	0.56	0.24	0.49	0.65	0.44	0.69	0.41	0.30	0.33	0.25

Figure 10 Annualized number of inpatient days via ER



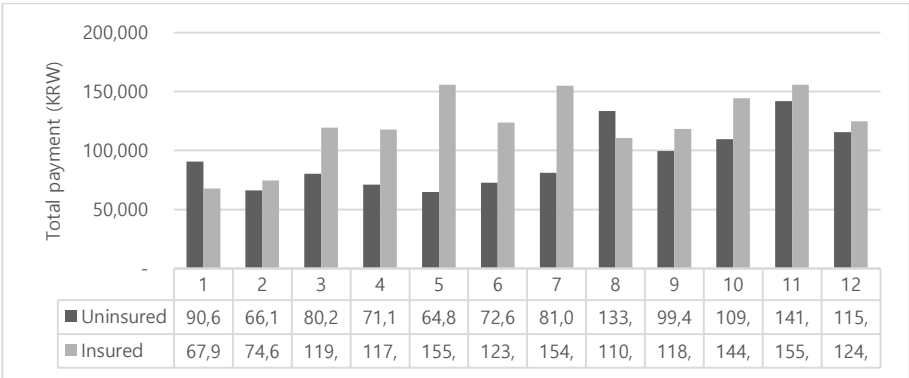
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	0.11	0.16	0.22	0.25	0.22	0.19	0.02	0.00	0.27	0.23	0.33	0.21
Insured	0.24	0.11	0.20	0.05	0.27	0.16	0.00	0.00	0.11	0.22	0.24	0.15

Figure 11 Annualized outpatient total payment



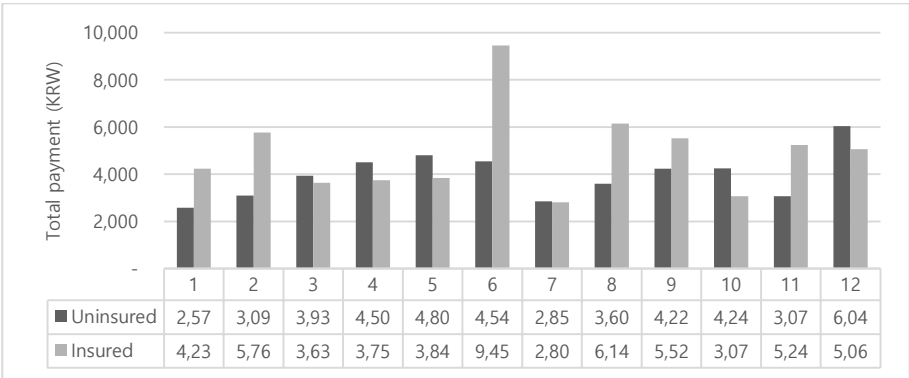
	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	174,	190,	219,	205,	231,	238,	263,	247,	279,	286,	310,	308,
Insured	226,	271,	304,	253,	241,	287,	277,	303,	326,	286,	375,	357,

Figure 12 Annualized inpatient total payment



	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	90,6	66,1	80,2	71,1	64,8	72,6	81,0	133,	99,4	109,	141,	115,
Insured	67,9	74,6	119,	117,	155,	123,	154,	110,	118,	144,	155,	124,

Figure 13 Annualized ER total payment



	1	2	3	4	5	6	7	8	9	10	11	12
Uninsured	2,57	3,09	3,93	4,50	4,80	4,54	2,85	3,60	4,22	4,24	3,07	6,04
Insured	4,23	5,76	3,63	3,75	3,84	9,45	2,80	6,14	5,52	3,07	5,24	5,06

Table 5 The result of Fixed effect model for equation (1) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Insured Period(β_1)	0.011	-0.003	-0.011	-0.002	-0.002	-0.008
	(0.298)	(0.017)	(0.013)	(0.007)	(0.003)	(0.012)
Age	-3.327***	-0.027	0.004	0.003	-0.001	0.010
	(0.460)	(0.026)	(0.020)	(0.011)	(0.005)	(0.018)
Age^2	0.023***	0.000**	0.000	-0.000	0.000	-0.000
	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
City	0.672	-0.096	-0.052	0.013	-0.001	-0.061
	(1.106)	(0.063)	(0.047)	(0.026)	(0.011)	(0.044)
Marital Status	2.871**	0.153**	0.058	0.029	0.003	0.030
	(1.142)	(0.066)	(0.049)	(0.027)	(0.011)	(0.045)
Employed	0.288	0.042*	-0.025	-0.022**	-0.006	-0.021
	(0.413)	(0.024)	(0.018)	(0.010)	(0.004)	(0.016)
Disabled	1.186	0.125	-0.028	0.114*	0.106***	-0.139
	(2.723)	(0.156)	(0.117)	(0.065)	(0.027)	(0.108)
Birth	-2.992***	0.064	0.042	0.005	-0.010	0.029
	(0.867)	(0.050)	(0.037)	(0.021)	(0.008)	(0.034)
Public Assistance Recipient	-1.631	-0.164	0.159**	-0.000	-0.019	0.177**
	(1.782)	(0.102)	(0.076)	(0.043)	(0.017)	(0.071)
Education	0.122	0.015	0.004	0.005	0.000	-0.000
	(0.252)	(0.014)	(0.011)	(0.006)	(0.002)	(0.010)
Economic Activity	-1.729*	-0.102*	0.018	0.006	0.002	0.019
	(0.967)	(0.055)	(0.041)	(0.023)	(0.009)	(0.038)
No. of chronic diseases	1.411***	0.035***	0.005	0.011**	0.004**	0.001
	(0.181)	(0.010)	(0.008)	(0.004)	(0.002)	(0.007)
Log(Annual Income)	0.078***	0.002*	0.003**	0.001	0.000	0.002**
	(0.025)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Lump-sum Health Insurance	0.929*	0.056*	-0.012	0.006	-0.002	-0.013
	(0.514)	(0.030)	(0.022)	(0.012)	(0.005)	(0.020)
Log(Insurance Premium)	0.000	0.000	-0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	92.283***	-0.118	-0.322	-0.150	0.008	-0.367
	(14.650)	(0.841)	(0.628)	(0.350)	(0.143)	(0.583)
Observations	18,001	18,001	18,001	18,001	18,001	18,001
R-squared	0.019	0.006	0.002	0.002	0.004	0.002
Time Trend	YES	YES	YES	YES	YES	YES
Job Dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6 The result of Fixed effect model for equation (1) : Intensive margin

VARIABLES	(1) Inpatient days	(2) Inpatient days via ER	(3) Inpatient days by Accident	(4) Log(out. payment)	(5) Log(in. payment)	(6) Log(ER payment)
Insured Period(β_1)	0.183	0.053	0.212	-0.102	-0.063	-0.052
	(0.228)	(0.076)	(0.131)	(0.150)	(0.101)	(0.070)
Age	0.330	0.128	0.163	-0.694***	-0.077	-0.008
	(0.352)	(0.118)	(0.202)	(0.232)	(0.156)	(0.108)
Age^2	-0.002	-0.001	-0.002	0.008***	0.002	0.001
	(0.003)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
City	-0.501	-0.347	-0.283	-0.661	-0.653*	-0.179
	(0.847)	(0.283)	(0.485)	(0.556)	(0.376)	(0.259)
Marital Status	1.240	-0.056	0.610	2.879***	0.794**	0.222
	(0.874)	(0.292)	(0.501)	(0.574)	(0.388)	(0.267)
Employed	0.123	-0.029	0.108	-0.176	0.253*	-0.132
	(0.316)	(0.106)	(0.181)	(0.208)	(0.140)	(0.097)
Disabled	1.263	-0.122	-1.307	-2.047	0.113	0.267
	(2.084)	(0.697)	(1.194)	(1.370)	(0.925)	(0.638)
Birth	0.505	0.031	0.263	-0.569	0.274	0.061
	(0.664)	(0.222)	(0.380)	(0.436)	(0.295)	(0.203)
Public Assistance Recipient	-2.209	-0.082	-0.189	-0.737	-0.690	0.375
	(1.364)	(0.456)	(0.782)	(0.897)	(0.605)	(0.417)
Education	-0.081	-0.019	-0.004	-0.112	0.049	0.023
	(0.193)	(0.064)	(0.110)	(0.127)	(0.085)	(0.059)
Economic Activity	-0.715	-0.086	-0.155	-0.802*	-0.582*	0.027
	(0.740)	(0.247)	(0.424)	(0.486)	(0.328)	(0.226)
No. of chronic diseases	0.507***	0.080*	0.079	0.293***	0.128**	0.073*
	(0.139)	(0.046)	(0.080)	(0.091)	(0.062)	(0.042)
Log(Annual Income)	0.026	-0.000	0.016	0.011	0.013	0.019***
	(0.019)	(0.006)	(0.011)	(0.013)	(0.009)	(0.006)
Lump-sum Health Insurance	0.244	-0.044	-0.064	0.545**	0.258	-0.019
	(0.394)	(0.132)	(0.226)	(0.259)	(0.175)	(0.120)
Log(Insurance Premium)	0.000	0.000	-0.000	0.000**	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-8.049	-2.567	-2.496	19.785***	-4.502	-5.158
	(11.214)	(3.748)	(6.425)	(7.369)	(4.975)	(3.431)
Observations	18,001	18,001	18,001	18,001	18,001	18,001
R-squared	0.003	0.001	0.003	0.007	0.003	0.002
Time Trend	YES	YES	YES	YES	YES	YES
Job Dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7 The result of Fixed effect model for equation (2) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
3.Insured period(β_3)	0.490	-0.006	0.011	0.011	0.003	0.012
	(0.574)	(0.034)	(0.025)	(0.013)	(0.005)	(0.023)
4.Insured period(β_4)	1.058	0.022	0.037	0.018	0.001	0.036
	(0.956)	(0.057)	(0.041)	(0.022)	(0.009)	(0.039)
5.Insured period(β_5)	1.665	0.047	0.065	0.028	0.003	0.062
	(1.374)	(0.081)	(0.059)	(0.032)	(0.013)	(0.055)
6.Insured period(β_6)	2.423	0.105	0.051	0.023	0.002	0.049
	(1.786)	(0.106)	(0.077)	(0.042)	(0.017)	(0.072)
7.Insured period(β_7)	1.801	0.075	0.065	0.046	0.001	0.064
	(2.205)	(0.130)	(0.095)	(0.051)	(0.021)	(0.089)
8.Insured period(β_8)	2.638	0.088	0.086	0.045	0.007	0.078
	(2.624)	(0.155)	(0.113)	(0.061)	(0.025)	(0.106)
9.Insured period(β_9)	3.297	0.163	0.110	0.060	0.022	0.091
	(3.050)	(0.180)	(0.132)	(0.071)	(0.029)	(0.123)
10.Insured period(β_{10})	4.196	0.188	0.038	0.049	0.003	0.039
	(3.477)	(0.206)	(0.150)	(0.081)	(0.033)	(0.140)
11.Insured period(β_{11})	4.644	0.186	0.124	0.067	0.011	0.119
	(3.903)	(0.231)	(0.168)	(0.091)	(0.037)	(0.157)
12.Insured period(β_{12})	3.090	0.163	0.076	0.080	0.027	0.044
	(4.330)	(0.256)	(0.187)	(0.101)	(0.041)	(0.175)
Age	-3.703***	-0.033	-0.008	-0.008	-0.004	0.001
	(0.528)	(0.031)	(0.023)	(0.012)	(0.005)	(0.021)
Age^2	0.026***	0.000*	0.000	0.000	0.000	0.000
	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
City	1.046	-0.135	-0.027	0.030	-0.000	-0.027
	(1.455)	(0.086)	(0.063)	(0.034)	(0.014)	(0.059)
Marital Status	2.632*	0.159*	0.033	0.023	-0.002	0.013
	(1.428)	(0.084)	(0.062)	(0.033)	(0.014)	(0.058)
Employed	0.299	0.026	-0.054**	-0.023*	-0.005	-0.058**
	(0.560)	(0.033)	(0.024)	(0.013)	(0.005)	(0.023)
Disabled	1.062	0.089	-0.022	0.150*	0.150***	-0.172
	(3.359)	(0.199)	(0.145)	(0.078)	(0.032)	(0.135)
Birth	-2.820***	0.072	0.032	0.007	-0.006	0.020
	(1.024)	(0.061)	(0.044)	(0.024)	(0.010)	(0.041)
Public Assistance Recipient	-4.941**	-0.181	0.252***	-0.025	-0.025	0.275***
	(2.151)	(0.127)	(0.093)	(0.050)	(0.021)	(0.087)
Education	0.183	0.005	0.004	0.004	0.001	-0.001
	(0.314)	(0.019)	(0.014)	(0.007)	(0.003)	(0.013)
Economic Activity	-1.985*	-0.127*	0.009	0.009	0.004	0.013
	(1.186)	(0.070)	(0.051)	(0.028)	(0.011)	(0.048)
No. of chronic diseases	1.067***	0.023*	-0.003	-0.000	0.002	-0.004
	(0.215)	(0.013)	(0.009)	(0.005)	(0.002)	(0.009)
Log(Annual Income)	0.081***	0.004**	0.002*	0.001	0.000	0.002
	(0.030)	(0.002)	(0.001)	(0.001)	(0.000)	(0.001)
Lump-sum Health Insurance	1.023	0.021	-0.035	-0.015	-0.006	-0.033
	(0.648)	(0.038)	(0.028)	(0.015)	(0.006)	(0.026)
Log(Insurance Premium)	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	102.704***	0.315	0.152	0.136	0.083	0.047
	(16.128)	(0.954)	(0.695)	(0.375)	(0.154)	(0.651)
Observations	13,624	13,624	13,624	13,624	13,624	13,624
R-squared	0.020	0.006	0.004	0.003	0.008	0.004
Time Trend	YES	YES	YES	YES	YES	YES
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8 The result of Fixed effect model for equation (2) : Intensive margin

VARIABLES	(1) Inpatient days	(2) Inpatient days via ER	(3) Inpatient days by Accident	(4) Log(out. payment)	(5) Log(in. payment)	(6) Log(ER payment)
3.Insured period(β_3)	-0.291	0.031	0.148	0.033	-0.071	0.071
	(0.452)	(0.151)	(0.237)	(0.291)	(0.198)	(0.135)
4.Insured period(β_4)	-0.216	0.177	0.102	0.235	0.149	0.267
	(0.752)	(0.252)	(0.395)	(0.484)	(0.329)	(0.225)
5.Insured period(β_5)	0.365	0.329	0.115	-0.030	0.319	0.353
	(1.081)	(0.362)	(0.568)	(0.696)	(0.474)	(0.324)
6.Insured period(β_6)	0.534	0.398	0.656	0.306	0.601	0.306
	(1.405)	(0.471)	(0.738)	(0.904)	(0.616)	(0.421)
7.Insured period(β_7)	0.496	0.460	0.478	0.003	0.273	0.429
	(1.734)	(0.581)	(0.912)	(1.117)	(0.760)	(0.520)
8.Insured period(β_8)	0.356	0.745	0.613	0.446	0.360	0.516
	(2.064)	(0.692)	(1.085)	(1.329)	(0.904)	(0.619)
9.Insured period(β_9)	0.922	0.884	0.791	-0.119	0.904	0.642
	(2.399)	(0.804)	(1.261)	(1.544)	(1.051)	(0.719)
10.Insured period(β_{10})	1.622	1.116	0.912	-0.002	0.954	0.225
	(2.735)	(0.917)	(1.438)	(1.761)	(1.199)	(0.820)
11.Insured period(β_{11})	1.422	1.507	0.939	0.139	1.185	0.738
	(3.070)	(1.029)	(1.614)	(1.976)	(1.345)	(0.921)
12.Insured period(β_{12})	0.791	1.086	0.980	-0.431	0.965	0.528
	(3.405)	(1.142)	(1.790)	(2.193)	(1.492)	(1.021)
Age	0.300	0.090	0.218	-0.355	-0.150	-0.106
	(0.416)	(0.139)	(0.218)	(0.268)	(0.182)	(0.125)
Age^2	-0.003	-0.001	-0.002	0.004*	0.002	0.001
	(0.004)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
City	-0.956	-0.603	-0.610	-0.028	-0.939*	-0.057
	(1.144)	(0.384)	(0.602)	(0.737)	(0.502)	(0.343)
Marital Status	1.633	-0.138	0.477	2.555***	0.839*	0.163
	(1.123)	(0.376)	(0.590)	(0.723)	(0.492)	(0.337)
Employed	0.203	0.027	0.045	-0.356	0.182	-0.278**
	(0.440)	(0.148)	(0.232)	(0.284)	(0.193)	(0.132)
Disabled	2.270	-0.267	0.064	-2.689	-0.102	0.915
	(2.641)	(0.886)	(1.389)	(1.701)	(1.158)	(0.792)
Birth	0.585	0.064	0.207	-0.599	0.408	-0.072
	(0.806)	(0.270)	(0.423)	(0.519)	(0.353)	(0.242)
Public Assistance Recipient	-3.059*	-0.142	-0.931	-1.937*	-0.762	0.598
	(1.692)	(0.567)	(0.889)	(1.089)	(0.741)	(0.507)
Education	-0.069	-0.027	-0.013	-0.349**	0.019	0.003
	(0.247)	(0.083)	(0.130)	(0.159)	(0.108)	(0.074)
Economic Activity	-0.883	-0.286	-0.300	-1.195**	-0.725*	0.028
	(0.933)	(0.313)	(0.490)	(0.601)	(0.409)	(0.280)
No. of chronic diseases	0.527***	0.080	0.071	0.195*	0.035	0.017
	(0.169)	(0.057)	(0.089)	(0.109)	(0.074)	(0.051)
Log(Annual Income)	0.003	-0.006	0.012	0.016	0.013	0.016**
	(0.023)	(0.008)	(0.012)	(0.015)	(0.010)	(0.007)
Lump-sum Health Insurance	0.002	-0.048	0.004	0.136	0.135	-0.169
	(0.509)	(0.171)	(0.268)	(0.328)	(0.223)	(0.153)
Log(Insurance Premium)	0.000	0.000	-0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-5.531	-0.201	-3.422	15.769*	-1.345	-1.859
	(12.684)	(4.252)	(6.668)	(8.167)	(5.559)	(3.804)
Observations	13,624	13,624	13,624	13,624	13,624	13,624
R-squared	0.004	0.003	0.003	0.008	0.004	0.004
Time Trend	YES	YES	YES	YES	YES	YES
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9 The result of Conditional Logit for equation (3)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Outpatient visits$_{t-1}$	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**	
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	
Inpatient visits$_{t-1}$	0.123***	0.122***	0.123***	0.123***	0.102***	0.130***	
	(0.046)	(0.046)	(0.046)	(0.046)	(0.038)	(0.041)	
ER visits$_{t-1}$	-0.000				-0.001	0.002	
	(0.044)				(0.045)	(0.044)	
by accident$_{t-1}$		0.015					
		(0.072)					
Surgical $_{t-1}$			-0.038				
			(0.213)				
Non Surgical$_{t-1}$				0.001			
				(0.047)			
Inpatient days$_{t-1}$	-0.002	-0.002	-0.002	-0.002			
	(0.003)	(0.003)	(0.003)	(0.003)			
via ER$_{t-1}$					0.000		
					(0.010)		
by accident$_{t-1}$						-0.007*	
						(0.004)	
Log(out. payment)$_{t-1}$							0.015***
							(0.004)
Log(in. payment)$_{t-1}$							0.020***
							(0.006)
Log(ER payment)$_{t-1}$							-0.011
							(0.008)
No. of chronic diseases$_{t-}$	-0.104***	-0.104***	-0.104***	-0.104***	-0.104***	-0.104***	-0.103***
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Disabled$_{t-1}$	-0.788**	-0.788**	-0.790**	-0.789**	-0.779**	-0.763**	-0.749*
	(0.383)	(0.383)	(0.383)	(0.383)	(0.382)	(0.384)	(0.384)
Birth$_{t-1}$	-0.202	-0.202	-0.202	-0.202	-0.202	-0.201	-0.205
	(0.179)	(0.179)	(0.179)	(0.179)	(0.179)	(0.179)	(0.179)
Age	0.310**	0.310**	0.310**	0.310**	0.310**	0.311**	0.316**
	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.129)
Age^2	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
City	-0.124	-0.124	-0.124	-0.124	-0.124	-0.124	-0.120
	(0.209)	(0.209)	(0.209)	(0.209)	(0.209)	(0.209)	(0.209)
Marital Status	0.316	0.316	0.317	0.317	0.316	0.317	0.300
	(0.233)	(0.233)	(0.233)	(0.233)	(0.233)	(0.233)	(0.234)
Employed	0.114	0.114	0.114	0.114	0.114	0.114	0.117
	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)
Public Assistance Recipient	-0.506	-0.506	-0.506	-0.506	-0.507	-0.504	-0.504
	(0.385)	(0.385)	(0.385)	(0.385)	(0.385)	(0.385)	(0.383)
Education	-0.068	-0.068	-0.068	-0.068	-0.068	-0.068	-0.070
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
Economic Activity	-0.092	-0.092	-0.092	-0.092	-0.091	-0.093	-0.085
	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)
Log(Annual Income)	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lump-sum Health Insurance	-2.498***	-2.498***	-2.498***	-2.498***	-2.498***	-2.499***	-2.500***
	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)
Time fixed effect	YES	YES	YES	YES	YES	YES	YES
Observation	24,857	24,857	24,857	24,857	24,857	24,857	24,857

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 10 The result of Fixed effect model for equation (4) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Constant(α)	5.444**	0.307**	-0.045	0.072	-0.001	-0.082
	(2.392)	(0.122)	(0.095)	(0.054)	(0.021)	(0.088)
$D_1: Existing\ insured(\beta_1)$	0.619***	0.028**	0.005	0.003	0.005**	0.001
	(0.240)	(0.012)	(0.010)	(0.005)	(0.002)	(0.009)
$D_2: Newly\ insured(\beta_2)$	0.774**	0.046***	0.024**	0.016**	0.007**	0.018
	(0.302)	(0.015)	(0.012)	(0.007)	(0.003)	(0.011)
$D_3: Canceler(\beta_3)$	0.983*	0.041	0.033	0.011	0.007	0.021
	(0.533)	(0.027)	(0.021)	(0.012)	(0.005)	(0.020)
$\beta_1 - \beta_2$	0.155	0.017*	0.019**	0.014***	0.002	0.016*
	(0.261)	(0.013)	(0.010)	(0.006)	(0.002)	(0.010)
Age	-0.805***	-0.022***	-0.003	-0.003	-0.000	-0.001
	(0.106)	(0.005)	(0.004)	(0.002)	(0.001)	(0.004)
Age^2	0.015***	0.000***	0.000*	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
City	0.882**	0.021	-0.001	0.008	-0.004	-0.002
	(0.443)	(0.023)	(0.018)	(0.010)	(0.004)	(0.016)
Marital Status	3.213***	0.030	0.033*	0.015	0.000	0.030*
	(0.448)	(0.023)	(0.018)	(0.010)	(0.004)	(0.016)
Employed	0.073	0.008	0.003	0.001	-0.001	0.005
	(0.140)	(0.007)	(0.006)	(0.003)	(0.001)	(0.005)
Disabled	2.391***	-0.042	-0.069***	-0.028**	-0.000	-0.070***
	(0.622)	(0.032)	(0.025)	(0.014)	(0.005)	(0.023)
Birth	-2.965***	-0.042**	-0.006	-0.005	-0.002	-0.003
	(0.393)	(0.020)	(0.016)	(0.009)	(0.003)	(0.014)
Public Assistance Recipient	0.309	0.044*	0.113***	0.015	0.010**	0.100***
	(0.498)	(0.025)	(0.020)	(0.011)	(0.004)	(0.018)
Education	0.180**	0.005	0.002	-0.000	0.001	0.001
	(0.083)	(0.004)	(0.003)	(0.002)	(0.001)	(0.003)
Economic Activity	0.439	-0.018	0.004	0.000	-0.002	0.000
	(0.371)	(0.019)	(0.015)	(0.008)	(0.003)	(0.014)
No. of chronic diseases	1.992***	0.032***	0.003	0.003*	0.001**	0.002
	(0.067)	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)
Log(Annual Income)	0.037***	0.001**	0.000	-0.000	-0.000	-0.000
	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lump-sum Health Insurance	0.347*	0.023**	0.016**	0.005	0.000	0.014*
	(0.199)	(0.010)	(0.008)	(0.005)	(0.002)	(0.007)
Log(Insurance Premium)	-0.000	-0.000	-0.000	-0.000	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	92,871	92,871	92,871	92,871	92,871	92,871
R-squared	0.035	0.003	0.001	0.000	0.000	0.001
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 11 The result of Fixed effect model for equation (4) : Intensive margin

VARIABLES	(1) Inpatient days	(2) Inpatient days via ER	(3) Inpatient days by Accident	(4) Log(out. payment)	(5) Log(in. payment)	(6) Log(ER payment)
Constant(α)	3.648*	0.631	2.366**	-0.254	-1.820***	-4.531***
	(2.014)	(0.784)	(1.106)	(1.184)	(0.706)	(0.500)
$D_1: Existing\ insured(\beta_1)$	0.233	-0.026	0.172	0.265**	0.157**	0.022
	(0.202)	(0.079)	(0.111)	(0.119)	(0.071)	(0.050)
$D_2: Newly\ insured(\beta_2)$	0.410	0.064	0.283**	0.691***	0.249***	0.092
	(0.255)	(0.099)	(0.140)	(0.150)	(0.089)	(0.063)
$D_3: Canceler(\beta_3)$	0.436	0.026	0.260	0.469*	0.137	0.090
	(0.449)	(0.175)	(0.246)	(0.264)	(0.157)	(0.111)
$\beta_1 - \beta_2$	0.177	0.091	0.111	0.426***	0.093	0.069
	(0.220)	(0.086)	(0.121)	(0.129)	(0.077)	(0.055)
Age	-0.161*	-0.014	-0.103**	-0.081	-0.124***	-0.002
	(0.089)	(0.035)	(0.049)	(0.052)	(0.031)	(0.022)
Age^2	0.002**	0.000	0.001**	0.003***	0.002***	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
City	0.195	-0.153	0.035	0.024	0.138	-0.063
	(0.373)	(0.145)	(0.205)	(0.219)	(0.131)	(0.093)
Marital Status	-0.351	0.080	0.130	2.341***	0.110	0.189**
	(0.377)	(0.147)	(0.207)	(0.222)	(0.132)	(0.094)
Employed	-0.020	-0.013	0.045	0.110	0.048	0.014
	(0.118)	(0.046)	(0.065)	(0.069)	(0.041)	(0.029)
Disabled	-1.032**	-0.816***	-0.991***	0.320	-0.379**	-0.270**
	(0.523)	(0.204)	(0.287)	(0.308)	(0.184)	(0.130)
Birth	-0.167	-0.060	0.003	-0.823***	-0.267**	0.021
	(0.331)	(0.129)	(0.182)	(0.195)	(0.116)	(0.082)
Public Assistance Recipient	0.130	-0.027	0.220	-0.158	-0.042	0.174*
	(0.419)	(0.163)	(0.230)	(0.246)	(0.147)	(0.104)
Education	0.004	-0.009	0.010	0.056	0.021	0.014
	(0.070)	(0.027)	(0.038)	(0.041)	(0.025)	(0.017)
Economic Activity	-0.314	0.009	0.042	-0.079	-0.063	0.095
	(0.312)	(0.122)	(0.172)	(0.184)	(0.110)	(0.078)
No. of chronic diseases	0.387***	0.049**	0.083***	0.403***	0.159***	-0.001
	(0.056)	(0.022)	(0.031)	(0.033)	(0.020)	(0.014)
Log(Annual Income)	0.014*	0.003	0.007	0.013***	0.003	-0.000
	(0.008)	(0.003)	(0.004)	(0.005)	(0.003)	(0.002)
Lump-sum Health Insurance	0.012	-0.025	-0.075	0.333***	0.123**	0.081*
	(0.168)	(0.065)	(0.092)	(0.099)	(0.059)	(0.042)
Log(Insurance Premium)	-0.000	0.000	-0.000*	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	92,871	92,871	92,871	92,871	92,871	92,871
R-squared	0.001	0.000	0.001	0.013	0.003	0.001
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 12 Heterogeneous effect (by sex) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: Men only						
$\beta_1 - \beta_2$	-0.196	0.022	0.006	0.005	0.004	0.002*
	(0.347)	(0.020)	(0.016)	(0.010)	(0.004)	(0.015)
Observations	44,228	44,228	44,228	44,228	44,228	44,228
R-squared	0.034	0.004	0.002	0.001	0.001	0.002
Panel B: Women only						
$\beta_1 - \beta_2$	0.462	0.013	0.028**	0.020***	0.000	0.027**
	(0.382)	(0.018)	(0.014)	(0.007)	(0.003)	(0.013)
Observations	48,643	48,643	48,643	48,643	48,643	48,643
R-squared	0.037	0.003	0.001	0.001	0.001	0.001

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 13 Heterogeneous effect (by sex) : Intensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: Men only						
$\beta_1 - \beta_2$	-0.196	0.022	0.006	0.005	0.004	0.002*
	(0.347)	(0.020)	(0.016)	(0.010)	(0.004)	(0.015)
Observations	44,228	44,228	44,228	44,228	44,228	44,228
R-squared	0.034	0.004	0.002	0.001	0.001	0.002
Panel B: Women only						
$\beta_1 - \beta_2$	0.462	0.013	0.028**	0.020***	0.000	0.027**
	(0.382)	(0.018)	(0.014)	(0.007)	(0.003)	(0.013)
Observations	48,643	48,643	48,643	48,643	48,643	48,643
R-squared	0.037	0.003	0.001	0.001	0.001	0.001

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 14 Heterogeneous effect (by age group) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: 20’s~40’s						
$\beta_1 - \beta_2$	0.423**	0.027**	0.007	0.002	-0.006	0.011
	(0.247)	(0.013)	(0.012)	(0.007)	(0.002)	(0.011)
Observations	64,311	64,311	64,311	64,311	64,311	64,311
R-squared	0.024	0.003	0.001	0.000	0.001	0.001
Panel B: 50’s~60’s						
$\beta_1 - \beta_2$	-0.233	-0.006	0.064***	0.054***	0.029***	0.035*
	(0.728)	(0.037)	(0.024)	(0.014)	(0.006)	(0.022)
Observations	28,560	28,560	28,560	28,560	28,560	28,560
R-squared	0.042	0.005	0.002	0.001	0.002	0.002

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 15 Heterogeneous effect (by age group) : Intensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: 20's~40's						
$\beta_1 - \beta_2$	0.205	0.074	0.104	0.566***	0.120*	-0.004
	(0.220)	(0.093)	(0.120)	(0.157)	(0.078)	(0.061)
Observations	64,311	64,311	64,311	64,311	64,311	64,311
R-squared	0.001	0.001	0.002	0.010	0.002	0.001
Panel B: 50's~60's						
$\beta_1 - \beta_2$	0.019	0.120	0.164	-0.074	-0.005	0.364***
	(0.583)	(0.206)	(0.326)	(0.236)	(0.202)	(0.125)
Observations	28,560	28,560	28,560	28,560	28,560	28,560
R-squared	0.004	0.001	0.001	0.022	0.004	0.002

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 16 Heterogeneous effect (by disability) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: Disabled						
$\beta_1 - \beta_2$	12.90***	-0.211	-0.036	0.071	0.082**	-0.132
	(4.691)	(0.236)	(0.169)	(0.089)	(0.040)	(0.158)
Observations	3,597	3,597	3,597	3,597	3,597	3,597
R-squared	0.039	0.010	0.014	0.009	0.027	0.014
Panel B: Non-disabled						
$\beta_1 - \beta_2$	0.046	0.018*	0.018**	0.013**	0.001	0.017**
	(0.255)	(0.013)	(0.010)	(0.006)	(0.002)	(0.009)
Observations	89,274	89,274	89,274	89,274	89,274	89,274
R-squared	0.035	0.003	0.001	0.000	0.000	0.001

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 17 Heterogeneous effect (by disability) : Intensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: Disabled						
$\beta_1 - \beta_2$	-0.460	0.911	-0.615	2.060*	-1.425	0.370
	(7.481)	(2.490)	(3.063)	(1.311)	(1.261)	(0.726)
Observations	3,597	3,597	3,597	3,597	3,597	3,597
R-squared	0.013	0.004	0.002	0.011	0.008	0.015
Panel B: Non-disabled						
$\beta_1 - \beta_2$	0.124	0.088	0.123	0.416***	0.106*	0.060
	(0.186)	(0.077)	(0.111)	(0.131)	(0.076)	(0.055)
Observations	89,274	89,274	89,274	89,274	89,274	89,274
R-squared	0.002	0.000	0.000	0.013	0.003	0.001

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 18 Heterogeneous effect (by chronic disease status) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: Chronic disease						
$\beta_1 - \beta_2$	0.201	0.035*	0.019	0.018**	0.003	0.012
	(0.529)	(0.027)	(0.019)	(0.010)	(0.004)	(0.018)
Observations	42,856	42,856	42,856	42,856	42,856	42,856
R-squared	0.023	0.003	0.001	0.001	0.001	0.001
Panel B: No Chronic disease						
$\beta_1 - \beta_2$	0.231	0.012	0.002	-0.001	-0.003	0.007
	(0.226)	(0.012)	(0.012)	(0.008)	(0.003)	(0.011)
Observations	50,015	50,015	50,015	50,015	50,015	50,015
R-squared	0.021	0.002	0.001	0.001	0.001	0.001

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 19 Heterogeneous effect (by chronic disease status) : Intensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Panel A: Chronic disease						
$\beta_1 - \beta_2$	0.211	0.277*	0.212	0.058	0.145	0.053
	(0.474)	(0.176)	(0.244)	(0.171)	(0.151)	(0.098)
Observations	42,856	42,856	42,856	42,856	42,856	42,856
R-squared	0.001	0.001	0.001	0.006	0.002	0.001
Panel B: No Chronic disease						
$\beta_1 - \beta_2$	0.226*	-0.028	0.059	0.615***	0.068	0.019
	(0.161)	(0.078)	(0.115)	(0.195)	(0.077)	(0.065)
Observations	50,015	50,015	50,015	50,015	50,015	50,015
R-squared	0.001	0.001	0.001	0.014	0.002	0.001

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 20 Robustness check1 (reduced sample) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Constant(α)	1.822	0.199	-0.095	0.093	0.014	-0.138
	(2.425)	(0.125)	(0.102)	(0.059)	(0.023)	(0.095)
$D_1: Existing\ insured(\beta_1)$	0.461*	0.025*	0.008	0.003	0.008***	0.002
	(0.255)	(0.013)	(0.011)	(0.006)	(0.002)	(0.010)
$D_2: Newly\ insured(\beta_2)$	0.730**	0.041**	0.025*	0.019**	0.007**	0.020
	(0.328)	(0.017)	(0.014)	(0.008)	(0.003)	(0.013)
$D_3: Canceler(\beta_3)$	1.342**	0.083**	0.042	0.025	0.009	0.025
	(0.632)	(0.033)	(0.027)	(0.015)	(0.006)	(0.025)
$\beta_1 - \beta_2$	0.269	0.016	0.017*	0.015**	-0.001	0.018*
	(0.284)	(0.015)	(0.012)	(0.007)	(0.003)	(0.011)
Age	-0.507***	-0.011*	0.002	-0.003	-0.001	0.005
	(0.114)	(0.006)	(0.005)	(0.003)	(0.001)	(0.004)
Age^2	0.012***	0.000**	0.000	0.000	0.000*	-0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
City	1.029**	0.018	-0.003	0.002	-0.006	-0.003
	(0.456)	(0.024)	(0.019)	(0.011)	(0.004)	(0.018)
Marital Status	2.658***	0.008	0.030	0.016	0.001	0.022
	(0.453)	(0.023)	(0.019)	(0.011)	(0.004)	(0.018)
Employed	0.019	0.009	0.004	0.003	-0.001	0.005
	(0.141)	(0.007)	(0.006)	(0.003)	(0.001)	(0.005)
Disabled	3.606***	-0.085**	-0.088***	-0.044***	-0.009	-0.080***
	(0.706)	(0.036)	(0.030)	(0.017)	(0.007)	(0.028)
Birth	-2.948***	-0.043**	-0.001	-0.004	-0.002	-0.000
	(0.380)	(0.020)	(0.016)	(0.009)	(0.004)	(0.015)
Public Assistance Recipient	0.474	0.061**	0.132***	0.009	0.007	0.118***
	(0.500)	(0.026)	(0.021)	(0.012)	(0.005)	(0.019)
Education	0.136	0.001	0.000	-0.001	0.001	-0.001
	(0.083)	(0.004)	(0.004)	(0.002)	(0.001)	(0.003)
Economic Activity	-0.006	-0.022	0.008	0.001	0.000	0.001
	(0.391)	(0.020)	(0.016)	(0.009)	(0.004)	(0.015)
No. of chronic diseases	1.992***	0.033***	0.004	0.003*	0.001	0.004
	(0.074)	(0.004)	(0.003)	(0.002)	(0.001)	(0.003)
Log(Annual Income)	0.030***	0.001**	-0.000	-0.000	-0.000	-0.000
	(0.010)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Lump-sum Health Insurance	0.289	0.014	0.017**	0.004	0.001	0.014*
	(0.203)	(0.010)	(0.009)	(0.005)	(0.002)	(0.008)
Log(Insurance Premium)	0.000	0.000	-0.000	-0.000	-0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	77,604	77,604	77,604	77,604	77,604	77,604
R-squared	0.030	0.003	0.001	0.000	0.001	0.001
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 21 Robustness check1 (reduced sample) : Intensive margin

VARIABLES	(1) Inpatient days	(2) Inpatient days via ER	(3) Inpatient days by Accident	(4) Log(out. payment)	(5) Log(in. payment)	(6) Log(ER payment)
Constant(α)	3.563	0.629	2.013*	-0.941	-2.433***	-4.695***
	(2.203)	(0.859)	(1.178)	(1.321)	(0.737)	(0.539)
$D_1: Existing\ insured(\beta_1)$	0.301	-0.006	0.185	0.274**	0.120	0.056
	(0.232)	(0.091)	(0.124)	(0.139)	(0.078)	(0.057)
$D_2: Newly\ insured(\beta_2)$	0.384	0.056	0.290*	0.607***	0.145	0.159**
	(0.298)	(0.116)	(0.159)	(0.178)	(0.100)	(0.073)
$D_3: Canceler(\beta_3)$	0.307	0.130	0.346	0.680**	0.351*	0.091
	(0.574)	(0.224)	(0.307)	(0.344)	(0.192)	(0.140)
$\beta_1 - \beta_2$	0.083	0.062	0.105	0.333**	0.025	0.104**
	(0.258)	(0.101)	(0.138)	(0.155)	(0.086)	(0.063)
Age	-0.105	-0.005	-0.065	-0.076	-0.062*	0.013
	(0.104)	(0.040)	(0.056)	(0.062)	(0.035)	(0.025)
Age^2	0.001	0.000	0.001	0.003***	0.001**	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
City	0.070	-0.234	-0.105	0.176	0.166	-0.057
	(0.415)	(0.162)	(0.222)	(0.249)	(0.139)	(0.101)
Marital Status	-0.834**	-0.032	0.045	2.411***	-0.024	0.197*
	(0.411)	(0.160)	(0.220)	(0.247)	(0.138)	(0.101)
Employed	-0.044	-0.011	0.019	0.093	0.058	0.017
	(0.128)	(0.050)	(0.068)	(0.077)	(0.043)	(0.031)
Disabled	-1.378**	-0.960***	-1.274***	0.554	-0.371*	-0.248
	(0.642)	(0.250)	(0.343)	(0.385)	(0.215)	(0.157)
Birth	-0.168	-0.045	0.014	-0.755***	-0.272**	0.034
	(0.346)	(0.135)	(0.185)	(0.207)	(0.116)	(0.085)
Public Assistance Recipient	0.253	0.107	0.312	-0.139	0.050	0.229**
	(0.454)	(0.177)	(0.243)	(0.272)	(0.152)	(0.111)
Education	-0.018	-0.019	-0.007	0.109**	-0.001	0.010
	(0.075)	(0.029)	(0.040)	(0.045)	(0.025)	(0.018)
Economic Activity	-0.242	0.095	0.100	-0.006	-0.114	0.077
	(0.355)	(0.138)	(0.190)	(0.213)	(0.119)	(0.087)
No. of chronic diseases	0.416***	0.056**	0.078**	0.469***	0.175***	-0.009
	(0.067)	(0.026)	(0.036)	(0.040)	(0.022)	(0.016)
Log(Annual Income)	0.010	0.002	0.005	0.010*	0.003	-0.001
	(0.009)	(0.004)	(0.005)	(0.005)	(0.003)	(0.002)
Lump-sum Health Insurance	-0.041	-0.017	-0.086	0.393***	0.074	0.089**
	(0.185)	(0.072)	(0.099)	(0.111)	(0.062)	(0.045)
Log(Insurance Premium)	-0.000	0.000	-0.000	0.000*	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	77,604	77,604	77,604	77,604	77,604	77,604
R-squared	0.001	0.000	0.001	0.011	0.002	0.001
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 22 Robustness check2 (narrower age window) : Extensive margin

VARIABLES	(1) Outpatient visits	(2) Inpatient visits	(3) ER visits	(4) ER visits by Accident	(5) ER visits Surgical	(6) ER visits Non-Surgical
Constant(α)	2.624	0.218*	-0.115	0.067	0.011	-0.153*
	(2.352)	(0.121)	(0.099)	(0.057)	(0.022)	(0.092)
$D_1: Existing\ insured(\beta_1)$	0.549**	0.031***	0.007	0.001	0.006***	0.002
	(0.232)	(0.012)	(0.010)	(0.006)	(0.002)	(0.009)
$D_2: Newly\ insured(\beta_2)$	0.646**	0.050***	0.020*	0.010	0.005**	0.017
	(0.290)	(0.015)	(0.012)	(0.007)	(0.003)	(0.011)
$D_3: Canceler(\beta_3)$	1.111**	0.055**	0.042*	0.016	0.010*	0.028
	(0.527)	(0.027)	(0.022)	(0.013)	(0.005)	(0.021)
$\beta_1 - \beta_2$	0.097	0.019*	0.014	0.009*	-0.001	0.014*
	(0.251)	(0.013)	(0.011)	(0.006)	(0.002)	(0.010)
Age	-0.544***	-0.013**	0.002	-0.002	-0.001	0.005
	(0.111)	(0.006)	(0.005)	(0.003)	(0.001)	(0.004)
Age^2	0.012***	0.000**	0.000	0.000	0.000*	-0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
City	0.894**	0.015	-0.001	0.003	-0.005	-0.002
	(0.434)	(0.022)	(0.018)	(0.010)	(0.004)	(0.017)
Marital Status	2.621***	0.024	0.026	0.014	0.000	0.022
	(0.439)	(0.023)	(0.018)	(0.011)	(0.004)	(0.017)
Employed	0.047	0.010	0.003	0.001	-0.001	0.004
	(0.136)	(0.007)	(0.006)	(0.003)	(0.001)	(0.005)
Disabled	3.264***	-0.083**	-0.089***	-0.042**	-0.008	-0.081***
	(0.687)	(0.035)	(0.029)	(0.017)	(0.006)	(0.027)
Birth	-2.940***	-0.041**	-0.006	-0.005	-0.002	-0.003
	(0.365)	(0.019)	(0.015)	(0.009)	(0.003)	(0.014)
Public Assistance Recipient	0.330	0.059**	0.127***	0.008	0.007	0.113***
	(0.491)	(0.025)	(0.021)	(0.012)	(0.005)	(0.019)
Education	0.133*	0.002	0.002	-0.000	0.001	0.001
	(0.080)	(0.004)	(0.003)	(0.002)	(0.001)	(0.003)
Economic Activity	0.030	-0.016	0.008	0.002	0.001	0.002
	(0.381)	(0.020)	(0.016)	(0.009)	(0.004)	(0.015)
No. of chronic diseases	2.004***	0.032***	0.004	0.003**	0.001	0.004
	(0.072)	(0.004)	(0.003)	(0.002)	(0.001)	(0.003)
Log(Annual Income)	0.031***	0.001**	-0.000	-0.000	-0.000	-0.000
	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lump-sum Health Insurance	0.248	0.014	0.013	0.002	0.001	0.010
	(0.195)	(0.010)	(0.008)	(0.005)	(0.002)	(0.008)
Log(Insurance Premium)	-0.000	-0.000	-0.000	-0.000	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	81,938	81,938	81,938	81,938	81,938	81,938
R-squared	0.031	0.003	0.001	0.000	0.001	0.001
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 23 Robustness check2 (narrower age window) : Intensive margin

VARIABLES	(1) Inpatient days	(2) Inpatient days via ER	(3) Inpatient days by Accident	(4) Log(out. payment)	(5) Log(in. payment)	(6) Log(ER payment)
Constant(α)	3.662*	0.671	2.112*	-0.357	-2.294***	-4.821***
	(2.107)	(0.817)	(1.145)	(1.286)	(0.718)	(0.524)
$D_1: Existing\ insured(\beta_1)$	0.369*	-0.011	0.229**	0.251**	0.174**	0.045
	(0.208)	(0.081)	(0.113)	(0.127)	(0.071)	(0.052)
$D_2: Newly\ insured(\beta_2)$	0.491*	0.052	0.333**	0.694***	0.271***	0.099
	(0.260)	(0.101)	(0.141)	(0.159)	(0.089)	(0.065)
$D_3: Canceler(\beta_3)$	0.403	0.062	0.447*	0.481*	0.265*	0.158
	(0.472)	(0.183)	(0.256)	(0.288)	(0.161)	(0.117)
$\beta_1 - \beta_2$	0.122	0.063	0.103	0.443***	0.097	0.054
	(0.225)	(0.087)	(0.122)	(0.137)	(0.077)	(0.056)
Age	-0.128	-0.009	-0.078	-0.083	-0.077**	0.015
	(0.099)	(0.039)	(0.054)	(0.061)	(0.034)	(0.025)
Age^2	0.002	0.000	0.001	0.003***	0.001***	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
City	0.120	-0.221	-0.088	-0.028	0.117	-0.043
	(0.389)	(0.151)	(0.211)	(0.237)	(0.132)	(0.097)
Marital Status	-0.635	-0.030	0.077	2.535***	0.079	0.172*
	(0.393)	(0.152)	(0.214)	(0.240)	(0.134)	(0.098)
Employed	-0.012	-0.018	0.047	0.100	0.064	0.011
	(0.122)	(0.047)	(0.066)	(0.075)	(0.042)	(0.030)
Disabled	-1.310**	-0.915***	-1.211***	0.455	-0.378*	-0.267*
	(0.616)	(0.239)	(0.335)	(0.376)	(0.210)	(0.153)
Birth	-0.146	-0.047	0.004	-0.829***	-0.264**	0.019
	(0.327)	(0.127)	(0.178)	(0.200)	(0.112)	(0.081)
Public Assistance Recipient	0.247	0.103	0.296	-0.089	0.038	0.214**
	(0.440)	(0.170)	(0.239)	(0.268)	(0.150)	(0.109)
Education	-0.002	-0.016	0.003	0.064	0.007	0.018
	(0.072)	(0.028)	(0.039)	(0.044)	(0.024)	(0.018)
Economic Activity	-0.191	0.097	0.105	-0.047	-0.093	0.062
	(0.342)	(0.133)	(0.186)	(0.208)	(0.116)	(0.085)
No. of chronic diseases	0.396***	0.054**	0.071**	0.462***	0.170***	-0.002
	(0.064)	(0.025)	(0.035)	(0.039)	(0.022)	(0.016)
Log(Annual Income)	0.009	0.002	0.005	0.014***	0.003	-0.001
	(0.009)	(0.003)	(0.005)	(0.005)	(0.003)	(0.002)
Lump-sum Health Insurance	-0.060	-0.042	-0.097	0.327***	0.071	0.074*
	(0.175)	(0.068)	(0.095)	(0.107)	(0.060)	(0.043)
Log(Insurance Premium)	-0.000	0.000	-0.000*	0.000*	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	81,938	81,938	81,938	81,938	81,938	81,938
R-squared	0.001	0.000	0.001	0.012	0.002	0.001
Job dummies	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

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Abstract in Korean

민영의료보험 중 실손의료보험이 가입자로 하여금 도덕적해이를 발생시켜 의료이용을 증가시킨다는 연구가 많았다. 일각에서는 이러한 의료이용의 증가가 도덕적해이가 아닌 역선택의 영향이라는 주장도 제기되었다. 이에 한국의료패널 2008~2013년 자료를 활용해 실손의료보험으로 인한 의료이용증가 도덕적해이로 인한 것인지, 역선택으로 인한 것인지 실증적으로 밝히고, 실손의료보험 가입자 중 현재기와 이전 기의 보험 상태에 따라 구분된 '신규가입자'와 '기존가입자'의 보험 가입 이후의 행태가 다름을 보였다. 분석 결과, 기존가입자보다 신규가입자가 가입 이후 더 많은 의료이용증가가 있었다. 이를 통해 가입 첫 기에만 나타나는 의료이용증가가 존재하며, 이것이 시간의 흐름에 따라 변하는 역선택의 영향임을 알 수 있었다.

효율적인 의료보장체계를 위해서는 실손의료보험이 일으키는 의료이용증가의 정확한 원인을 파악하는 것이 중요하며, 이것은 정부뿐만 아니라 의료서비스산업과 민영의료보험산업의 발전에도 필요한 연구가 될 것이다.

주요어 : 실손의료보험, 민영의료보험, 의료이용, 도덕적해이, 역선택, 한국의료패널

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