Revisiting the Japanese Comprehensive Reimbursement Scheme for the Elderly Outpatients during 1996-2002 Period: How It Affected Japanese Health Care Practices[1]

Seiritsu Ogura

Hosei Institute on Aging, Hosei University

Abstract

In 1996, Japanese government introduced Comprehensive Reimbursement for Elderly Outpatients, followed by per-visit charge and drug surcharge in 1977. They were an attempt to remove the three basic problems of the Japanese primary-care in those days; over-medication, over-testing, and over-visitation. Taken separately, each measure may have been a sensible measure, but, altogether, they did not work in the way the government had hoped. Particularly disastrous was CREO, as it actually worked to increase the costs of medical care. Through our analyses, we will shown why and how it happened. All the empirical evidences are consistent with our hypothesis; namely, the selectivity of CREO and FFS, and the exemption of CREO patients from paying drug surcharge were the sources of these policy failures. Our estimated treatment effect models indicate that CREO increased the drug costs and total medical costs by 40 to 50 percents.

[**Keywords**] fee-for-service, comprehensive payment scheme, prospective payment scheme, separation of dispensing from medical practice, treatment effect model

1. Introduction

In the early 1990's, the primary concern of the public health insurance authority was the relentless increase in the health care costs of the elderly. It had been threatening to destroy the very framework of the health insurance program supported by the general tax-revenue and cross-subsidization of the employee's health insurance programs. The consensus among the health economists at that time was that four major problems had to be addressed in our health care system; the first was the fee-for-service（FFS）payment of the insurance, the second was the virtually zero out-of-pocket payment for the elderly, the third was the excessive consumption of pharmaceuticals, and the fourth was the so-called social hospitalization. Most argued for the adoption of comprehensive payment scheme similar to DRG instead of FFS, introduction of proportional out-of-pocket payments for the elderly patients, and separation of prescription and sale of pharmaceuticals, as essential ingredients of such a structural reform.

In the *Central Social Insurance Medical Council* in charge of the public health insurance, these reforms had been constantly brought up by the payer's representatives and by the expert members, but they met strong opposition of provider's representatives. In FY1996, however, the government successfully introduced a scheme of Comprehensive Reimbursement scheme for the Elderly Outpatients with chronic "lifestyle" diseases. We will simply refer to this as CREO for short. Then, in September 1997, the government decided to ask elderly patients to start paying 500 yen each time they visit the physicians, instead of the previous flat charge of 1020 yen per month. At the same time, the government introduced a new surcharge for pharmaceuticals for all patients.

Almost immediately after these measures had been put in place, the hospitals and clinics began reporting substantial drops in patient volume, and almost all of them blamed the decrease on the drug surcharge, particularly on the complexity of the rules used to compute the charges. In less than two years after its inception, in July 1999, the strong opposition of providers forced the government to drop the drug surcharge, first by taking over the payment of drug surcharges of elderly patients, and eventually in October 2002, they were repealed altogether. In January 2001, the per-visit charge for elderly patient was also abolished and replaced by a limited 10% proportional out-of-pocket payment[2]. In September 2002, the CREO for elderly was suddenly dropped too; according to the government, "the complexity of its requirements is the source of serious confusion in the medical institutions". Quite ironically, the providers complained that their net revenue deteriorated considerably by the abolition.

By September 2002, without achieving the original goals, all the reform measures that began with the CREO scheme in 1996 had been withdrawn. In October 2002, a complete 10% out-of-pocket payment took effect for the elderly patients. In April 2003, the out-of-pocket payment for the employed workers was raised to 30%, the same level as their dependents. At the same time, the lower limit of the age for elderly health care system was to move up one year for each year to reach age 75, instead of age 70, in five years.

This paper is an attempt to analyze the changes in medical practices that took place in our primary care institutions while these reform measures had been in place. First, we will analyze the economic incentives which these reforms created through a simple theoretical analysis; in particular, what choices they have encouraged or discouraged on the part of patients and on the part of medical institutions. Subsequently, we will analyze how they have affected the various components of health care costs using a unique data collected from a local city during this period. The conclusion of this paper is that these reforms strongly encouraged relatively low cost FFS medical institutions to adopt the new comprehensive reimbursement scheme, but the switch was unfortunately more costly with far more intensive use of pharmaceuticals than FFS, contrary to the presumed goals of these reforms.

The rest of the paper is structured as follows: in 2., we explain the details of the reforms in our public health insurance during 1996 to 2002, and in 3., we analyze the economic incentives these reforms have created for patients and medical institutions using a simple theoretical framework. In 4., we explain the basic structure of the data we use for our analysis, and, in 5., we compare the costs of the FFS claims and Comprehensive Reimbursement Scheme claims during these periods. In 6., we measure the effects of the reforms using econometric methods. In 7., we summarize our findings.

2. Comprehensive Reimbursement for Elderly Outpatients and Increases in Patient Charges

2.1 Comprehensive Reimbursement for Elderly Outpatients (CREO)

Outline of the Scheme

In 1996, the CREO scheme was introduced for the first time as an alternative to the traditional Fee-For-Service insurance claims. The scheme was designed for elderly patients with such common chronic medical conditions as hyper-tension, hyper-lipidemia, diabetes, ischemic cardiac disease, and cerebro-vascular diseases. The only requirement for their physicians was to see the elderly patients at least *twice a month*. Under the scheme, a physician were reimbursed 885 points (or 8,850 yen[3]) for the first visit, and 735 points for the second visit, of the month respectively, as the costs of examination, counseling, tests, medication and shots. It was up to the individual primary-care physicians to adopt CREO or not to adopt it[4].

In 1997, CREO was extended to patients who visit their physicians only once a month and the reimbursement rate was set at 735 points. In 1998, the reimbursement rate for CREO physicians who dispense the drugs themselves was set at 1035 points for the first visits, and 735 points for the second. The reimbursement rate for physicians who write pharmacy prescriptions for their patients was set at 735 points per visit[5]. At the same time, only clinics and hospitals with 200 beds or less were eligible for CREO scheme, and the choice had to be made by the medical institution, and not by physicians[6].

This scheme suddenly attracted a lot of provider's attention in 1997, when the new drug surcharge was introduced for all patients (We will explain the details of the surcharge in 2.2.). They have learned that by adopting this scheme, they would be able to avoid charging their patients the new drug surcharge. The exemption may have made some sense for physicians operating under CREO and dispensing drugs themselves, as they were not required to submit the records of dispensed drugs to the insurers, and the compliance could have been a serious problem. The exemption, however, simply gave all the physicians working under CREO scheme considerable advantage, including those writing pharmacy prescriptions, as they could comfortably guarantee their patients that they would not have to pay the new drug surcharge. In contrast, similar physicians who were practicing under FFS had to ask their patients to pay the new drug surcharge at the pharmacies.

It was not clear why the Ministry of Health and Welfare had made such an exception for CREO physicians. This could have been the sugar-coating on a potentially bitter bill the ministtry had used to persuade the representatives of practicing physicians in the Central Social Insurance Medical Council. Or, the ministry may have been more concerned with the protection of the separation policy of the dispensary and medical practices they had pursued for more than a decade. If they had exempted the CREO patients who get the drugs directly from their doctors, but not the patients who receive the drugs in pharmacies, the new drug surcharge would have strongly encouraged discouraged the former practice, wiping out much of the achievement of the past decade.

In either case, as we will see shortly, this exemption of CREO patients with drug surcharges was most likely the one of the factors that drove a large number of elderly patients from hospitals to clinics.

2.2 The 1997 Reform: Introduction of Per-Visit Charge and Surcharge for Drugs

Introduction of Per Visit Fee

Prior to September 1997, the elderly outpatients (age 70 or older) under FFS scheme had to pay only 1020 yen per month, no matter how many times they had visited their doctors. But starting September 1997, they had to pay 500 yen for each visit up to four times a month at each medical institution. If we ignore the new drug surcharge, the cost of visiting clinics or hospitals for elderly patients actually went down if they visited them only once a month. The cost remained almost the same if they visited twice a month as it changed from 1020 yen to 1000 yen without the drug surcharge. But if they visited the medical institution more than three times a month, they were to be charged 500 yen

per visit up to 2000 yen, and the increase should have reduced the number of elderly patients making the third and the fourth visits. If they had visited there more than five times, the patient charge would be fixed at 2000 yen, but that would be almost twice the 1020 yen they had paid. Thus the per-visit charge should have worked to reduce the number of visits beyond two for a month.

Surcharge for Drugs

At the same time, new surcharge for drugs was introduced for patients of all ages, including the elderly. For non-elderly patients, when they receive drugs from doctors or pharmacies, surcharges were added to their regular out-of-pocket costs. The amount of surcharge was determined by types of drugs, number of drugs, and number of doses, in very peculiar ways. For internal medication, while nothing was charged for one drug, thirty yen per day was charged for two or three different drugs, sixty yen was charged for four or five different drugs, and one hundred yen per day was charged for more than six different drugs. For external medication, 50 yen per day for one drug, 100 yen per day for two different drugs and 150 yen for three or more different drugs. But the actual application of these rules was far more complex and for most patients who take more than one drugs at different intervals they looked very arbitrary.

The elderly patients, too, were asked to pay the same drug surcharge with one important exception; namely if their physicians were working under CREO, they were exempt from the surcharge.

3. A Theoretical Model of Medical Institutions concerning the Choices of Drug Dispensing and Comprehensive Payment

In this section, we will clarify what kinds of providers have adopted this comprehensive payment scheme. To simplify our analysis, we will assume here that a provider receives 1,470 points per month for CREO with pharmacy prescription, but receives 1,770 points per month for CREO with in-house pharmaceutical dispensing.

3.1 Preceding Studies

As far as we know, there is almost no preceding study on our comprehensive reimbursement scheme, presumably because it had been implemented only for a relatively short period of time (from 1996 to 2002). The only exception we have found is Kawai and Maruyama (2000) who had analyzed the effects of fixed-sum reimbursement including the comprehensive reimbursement for elderly outpatient care on health care costs, using the micro-data from the *Survey of Medical Care Activities in Public Health Insurance* (*or, Survey of Medical Care, for short*). They have found that fixed sum reimbursement schemes had increased the health care costs since providers chose them only when they could obtain more reimbursement than FFS scheme.

Although we agree with them in their conclusion, the data they had used reflected only the reimbursement claims submitted directly by hospitals and clinics, but not those submitted by pharmacies. This is because *Survey of Medical Care* draws reimbursement claims randomly from each type of institutions, making no attempt to integrate claims of medical institutions and pharmacies for given patients. As we will show shortly, the comprehensive reimbursement scheme during this period in effect provided a strong economic incentive for pharmacy prescription, and this short-coming in *Survey of Medical Care* data can introduce a substantial downward bias in their conclusion. Thus we need to integrate comprehensive reimbursement claims submitted by medical institutions and pharmacies for individual patients to obtain the total health care costs under the comprehensive reimbursement scheme. Only by comparing these integrated costs with those submitted under FFS, we can reach firm conclusions[7].

3.2 Selection of In-house Dispensing under Fee-for-Service Scheme

Before going into the analysis of comprehensive payment schemes, let us analyze what kind of providers had been dispensing pharmaceuticals to their patients under the fee-for-service scheme. By dispensing pharmaceuticals to patients, providers could keep the substantial differences between the reimbursement prices and wholesale prices of pharmaceuticals that existed in those days, but they have to pay the salaries of pharmacists as well as the inventory costs of drugs. Let us denote the reimbursement claim for, consultation, shots and tests as C_{00}, the cost as c_{00} under FFS with pharmacy prescription. Also for physicians dispensing drugs themselves, we denote the reimbursement for examination as C_0, the cost as c_0, the reimbursement for drugs as T_0, the wholesale cost of the drugs as t_0. If we express the cost of personnel and inventory control of the drugs by θ ,a physician will choose to dispense the drug to his/her patients, if the combined net profit of medical services and dispensing drugs is larger than the sum of the net profit from medical services and θ . That is, the following condition has to be satisfied;

(1) $$(C_0 - c_0) + (T_0 - t_0) > (C_{00} - c_{00}) + \theta .$$

For the sake of simplicity, let us assume

$$C_0 = C_{00}, \quad c_0 = c_{00.}$$

Then（1）means that the price differential of the drug, the second term of the right hand side of the inequality, or $(T_0 - t_0)$, exceeds the inventory control cost θ . If we write the profit rate from dispensing the drugs by π , the price differential can be written as $\pi \cdot t_0$, and（1）is now expressed as

(2a) $$\pi \cdot t_0 > \theta$$

Or

(2b) $$t_0 > \frac{\theta}{\pi} .$$

We can define the breakeven point of in-house drug provision as the ratio of θ to π ; a provider will choose the in-house provision if the per-patient administration of the drug exceeds the break-even point, and the pharmacy prescription otherwise.

3.3 Provider's Choice of Prescription and CREO adoption

Let us consider a provider who was writing pharmacy prescription under FFS, and receiving C_{00} for examination, consultation, shots and tests, and paying c_{00} as their costs. Now under CREO, the provider can receive 1470 points[8] which will cost him c_1. This provider will switch to CREO scheme if the profit from CREO exceeds the profit from FFS, or,

(3) $$C_{00} - c_{00} < 1470 - c_1.$$

Therefore, the necessary condition for the switch is expressed as

$$C_{00} < 1470 + (c_{00} - c_1) .$$

In general, the optimal bundle under FFS, whose cost is c_{00}, is not necessarily optimal for CREO scheme. Under

CREO scheme, for instance, the only requirement for submitting the claim is the number of visits (i.e. at least twice in a month), while under the FFS scheme, a provider has to consider each cost item's profitability separately. For this reason, we can assume that it will be cheaper to take care of a patient under CREO than under FFs; or,

(4) $$c_{00} \geq c_1.$$

We can express our necessary condition (3) as

(5) $$C_{00} < 1470 + \alpha_1.$$

Notice that α_1 is the excess FFS cost over CREO cost, or

(6) $$\alpha_1 = c_{00} - c_1 > 0.$$

Clearly, a provider whose average reimbursement claims under FFS (C_{00}) was equal to or less than 1470 points can benefit from the switch. Only those providers whose reimbursement claims were substantially higher than 1470 plus α_1 points should continue to operate under the FFS.

Provider Dispensing the Drugs: Case 1

Let us now turn to a provider who has been dispensing the drugs to its patients. In particular, first we will consider the set of conditions that will lead it to switch to CREO scheme. As we have denoted above, under FFS, the average reimbursement claim for drugs was T_0, their cost t_0, the average claim for examination, consultation, shots and tests C_0, and the cost as c_0. For this provider to switch to CREO, it has to realize a larger net profit by the change. If we denote the cost of examination etc. as c_2, and the cost of drugs as t_2, both under CREO, this condition can be expressed as

(7) $$(C_0 - c_0) + (T_0 - t_0) < 1770 - (c_2 + t_2)$$

In general, since there is no monitoring in CREO, it is reasonable to assume

(8) $$c_0 + t_0 \geq (c_2 + t_2).$$

Therefore, if we have

(9) $$C_0 + T_0 < 1770 + \beta_2,$$

the condition (7) above is always satisfied. Notice again here that β_2 is the excess cost of care under the FFS defined by

(10) $$\beta_2 = (c_0 + t_0) - (c_2 + t_2) > 0.$$

Thus, a provider whose reimbursement claims were equal to or less than 1770 points will switch to comprehensive reimbursement with drug dispensing.

For such a provider to choose CREO and dispense drugs at the same time, we need a second condition; namely, dispensing drugs has to produce a larger profit than pharmacy prescription. This can be written as

(12) $$1770 - (c_2 + t_2) > 1440 - c_1 + \theta,$$

where θ is the (per patient) administrative costs of drugs, including salaries of pharmacists and inventory control costs. Thus, the second condition can be written as

$$(13) \qquad\qquad t_2 + \theta < 300 + (c_1 - c_2).$$

Let us assume for the sake of simplicity that c_1 and c_2 are the same;

$$(14) \qquad\qquad c_1 = c_2.$$

Then the second condition is reduced to

$$(15) \qquad\qquad t_2 + \theta < 300.$$

Thus, the cost of drugs given to patients cannot exceed 300 points, if the provider is to adopt CREO and dispense drugs at the same time.

Providers Switching to Pharmacy Prescriptions: Case 2

Lastly, we have to think of a case where a provider who has been dispensing drugs internally under FFS scheme decides to adopt comprehensive reimbursement with pharmacy prescription. We will denote the average reimbursement claims for drugs as T_0, their costs as t_0, claims for examination etc as C_0, their costs as c_0. This provider will switch to comprehensive scheme if a larger profit is secured. This condition is written as

$$(16) \qquad\qquad (C_0 - c_0) + (T_0 - t_0) < 1470 - c_3 + \theta ,$$

where c_3 is the costs of examination etc. under the CREO with pharmacy prescription. It is clear that if the inequality

$$C_0 + \pi \cdot t_0 < 1470 + \alpha_2 + \theta$$

holds for a provider, condition (16) is satisfied. We note here that α_2 is defined by

$$(17) \qquad\qquad \alpha_2 = c_0 - c_3 > 0.$$

Recall that for internal provision, condition (2a) has to hold, and we have the following inequalities;

$$C_0 + \theta < C_0 + \pi \cdot t_0 < 1470 + \alpha_2 + \theta .$$

Thus one sufficient condition for (16), which is the first necessary condition for a provider to switch from in-house to pharmacy prescription, and FFS to comprehensive at the same time, is given by

$$(18) \qquad\qquad C_0 < 1470 + \alpha_2.$$

Furthermore, we need the second condition such that pharmacy prescription brings in more profit than in-house provision within the comprehensive reimbursement scheme. This condition is obtained by simply reversing the inequality (15); namely,

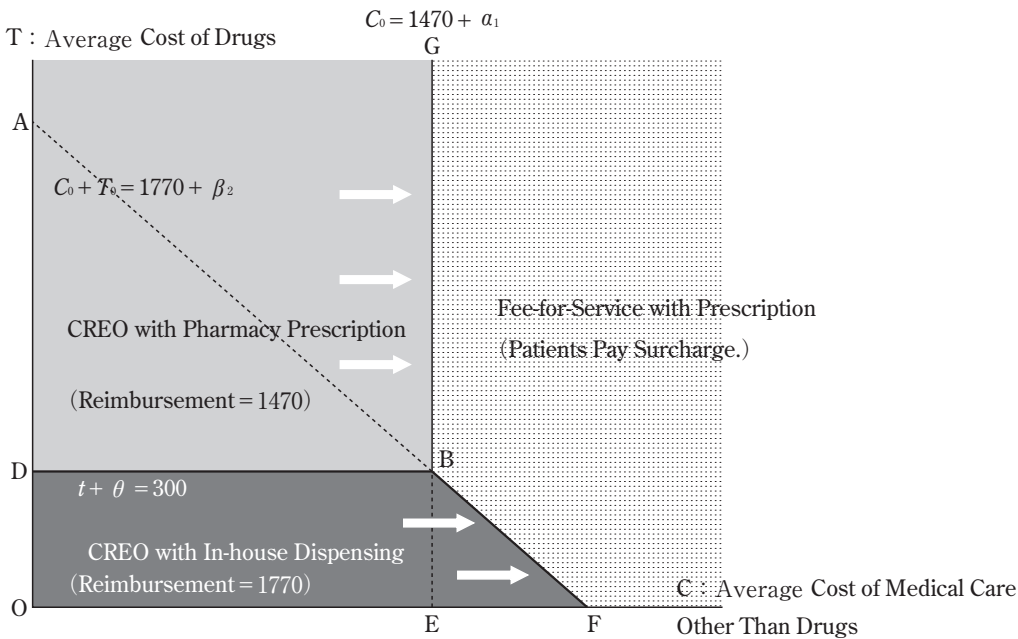$$(19) \qquad\qquad t_2 + \theta > 300.$$

Figure 1: Average Patient's Characteristics and Rational Selection of Reimbursement Schemes

Namely, since the total cost of providing the drugs internally exceeds 300 points allowed under the comprehensive reimbursement program, it opts for pharmacy prescription.

3.4 *Optimal Decision Rules and Their Implications*

We have summarized the preceding analyses in Figure 1. The horizontal axis measures the points for examination, tests, shots etc. under FFS, and the vertical axis measures the points for the costs of drugs under FFS, for the average elderly outpatient. The decision rules are very simple.

（A）Every provider with patients to the left of BF submits a CREO claim with drug dispensing and receives 1770 points. In terms of patient characteristics, these are patients whose drugs cost are relatively inexpensive, less than 300 points, and consume relatively small amount of medical care.

（B）Every provider with patients above BD but to the left of BG submits a CREO claim with pharmacy prescription and receives 1470 points for examination, tests, shots etc.. In terms of patient characteristics, these are patients whose drugs cost are relatively expensive, but consume relatively small amount of medical care, less than 1470 points.

（C）Every provider with patients to the right of BG or to the right of BF continues to submit a FFS claim and write pharmacy prescription. In terms of patient characteristics, these are patients who consume relatively large amount of medical care, and whose drug cost are relatively expensive.

4. Description of our Data

The data used in this paper were collected in a small city in western part of Japan from the reimbursement claims submitted to Health Care Program for the Aged. Selected entries of all the claims during the following two different periods were transcribe; firstly, from June to November of 1997, and secondly, from April to September of 1999. If a claim submitted by a medical institution indicated the existence of a pharmacy prescription, we looked for a pharmacy claim for the same patient for the same month and the same medical institution. A small number of unmatched medical claims and pharmacy's claims had been left after these procedures, and they were removed from our dataset[9].

4.1 Three Periods

We classify our data into three different periods, using the year and month during which the medical examination took place.
- First period: June, July and August of 1997, prior to the increase in out of pocket costs of the elderly.
- Second period: September, October, and November of 1997, and April, May and June of 1999, both after the increase in out of pocket costs.
- Third period: July, August and September of 1999, after the removal of the special drug surcharge from the elderly patients.

While the comprehensive reimbursement scheme underwent minor changes, to simplify our analysis, we will ignore them.

Table 1. Visits and Cost Statistics of Four Types of Medical Institutions

		medical institutions			
		small	general	geriatric	clinics
Period 1	number	2,017	605	848	7,433
	n. of visits	4.55	1.53	4.91	3.62
	r. claims	2453.82	1883.78	3114.11	1981.37
	o. pockets	1052.19	1007.54	1019.17	1019.40
Period 2	number	3,525	1,313	1,722	17,198
	n. of visits	3.62	1.52	4.39	3.48
	r. claims	2453.93	1408.56	2644.84	1913.98
	o. pockets	1195.93	696.74	1425.01	1226.84
Period 3	number	1,512	662	865	10,374
	n. of visits	2.47	1.44	4.15	3.52
	r. claims	2549.77	1162.95	2338.86	1849.50
	o. pockets	1022.14	658.01	1424.57	1240.84

4.2 Analysis of Insurance Claims Submitted by Medical Institutions

In Table 1, we have classified the medical institutions into four types (general hospitals, hospitals, geriatric hospitals and clinics), and we have shown the average number of visits of patient per month, points claimed for reimbursement, average out-of-pocket costs per patient, and average amount of drug surcharge, in each of these three periods. Particularly, regarding the drug surcharge, we note here that the figures only account for those paid at hospitals and clinics.

Small Hospitals[10]

According to Table 1, the average number of patient visits had decreased almost by two days during this period; from 4.5 days in period 1, to 3.6 days in period 2, and 2.5 days in period 3. The average reimbursement claims, however, remained stable around 2450 points. The patient's out-of-pocket costs had shown an increase from 1052 yen in period 1 to 1195 yen in period 2, but it decreased to 1022 yen in period 3. Special drug surcharges jumped from almost zero to more than 800 yen.

General Hospitals[11]

Throughout these three periods, general hospitals experienced a small decline in average number of visits from 1.53 to 1.44, but the average reimbursement claims had dropped very sharply from 1,884 points to 1,162 points. Most likely, this sharp decline reflected special local factors that were not related to changes in public health insurance system. Average out-of-pocket cost of patient has decreased from 1,007 yen to 658 yen, a 35% point decline. Special drug charges were zero in period 1, increased to 407 yen in period 2, and declined to 160 yen in period 3. Because of the apparent data anomaly, in what follows, we will not try to explain the changes concerning general hospitals.

Geriatric Hospitals[12]

The average number of visits in geriatric hospitals decreased by 0.8 days during these periods; it was 4.9 days in period 1, but decreased to 4.4 days in period 2, and further to 4.1 days in period 3. The average reimbursement claims decreased almost by 30 percent from 3,114 points to 2,338 points, while the average out-of-pocket cost of patients increased from 1,019 yen to 1,424 yen. The average drug surcharge was zero in period 1, but increased to 150 yen in period 2, and remained almost the same in period 3.

Clinics

The number of visits of patients remained very stable through these periods; it was 3.6 days in period 1, and 3.5 days in periods 2 and 3. The average reimbursement claims also remained relatively stable; it was 1,981 points in period 1, and increased slightly in period 2, but dropped to around 1,850 points in period 3. Average out-of-pocket cost of patient was also relatively stable through these periods; it was 1,019 yen in period 1, was 1,220 yen in period 2, and was 1,240 yen in period 3. Average drug surcharge was 103 yen in period2, and 97 yen in period3.

Number of Patients

Since one reimbursement claim is submitted for one patient by a medical institution every month, the number of reimbursement claims submitted is a very accurate index on the choice of medical institutions by patients. Recall that there are three months in our periods 1 and 3, but six months in period 2. Although some of the variations in the patient volume must have reflected seasonal factors, we will assume they were minor, as winter months have been excluded. We assume that most of the changes in patient volume were driven by changes in costs to patients. Thus we should expect to have about the same number of claims in period 1 and 3, and twice the number in period 2, if all things are the same.

In this regard, hospitals that had around 2,000 claims in period 1 probably lost some patients during these periods, as it had only 3,500 claims in period 2, and 1,500 claims in period 3. Geriatric hospitals experienced little change in the number of patients; it had 850 claims in period 1, more than 1,700 claims in period 2, and about the same number of claims as period 1 in period 3. On the other hand, clinics experienced a substantial increase in their patients; in the first period, the number of claims was 7,400, in the second period, it was 17,000, and in the third, it was 10,000.

Table 2. Numbers and Costs of Parmacy Claims by Origin Medical Institutions

Origin	Items	Period 1		Period 2		Period 3	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Small	Num. of P.Claims*	946		1239		294	
	Cost of P.Claims	1275.06	1132.58	1313.19	1117.85	1699.70	1213.39
	Patient Cost	0.00	0.00	656.28	789.70	1098.57	1085.83
General	Num. of P.Claims*	29		377		348	
	Cost of P.Claims	1620.03	1135.91	1639.50	1918.89	1576.81	1807.00
	Patient Cost	0.00	0.00	1098.54	1163.90	1084.97	1164.05
Geriatric	Num. of P.Claims*	581		1205		621	
	Cost of P.Claims	1692.51	1125.92	1540.59	1057.09	1521.78	1072.85
	Patient Cost	0.00	0.00	237.98	665.11	310.82	764.63
Clinics	Num. of P.Claims*	4897		12018		7691	
	Cost of P.Claims	1006.45	1396.29	984.30	1112.89	953.97	839.75
	Patient Cost	0.06	3.03	289.48	513.67	292.36	525.30

4.3 Analysis of Reimbursement Claims of Pharmacies

Prescription Reimbursement Claims

The preceding figures are based on the reimbursement claims submitted by medical institutions. They can be quite misleading, as more and more medical institutions under persistent government pressure adopt pharmacy prescriptions. In order to get accurate information on the total health care cost, we need to integrate these two kinds of claims, one submitted by medical institutions and the other submitted by pharmacies, for each patient. In Table 2, we have classified the medical institutions that had issued the original prescriptions on which the pharmacies submitted their claims.

Number of Prescription Reimbursement Claims

Geriatric hospitals had a mild increase in the number of pharmacy claims; in period 1, it was 581, it was 1,205 in period 2, and in period 3, it was 621. Clinics had the dominant share in the number of pharmacy claims, and experienced a sizeable increase during these periods; in period 1, the number was 4,897, in period 2, it was 12,018, and in period 3, it was 7,691. On the other hand, small hospitals had experienced a huge drop; in period 1, it was 946, in period 2, it was less than 1,250, but in period 3, it was less than 300.

Costs of Pharmacy Claims and Patient Charges

As to the average value of pharmacy claims, only those coming from small hospitals experienced increases; it was 1,275 points in period 1, and increased slightly to 1,313 points in period 2, and sharply to 1,700 points in period 3. As to the total pharmaceutical charges to patients including the drug surcharge, it was zero in the first period, but jumped to 656 yen in period 2, and to 1,099 yen in period 3.

The rest of medical institutions, more or less, experienced declines. The average value of pharmacy claims coming from geriatric hospitals was 1,693 points in period 1, declined to 1,541 points in period 2, and stayed at 1,522 points in period 3. The total pharmaceutical charge to patients remained modest; it was 238 yen in the second, and

increased to 311 yen in the third.

As to the clinics, the average value of pharmaceutical claims was 1,006 points in period 1, decreased slightly to 984 points in period 2, and decreased again to 954 points in period 3. As to the total pharmaceutical charge to patient, it was virtually zero in period 1, increased to 289 yen in period 2, and increased slightly to 293 yen period 3.

Table 3. Cost Information on Integrated Claims byTypes of Medical Institutions

Types	Items	Period 1		Period 2		Period 3	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Small Hospitals	N. of Claims*	2017		3525		1512	
	Total Medical Cost	3051.84	3983.41	2915.51	4223.54	2880.27	4371.70
	Total Patient Cost	1052.70	817.41	2031.57	1581.53	1022.14	547.81
	Drug Charge to Patient	0.51	22.71	835.65	916.73	0.00	0.00
	Pharmacy Claims	598.02	1003.18	461.57	912.24	330.50	859.25
General Hosiptals	N. of Claims*	605		1313		662	
	Total Medical Cost	1961.43	2245.52	1879.31	2108.72	1991.85	2206.59
	Total Patient Cost	1007.54	109.35	1419.41	1174.68	658.01	391.86
	Drug Charge to Patient	0.00	0.00	722.67	1047.99	0.00	0.00
	Pharmacy Claims	77.65	424.01	470.75	1267.22	828.90	1528.08
Geriatric Hospitals	N. of Claims*	848		1722		865	
	Total Medical Cost	4273.73	4191.64	3722.90	3707.21	3431.38	3331.02
	Total Patient Cost	1019.17	11.67	1741.16	1170.24	1424.57	539.04
	Drug Charge to Patient	0.00	0.00	316.15	694.22	0.00	0.00
	Pharmacy Claims	1159.61	1219.33	1078.05	1131.67	1092.52	1138.19
Clinics	N. of Claims*	7433		17198		10374	
	Total Medical Cost	2644.43	3999.82	2601.81	3777.33	2556.74	3545.34
	Total Patient Cost	1020.44	62.10	1532.39	879.08	1240.84	603.45
	Drug Charge to Patient	1.04	36.74	305.54	531.40	0.00	0.00
	Pharmacy Claims	663.07	1229.67	687.83	1034.11	707.24	835.04

4.4 Cost of Integrated Claims and Total Charges to Patient

Let us define the cost of integrated claims as the sum of the costs of medical claims and pharmacy claims. In Table 3, we have shown the average costs of the integrated claims for each type of medical institutions in each period. Almost all types of medical institutions experienced a decline in the second period and in the third period as well. For geriatric hospitals, the declines were most conspicuous; in period 1, it was 4,273 points, in period 2, it went down to 3,723 points, and it declined further down to 3,431 points in period 3. For clinics, the declines were relatively modest; in period 1, it was 2,644 points, and in period 2, went down to 2,601 points, and again to 2,556 points in period 3. For small hospitals the declines were modest, too; in period 1, it was 3,051 points, in period 2, went down to 2,916 points, and in period 3, to 2,880 points.

With respect to total patient charges, the pattern of the changes was very similar; they increased sharply in the second period, and declined hard in the third period. These changes were most dramatic in small hospitals, but geriatric hospitals and clinics also experienced sizeable changes. In small hospitals, it started at 1053 yen in period 1, almost doubled to 2031 yen in period 2, but came down to 1022 yen in period 3, reflecting the government takeover of

the drug surcharges. In geriatric hospitals, it started at 1019 yen in period 1, increased by 70% to 1741 yen in period 2, but dropped to 1425 yen in period 3. In clinics, it started at 1020 yen in period 1, increased almost by 50% to 1532 yen in period 2, but dropped to 1240 yen in period 3.

In the first period, average patient charges in different types of medical institutions were very close to each other, but the "reforms" in the public health insurance system prior to the second period created a large variance across different types of medical institutions. As a result, in the second period, patients at small hospitals paid more than 2,000 yen in what they paid at hospitals and at pharmacies, followed by those of geriatric hospitals paying close to 1,700 yen, followed by those of clinics paying more than 1,500 yen. But in the third period when government took over the payment of special drug surcharge, these differentials shrank considerably; the largest were patients at geriatric hospitals paying 1,400 yen, followed by those at clinics paying 1,240 yen, and, by those at hospitals paying 1,020 yen.

Table 4. Share of the Number of Pharmacy Claims to the Number of Medical Claims by Types of Medical Institutions

Types	Period 1	Period 2	Period 3
Small Hospitals	0.469	0.351	0.194
General Hospitals	0.048	0.287	0.526
Geriatric Hospitals	0.685	0.700	0.718
Clinic	0.659	0.699	0.741
Total	0.592	0.625	0.668

Sources: Tables 2 and 3

In Table 4, we have shown the percentage of pharmacy's claims to medical claims. For small hospitals, in the first period, the share was 47%, but, subsequently, it dropped sharply to less than 20% in the third period. For geriatric hospitals and clinics, the shares were more than 65% in the first period, and they kept on increasing to reach more than 70% in the third period for both of them.

In sum, the share of pharmacy's claims declined in hospitals that lost patients, but they went up for clinics and geriatric hospitals that gained patients after the reforms in public health insurance system. In other words, medical institutions that gained patients during these periods largely coincided with those that relied on pharmacy prescriptions.

Table 5. Share of OCR Claims in Each Period

	Period 1	Period 2	Period 3	Total
N. of Medical Claims (A)	9381	18851	10664	38896
(A/C)%	86.0	79.3	79.5	80.85
N. of OCR Claims (B)	1522	4910	2778	9210
(B/C)%	14.0	20.7	20.7	19.15
Total N. of Medical Claims	10903	23758	13413	48074
	100	100	100	100

Table 6. The Share of OCR Claims by Types of Medical Institution and by Periods

	Period 1			Period 2			Period 3		
	N. of Medical Claims	N. of OCR Claims	Total	N. of Medical Claims	N. of OCR Claims	Total	N. of Medical Claims	N. of OCR Claims	Total
Small	1986	31	2017	3449	76	3525	1473	39	1512
	0.985	0.015	1.000	0.978	0.022	1.000	0.974	0.026	1.000
General	605	0	605	1313	0	1313	662	0	662
	1.000	0.000	1.000	1.000	0.000	1.000	1.000	0.000	1.000
Geriatric	381	467	848	771	951	1722	403	462	865
	0.449	0.551	1.000	0.448	0.552	1.000	0.466	0.534	1.000
Clinics	6409	1024	7433	13315	3883	17198	8097	2277	10374
	0.862	0.138	1.000	0.774	0.226	1.000	0.781	0.219	1.000
Total	9381	1522	10903	18848	4910	23758	10635	2778	13413
	0.860	0.140	1.000	0.793	0.207	1.000	0.793	0.207	1.000

5. Characteristics of CREO Claims

5.1 Empirical Criteria for CREO

Unfortunately, our reimbursement claim data did not carry an identifier for CREO scheme. We could, nevertheless, identify those claims fairly accurately using the following set of rules[13] ;

（1）medical claims unaccompanied by pharmacy claims, satisfying both of the following two conditions;
    （a）zero reimbursement for examination, drugs and shots, and
    （b）reimbursement claims for consultation exceeding those of comprehensive scheme:
（2）medical claims accompanied by pharmacy claims, satisfying all of the following three conditions;
    （a）no reimbursement for examination, drugs and shots,
    （b）reimbursement for consultation exceeding the CREO points, and
    （c）no charge to patient in the pharmacy claims.

5.2 Proportions of CREO Claims

In Table 5, we have shown the shares of CREO claims in each period. In the first period, comprehensive reimbursement claims accounted for less than 14% of all the claims, but, in period 2 the share went up close to 21%,

and in period 3 the share stayed unchanged.

In Table 6, we have shown the shares of comprehensive reimbursement claims in each type of medical institution for the three periods. Only 1.5 % of small hospitals adopted the scheme in the first period, it increased to 2% in period 2, and increased only slightly in period 3. In contrast, 55% of geriatric hospitals had adopted the scheme in the first period, and the share kept decreased only slightly to 53% in period 3.In clinics, the share of the comprehensive scheme which was 14% in period 1, it increased to reach 23% in period 2, and decreased slightly in the third period.

Table 7. Comparison of FFS Claims and OCR Claims

		Geriatric Hospitals				Clinics			
		FFS		CREO		FFS		CREO	
		Mean	St. Dev	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev
Period 1	N. of Claims*	381		771		6409		1024	
	Medical Costs	5224.8	5987.6	4340.9	5343.7	2584.6	4279.3	3019.2	1165.3
	R. Claims	4664.3	6099.5	3749.1	5363.1	1987.5	4004.4	1942.9	605.4
	P. Costs	1072.8	1259.3	961.3	1198.1	772.2	1260.5	1076.2	854.1
	Total Patient Charge	1018.3	17.1	2317.8	1490.4	1020.5	66.9	1020.0	0.0
	P. Patient Charge	0.0	0.0	706.1	895.2	1.2	39.6	0.0	0.0
	N. of Visits	6.5	4.8	5.9	4.7	3.6	4.1	3.5	3.3
Period 2	N. of Claims*	467		951		13315		3883	
	Medical Costs	3497.8	1165.1	3221.8	1091.6	2491.8	4230.2	2978.9	1284.9
	R. Claims	1849.4	495.1	1749.6	486.2	1922.0	3990.0	1886.4	680.9
	P. Costs	1648.5	958.1	1472.2	878.9	719.9	1020.1	1092.9	968.1
	Total Patient Charge	1019.9	2.8	1273.7	438.1	1579.7	953.8	1370.0	518.9
	P. Patient Charge	0.0	0.0	0.0	0.0	394.6	574.1	0.0	0.0
	N. of Visits	3.6	3.1	3.2	3.3	3.4	4.1	3.7	3.7
Period 3	N. of Claims*	403		462		8097		2277	
	Medical Costs	3788.0	4724.8	3120.3	1058.4	2419.1	3944.6	3046.0	1276.9
	R. Claims	3074.9	4686.9	1696.8	411.6	1848.8	3770.4	852.157	704.4
	P. Costs	1011.3	1268.7	1423.6	886.5	719.6	756.3	1193.9	934.4
	Total Patient Charge	1553.2	605.1	1312.4	445.2	1200.0	616.7	1386.1	528.9
	P. Patient Charge	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	N. of Visits	5.3	4.4	3.1	2.9	3.5	4.3	3.7	3.7

* : Total Number of Claims Submitted during the Period

5.3 Comparison of FFS Costs and CREO Costs

Let us compare the costs of care between FFS and CREO in two relatively homogenous medical institutions, namely, geriatric hospitals and clinics. We have selected geriatric hospitals because we can secure enough sample size; the comprehensive reimbursement claims account for more than 50 % of their reimbursement claims. Although in clinics the comprehensive reimbursement claims account only around 20%, they have the largest patient population. The results of the comparison are shown in Table 7.

Geriatric Hospitals

Period 1: The average total cost of claims was 5,225 points for FFS patients, but 3,498 points for CREO patients. Medical claims accounted for 4,664 points for FFS patients, but only 1,849 points for CREO patients. Pharmaceutical claims accounted for 1,073 points for FFS patients, but 1,648 points for CREO patients. Thus the average share of pharmaceuticals in total cost of claims was 21% for FFS, but in CREO patients, it reached more than 47%. The average number of visits was 6.48 days for FFS patients, but it was only 3.64 days for CREO patients.

Period 2: The average total cost of claims for FFS patients was 4,341 points, or a decline of 17% from period 1, and it was 3,222 points for CREO patients, or a 8 percent decline. Medical claims for FFS patients decline by 20%, but, those for CREO patients declined only by 6%. Pharmacy claims declined almost by 10% in both kinds of patients. Total patient charge almost doubled to 2,318 yen for FFS patients, but it increased only by 20% for CREO patients. The average number of visits declined by 0.5 day for both FFS and CREO patients.

Period 3: The average total cost of claims for FFS patients was 3,788, which is a decline of 13% from the previous period, but for CREO patients, decline has almost ended. Cost of medical claims for FFS patients showed another decline of almost 20 percents, but the cost for CREO patients showed a decline of only around 5%. Pharmaceutical costs for FFS patients increased by 5%, but it decreased by 3% for CREO patients. Government's takeover of the drug surcharge benefited only the FFS patients, as the total patient charge dropped to 1,553 points for FFS patients, but it actually increased a little to 1,312 points for CREO patients. The average number of visits had another decline of 0.5 days for FFS patients, but the decline had stopped for CREO patients.

These observations on geriatric hospitals seem to be consistent with our theoretical model. Geriatric hospitals working under FFS are expected to try to produce as much profitable medical service internally, but those working under CREO are expected to minimize the internal production cost of medical services, and substitute them by pharmaceuticals that are not included in the fixed reimbursement. In practice, our data shows that the costs of pharmaceuticals of CREO institutions are substantially higher than those of FFS institutions.

So long as the patient charges are almost uniform across different types of medical institutions, these different medical practices will not affect the distribution of patients across these institutions. But when per visit charge and special drug surcharge were introduced, the difference in medical practices resulted in differences in patient charges. The differences in medical charges in turn induced changes in patient behaviors, including the reduction in the number of physician visits and move to medical institutions with smaller patient charges.

Clinics

Period 1：Total cost of integrated claims was 2,585 points for patients in FFS clinics, but 3,019 points for those in CREO clinics. Costs of medical claims, however, were not very different in these two types of clinics, with the former accounting for 1,987 points, and the latter for 1,942 points. Cost of pharmaceuticals were significantly different, with the FFS clinics accounting for 772 points, or 29.9 % of the total, and CREO clinics accounting for 1,076 points, or 35.6% of the total. The average numbers of visits were not very different; it was 3.64 days for FFS, and 3.55 days in CREO.

Period 2：Total costs of integrated claims dropped in both types of clinics; in FFS clinics, it was 2,942 points, or a drop of 4%, and in CREO clinics, it was 2,979 points, or a drop of 1.5%. Costs of medical claims dropped by 3% in FFS clinics and in CREO clinics as well. But the pharmaceutical costs moved in opposite directions; in FFS clinics, the cost of pharmaceuticals went down to 720 points, or a 7% drop, but in CREO clinics, it went up to 1,093 points, or a 2% increase. Total patient charge increased to 1,580 yen, a 55% increase, in FFS clinics, but it was 1,370 yen, a 34% increase, in CREO clinics. Average number of visits decreased by 0.2 days to 3.42 days in FFS but it increased by 0.1 days to 3.68 days in CREO clinics.

Period 3：Costs of integrated claims decreased by 3% for FFS clinics, but they increased by 2% in CREO clinics. As a result, the latter（3,046 points）is almost 20% more costly than the former（2,419 points）. Cost of medical claims decreased in both of them; FFS declined by 4%, while CREO declined by 2%. Pharmaceutical costs in FFS clinics remained almost the same as the previous period, but they increased almost by 9% in CREO clinics. Patient charges

dropped sharply to 1,200 yen in FFS clinics as a result of government's takeover of the drug surcharge, but they actually increased slightly to 1,386 yen in CREO clinics mostly because their patients had not paid drug surcharges. Average number of visits increased slightly to 3.5 days in FFS clinics, but it did not change very much for CREO clinics.

Again these comparative results on clinics seem to support our theoretical model. In the first period, elderly patients paid a fixed sum regardless of the intensity of the treatments they received. On average, CREO clinics spent almost 30% more in pharmaceutical costs than FFS clinics. Total costs of integrated claims were higher in CREO clinics than FFS clinics, but the difference was mainly due to pharmaceutical costs. The introduction of per visit charges and drug surcharges in the second period made FFS clinics more costly than CREO clinics, but actually the average difference was only 200 yen. Nevertheless, the lower cost attracted a substantial number of patients into CREO clinics where the physicians spend 30% more in pharmaceutical costs. In the third period, when the drug surcharges were dropped, FFS clinics suddenly became less costly than CREO clinics.

6. Econometric Analysis of Outpatient Comprehensive Reimbursement

6.1 Estimation of the Effects of CREO on Medical Care Practices

In what follows, we will explore the effects of CREO on medical practices of physicians, particularly on the cost of drugs, and the total medical costs. We will concentrate our analysis on clinics for which we have enough sample size.

The adoption of CREO depends not only on the physicians but also on the patients. In order to estimate the effect of the effects of CREO on the medical practices or their costs, we cannot treat CREO as another exogenous variable and use simple OLS. In particular, let us assume that the costs of prescription drugs per month (y_{ij}) is determined by the patient's characteristics (X_i) such as sex, age and diagnosed diseases, clinic (physician) characteristics (W_j), and the dummy variable for CREO (D_{ij}). Thus we have the following equation,

$$y_{ij} = \beta X_i + \gamma W_j + \tau D_{ij} + \varepsilon_{ij},$$

to estimate.

On the right hand size of the last equation, however, we should treat D_{ij} as a potential endogenous variable that depends on the value of the following latent variable z_{ij};

$$z_{ij} = \alpha X^*_i + \eta W^*_j + v_{ij},$$

where X^* and W^* are the relevant properties of average patients and the clinic, respectively. If the error terms of the first and second equations are independent, we can estimate the number of prescription drug equation by OLS and obtain consistent estimates of the parameters of the first equation. If, however, the error terms are correlated, estimating the equation by OLS will give us biased estimates of the true coefficients.

In such a case, we should estimate these two equations jointly by the method of maximum likelihood, the second one as a probit equation for CREO selection, or though a two-step procedure and the first one as a linear equation with an endogenous CREO dummy variable through maximum likelihood estimation. Such a model is known as treatment effect model.

6.2 Specifications

We examine the effect of CREO on the cost of drugs for clinic patients, but the cost of the drugs dispensed directly by the CREO physicians are not recorded in the reimbursement claim forms and those reimbursement claims were removed from this analysis. In effect, we will be comparing the costs of drugs of FFS physicians with

those of CREO physicians both of whom were writing pharmacy prescriptions. The cost of drugs of FFS physicians are obtained by summing the items for drugs and pharmacist charges in both medical claims and pharmacy claims. The costs of drugs of CREO physicians are the cost of pharmacy claims for their prescriptions.

In terms of specification, the explanatory variables in the cost of drugs equation are the disease dummy variables for the patient, dummy variables for period 2 and period 3, and the dummy variable for CREO. In the CREO equation, the dummy variables for period 2 and period 3, the number of beds, average number of diseases of all the patients of the clinic, and the total number of elderly patients of the clinic were selected. If the error term in the CREO equation is independent of the error of the cost of drugs equation, there is no bias in the CREO coefficient, but it has an upward or downward bias depending on whether the error terms have a positive or a negative correlation. In other words, if the physicians who choose CREO system tend to give more drugs, OLS result would be upward-biased, but if they tend to give less amount of drugs, OLS result will be downward biased.

Table 8. Estimation Results of Total Medical Costs Equation

Total pharmaceutical costs equation						
Est. Method	OLS	OLS	Two-step	Two-step	FML	FML
num. of obs	20642	20642	20641	20641	20641	20641
R2/Log Likelihood	0.610	0.476			-29837.706	-30040.675
Root MSE	0.542	0.652				
Variables 1) 2)						
num. of visits	0.043	0.044	0.043	0.044	0.043	0.044
OCR	0.222	0.206	0.394	0.373	0.410	0.391
female	-0.042	-0.041	-0.042	-0.042	-0.042	-0.041
num. of diseases	0.088		0.088		0.088	
Period 2	-0.102	-0.092	-0.113	-0.102	-0.114	-0.104
Period 3	-0.122	-0.105	-0.133	-0.115	-0.133	-0.116
OCR probit equation						
Variables 1)						
Period 2			0.147	0.147	0.156	0.156
Period 3			0.174	0.174	0.185	0.184
num. of beds			-0.091	-0.091	-0.089	-0.089
ave. num. of diseases			0.177	0.177	0.170	0.171
num. of patients			-0.002	-0.002	-0.002	-0.002
constant			-0.768	-0.768	-0.730	-0.739
Other Parameters						
rho			-0.171	-0.165	-0.186	-0.182
sigma			0.647	0.653	0.648	0.654
lambda			-0.111	-0.108	-0.121	-0.119
Wald test 3)					53.07	49.72

1. All the coefficients have p-values<0.001.

2. Coefficients of disease dummy variables are not shown here.

3. Chi2 statistics for the independence of the two equations (rho=0)

6.3 Effects of CREO on the Cost of Drugs

In Table 8, the second and the third columns show the results of OLS estimation of the drug cost equation. According to the OLS results, the CREO has increased the cost of drugs by more than 20%, while the reforms in the second period reduced the pharmaceutical costs by 10%, and the effects remained intact in the third period. The fourth and fifth columns of the same table show the results of treatment effect estimation by two-step procedure. According to the two-step procedure, for a given patient, if his physician has accepted CREO, the cost of drugs would be 37% to 39% larger than what his physician used to use under FFS. In the last two columns of the same table, we report the results of the maximum-likelihood estimation. The cost of drugs under CREO practice would be larger than those under FFS practice roughly by 40%, almost double the OLS estimates. The OLS underestimated the effect of CREO on the cost of drugs, because, as we had expected in our theoretical model, physicians who tend to use less drugs for given conditions of patients tend to choose CREO more. The reforms including the drug surcharge had reduced the drugs costs of (baseline) FFS physicians by more than 10% in the second period, and, slightly more in the third period, in spite of the end of drug surcharge, respectively compared with the first period.

In the bottom part of the same column, we can see the characteristics of clinics that adopted the CREO. The more beds and the more patients a clinics has, less likely it is to adopt CREO. But more diagnosed diseases an average patient has, more likely it is to adopt CREO. In the second period, the probability of adopting CREO increased by 15%, and slightly more in the third period, both compared with the first period.

Table 9. Estimation of total medical costs equation

Total medical costs equation						
Est. Method	OLS	OLS	Two-step	Two-step	FML	FML
num. of obs	20642	20642	20642	20642	20642	20642
R2/Log Likelihood	0.610	0.606			-26219.493	-26309.84
Root MSE	0.542	0.545				
Variables 1) 2)						
num. of visits	0.082	0.083	0.082	0.082	0.081	0.082
OCR	0.157	0.148	0.327	0.315	0.552	0.557
female	-0.047	-0.047	-0.047	-0.047	-0.046	-0.045
num. of diseases	0.049		0.050		0.049	
Period 2	-0.052	-0.047	-0.063	-0.057	-0.077	-0.072
Period 3	-0.083	-0.073	-0.093	-0.083	-0.107	-0.098
OCR probit equation						
Variables 1)						
Period 2			0.147	0.147	0.147	0.148
Period 3			0.174	0.174	0.166	0.165
num. of beds			-0.091	-0.091	-0.085	-0.085
ave. num. of diseases			0.177	0.177	0.161	0.162
num. of patients			-0.002	-0.002	-0.002	-0.002
constant			-0.768	-0.768	-0.747	-0.758
Other Parameters						
rho			-0.200	-0.197	-0.446	-0.459
sigma			0.545	0.547	0.563	0.566
lambda			-0.109	-0.108	-0.251	-0.260
Wald test 3)					71.31	71.36

1. All the coefficients have p-values<0.001.

2. Coefficients of disease dummy variables are not shown here.

3. Chi2 statistics for the independence of the two equations (rho=0)

6.4 *Effects of CREO on Total Medical Costs*

In Table 9, the second and the third column show the results of OLS estimation of the total medical cost equation. We define the total medical costs as the sum of the costs in the physician's claims (inclusive of out-of-pocket costs) and the pharmacy's claims for their prescriptions. The estimated coefficients show that CREO has increased the total medical costs by 15% or so, while the reforms have reduced the costs by 5% in the second period and by 7% or more in the third period, respectively, compared with the first period. The fourth and fifth columns of the same table show the results of our two-step treatment effect estimation. According to the two-step estimation, CREO physicians managed to charge 30% or more compared with FFS physicians. The sixth and seventh columns of the same table show the results of full maximum-likelihood estimation of the treatment model. According to the FML results, CREO was even more costly, both to the government and to the patients; it managed to increase the costs of CREO physicians by 55% compared with FFS physicians, controlling for patients' diagnosed diseases, provided that both physicians were writing pharmacy prescription. On the other hand, the reforms including the drug surcharge had reduced the medical costs of (baseline) FFS physicians by 7% in the second period, and, by 10% in the third period in spite of the end of drug surcharge, both compared with the first period.

7. Conclusions

In 1996, Japanese government introduced Comprehensive Reimbursement for Elderly Outpatients in an attempt to remove the three basic problems of the Japanese primary-care in those days; over-medication, over-testing, and over-visitation. Geriatric hospitals and clinics were intended as primary targets of CREO, but they were also given the choice to remain under FFS. By providing fixed payment to treat patients with common chronic diseases, the government hoped to remove the incentives to provide excessive care. In 1997, the government followed it by introducing per-visit charge and drug surcharge. Taken separately, each of these measures should have been a sensible measure, but, altogether, they did not work in the way the government had hoped.

Particularly disappointing was CREO, as it actually worked to increase the costs of medical care. Through our analyses, we have shown why and how it happened:

(1) we have shown that the reform measures of 1997 drove substantial number of elderly patients from FFS scheme to CREO scheme. We have shown that the switch was made in medical institutions that provided patients with relative low intensity of care but with high volume of drugs:

(2) as almost half of the geriatric hospital patients had been already treated under CREO, the additional measures of 1977 had relatively small effects on geriatric hospitals:

(3) the adoption of CREO increased substantially after the 1977 measures, and almost all CREO patients were issued pharmacy prescriptions, which exempted them from paying the drug surcharge at pharmacies. The clinics with relatively high drug cost patients had stronger incentive to adopt the scheme, and once they adopted the scheme, they felt no incentive to reduce the drug costs.

In sum, CREO was very costly; according to our estimation, it had increased the drug costs and the medical costs of CREO clinics by 40 to 50 percent. This is in sharp contrast with FFS clinics that had decreased their drug costs and total medical costs by almost 10 percent. Our analysis points to the sources of these failures; there were two of them. First is the selectivity of CREO and FFS. The targeted medical institutions could select either of the two depending on which one is more profitable. The second critical error is the exemption of CREO patients from paying drug surcharge. The first problem would have been far less costly in the absence of the second problem[14]. Thus the exemption was the proverbial horse-shoe nail[15] that had been lost in a fight to control the health care costs of the elderly.

Footnotes

1   I would like to thank All-Japan Federation of National Health Insurance Organizations for making this date set available for our research. I would like to thank the referee of this journal for his helpful comments. The original version of this paper had been presented at the Japan Economic Society Meeting in 2006. I have benefited from Professor Wataru Suzuki's valuable comments there. This research has been supported by a research grant from Pfizer-zaidan (principal investigator Tadashi Yamada 2003-2004) and a special grant to Hitotsubashi University from the Ministry of Education, Science and Technology (principal investigator Noriyuki Takayama 2009).

2   There was an upper-limit to the out-of-pocket payment for the elderly patients; for in-house prescription, it was 3000 yen for clinics and hospitals with less than 200 beds, but 5000 yen for hospitals with more beds. For outside prescription, the upper-limit was one-half of that amount for both medical institutions and pharmacies. Also clinics were able to choose to charge 800 yen per visit up to four times a month.

3   One point is worth ten yen in Japanese public health insurance reimbursement.

4   Other physicians are allowed to claim "joint supervision fee" (more than 200 points) up to twice a month.

5   For patients visiting once a month, the reimbursement was 735 points for an in-house prescription, but it was 885 points otherwise.

6   In other words, a medical institution must accept the comprehensive reimbursement scheme for all patients to whom the scheme was applicable. When the patient's condition suddenly deteriorates, however, it was able to provide necessary medical services on the fee-for-service basis.

7   Furthermore, in measuring the effects on medical care costs and the number of visits of the comprehensive reimbursement scheme, Kawai and Maruyama (2000) have used its dummy variable as an independent variable. As the choice of comprehensive reimbursement may be an endogenous variable, their result suffers from an endogeneity bias.

8   In this section, we are expressing critical values of the system in terms of points rather than in terms of yen.

9   These were mostly medical reimbursement claims submitted by providers located outside this city.

10 This category includes all the hospitals that were neither general hospitals nor geriatric hospitals. To be exact, therefore, they are "other hospitals". Since most of these hospitals are small hospitals, particularly in a local city of modest population, we will refer them as "small hospitals". Since these hospitals tend to be small, we refer them as small hospitals.

11 Until the revision of Medical Service Act in 1996, a general hospital was a hospital with at least 100 beds, and had to offer at least the following five departments; internal medicine, surgery, otorhinolaryngology, ophthalmology, obstetrics and gynecology. Although the classification was abolished in 1996, most hospitals that had called themselves general hospitals still continue to use the name.

12 The government used to classify a hospital as a geriatric hospital, if more than 60 percent of its inpatients was 65 years old or older, and reimbursed its claims at reduced rates.

13 We have tried a simpler criterion for OCR scheme where examination points exactly matched those in OCR scheme; practically speaking, there were no difference between the two criteria.

14 In January 2001, the government started to impose 10% surcharge for all pharmacy prescriptions, subject to caps. For clinics and small hospitals, the maximum surcharge was set at 1,500 and for large hospitals, it was 2,500.

15 *"For want of a nail the shoe was lost. For want of a shoe the horse was lost. For want of a horse the rider was lost. For want of a rider the battle was lost. For want of a battle the kingdom was lost. And all for the want of a horseshoe nail."*

References (in Japanese)

Seiritsu Ogura (2006)," Why CREO Pushed Up the Health Care Costs of the Elderly?", paper presented at Japan Economic Association.

Hiroki Kawai and Shiko Maruyama, "An analysis of the effect of the inclusive payment system on costs and intensity of care-the cases of elderly outpatients and infant outpatients", Japanese Journal of Health Economics and Policy, Vol.7 2000, pp37-63.