

**AN EMPIRICAL RESEARCH
OF SUBSTITUTABILITY
BETWEEN MEDICAL SERVICES AND
OVER-THE-COUNTER MEDICATION.
AN ANALYSIS OF THIRTEEN
DIFFERENT MINOR AILMENTS**

Masako Ii
and
Yasushi Ohkusa

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The Institute of Social and Economic Research
Osaka University
6-1 Mihogaoka, Ibaraki, Osaka 567-0047, Japan

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An Empirical Research of Substitutability between Medical Services and Over-the-Counter Medication. An Analysis of Thirteen Different Minor Ailments ^{*)}

Masako Ii

Yokohama National University

and

Yasushi Ohkusa

Osaka University

Abstract

This paper examines the choice of health care for minor ailments in Japan for patients suffering from thirteen different minor ailments. Original data were obtained from a survey conducted by the authors. For the common cold, shoulder/neck pain, backache, constipation/diarrhea, asthenopia, various skin diseases, and hemorrhoids, an increase in the coinsurance rate statistically significantly lowers the demand for medical services. On the other hand, the demand for over-the-counter (OTC) medication is statistically significantly higher with an increase in the coinsurance rate for the common cold and skin diseases. In the case of the common cold, the marginal effects for medical services and for the OTC medication are -0.35 and 0.34 respectively. For shoulder/neck pain, the marginal effect for medical services is -0.26. For other illnesses, marginal effects for medical services range from -0.87 to -3.69, while the values of that for OTC are around 1.5.

JEL Classifications: I11,I12, I31, I18

Keywords: minor illnesses, medical service demand, medical insurance system, over-the-counter medication

Correspondence: Yasushi Ohkusa, Institute of Social and Economic Research, Osaka University, 6-1 Mihogaoka Ibaraki Osaka, Japan

Tel:81-6-6879-8566 Fax:81-6-6878-2766

e-mail:ohkus iser.osaka-u.ac.jp

1 Introduction

Japanese society is rapidly aging and Japanese national medical costs continue to rise by at least one trillion yen (about 0.1 billion US dollars) every year. There is universal coverage with unlimited access to all health care facilities to all the residents. Because of this generous national medical insurance system, patients have no incentive to prevent disease and are increasingly turning away from clinics in favour of hospitals because of their perceived higher quality and standardized price charge across all providers.

Many health care reform plans have been put forward. One of them proposes to increase the coinsurance rate for relatively minor ailments as well as for their prescribed medications. Minor ailments are illnesses such as the common cold and diarrhea, which are curable by standard treatments at reasonable costs.

As there are several kinds of treatments for minor illnesses, including medical services provided by hospitals or clinics, the anticipated effect of an increase in the coinsurance rate on national medical costs is unclear. If patients are not sensitive to price change, an increase in the coinsurance rate may not have any appreciable effect on national costs. On the other hand, if patients are sensitive to a price increase, they may choose other options and decide to seek medical services less frequently. An increase in the coinsurance rate will then decrease national medical costs.

In this paper, we assume that when suffering from a minor ailment, a patient has three options: he or she can either consult a doctor, purchase over-the-counter (OTC) medications, or seek no treatment. There is a possibility that patients are highly sensitive to price change, but this needs to be tested empirically.

In the United States, where extensive research has been conducted on health economics, only a few studies have focused on the demand for medical services related to minor ailments, or on the substitutability between prescribed medication and OTC medication (Stuart and James, 1995; Fillenbaum, et. al., 1995). Of these studies, particular attention

is paid to the research by Newhouse (1993) because of its originality and innovative research design. The research was part of a 10-year study referred to as the Health Insurance Experiment (HIE) that Newhouse and others at the RAND Institute initiated in 1971. The HIE is a longitudinal study that experimentally altered the cost-sharing of medical care faced by families. Between November 1974 and February 1977, the HIE assigned families to various insurance plans that differed in the amount of cost-sharing. According to this study, the use of emergency units involving minor illnesses is only 47% lower on the cost-sharing plan than on the free plan. For example, the use of emergency units by patients suffering from influenza declined by 65% on the cost sharing plan compared to the use by those on the free plan. On the cost sharing plan, for abdominal pain use is 53% lower, for back/neck pain use is 45% lower, and for headache use is 11% lower. Although price elasticity are not accounted for in the study, the results suggest that for minor ailments, the demand for medical services is relatively more sensitive to price than for more urgent illnesses.

Ii and Ohkusa (1998) were the first to attempt to estimate the demand for medical services related to minor illnesses. They explicitly modeled the incidence of minor illnesses, and using micro household data measured the price elasticity of demand for medical care for minor illnesses in Japan. Their data, from the Basic Survey on People's Life (BSPL), were not experimentally or extensively collected like that in the HIE. However, the sample size in the BSPL - approximately 600,000 - is much larger compared to that of the HIE, which is about 2000. BSPL includes household and individual characteristics such as gender, age, income and assets, as well as detailed health information. Their results show that the price elasticity for medical services was 0.208, which is comparable to that for the United States, and that medical services and OTC medications are substitutable.

Ii and Ohkusa (2000a) used patients' health information from the BSPL to define minor illnesses, and estimated price elasticities for various minor illnesses. They found that in the case of minor illnesses, the price elasticities for medical services were between 0.144 and

0.149. The data set also included detailed information on 43 subjective symptoms. The authors estimated price elasticities for medical services demanded for the 43 symptoms separately and found that for almost half of the symptoms, the price elasticities estimated at less than unity.

In their study using original data from a survey they conducted, Ii and Ohkusa (1999) examined the choice of health care in Japan for patients suffering from the common cold. Empirical results show that the price elasticity for medical services is between 0.23 and 0.36. This estimated price elasticity suggests that if the new medical insurance reform plan were to increase the coinsurance rate for both the insured and their dependants by 10%, national medical costs may be reduced by, at most, 43 billion yen (358 million US dollars). Correspondingly, this could increase the demand for OTC medicine by at most 8.8 billion yen (73.3 million US dollars). This result implies that medical services and OTC medications are substitutable. Moreover, a tenfold increase in the provision of information on drugs could reduce national medical costs by no more than 60 billion yen (500 million US dollars) with a corresponding increase in the demand for OTC medications of approximately 6.9 billion yen (57.5 million US dollars).

This paper uses the same research method as that employed by Ii and Ohkusa (2000a) but extends in the following three directions. First, Ii and Ohkusa (2000a) analysed only the patient's final decision: either receiving medical services, purchasing OTC or receiving no treatment. In reality, however, when faced with a cold, some patients would initially seek no treatment, later demand OTC, and eventually consult a doctor if they have not recovered within a period of time. The three options are not mutually exclusive a priori. This paper takes these dynamics into account¹).

The second point is that Ii and Ohkusa (2000a) only conducted an analysis on the common cold, while this paper intends to cover the entire range of minor ailments, in terms of both collecting and analyzing the data. The third point is that this article has better access to information on illnesses such as the treatment the patients received, their

recovery progress, as well as the symptoms of their illnesses, such as a sore throat or languidness. This research focuses particularly on the second and third points.²⁾

Section 2 describes the data. The empirical model is explained in Section 3. The empirical results are given in Section 4. Concluding remarks are then provided at the end of the paper.

2 Data

The data for this research are obtained from a survey conducted in December, 1999 in the Kanto area (Tokyo, Kanagawa, Saitama, and Chiba) and the Kansai area (Osaka, Kyoto, Nara, and Hyogo). Of the total of 1300 questionnaires distributed to 1300 households, 1249 were completed and returned. All households that completed the questionnaire volunteered to be monitored for the various surveys. Therefore, particular attention should be paid to the sample bias caused by this type of sampling.

The questionnaire was composed of three parts: household, individual, and illness history. The household and the illness history sections were completed by housewives, and the individual section by each household member who are between 20 and 69 years old. There were some minors (those under 20 years old), the elderly, and other household members who were not present at the time of the survey and were, therefore, not able to fill in the questionnaires. A total of 4282 respondents completed the household part of the questionnaire while 2787 people filled in the individual section.

In the household section, the questionnaire asks about age, gender, history of chronic illness (where applicable), household income, assets, and house ownership. The individual section includes questions related to employment status, labor income, and education level. In the illness history section, respondents were asked to describe their illnesses in detail, that is, date when the first symptom appeared, duration of the illness, body temperature, symptoms, their ability to continue their daily activities during the ill-

ness, whether they were bedridden, the treatments they received, as well as their recovery progress. Thirteen different illnesses were under investigation: common cold, pollinosis, abdominal pain/indigestion, headache/menorrhagia, shoulder/neck pain, backache, constipation/diarrhea, asthenopia, athlete's foot/corn, various skin diseases(atopic dermatitis, insect bites, miliaria, or urtication), injury (cuts, scratches or burns), bruise/sprain and hameorrhoids. The data also include information on nine symptoms: sore throat, cough, rhinitis/running nose, nausea, languidness, itchy eyes/watery eyes, pain/itching, bleeding/internal haemorrhage, and others.

In the following analysis, during the period of a patient's illness, a day of illness is considered one sample case. In the case where the patient's temperature or symptoms does/do not change, only variation of the time period describes change. In the tables, length of illness refers to the number of days a patient suffers from an illness. Length of discontinuity refers to the number of consecutive days a patient discontinues daily activities such as work, study or household chores as a result of poor health. A patient's bedridden period is the number of days a patient is confined to bed due to the illness. When a patient discontinues his or her daily activities or stays in bed for half a day, a value of 0.5 was assigned.

Tables 1-13 show sample statistics. Among the 18,033 samples who suffered from a common cold, 44% sought medical services from the hospitals, 32% purchased OTC medications, while 24% did not seek medical assistance. On average, patients suffered from a common cold for 4.64 days. The average period of time the patients discontinued their daily activities or remained in bed as a result of their illnesses was half a day. Of the total, 65% of the patients were high school graduates, while 14% were college graduates. The average coinsurance rate was 23%. Patients suffering from a common cold or abdominal pain/indigestion were more likely to seek medical services, and those suffering from headaches/menorrhagia, shoulder/neck pain, backache, athlete's foot or injury were more likely to demand OTC or take no action to cure their illnesses. This was true espe-

cially among those suffering from athlete's foot or corns, 70% of whom demanded OTC. The study found that patients suffering from pollinosis, shoulder/neck pain, or constipation/diarrhea generally had relatively higher education levels compared to those suffering from other illnesses. The number of people suffering from athlete's foot, corns or hameorrhoids was higher in Kansai compared to that in the Kanto area. More than half of the patients suffering from hameorrhoids or backache were employed at the time of the survey. Can this result be interpreted that those working were more likely to suffer from backache even after the variables age or labor income were controlled? Were those suffering from backache and those with employment more likely to seek medical services or demand OTC? The answers to these questions will be discussed following the econometric analysis.

3 The Empirical Model

The dependent variable takes three values: $T_{i,t} = 1$ if a patient demands medical services, $T_{i,t} = 2$ if a patient demands OTC, and $T_{i,t} = 0$ in other cases. Independent variables are X_i patient characteristics $Y_{i,t}$ information on illness and $Z_{i,t}$ variables on length. Individual characteristics X_i are age, gender (=1 if female, = 0 if male), an education dummy, a dummy variable taking the value of one if a person has a history of chronic illnesses, labor income (in logarithms), per capita household income net of own labor income, household net financial assets, a dummy variable taking the value of one if a person owns a house, a dummy variable taking the value of one if a person owns an apartment, a dummy variable taking the value of one if a person lives in the Kansai area, and the coinsurance rate. These variables do not depend on period t . Information on illness $Y_{i,t}$ are temperature, nine symptoms, and a dummy variable taking the value of one if a person has a fever. Variables on length of time $Z_{i,t}$ are: the number of days a patient suffers from an illness, its squared value, the period of time a patient discontinues his/her daily activities due to illness, and length of a patient's bedridden period.

We have the following empirical specification:

$$\begin{aligned}
T_{i,t}^{j*} &= \alpha_0^j + \alpha_X X_i + \alpha_Y^j Y_{i,t} + \alpha_Z^j Z_{i,t} + \varepsilon_{i,t}^j \quad (j = 0, 1, 2) \\
T_{i,t} &= \begin{cases} 1 & \text{if } T_{i,t}^{1*} > T_{i,t}^{2*} \text{ and } T_{i,t}^{1*} > T_{i,t}^{0*} \\ 2 & \text{if } T_{i,t}^{1*} < T_{i,t}^{2*} \text{ and } T_{i,t}^{2*} > T_{i,t}^{0*} \\ 0 & \text{otherwise} \end{cases} \quad (1)
\end{aligned}$$

The error term, ε_i^j ($j = 0, 1, 2$) is a random variable and follows a three-dimensional normal distribution. For estimation, the multinomial probit method with random effect on the individual is used (Keane, 1992). Because the probability of choosing j adds up to 1, we can estimate the differences in probability. Here, we set $j = 0$, the choice of ‘do nothing’, as the basis for comparison. The variance-covariance matrix should be:

$$\begin{bmatrix} 1 & \rho \\ \rho & \sigma \end{bmatrix} \quad (2)$$

4 Estimation Results

Tables 14-39 present the determinants of patients’ demand for medical services and OTC. The second column shows the marginal effects, and not estimated coefficients. These effects explain how a unit change in an explanatory variable changes the probabilities of choosing medical services or OTC.

The coinsurance rates are significantly negative for demand for medical services when patients suffered from a common cold, shoulder/neck pain, backache, constipation/diarrhea, asthenopia, various skin diseases (atopic dermatitis, insect bites, miliaria, or urtication) and hameorrhoids. On the other hand, the coinsurance rates are significantly positive for demand for OTC in the case of the common cold and various skin diseases. The common cold and various skin diseases are two illnesses which are statistically significant in both cases.

In the case of a common cold, marginal effects for medical services and for the OTC medication are -0.35 and 0.34 respectively. For shoulder/neck pain, the marginal effect for medical services is -0.26. For other illnesses, the marginal effects for medical services range from -0.87 to -3.69 while the values of that for OTC are approximately 1.5, which are rather large. This implies that in the case of a cold, a 10% increase in the coinsurance rate (for example, rising from 20% to 30%) reduces the medical demand by 3.5 percentage points and increases the OTC demand by 3.4 percentage points. For shoulder/neck pain, a 10% increase in the coinsurance rate reduces the medical demand by 2.6 percentage points. For other illnesses, the same percentage increase in the coinsurance rate reduces the medical demand from 8.7 to 3.7 percentage points while increasing the OTC demand by 15 percentage points.

With some exceptions, the young demanded medical services more and OTC less than did the elderly. People living in Kansai were more likely to have a higher demand for OTC than for medical services. Those employed were also more likely to demand OTC than medical services. While the duration of illnesses was brief, patients demanded more OTC. However, patients were more likely to consult a doctor if they did not recover from their illnesses within a period of time. For many illnesses, education level did not play a significant role in the level of demand for either medical services or OTC. However, in the case of asthenopia, skin disease, and haemorrhage, high school and college graduates had a higher demand for medical services than those still in school. On the other hand, for athlete's foot/corns, demand for medical services was higher among those in school compared to graduates.

5 Concluding Remarks

This paper examines the choice of health care for minor ailments in Japan for patients suffering from 13 different minor ailments. Original data were obtained from a survey

conducted by the authors. For the common cold, shoulder/neck pain, backache, constipation/diarrhea, asthenopia, various skin diseases, and haemorrhoids, an increase in the coinsurance rate statistically significantly lowers the demand for medical services. On the other hand, the demand for OTC medication is statistically significantly higher with an increase in the coinsurance rate for the common cold and skin diseases. In the case of the common cold, the marginal effects for medical services and for the OTC medication are -0.35 and 0.34 respectively. For shoulder/neck pain, the marginal effect for medical services is -0.26. For other illnesses, the marginal effects for medical services range from -0.87 to -3.69 while the values for OTC are around 1.5.

For future research, the dynamics of patients' choice should be analysed more thoroughly as the medical options are usually not mutually exclusive. Some illnesses that are prone to occur during summer time are omitted in this analysis because our survey was conducted in winter and spring, that is, from the beginning of November until the end of April. Future research should include these illnesses. Moreover, taking into account the OTC price and its accessibility, and the choice among medical institutions such as clinics and hospitals, this would be interesting to future researchers.

Footnote

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- 1) Similar research was done by Gilleskie (1998). Her estimation model is detailed, but information on illnesses and symptoms were not utilized as in our study.
- 2) Another paper by Ii and Ohkusa (2000b) focuses more on the first point.

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Table1 : Descriptive statistics(Common Cold)

	Mean	Standard deviation	Min	Max
Medical Service	.4384279	.4962063	0	1
OTC Medication	.3206169	.4667249	0	1
Do nothing	.2409552	.4276734	0	1
Length of illness	4.635856	6.60715	1	83
Length of discontinuity	.5711021	1.348751	0	18
Patient's bed ridden period	.5540884	1.182849	0	12
High sch. grad.	.6498823	.4770181	0	1
Univ. grad.	.1428434	.3499215	0	1
Female	1.576534	.4941197	0	1
Kansai Area	.378081	.4849196	0	1
Worker	.3294576	.4700275	0	1
Labour income	1.850485	2.708611	0	7.467942
Coinsurance rate	.2297321	.1064806	0	.3

Note: Sample size is 18,033. Education level is relative to those still in school. For insurance plans, weights are used to adjust a sample distribution to the population distribution. A day of illness is considered one sample case. For variation of the time (length of illness, length of discontinuity, and patient's bed ridden period), a period an individual suffers from illness is considered to be one sample.

Table2 : Descriptive statistics(Pollinosis)

	Mean	Standard deviation	Min	Max
Medical Service	.3518444	.4775698	0	1
OTC Medicaton	.3289659	.4698613	0	1
Do nothing	.3191897	.4661862	0	1
Length of illness	25.08652	24.03984	1	89
Length of discontinuity	.0251509	.1764092	0	2
Patient's bed ridden period	.0633803	.5935703	0	10
High sch. grad.	.524491	.499425	0	1
Univ. grad.	.1953235	.3964695	0	1
Female	1.623571	.4845141	0	1
Kansai Area	.3160653	.4649622	0	1
Worker	.4866962	.4998482	0	1
Labor income	2.652554	2.836777	0	7.467942
Coinsurance rate	.263473	.0675639	0	.3

Note:Sample size is 8,454.

Table3 : Descriptive statistics (Abdominal pain/indigestion)

	Mean	Standard deviation	Min	Max
Medical Service	.5129073	.4999392	0	1
OTC Medicaton	.3393991	.4736056	0	1
Do nothing	.1476936	.3548711	0	1
Length of illness	5.501873	12.02703	1	76
Length of discontinuity	.2059925	.578988	0	4
Patient's bed ridden period	.2509363	.7674958	0	9.5
High sch. grad.	.536606	.4987637	0	1
Univ. grad.	.1527719	.3598436	0	1
Female	1.653226	.4760442	0	1
Kansai Area	.350402	.4771968	0	1
Worker	.5023275	.5001004	0	1
Labor income	2.846214	2.907617	0	7.467942
Coinsurance rate	.2520211	.0840217	0	.3

Note:Sample size is 2,253.

Table4 : Descriptive statistics (Headache/menorrhagia)

	Mean	Standard deviation	Min	Max
Medical Service	.1404651	.3476307	0	1
OTC Medicaton	.4883721	.5000974	0	1
Do nothing	.3711628	.4833408	0	1
Length of illness	2.276498	3.438218	1	30
Length of discontinuity	.2626728	1.204789	0	15
Patient's bed ridden period	.3364055	.9776256	0	7.5
High sch. grad.	.4334884	.4957871	0	1
Univ. grad.	.1869767	.3900743	0	1
Female	1.948113	.2219031	0	1
Kansai Area	.3581395	.4796766	0	1
Worker	.4604651	.4986665	0	1
Labor income	2.232641	2.496772	0	6.746412
Coinsurance rate	.2803015	.0506885	0	.3

Note:Sample size is 973.

Table5 : Descriptive statistics (Shoulder/neck pain)

	Mean	Standard deviation	Min	Max
Medical Service	.0668579	.2498033	0	1
OTC Medicaton	.4093116	.4917611	0	1
Do nothing	.5238305	.4994869	0	1
Length of illness	13.29605	22.48618	1	90
Length of discontinuity	.0559211	.3015326	0	3
Patient's bed ridden period	.1134868	.7171513	0	10.5
High sch. grad.	.3993822	.4898255	0	1
Univ. grad.	.2206531	.4147328	0	1
Female	1.74338	.4368158	0	1
Kansai Area	.3848191	.4866062	0	1
Worker	.479038	.4996155	0	1
Labor income	2.541758	2.778652	0	7.467942
Coinsurance rate	.2710278	.0542556	0	.3

Note:Sample size is 3,975.

Table6 : Descriptive statistics (Backache)

	Mean	Standard deviation	Min	Max
Medical Service	.194271	.3957111	0	1
OTC Medicaton	.3815645	.4858598	0	1
Do nothing	.4241645	.4943063	0	1
Length of illness	10.23684	18.9608	1	88
Length of discontinuity	.2587719	1.508759	0	20
Patient's bed ridden period	.1688596	.6776771	0	7
High sch. grad.	.4770474	.4995646	0	1
Univ. grad.	.1939038	.395427	0	1
Female	1.600884	.4898069	0	1
Kansai Area	.3040764	.4600996	0	1
Worker	.5104664	.4999823	0	1
Labor income	2.972718	2.992871	0	7.467942
Coinsurance rate	.2285769	.1008749	0	.3

Note:Sample size is 2,380.

Table7 : Descriptive statistics (Constipation/diarrhea)

	Mean	Standard deviation	Min	Max
Medical Service	.3888112	.4876508	0	1
OTC Medicaton	.3748252	.4842471	0	1
Do nothing	.2363636	.4249967	0	1
Length of illness	4.596774	13.12316	1	87
Length of discontinuity	.2520161	.7240769	0	7
Patient's bed ridden period	.2096774	.5676743	0	4.5
High sch. grad.	.4447552	.4971125	0	1
Univ. grad.	.2090909	.4068017	0	1
Female	1.62069	.4853862	0	1
Kansai Area	.3342657	.4718982	0	1
Worker	.3265734	.4691238	0	1
Labor income	1.807746	2.659321	0	7.467942
Coinsurance rate	.234442	.1027542	0	.3

Note:Sample size is 1,319.

Table8 : Descriptive statistics (Asthenopia)

	Mean	Standard deviation	Min	Max
Medical Service	.4082969	.4916528	0	1
OTC Medicaton	.2227074	.4161771	0	1
Do nothing	.3689956	.4826645	0	1
Length of illness	11.40179	19.18354	1	87
Length of discontinuity	.0535714	.4762709	0	5
Patient's bed ridden period	.1339286	.8328345	0	7
High sch. grad.	.6146288	.4868158	0	1
Univ. grad.	.121179	.3264243	0	1
Female	1.651201	.4767204	0	1
Kansai Area	.2374454	.4256336	0	1
Worker	.503821	.5001219	0	1
Labor income	2.771804	2.850827	0	7.131699
Coinsurance rate	.2793613	.0467254	0	.3

Note:Sample size is 1,583.

Table9 : Descriptive statistics (Athletes' foot/corn)

	Mean	Standard deviation	Min	Max
Medical Service	.1283997	.3346402	0	1
OTC Medicaton	.6850095	.4646591	0	1
Do nothing	.1865908	.3897059	0	1
Length of illness	28.73973	32.50642	1	92
Length of discontinuity	.0068493	.0585206	0	.5
Patient's bed ridden period	0	0	0	0
High sch. grad.	.5173941	.4998555	0	1
Univ. grad.	.1676154	.3736426	0	1
Female	1.487666	.500006	0	1
Kansai Area	.5085389	.5000853	0	1
Worker	.4965212	.5001461	0	1
Labor income	2.766092	2.892256	0	7.313887
Coinsurance rate	.2407381	.0867652	0	.3

Note:Sample size is 1,949.

Table10 : Descriptive statistics (Various skin diseases(atopic dermatitis, insect bites, miliaria, or urticaria))

	Mean	Standard deviation	Min	Max
Medical Service	.3691843	.4826568	0	1
OTC Medicaton	.31571	.4648682	0	1
Do nothing	.3151057	.4646282	0	1
Length of illness	14.7243	23.19915	1	89
Length of discontinuity	.1238318	.7152545	0	7
Patient's bed ridden period	.0560748	.3515699	0	3.5
High sch. grad.	.6438066	.4789457	0	1
Univ. grad.	.1438066	.3509466	0	1
Female	1.50423	.5000577	0	1
Kansai Area	.4362538	.4959947	0	1
Worker	.2456193	.4305188	0	1
Labor income	1.42729	2.548173	0	7.467942
Coinsurance rate	.2359	.1016649	0	.3

Note:Sample size is 2,893.

Table11 : Descriptive statistics (Injury (cut, scratch or burn))

	Mean	Standard deviation	Min	Max
Medical Service	.1506849	.3578777	0	1
OTC Medicaton	.54414	.4982375	0	1
Do nothing	.305175	.4606568	0	1
Length of illness	2.951456	3.039187	1	22
Length of discontinuity	.0946602	.5314689	0	6
Patient's bed ridden period	.026699	.1794729	0	2
High sch. grad.	.6506849	.4769352	0	1
Univ. grad.	.152968	.3600937	0	1
Female	1.570878	.4951415	0	1
Kansai Area	.4003044	.4901465	0	1
Worker	.3493151	.4769352	0	1
Labor income	1.884918	2.652107	0	7.313887
Coinsurance rate	.2383446	.1036084	0	.3

Note:Sample size is 1,095.

Table12 : Descriptive statistics (Bruise/sprain)

	Mean	Standard deviation	Min	Max
Medical Service	.2385466	.4263072	0	1
OTC Medicaton	.4555029	.4981472	0	1
Do nothing	.3059505	.4609302	0	1
Length of illness	7	12.66221	1	79
Length of discontinuity	.4532967	1.786773	0	16
Patient's bed ridden period	.1950549	1.256641	0	16
High sch. grad.	.5197472	.4997415	0	1
Univ. grad.	.1832543	.3869768	0	1
Female	1.672813	.4693096	0	1
Kansai Area	.3027909	.4595866	0	1
Worker	.3786203	.485171	0	1
Labor income	1.955575	2.596821	0	6.746412
Coinsurance rate	.2633607	.0670628	0	.3

Note:Sample size is 1,555.

Table13 : Descriptive statistics (Hemorrhoid)

	Mean	Standard deviation	Min	Max
Medical Service	.3180428	.4659538	0	1
OTC Medicaton	.4964322	.5002423	0	1
Do nothing	.185525	.3889211	0	1
Length of illness	8.175258	16.23975	1	86
Length of discontinuity	.3298969	1.255999	0	11
Patient's bed ridden period	.3195876	1.268992	0	11
High sch. grad.	.459735	.4986303	0	1
Univ. grad.	.1121305	.3156879	0	1
Female	1.695058	.4606252	0	1
Kansai Area	.5015291	.5002527	0	1
Worker	.5504587	.4977011	0	1
Labor income	3.08741	2.884409	0	7.131699
Coinsurance rate	.2043968	.1035098	0	.3

Note:Sample size is 795.

Table14 : Marginal effect for medical services (Common cold)

	Marginal effect	t-value	Prob. value
Age	-.0190068	-5.75	0.000
Age squared	.0002153	4.61	0.000
Female	.0248456	0.78	0.435
High sch. grad.	.0732418	0.73	0.465
Univ. grad.	.0764142	0.69	0.488
Kansai Area	-.0467658	-1.78	0.076
Worker	-.053413	-0.37	0.712
Labour income	.0054246	0.20	0.845
Length of discontinuity	.0314145	3.39	0.001
Patient's bedridden period	-.0071371	-0.81	0.420
Length of illness	.007614	2.63	0.009
Length of illness squared	-.0001331	-2.63	0.009
Coinsurance rate	-.3578729	-2.22	0.027

Table15 : Marginal effect for OTC medication (Common cold)

	Marginal effect	t-value	Prob. value
Age	.017197	5.51	0.000
Age squared	-.0002103	-4.81	0.000
Female	-.0451196	-1.36	0.175
High sch. grad.	-.0743143	-0.88	0.381
Univ. grad.	-.0781449	-0.91	0.365
Kansai Area	.0485596	1.96	0.051
Worker	.2495458	1.91	0.057
Labour income	-.04204	-1.75	0.080
Length of discontinuity	-.0268871	-2.76	0.006
Patient's bedridden period	.0031314	0.44	0.660
Length of illness	-.0070789	-2.53	0.011
Length of illness squared	.0001457	3.31	0.001
Coinsurance rate	.3403793	1.89	0.059

Note: Log likelihood is -20831. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.4465778. Its probability value is 0.000.

Table16 : Marginal effect for medical services (Pollinosis)

	Marginal effect	t-value	Prob. value
Age	-.0217162	-2.54	0.011
Age squared	.0002491	2.17	0.030
Female	-.0831281	-0.93	0.350
High sch. grad.	-.1196931	-0.51	0.607
Univ. grad.	-.0194976	-0.08	0.932
Kansai Area	-.0856596	-1.27	0.205
Worker	.1342944	0.52	0.600
Labor income	-.0277885	-0.54	0.592
Length of discontinuity	.1975711	3.34	0.001
Patient's bed ridden period	-.3465963	-2.92	0.003
Length of illness	.0000821	0.04	0.970
Length of illness squared	-8.64e-06	-0.29	0.771
Coinsurance rate	.461461	0.73	0.468

Table17 : Marginal effect for OTC medication (Pollinosis)

	Marginal effect	t-value	Prob. value
Age	-.0042849	-0.54	0.592
Age squared	.0000528	0.50	0.619
Female	.1252463	1.53	0.126
High sch. grad.	.3243953	1.91	0.056
Univ. grad.	.1382388	0.72	0.470
Kansai Area	.0611221	1.06	0.291
Worker	-.1578635	-0.73	0.466
Labor income	.0404836	0.97	0.334
Length of discontinuity	-.1232465	-3.23	0.001
Patient's bed ridden period	.2604591	3.62	0.000
Length of illness	-.0006049	-0.27	0.788
Length of illness squared	.0000123	0.42	0.676
Coinsurance rate	-.7624772	-1.60	0.109

Note: Log likelihood is -296766. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.4676118. Its probability value is 0.000.

Table18 : Marginal effect for medical services (Abdominal pain/indigestion)

	Marginal effect	t-value	Prob. value
Age	-.0379059	-3.31	0.001
Age squared	.0005251	3.38	0.001
Female	.1252175	0.95	0.341
High sch. grad.	-.0058971	-0.02	0.985
Univ. grad.	-.0978897	-0.32	0.753
Kansai Area	.2587631	2.75	0.006
Worker	-.1411687	-0.36	0.722
Labor income	.0268732	0.37	0.710
Length of discontinuity	.1003026	1.48	0.140
Patient's bed ridden period	-.0265878	-1.04	0.300
Length of illness	.0244221	4.66	0.000
Length of illness squared	-.0003043	-5.08	0.000
Coinsurance rate	.0792102	0.10	0.921

Table19 : Marginal effect for OTC medication (Abdominal pain/indigestion)

	Marginal effect	t-value	Prob. value
Age	.0400448	3.74	0.000
Age squared	-.0005077	-3.64	0.000
Female	-.3216069	-2.81	0.005
High sch. grad.	.0605047	0.25	0.806
Univ. grad.	.0365491	0.14	0.887
Kansai Area	-.0748168	-1.17	0.242
Worker	.5586636	2.27	0.023
Labor income	-.1261616	-2.44	0.015
Length of discontinuity	-.0361844	-0.65	0.516
Patient's bed ridden period	-.0590296	-1.11	0.265
Length of illness	-.0161238	-4.63	0.000
Length of illness squared	.0001973	4.95	0.000
Coinsurance rate	-.3632696	-0.63	0.531

Note:Log likelihood is -1429. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.3614994. Its probability value is 0.000.

Table20 : Marginal effect for medical services

(Headache/menorrhagia)

	Marginal effect	t-value	Prob. value
Age	-.0087293	-3.82	0.000
Age squared	.0001192	3.82	0.000
Female	-.0060813	-0.28	0.783
High sch. grad.	.0073742	0.11	0.913
Univ. grad.	.0036701	0.05	0.960
Kansai Area	.0569773	2.95	0.003
Worker	-.1901717	-1.68	0.094
Labor income	.0202852	1.99	0.047
Length of discontinuity	.0074461	1.61	0.108
Patient's bed ridden period	-.0145837	-1.65	0.099
Length of illness	-.0004446	-0.29	0.770
Length of illness squared	.0000288	0.58	0.562
Coinsurance rate	.4995299	1.53	0.106

Table21 : Marginal effect for OTC medication
(Headache/menorrhagia)

	Marginal effect	t-value	Prob. value
Age	-.0005913	-0.03	0.979
Age squared	.0000341	0.12	0.908
Female	.3729852	1.52	0.129
High sch. grad.	-.9525601	-2.83	0.005
Univ. grad.	-.6909075	-2.14	0.032
Kansai Area	-.1773043	-1.79	0.073
Worker	.7455934	2.23	0.026
Labor income	-.1730022	-2.15	0.032
Length of discontinuity	-.0524014	-1.49	0.135
Patient's bed ridden period	.1699684	2.83	0.005
Length of illness	-.1246088	-5.15	0.000
Length of illness squared	.0039213	4.08	0.000
Coinsurance rate	-.2476926	-0.24	0.811

Note:Log likelihood is -366. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -.4927063. Its probability value is 0.000.

Table22 : Marginal effect for medical services (Shoulder/neck pain)

	Marginal effect	t-value	Prob. value
Age	.0014839	0.71	0.475
Age squared	-.0000211	-0.94	0.350
Female	.0105781	0.96	0.339
High sch. grad.	.9744353	12.35	0.000
Univ. grad.	.9795201	10.11	0.000
Kansai Area	-.0219652	-3.32	0.001
Worker	.044843	1.22	0.222
Labor income	-.0055971	-0.93	0.355
Length of discontinuity	.0128259	0.78	0.437
Patient's bed ridden period	-.0040868	-1.25	0.212
Length of illness	-.0002704	-0.83	0.409
Length of illness squared	8.60e-08	0.02	0.981
Coinsurance rate	-.2612172	-2.05	0.040

Table23 : Marginal effect for OTC medication (Shoulder/neck pain)

	Marginal effect	t-value	Prob. value
Age	.0030846	0.13	0.895
Age squared	.0000556	0.21	0.837
Female	.2463723	1.82	0.069
High sch. grad.	.5337669	1.27	0.204
Univ. grad.	.552625	1.34	0.180
Kansai Area	.274819	2.98	0.003
Worker	.7041422	1.87	0.062
Labor income	-.1559615	-1.79	0.074
Length of discontinuity	-.153621	-0.97	0.331
Patient's bed ridden period	.0363429	1.11	0.267
Length of illness	-.0005379	-0.15	0.880
Length of illness squared	-5.00e-06	-0.12	0.901
Coinsurance rate	-2.973727	-1.27	0.123

Note:Log likelihodd is -1160. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.2493771. Its probability value is 0.000.

Table24 : Marginal effect for medical services (Backache)

	Marginal effect	t-value	Prob. value
Age	-.0256784	-2.13	0.033
Age squared	.0002527	1.92	0.054
Female	.0758801	0.87	0.386
High sch. grad.	.2300355	1.10	0.271
Univ. grad.	.5118543	1.50	0.135
Kansai Area	-.0859991	-1.25	0.212
Worker	.3169298	1.18	0.239
Labor income	-.0775366	-1.57	0.117
Length of discontinuity	-.019307	-1.62	0.105
Patient's bed ridden period	-.012238	-0.55	0.582
Length of illness	.0077638	3.08	0.002
Length of illness squared	-.0000807	-2.36	0.018
Coinsurance rate	-.8732081	-1.64	0.098

Table25 : Marginal effect for OTC medication (Backache)

	Marginal effect	t-value	Prob. value
Age	.0002556	2.11	0.035
Age squared	-2.71e-06	-2.00	0.045
Female	-.0009574	-1.31	0.192
High sch. grad.	-.011382	-1.80	0.072
Univ. grad.	-.0016009	-1.43	0.154
Kansai Area	.0008393	1.05	0.294
Worker	-.0010171	-0.37	0.713
Labor income	.0000886	0.21	0.837
Length of discontinuity	-.0001122	-0.89	0.374
Patient's bed ridden period	-.0000667	-0.57	0.566
Length of illness	-.0000102	-0.42	0.677
Length of illness squared	1.52e-07	0.49	0.622
Coinsurance rate	.0020851	0.43	0.666

Note:Log likelihodd is -1488. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.1522507. Its probability value is 0.000.

Table26 : Marginal effect for medical services (Constipation/diarrhea)

	Marginal effect	t-value	Prob. value
Age	-.0297777	-2.43	0.015
Age squared	.0004167	2.25	0.024
Female	-.2166871	-1.59	0.113
High sch. grad.	.2224986	0.68	0.495
Univ. grad.	.3575566	1.09	0.277
Kansai Area	-.2022586	-1.66	0.098
Worker	-.3619617	-0.72	0.471
Labor income	.0412234	0.40	0.693
Length of discontinuity	.2125956	2.83	0.005
Patient's bed ridden period	.1517018	1.65	0.098
Length of illness	.0123883	2.65	0.008
Length of illness squared	-.0001376	-2.93	0.003
Coinsurance rate	-1.807227	-2.64	0.008

Table27 : Marginal effect for OTC medication (Constipation/diarrhea)

	Marginal effect	t-value	Prob. value
Age	.0030526	0.30	0.766
Age squared	.0000181	0.13	0.900
Female	.2077292	2.04	0.041
High sch. grad.	.6463835	2.18	0.029
Univ. grad.	.7166471	2.07	0.039
Kansai Area	.2442321	3.03	0.002
Worker	-.424015	-1.37	0.170
Labor income	.1166378	1.60	0.109
Length of discontinuity	-.2536099	-1.96	0.050
Patient's bed ridden period	.1556212	1.18	0.236
Length of illness	.0039275	1.04	0.300
Length of illness squared	3.38e-06	0.10	0.922
Coinsurance rate	.3845725	0.82	0.412

Note:Log likelihood is -894. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.3598876. Its probability value is 0.000.

Table28 : Marginal effect for medical services (Asthenopia)

	Marginal effect	t-value	Prob. value
Age	-.0567773	-1.87	0.061
Age squared	.0007863	2.02	0.043
Female	.1376578	0.65	0.513
High sch. grad.	.6147256	2.31	0.021
Univ. grad.	.5788484	1.84	0.065
Kansai Area	-.3800073	-1.93	0.053
Worker	.9965247	3.66	0.000
Labor income	-.4812977	-4.06	0.000
Length of discontinuity	.1751689	1.21	0.227
Length of illness	.0021729	0.53	0.599
Length of illness squared	-.000032	-0.71	0.477
Coinsurance rate	-3.697796	-2.54	0.011

Table29 : Marginal effect for OTC medication (Asthenopia)

	Marginal effect	t-value	Prob. value
Age	.0328533	3.43	0.001
Age squared	-.0003826	-3.22	0.001
Female	-.2578228	-2.49	0.013
High sch. grad.	-.4738471	-2.68	0.007
Univ. grad.	-.1672668	-2.77	0.006
Kansai Area	.0160782	0.22	0.824
Worker	-.9188349	-2.66	0.008
Labor income	.1589838	2.38	0.017
Length of discontinuity	.8782329	3.24	0.001
Patient's bed ridden period	-.0367425	-1.00	0.319
Length of illness	-.0020196	-0.74	0.461
Length of illness squared	.0000143	0.46	0.647
Coinsurance rate	.6992843	0.96	0.337

Note:Log likelihodd is -821. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.2623444. Its probability value is 0.0000.

Table30 : Marginal effect for medical services (Athletes' foot/corn)

	Marginal effect	t-value	Prob. value
Age	.0083934	2.45	0.014
Age squared	-.0001239	-2.35	0.019
Female	-.0020502	-0.11	0.915
High sch. grad.	-.9525492	-2.27	0.023
Kansai Area	.0361695	1.03	0.301
Worker	.4792995	1.09	0.277
Labor income	-.0364885	-2.15	0.031
Length of illness	-.0011745	-2.38	0.017
Length of illness squared	.0000121	2.78	0.005
Coinsurance rate	.3290009	1.20	0.227

Table31 : Marginal effect for OTC medication (Athletes' foot/corn)

	Marginal effect	t-value	Prob. value
Age	-.0203553	-1.45	0.148
Age squared	.0004324	2.10	0.036
Female	-.1745325	-1.21	0.225
High sch. grad.	.8888703	3.49	0.000
Univ. grad.	.3435814	3.64	0.000
Kansai Area	-.2422668	-2.57	0.010
Worker	-.8986	-2.36	0.018
Labor income	.1640201	2.30	0.022
Length of illness	.0013252	0.47	0.641
Length of illness squared	-.0000144	-0.57	0.572
Coinsurance rate	-1.123085	-1.58	0.114

Note: Log likelihood is -291. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.2960467. Its probability value is 0.000.

Table32 : Marginal effect for medical services (Various skin diseases(atopic dermatitis, insect bites, miliaria, or urticaria))

	Marginal effect	t-value	Prob. value
Age	-.036201	-3.23	0.001
Age squared	.0006611	4.18	0.000
Female	-.2045767	-2.37	0.018
High sch. grad.	.8096419	4.29	0.000
Univ. grad.	.8973977	4.14	0.000
Kansai Area	-.0820115	-1.04	0.300
Worker	-.257197	-0.51	0.608
Labor income	.1271258	1.17	0.241
Length of discontinuity	.0800188	0.97	0.333
Patient's bed ridden period	-.0527944	-0.36	0.722
Length of illness	-.0110596	-3.01	0.003
Length of illness squared	.000116	2.64	0.008
Coinsurance rate	-.9167819	-2.35	0.019

Table33 : Marginal effect for OTC medication (Various skin diseases(atopic dermatitis, insect bites, miliaria, or urticaria))

	Marginal effect	t-value	Prob. value
Age	.018164	1.88	0.060
Age squared	-.0002656	-2.00	0.046
Female	.0638806	0.89	0.372
High sch. grad.	-.8485309	-2.97	0.003
Univ. grad.	-.3922729	-2.86	0.004
Kansai Area	.0444187	0.42	0.675
Worker	-.062161	-0.14	0.891
Labor income	-.0370979	-0.41	0.682
Length of discontinuity	.1183589	1.69	0.092
Patient's bed ridden period	-.1182407	-0.80	0.423
Length of illness	.0061915	2.18	0.029
Length of illness squared	-.0000643	-2.00	0.045
Coinsurance rate	1.623608	3.34	0.001

Note:Log likelihodd is -2274. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.2960467. Its probability value is 0.000.

Table34 : Marginal effect for medical services (Injury(cut, scratch or burn))

	Marginal effect	t-value	Prob. value
Age	-.011535	-3.02	0.003
Age squared	.0001852	3.47	0.001
Female	-.0409943	-1.40	0.162
High sch. grad.	.0602717	0.78	0.433
Univ. grad.	.116934	0.78	0.435
Kansai Area	.0318216	1.20	0.229
Worker	-.1509132	-1.31	0.191
Labor income	.0387758	1.58	0.114
Length of discontinuity	.0139092	1.17	0.243
Patient's bed ridden period	.0546375	0.89	0.372
Length of illness	-.0118258	-2.81	0.005
Length of illness squared	.0005734	3.30	0.001
Coinsurance rate	.0659511	0.39	0.696

Table35 : Marginal effect for OTC medication (Injury(cut, scratch or burn))

	Marginal effect	t-value	Prob. value
Age	.0089839	0.71	0.477
Age squared	-.0001596	-0.90	0.368
Female	.0345442	0.30	0.764
High sch. grad.	.1517395	0.45	0.652
Univ. grad.	.247799	0.73	0.464
Kansai Area	-.0640607	-0.61	0.541
Worker	-.8134573	-1.99	0.047
Labor income	.1905276	1.89	0.059
Length of discontinuity	-.0132369	-0.41	0.681
Patient's bed ridden period	-.0573224	-0.37	0.709
Length of illness	-.0182548	-1.29	0.197
Length of illness squared	.0002182	0.40	0.693
Coinsurance rate	-.0494607	-0.07	0.945

Note:Log likelihoedd is -914. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.2960467. Its probability value is 0.000.

Table36 : Marginal effect for medical services (Bruise/sprain)

	Marginal effect	t-value	Prob. value
Age	-.005851	-0.88	0.377
Age squared	.0000698	0.81	0.418
Female	-.0750209	-1.54	0.124
High sch. grad.	-.3634502	-1.92	0.054
Univ. grad.	-.1811872	-1.56	0.120
Kansai Area	.0418156	0.79	0.428
Worker	.0019355	0.01	0.992
Labor income	.0232369	0.61	0.545
Length of discontinuity	.0123036	1.75	0.080
Patient's bed ridden period	.029024	1.11	0.269
Length of illness	.0131927	3.97	0.000
Length of illness squared	-.0002441	-5.18	0.000
Coinsurance rate	.3450865	0.97	0.333

Table37 : Marginal effect for OTC medication (Bruise/sprain)

	Marginal effect	t-value	Prob. value
Age	-.0287334	-1.48	0.140
Age squared	.0004025	1.51	0.131
Female	.1969428	1.24	0.215
High sch. grad.	.2635165	0.46	0.649
Univ. grad.	.3595715	0.59	0.554
Kansai Area	-.097164	-0.76	0.445
Worker	.4758668	0.92	0.357
Labor income	-.0974992	-0.89	0.375
Length of discontinuity	-.1061113	-2.07	0.038
Patient's bed ridden period	.0478824	0.51	0.609
Length of illness	-.0129608	-2.08	0.038
Length of illness squared	.0001842	2.23	0.026
Coinsurance rate	1.541766	1.22	0.222

Note:Log likelihodd is -1121. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.5372352. Its probability value is 0.000.

Table38 : Marginal effect for medical services (Hemorrhoid)

	Marginal effect	t-value	Prob. value
Age	-.0208538	-1.66	0.097
Age squared	.0002486	1.43	0.152
Female	-.6133911	-3.31	0.001
High sch. grad.	.9999974	4.02	0.000
Univ. grad.	.9980987	4.36	0.000
Kansai Area	.1768965	1.36	0.173
Labor income	-.6632161	-4.56	0.000
Length of discontinuity	.3184902	4.06	0.000
Patient's bed ridden period	-.1635912	-1.95	0.051
Length of illness	.0183334	4.53	0.000
Length of illness squared	-.000209	-4.24	0.000
Coinsurance rate	-3.562828	-3.70	0.000

Table39 : Marginal effect for OTC medication (Hemorrhoid)

	Marginal effect	t-value	Prob. value
Age	.0412808	1.72	0.085
Age squared	-.0004858	-1.84	0.065
Female	1.356532	4.94	0.000
High sch. grad.	-.9999997	-3.95	0.000
Univ. grad.	-.831394	-4.17	0.000
Kansai Area	.1487035	1.33	0.183
Labor income	.7246168	5.10	0.000
Length of discontinuity	-1.678381	-3.62	0.000
Patient's bed ridden period	1.253143	3.26	0.001
Length of illness	-.0173603	-3.99	0.000
Length of illness squared	.0001141	3.21	0.001
Coinsurance rate	1.442343	1.19	0.233

Note:Log likelihood is -247. A correlation coefficient between the difference of the disturbance terms for medical services and OTC, and the difference of the disturbance terms for OTC and do nothing is -0.3042642. Its probability value is 0.000.