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SUMMARY

The Ministry of Health and Welfare of Japan took the initiative to discourage lengthy hospital treatments and/or stays, especially for the elderly. This paper explores the public policy and examines the trade off between the number of treatment days and the units of service provided per day for elderly patients by medical service providers, to evaluates the effectiveness of the government cost-containment initiative and its policy consequences. We use the three leading diseases among the elderly and separate care utilization into episodes by type of treatments. Our results suggest that the government measure can reduce lengthy hospital treatments and/or stays by the elderly but the policy does not effectively influence medical service providers to curb increases in medical care expenditures with the fee-for-service basis under the managed national health care system. The results indicate the interdependency between days and units of services. Medical service providers are likely to prescribe more drugs as prices of drugs decline under the generous price controls of the fee-for-service basis. Generous reimbursement prices for the material type of services with price controls seem to encourage medical service providers to supply more services to mitigate the loss of financial resources as the reimbursement prices fall.

I Introduction

At present, the United States and Japan along with most other industrialized countries are faced with aging societies. The percentage of Japanese citizens aged 65 and over is currently 13 percent and is expected to reach 17 percent by the year 2000 and 25 percent by 2025. This increase in the aging population will significantly affect national medical care expenditures in Japan. The elderly receiving medical care services have increased 8.1 percent per year on average since the early 1980s. Medical care expenditures for the elderly have increased faster than national medical care expenditures (5.5 percent on average), and the ratio of these expenditures for the elderly to national medical care expenditures has been constantly rising (Table 1).[1,2,3] The recent measure taken by the Ministry of Health Welfare is to offer incentives to hospitals to discourage lengthy stays at hospitals by the elderly and to curb increases in medical care expenditures. The purpose of this study is to evaluate the effectiveness of the government cost-containment initiative with the fee-for-service basis under the managed national health care system and its policy consequences.

With the rapid increase in medical care expenditures in the U.S., researchers have focused on policies on cost containment strategies. Garrison[4] points out that payment policies with expenditure caps may offer the most promise in the short run as a method for limiting cost growth. However price controls create drawbacks under a fee-for-service basis for over-providing medical services in the long run. Butler[5] places emphasis on a consumer-based universal health care system with a system of refundable tax credits based on family income and risk category rather than the current tax exclusion for company-based health plan. This choice leads consumers to make better health care decisions and is a powerful restraint on cost. Newhouse[6,7] underscores

that some cost containment policies may result in welfare loss for the insured and may even increase the number of insured. He emphasizes the importance of a dynamic context of welfare loss rather than the welfare loss in the short run with the presence of reimbursement insurance.

Traditional cost-containment analysis generally focuses on the institutional sector. Bailit and Sennett[8] remark utilization management programs as a primary cost-containment strategy. They state that in spite of a significant reduction in bed days under utilization management programs in the United States, the reduction limits the impact on aggregate health care costs, for as hospital bed days decline, the cost of unmanaged medical services increases. Lave and Frank[9] find that per case systems and negotiated contracts lead to decrease in costs by a significant decrease in the length of stays under the prospective payment system. But Custer, Moser, Musacchio and Willke[10] claim that the system results in a reduction in the quality of health care delivered.

Previous studies report that the experiences with cost-containment policies in the U.S. show not only some effectiveness in controlling rapid increases in medical care expenditures but also some drawbacks. More importantly, McGuire and Pauly[11] in their study on the U.S. Medicare system point out that unlike usual economic markets, a fall in exogenous prices will lead to an increase in supply because of the government managed fee schedule. Their findings show that from the individual physician's point of view price cuts will lead to increases in the volume of services. Thus the objective of our paper is to apply McGuire and Pauly's findings to examine hospital behavior under the government managed health care system in Japan. First, we will analyze the effectiveness of the government cost-containment policy, more specifically the government reimbursement policy. We will assess whether the intention of the Ministry of Health

and Welfare's measure discourages in Japan lengthy hospital treatments and/or stays of the elderly and curbs increases in medical care expenditures by lowering reimbursements for medical services and constrains the quantity of medical services under the fee-for-service basis in the managed national health care system. Second, we will examine the trade off between the length of treatments and units of services provided by medical service providers. Third, since the Ministry of Health and Welfare imposes stringent price controls for the skilled type of services (injection, general treatment, consultation and operation) and allows more generous reimbursement prices for material type of services (medication and examination) under the fee-for-service basis, we will analyze effects of these differences on medical services.

The organization of this paper is as follows. Section II presents a brief summary of the historical background of the Japanese medical care system for the elderly. Section III describes the conceptual framework and methodology. The empirical results are presented in Section IV and finally the conclusion in Section V.

II Historical Background and Medical Care System for the Elderly

In 1963 the Welfare Law for the Elderly was established to provide physical examinations for the elderly. This Medical Care Expenditure Payment System (MCEPS) was enacted in 1973. This free care system, in which the copayments of the elderly were paid for by the government, resulted in too frequent medical treatments and caused a rapid expansion in government expenditures on medical services for the elderly.[12,13] The average annual percentage change in medical care expenditures was 18 percent until the Health Service System for the Elderly was established in 1983. The MCEPS system created an imbalance in the burden between the elderly

who were covered by Employees' Health Insurance and Community Based National Insurance. However, this system enabled the elderly to have access to medical care services, and provided needed medical care services for them. The present cost-sharing system (Health Service System) for the elderly, does not eradicate the imbalance of the burden shared among different health insurers. Currently the elderly are responsible for a minimal portion of the medical costs with the remaining costs jointly paid by the national (20%), state (5%) and local (5%) governments, and the insurers of the medical care insurance systems (70%).

The insurance system for the elderly consists of five insurers under government supervision. Government-managed Health Insurance covers employees at places of work (mainly small and medium sized enterprises) where no Social-managed Health Insurance is established. Social-managed Health Insurance covers employees at places of work (mainly large enterprises, i.e. enterprises with 300 and more employees) where Social-managed Health Insurance is established. Seamen's Insurance covers seamen, those on ships/boats. Mutual Aid Associations covers national public service employees, local public service employees, and private school teachers and employees. National Health Insurance covers people who are not covered by employee insurances (farmers, the self-employed, carpenters, doctors, employees of small businesses, etc.) and retirees formerly under employees' insurance and their dependents. In 1994 about seventy percent of the 10.884 million elderly belonged to National Health Insurance while seventeen percent were general employees under Government-managed Health Insurance. The remaining thirteen percent belonged to Social-managed Health Insurance, Seamen's Insurance and Mutual Aid Associations.[1]

Medical service providers follow the reimbursement schedules by utilizing a point system

which is set by the Ministry of Health and Welfare of Japan. The reimbursement price is based on a point system. This unified point system is applied to all medical service providers, regardless of the types of health insurance provided. The role of the point system is to generate enough revenues to cover the costs incurred. Each item of medical service is assigned a certain number of points, and providers are reimbursed a sum of total points multiplied by 10 yen (approximately 10 cents assuming one dollar equals 100 yen) under the fee-for-service basis. The point system is classified into thirteen service categories: medication, injection, examination, hospital service, general treatment, radiology, mental treatment, anesthesia, basic consultation, home care, image diagnosis, operation and physiotherapy. In these groups there are further classifications. For example an initial consultation is 195 points (1 point=10 yen except medication) and 450 points with referrals; nursing at hospitals is 318 points; injection ranges from 15 to 150 points, depending on the skill required. The point of medication is 1 point per 15 yen and is the material purchasing price plus the prescription which is 74 points per unit. These changes in points are dependent on whether the patients are children, adults or the elderly, the degree of skill required, the quantity of material needed and the patient's length of treatment. The government reimbursement price consists of these complicated pricing classifications on a fee-for-service basis.

For the elderly, the criteria for government reimbursement slightly differs from the general case. Table 2 shows points by the types of services. The services such as medication, injection, operation, anesthesia, and radiology do not have specific point criteria for the elderly. These consist of so many kinds of services and treatments that the differences between maximum and minimum points are large, e.g. 1,200 yen (1 point=10 yen) ~ 800,000 yen for operation, 310 yen

~ 51,000 yen for anesthesia, and 800 yen ~ 100,000 yen for radiology. Abe[14] intensively discusses a lack of strict internal controls by medical service providers, who create a failure to perform efficiently, under the Japanese point system.

The share pattern is different for the three types of leading diseases for the elderly as defined by the different service categories shown in TABLE 3. Hospital services represents the largest expenditures for mental illness patients, followed by heart-related diseases and cancer. With cancer, the injection category and hospital services category dominate the share. Especially, cancer patients within one year require more points for injections: about 230 points per day per patient on average, and they require 85 points per day per patient after one year (see Table 2 for injection service). For the medication category, mental illness and heart-related diseases have a relatively larger share than cancer. Regarding reimbursements for the skilled type of treatment services, general treatment and consultation reimbursement are higher for heart-related diseases than in the case of cancer, while the operation category is higher for cancer than heart-related diseases. With mental illness, the skilled types of treatment services play a smaller role than general treatment.

Let's briefly describe the Japanese hospital system. The total number of hospitals is about 10,100 and about 72 percent of them are private hospitals whose share of total beds is about 54 percent.[2,13] The private hospitals are prohibited from operating for profit and their chief executives must be physicians. Their capital investments are not restricted except for recently regulated bed expansions.[15] The number of general hospitals is about 9,000, and the rest are psychiatric, tuberculosis, infectious, leper and other long-term hospitals. Hospitals with less than 100 beds are about 4,500 and those of 100 and over are about 5,600. The total number of clinics is 82,000,

private clinics share about 84 percent and they share about 96 percent of beds. The rest of them are public clinics. A clinic is defined as having less than a 20-bed capacity and the clinic is legally prohibited to hold a patient for more than 48 hours except under special circumstances. In Japan, physicians in the clinic do not have access to hospital facilities because unlike the United States, Japan's physicians are not affiliated with the hospital system. Thus the physicians in clinics must refer all patients needing care that they cannot legally and physically provide within their own premises. Both clinics and hospitals compete for patients. Patients have the freedom to choose any hospital or clinic for their needs. Recently, patients have increasingly been turning to the large public hospitals because of better facilities and human resources.

III Analytical Framework

1: Model Structure

For utilization of treatments, medical service providers have dual roles. They function not only as the patient's advisors but also as income optimizers for their own interest. In the latter role, these providers have an incentive for optimizing their target revenue under a fee-for-service basis in a managed national health insurance system. In this paper we note that the meaning of target revenue by medical providers is different from the well-known theory of target income hypothesis of physician pricing. Our hypothesis suggests that physicians will induce consumer demand for services with an change in prices of medical services because the unified point system under the fee-for-service basis is controlled by the government in the managed national health care system. With elderly care we also note that service utilization not only rises rapidly near the terminal period, but also the last days of physician and hospital services have less resource

utilization than the first days. It is plausible that a fall in the average length of treatments by the government containment policy for lengthy stays by the elderly may increase the resource intensity per day under the fee-for-service basis. A rise in the amount of reimbursements per day, namely medical care expenditures, depends on the average utilization of services per day and the last day's marginal change in the resource intensity. If a medical service targets a certain revenue, then there exists a trade off between the length of treatment in days and the quantity of services per day within a given target revenue.

In this section we proceed to formulize a relationship between the length of treatment in days and the number of units of service treated per day by a hospital along with the effect of the reimbursement prices on a volume of medical services by a hospital in a generalized framework. Each disease requires different types of treatment services within an episode and the cost of each treatment service is reimbursed by the government. In Japan, physicians are heavily involved in decision making in hospitals. In this study, medical service providers mean both physicians and hospitals. This assumption is not extreme. Coyte[16] does not make the distinction between hospital managers (entrepreneurs) and specialists (i.e. physicians) employed.

Let a reimbursement price by the government to medical service providers:P_r, be expressed as, (1) $P_r = P_m \cdot s + P_m \quad 0 < s < 1,$

where P_m denotes a shadow price of health and medical service by providers, "s" stands for a subsidy rate by the government, Pm·s is a government subsidy through medical service providers. The government subsidy with a fee-for-service basis tends to induce medical service providers to provide more medical services to patients and to create induced demand for medical service:Q.[17] The choice of medical service is determined by providers, not patients. Providers will be guided

by their efficiency and treatment prices which will affect their revenues. Under the existing managed national health care system, the demand curve for health and medical services with the government subsidy would shift to the right. Thus, a one unit increase in the demand for health and medical services results in an increase in price which depends on the slope of the supply curve. Each percentage increase in Q raises the market price of medical services, resulting in a net change in price due to a one unit increase in medical care is expressed as

(2) $\partial P_m/\partial Q = 1/Q \cdot P_m \cdot 1/\epsilon$.

An absolute rise in the price ($\partial P_m/\partial Q$) is equal to a medical price per service multiplied by $1/\epsilon$ which is the inverse of the elasticity of the supply of medical services. Thus, the total price is expressed as, $\partial P_m/\partial Q + P_m$. Japan's point system is based on fee-for-services, and providers will be encouraged to generate revenues to cover the total cost. It provides more individualized care and requires different resources for treatment.

The intention of the government's point system was originally to encourage efficient resource utilization and it depends on the optimal size of the government subsidy which in turn influences the revenues of medical service providers. An equilibrium subsidy rate, given the medical service supply curve, is derived from equations 1 and 2. We obtain the following.

(3) $s = (\partial P_m/\partial Q)(1/P_m)$,

where the subsidy rate is a rate of change in P_m with respect to Q. Under the government subsidy of the managed national health care system, the equilibrium point moves to the right by a shift in the demand curve to the right, therefore, the population would enjoy a higher level of consumption of medical services. The purpose of the managed national health care system in Japan is for the government to provide comprehensive health and medical services for the

population. This will improve the health status of Japanese citizens, and in turn will extend the amount of time available for daily activities, because a decrease in the number of sick days will increase the time available for socio-economic activities such as work, leisure and quantity of life from a human capital point of view.[18,19] Thus, the system will raise the economic value of human resources and permeate benefits to others through a provision of health and medical services in society.[20,21,22] As a result, the external benefits to others in society emerges. An increase in social benefits is expressed by $MSB=\partial P_m/\partial Q=P_m \cdot s$ and the government subsidy rate has a positive relationship. The larger the gap between the supply curve and the social benefits curve, the higher the subsidy rate the government provides.

A government subsidy largely depends on the slope of the medical services supply curve. The current supply curve depends on and is determined by the efficient use of medical input resources. As has been mentioned, we will examine a trade off between the length of treatment in days and units of service provided per day with a simultaneous model. We do not intend to test the effect of going from no government insurance to having government insurance. For simplicity of analysis we do not change the slope of the demand curve because a change in the demand curve does not enhance the results of the model in this analysis. Given the government reimbursement price, a medical service provider has a target at a certain revenue. Revenue is an additively separable revenue function and is defined as

(4) $R = P_r \cdot Q(Q_l, Q_s)$,

where Q_l and Q_s are lengths of treatments and quantity of services provided, respectively. This separation is theoretically proved by Coyte,[16] and he explicitly discusses medical service providers as utility maximizers. For a dual role assumption, providers act according to a patient's financial

and medical interests as decision makers, and also act as their own utility maximizers who target an optimization of total revenue. A provider's optimized revenue is obtained by differentiating the total revenue with respect to both types of care provided, which we represent as,

(5) $MR = AR_l[\ 1 + (1/\epsilon_{PrQl})] + AR_s[\ 1 + (1/\epsilon_{PrQs})],\ MR \geq 0$

where MR is a marginal revenue, AR is an average revenue of a length of stay:l, and of a quantity of service:s, and ϵ is a government reimbursement price elasticity of a length of stay:ϵ_{PrQl}, and of a quantity of service:ϵ_{PrQs}. Japan's point system, i.e. the government reimbursement price, has an important role for the medical service providers and influences on quantitative decision of medical services, especially the fee-for-service basis which induces the providers to perform a dual role.

Let's suppose T is a target-revenue margin per unit as mark-ups over cost. It is expressed as follows.

(6) $T = (P_r - MC)/P_r$,

where MC is the marginal cost of medical service provided, and P_r is the government reimbursement price. A smaller gap between P_r and MC represents a more competitive market.[23] Therefore T tends to be small. Under an optimal condition from equations 5 and 6, we express as,

(7) $P_r = AR_l\{[1+(1/\epsilon_{PrQl})]/[1-T]\} + AR_s\{[1+(1/\epsilon_{PrQs})]/[1-T]\}$, and

(8) $MSB = \partial P_m/\partial Q = AR_l\{[1+(1/\epsilon_{PrQl})]/[1-T]\} + AR_s\{[1+(1/\epsilon_{PrQs})]/[1-T]\} - P_m$.

The derivation of the above approach is in conformity with the theoretical framework of optimization.[24]

Equation 8 presents the following interesting implications in a provision of medical service under the current managed national health care system. Given an equilibrium quantity of medical services, an inelastic ϵ_{PrQl} and/or ϵ_{PrQs} means a large $1/\epsilon = s \cdot Q$ at the equilibrium level of medical

services. It implies that a large subsidy relative to the market price (namely the subsidy rate:s) will be required with a steep inelastic supply curve. Hence a medical service provider targets a high level of T because of an increase in the level of P_r with a given level of P_m and a quantity of medical service. An inelastic supply curve requires the government to spend a relatively large amount of subsidies to maintain national medical services at existing levels, while an elastic supply curve (a small $1/\epsilon = sQ^*$) requires a lower amount of government subsidies. Thus, efficiency in producing medical services by providers is important to achieving a cost-containment policy without large increases in government expenditures.

We have discussed the implication of government reimbursement prices on the behavior of medical service providers target revenues. Our concern is that the objective of medical service providers as optimizers is to target a certain level of total revenue under the fee-for-service basis. In this case, a change in government reimbursement prices will affect the medical service providers who control the quantity of medical services, such as the length of treatment in days and/or number of units of service per day. An assumption of our target revenue hypothesis is that medical service providers maintain their actual total revenues. The following equations derived from equations 7 and 8 allows us to analyze precisely how different service treatments affect the length of treatment in days and the quantity of services provided.

(9-1) $Q_l = \theta^{-1}{}_l/Z_{PrQl} - Q_s\phi_{ls}(Z_{PrQs}/Z_{PrQl})$, and

(9-2) $Q_s = \theta^{-1}{}_s/Z_{PrQs} - Q_l\phi_{ls}(Z_{PrQl}/Z_{PrQs})$,

where Z_{PrQl} is $[1+(1/\epsilon_{PrQl})]/[1-T]$, Z_{PrQs} is $[1+(1/\epsilon_{PrQs})]/[1-T]$. $\theta^{-1}{}_l$ and $\theta^{-1}{}_s$ are inversed proportions of government reimbursement prices to revenues from the length of stay and to revenues from the quantity of services provided respectively. ϕ_{ls} is a ratio of revenues from the length of stay to the

quantity of services provided. Equations 9-1 and 9-2 show that Q_l and Q_s are functions of both a length of treatment in days, a quantity of services provided, and the government reimbursement price. Q_l and Q_s are also simultaneously determined.

To understand the process of producing medical services for the elderly from the government's point of view regarding health care needs among the different treatments for an episode, we will investigate the impacts of reimbursement prices of various services on the length of treatment in days and the number of units of service. We will also examine these relationships regarding the existence of a trade off between the treatment in days and the quantity of services provided per day within an episode. The length of treatment in days and the number of units of service treated per day employed within the context of this paper are estimated as,

(A) $DAY = f(SERVICE, PRICE) + \omega_1$, and

(B) $SERVICE = f(DAY, PRICE) + \omega_2$,

where DAY is the length of treatment in days for treatment, SERVICE is the number of units of service provided per day, and PRICE is the various reimbursement prices received from the government through the health care system. The ω in (A) and (B) are two random disturbances, because there are components of the length of treatment in days for treatment and the number of units of service per day that are affected by unmeasurable factors. To test the interdependency between the length of treatment days and the quantity of services per day we will employ a system of simultaneous equations using a two-stage-least-squares estimation.

2: Data

The data used to estimate models A and B is based on the Shakai Iryo Shinryo Koibetsu

Chosa Houkoku (The Survey Report of Social and Medical Examinations and Treatments in English) 1989-1991 which is based on averaged- and aggregated financial data surveyed in June of each year and is compiled by the Ministry of Health and Welfare. The paper analyzes the three leading diseases among the elderly: cancer, heart-related diseases and mental illness. Cancer and heart-related diseases cause the highest rate of death and hospitalization among the elderly in Japan. Medical expenditures on cancer (15.0%) and heart-related diseases (37.1%) dominate, with expenditures on mental illness (6.7%) being fourth, for the elderly age 65 and over.[2,12] Mental illness has recently been increasing as the life expectancy of the elderly rises and has also gradually increased its share of medical expenditures.

This aggregate data contains thirteen disease classifications, for which we chose the three leading types of diseases (48 observations for cancer, 54 for heart-related diseases and 48 for mental illness). Another source of data is the Government-managed Health Insurance and the National Health Insurance (120 observations) which make no distinction between disease classification. The latter data also contains thirteen types of treatment services with the number of claims, services and the amounts of government reimbursements. Both sources do not classify between male and female differences regarding the length of treatment in days and units of service provided. Using dummy variables we will integrate the two important health insurances (Government-managed Health Insurance and National Health Insurance) and age classifications of 65-69 and 70 and older into the estimation of all the elderly.

We are not able to integrate the variables of insurance and age for the estimation of each disease (cancer, heart-related diseases and mental illness) because of inadequate data regarding disease classification among the elderly in this publicly available data. The data does not contain

information about the providers' and the patients' characteristics. Thus, we await the availability of micro-level data on the public to get further insight. Table 4 presents the definition of variables. Means and standard deviation are reported in Tables 5-1 (Elderly with Government-managed Health Insurance and National Health Insurance aged 65 and over) and 5-2 (Three leading diseases among the elderly).

IV Empirical Results

Tables 6-1 (Elderly with Government-managed Health Insurance and National Health Insurance aged 65 and over) and 6-2 (Three leading diseases among the elderly) present the results of reimbursement prices on the number of days of treatment and units of service per day. We employed various government reimbursement prices as exogenous variables while controlling quantity measures: the amount of services and length of treatment in days. Regarding medical-service quality control, as Mwabu, Ainsworth and Nyamete[25] discuss medical services by physicians, our study has difficulty in controlling for quality measures because of the characteristics of the data. We present the results of the specification test for endogeneity for the elderly in Table 6-1. According to the Wu test, the study rejects the null hypothesis of zero correlation between the error term and the medical service terms (services and days) at the 1% level. The treatment of these variables as endogenous is found to be appropriate. As an appropriate estimation procedure we employed a two-stage least squares regression.[26,27,28,29]

As for the identification of simultaneous equation models, Kmenta[30] and Green[31] intensively discuss the conditional requirements to perform the simultaneous equations. The model of equations in our study should be identified. The equation for the elderly with

Government-managed Health Insurance and National Health Insurance aged 65 and over (Table 6-1) is identified. The equation for cancer (Table 6-2) is over-identified. The equations for heart-related diseases (Table 6-2) and mental illness (Table 6-2) are identified. In the model of simultaneous equation in our study, the order condition of identifiability and the rank condition are all examined, and these conditions for all four equations are satisfied. The use of conditional indexes for the detection of multicollinearity is required. The results of conditional indexes are less than 5.5 and the variance of inflation factors are less than 4. We conclude that there exists no harmful multicollinearity problem.

Tables 6-1 and 2 report the estimation results as an elasticity term. The coefficients of primary interest on treatment days and services are statistically significant and negative signs. The results of the negative signs represent an inverse relationship between treatment days and the amount of services provided per day for the elderly. The results seem to be consistent with our prior hypothesis, i.e. an inverse relationship exists between services and treatment days. In Table 6-1 the results of a negative sign represents an inverse relationship between treatment days and the amount of services provided per day for the elderly. The effect of services on days has a larger impact than that of days on services. Under the fee-for-service basis in the managed national health care system, medical service providers can easily increase their revenues through additional services, not by additional treatment days. Our research provides evidence for this important findings, however further careful empirical testing is necessary to generalize the inverse relationship, namely the trade off between treatment days and units of services provided, and to measure the initiative taken by the Ministry of Health and Welfare of Japan regarding lengthy hospital stays by the elderly under the fee-for-service basis.

Regarding the results of the three types of leading diseases: cancer, heart related-disease and mental illness, services and days show a negative relationships in Table 6-2. With cancer, a one percent increase in services will lead to a 1.515 percent decrease in days, while a one percent increase in treatment days will lead to a 0.426 percent decrease in services per day. For cancer treatments, the marginal impact of the units of service per day on treatment in days is a net change of 17,150 yen ($171.5: $1=100 yen) for medical service providers and the marginal impact of treatment days on services per day is 3,634 yen ($36.34).[32] Stated differently, the providers gain more revenues by increasing the units of service, rather than by increasing treatment days, because the impact of services is greater than the impact of induced change in a treatment day. If the providers increase per day treatments, then their revenues will decline, and vice versa. Again the impact of per day treatment is smaller than the impact of induced change in per day services.

Under the fee-for-service basis the medical service providers are easily able to raise the quantity of services to treat the elderly. However, the objective of the Ministry of Health of Welfare is to discourage lengthy stays by the elderly by lowering reimbursement prices. This causes the providers to obtain less revenues by lowering reimbursement prices. But the results show that the medical providers would not lose revenues by increasing additional services because of the positive net gain of about 13,516 yen (=17,150-3,634) per day, when the quantity of services rises regardless of a change in controlled services or of an induced services change. For the policy by the Ministry of Health and Welfare to reduce lengthy hospital stays, our empirical study shows that the shorter the hospital stay of an elderly patient, the larger the amount of additional services.

Our results indicate that the government objective appears to work in a narrow sense, i.e.

to reduce lengthy hospital stays, however the medical expenditures by the government for the elderly do not decline under the fee-for-service basis in the managed national health care system. In addition, the quantity of services is a larger influence on cost savings than on treatment days from the view of the government. Thus the government cost-containment policy is not effective.

In comparison to cancer, heart-related diseases estimated coefficient of treatment days in Table 6-2 is less elastic while that of services is more elastic. A one percent increase in services will tend to lower treatment days by 0.9776 percent, and a one percent increase in treatment days will lower the quantity of services by 0.5375 percent. It is also notable that the impact of services on treatment days contributes 17,047 yen ($170.47) which is very similar to the amount derived for cancer, whereas the impact of days on services contributes only 7,516 yen ($75.16) which is twice as large as in the cancer case. In spite of the inverse relationship between days and units of service, an ineffective cost-containment policy occurs because an increase in the amount of government reimbursements caused by an increase in units of service dominates the amount of the government reimbursement which stems from a decline in treatment days for the elderly. For mental illness, although the gain is a small amount of 833 yen ($8.33), the results for mental illness also implies a similar conclusion.

As has been discussed in the implications by equation 8 in III Analytical Framework, it is not difficult to discern that the government cost-containment policy, namely the measure to discourage lengthy hospital treatments and/or stays by the elderly by lowering reimbursement prices under the fee-for-service basis, actually results in an increase in government expenditures in spite of reducing lengthy hospital stays. Our results are indicative of an inelastic supply curve and medical service providers seemingly target a high level of T: a target-revenue margin per unit as

mark-ups over cost with a given level of quantity of medical services.

Turning our attention to the effect of government reimbursement prices on skilled and material types of services, we will not examine all thirteen types of treatments in the same manner for three types of diseases, because physiotherapy is close to zero and less important for cancer but not for heart-related diseases as Table 3 shows. Also mental treatment is almost a zero share for heart-related diseases and radiology services are almost zero for heart-related diseases and mental illness in our data sources.

In both cancer and heart-related diseases one interesting finding from the results in Table 6-2 is that the material types of services, such as R.medication and R.examination, show negative signs and are statistically significant while the skilled type of services, such as R.consultation, R.operation, R.injection and R.treatment(general), are positively and statistically significant except the R.treatment variable for cancer. Abe[14] states that points for the skilled types of services are set lower than they should be while points for the material types of services are set higher than they should be in the fee-for-service basis. As a consequence medical service providers intend to recover losses caused by operations and consultations through medication and examinations.

In cancer and heart-related diseases the results of negative signs of material types of services and positive signs of the skilled types of services suggest that medical service providers adjust the quantity of services to the government reimbursement pricing policy. Generous prices for the material type of services seem to encourage medical service providers to supply more services to mitigate the loss of financial resources as the reimbursement prices fall, while stringent prices for the skilled type of services would tend to induce medical service providers to provide more of the skilled type of services to lessen the drain of financial resources as the reimbursement

prices increase.

It is interesting to note that the negative signs for R.medication and R.examination appear to be congruent with a statement made concerning excessive drugs and diagnostic examinations by Japanese medical service providers.[7] For example a one percent decrease in R.medication will increase by 0.1787 percent for cancer days and 0.4443 percent of days for heart-related diseases. In R.examination a one percent decrease in government reimbursement prices will increase by 0.168 percent days for cancer and 0.3819 percent days for heart-related diseases.

Unlike cancer and heart-related diseases the results for mental illness show that R.medication as a material type of service treatment tends to have lengthy hospital stays and additional service treatments. This seems to reflect the characteristics of the illness. A one percent rise in R.medication will increase by 0.3975 percent of days and 0.2449 percent of services for mental illness patients. These results are different from cancer and heart-related diseases. The results for R.mental (mental treatment) and R.consultation (skilled type of service) indicate the negative effect of reimbursement prices on treatment days and on services. A change in government reimbursement prices does not reveal a systematic effect of the skilled and material types of services on the length of treatment and the quantity of services provided per day.

Another noteworthy finding in Table 6-1 is that the statistically significant positive sign of estimated coefficients indicate that low prices for the skilled types of services (injection, general treatment, consultation and operation) tend to motivate medical service providers to prepare more medical services as the prices rise. Again the coefficient of R.medication shows the negative sign in Table 6-1. As has been mentioned, from this result we may deduce that currently controlled drug prices by the government induces the medical service providers to prescribe more drugs for

the elderly to mitigate the financial loss caused by the provision of operations and consultations as prices decline[15].

The length of treatments and units of service provided per day are insensitive to the government reimbursement prices. Stated differently, most of the estimated elasticities of government reimbursement prices are inelastic except R.radiology for cancer and R.hospital for days of heart-related diseases. As for the positive case, an increase in government reimbursement prices will present an incentive to medical service providers to induce more specific types of service treatments, say physiotherapy, to the elderly with heart-related diseases. Thus, a large increase in government reimbursement price will be required to increase the treatment of physiotherapy to cover the needs of the elderly. As for the negative case, a large decrease in government reimbursement prices has a small impact on the change in quantity, and the government is able to reduce a large amount of health and medical care expenditures on the material type of service treatments, such as medication and diagnostic examination, by reducing government reimbursement prices.

The National Health Insurance and the Government-managed Health Insurance cover about 88% of the elderly under the Japanese managed national health care system. The result of Insurance.D in Table 6-1 indicates that medical service providers treat the patient of National Health Insurance with fewer treatment days (about 1.1 days at the sample mean) and the quantity of services per day (about 1.4 units at the sample mean) compared to those of the Government-managed Health Insurance. It is alleged that people under the community based National Health Insurance, i.e. farmers, the self-employed and employees of small business, are inferior in health status and financial condition than those of the employee based Government-managed Health

Insurance. If it is true, our result is not congruent with the adduced statement, because the length of treatments and units of service are provided more to the Government-managed Health Insurance patients.

The negative signs of Insurance.D may reflect the higher coinsurance rates for patients under the National Health Insurance. The insurance system for the elderly consists of five insurers under government supervision. All plans offer basically the same set of comprehensive medical benefits and reimbursement prices are set by the government. All medical service providers are reimbursed exactly the same amount per service regardless of the providers' characteristics. However, the coinsurance rates of the Government-managed Health Insurance are 10 percent for insured persons and 20 percent for dependents while the rates of the National Health Insurance are 20 percent for retired insured persons and 30 percent for general persons. The monthly limits of personal liability for high-cost medical care are 63,000 yen for ordinary-income families and 35,400 yen for low-income families. Further careful empirical study is necessary to evaluate coinsurance rates to support our results.

We are interested in the costs of these three types of leading diseases in Japan and we have a proximity of loss of economic indirect costs (loss of ones earnings) and direct health and medical costs by the elderly age 65 and over in 1991.[33] Regarding monthly costs of cancer, the economic indirect costs are about 5.59 billion yen ($55.9 million: $1=100 yen), and health and medical costs of 68.201 billion yen ($682.01 million). Likewise, the monthly costs for heart-related diseases have economic indirect costs of 30.86 billion yen ($308.6 million), and health and medical costs of 257.497 billion yen (about $2.575 billion). The monthly costs for mental illness have economic indirect costs of 0.46 billion yen ($4.6 million), and health and medical costs of

26.43 billion yen ($264.3 million). We note that summing these figures still underestimates the total loss of costs caused by these three leading diseases of the elderly age 65 and over.

For comparison purposes, we tentatively calculate and compare it with the gross national product in 1991. The total cost of the three leading diseases: 4,668.456 billion yen (about $46.685 billion), is about 1.02 percent of the gross national product in 1991. If we adjust this figure to include medical expenditures for the elderly age 65 and over, it becomes $78.86 billion, that is 1.72 percent of the gross national product. The numbers reveal the influence of expenditures by the elderly on not only government medical expenditures but also the economic losses to Japan. Most general hospitals in Japan provide long-term care as well as acute care. The current situation of most hospital facilities have not been good enough to accommodate the many elderly who need and want long-term care. The institutional lack of a long-term care system would have substantial effects on the elderly, due to the increase in the number of the aged in society. Thus the provisions of a long-term care system is becoming one of the most important and urgent tasks along with the policy of imposing disincentives to lengthy hospital stays by the elderly.

V. Conclusion

This paper examines the trade off between the length of treatment in days and the units of service provided per day for the elderly in the context of the cost-containment policy taken by the Ministry of Health and Welfare of Japan. The policy intends to discourage lengthy hospital treatments and/or stays by the elderly in order to reduce the constantly rising medical care expenditures. By separating disease care utilization into episodes by types of treatment, our results suggest that the government measures seem to reduce lengthy hospital stays by the elderly

but it does not effectively influence a curb on the increasing trend of medical expenditures by the elderly under the fee-for-service basis in the managed national health care system. The evidence of the three leading diseases shows the interdependency between the days and units of service and the larger impact of services on days than days on services. Medical service providers are easily able to raise their revenues by additional services, not by additional treatment days, under the government's current cost-containment policy toward elderly care. Thus the government cost-containment policy does not work effectively.

Generous reimbursement prices for the material type of services with price controls seem to encourage medical service providers to supply more services to mitigate the loss of financial resources as the reimbursement prices fall. On the other hand the stringent price controls for the skilled type of services with low price controls would tend to induce medical service providers to provide more skilled type of services to lessen the drain of financial resources as the reimbursement prices increase.

The material type of treatment services have a negative effect on the length of treatment in days and the units of service in cancer and heart-related diseases, but a positive effect in mental illness. Since the material type of services, especially medication, by generous price controls show a negative effect on days and services, the results provide a suggestion of excessive drug and diagnostic examination by the medical service providers. The elderly with cancer and heart-related disease are more likely to be prescribed more drugs as the prices of drugs fall under the fee-for-service basis in the managed national health care system.

It is interesting to note that large health care expenditures are generally required to expand each type of treatment to promote the health status for the elderly in Japan, which is implied by

the existing inelastic supply curve. The leading diseases of the elderly: cancer, heart-related diseases and mental illness, cost about 1.02 percent of the GNP in 1991 although this figure is an approximation of losses due to the indirect- and direct costs of the elderly age 65 and over.

Our results also indicate that the elderly under the community based National Health Insurance receive shorter lengths of treatments in days and quantity of services per day than patients under the employee based Government-managed Health Insurance. The results may imply that a low coinsurance rate under the employee based Government-managed Health Insurance seems to induce higher utilization of services than a high coinsurance rate under the community based National Health insurance.

These results welcome further careful study to assess the government cost-containment policy with the fee-for-service basis under the managed national health care system. It is interesting to do further study on comparisons between the Japanese and the U.S. systems (market oriented health care systems compared to nationalized health care systems, such as the U.K., Canada and Japan) could be very beneficial to policy analysis. The publicly available data on health care payments, utilization and outcomes is comparatively limited in Japan. Further insights into the health care cost analysis awaits the availability of individual data.

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26. Testing simultaneity and endogeneity are intensively discussed by Wu[29], Hausman[30] and Nakamura and Nakamura[31]. The set of instrumental variables which we use are reimbursement prices, total claims per month, total government reimbursement of medication, operation, hospital, image diagnosis, home services, examination, treatment, physiotherapy, anesthesia and mental special treatment. The inverse of the correlation matrix is also used in detecting multicollinearity. The results of variance inflation factors indicate harmless multicollinearity.

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32. The calculation is based on Tables 8-2 and others are 12 and Shakai Iryo Shinryo Koibetsu Chosa Houkoku, Vol.1 and 2, Department of Statistics and Information, Minister's Secretariat, Ministry of Health and Welfare, 1991 and 1993.
a) an impact of services on treatment days = [coefficient of services(=elasticity) x (mean of day/mean of services) x amount of per day government reimbursement] - [amount of the government reimbursement per unit x mean of per day units services].
b) an impact of treatment days on services = [coefficient of days (=elasticity) x (mean of services/mean of days) x amount of the government reimbursement per unit x mean of per day units services] - amount of per day government reimbursement.
We use an exchange rate $1=100 yen in this paper. Readers are required to be cautious of interpretation because we do not use "purchasing power parity" for this simple estimation.

33. Because of data availability we have not estimated the loss of complete direct and indirect costs, such as care giver's market opportunity costs, patients' waiting time, and expenditures of elderly in nursing homes which are in the very early stages in Japan. Waiting time costs by patients, especially in Japan, is an important factor in accessing loss of human time. Yamada and Yamada[34] and Feldstein[17] intensively discuss time costs for traveling to a provider and for waiting for treatment. The calculation is based on average labor force participation for men and women age 65 and over considering full- and part-time workers, and average monthly salary for men and women is based on the assumption that they are full-time workers and these cancer, heart related disease and mental illness patients are healthy. The sources come from Department of Statistics and Information, the Ministry of Health and Welfare. *Shakai Iryo Shinryo Koibetsu Chosa Houkoku 1989, 1990 and 1991* (The survey report of social and medical examinations and treatments), 1 and 2: Tokyo: Health and Welfare Statistics Association, 1991, 1992 and 1993. Other sources come from 12, 35, 36 and 37.

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TABLE 1
Trends in Medical Care Expenditures

Year	National Medical Care Expenditures		Medical Care Expenditures for the Elderly				
	billion yen (A)	% change	billion yen (B)	% change	1000 yen per elderly person	% change	(B) (A) %
1986	17,069.0	6.6	4,437.7	9.1	523	4.9	26.0
1987	18,075.9	5.9	4,830.9	8.9	549	4.9	26.7
1988	18,755.4	3.8	5,159.3	6.8	568	3.5	27.5
1989	19,729.0	5.2	5,557.8	7.7	594	4.5	28.2
1990	20,607.4	4.5	5,926.9	6.6	609	2.6	28.8
1991	21,826.0	5.9	6,409.5	8.1	634	4.1	29.4
1992	23,478.4	7.6	6,937.2	8.2	661	4.4	29.5
1993	24,363.1	3.8	7,451.1	7.4	685	4.4	30.6
1994	25,790.8	5.9	8,159.6	9.5	719	5.1	31.6

Sources: Health and Welfare Statistics Association. *Hoken to Nenkin no Doko 1996* (The trend of insurance and pension 1996), Tokyo: 1996; Health and Welfare Statistics Association. *Kokumin Eisei no Doko 1996* (The trend of national public health 1996), Tokyo: 1996; Sorifu Shakai Hoshoseido Shingikai Jimukyoku. *Shakai Hosho Tokei Nenpo 1995* (Social security yearbook 1995), Tokyo: 1996.

TABLE 2
Point System for the Elderly (Health and Medical Care Services)

Type of Service	Points
1. Consultation	
First hospital visit	195
Hospital visit more than once	43
2. Home Care (per month)	2,200
3. * Medication	
Preparation (a/)	1~4
Prescription	24
4. Injection (b/)	15~250
5. Physiotherapy (per day)	
Equals or less than 6 months since the first consultation	
Complicated physiotherapy	500
Simple physiotherapy	170
More than 6 months since the first consultation	
Complicated physiotherapy	460
Simple physiotherapy	150
6. Image diagnosis	
Simple computer tomogram	
Head	800
Body	1,100
Limbs	800
Computer tomogram for cerebral functions	2,300
7. Examination	
Basic examination	
when an admission to a hospital (per month)	60
8. Treatment (per day)	12
9. * Operation	120~80,000
10. * Anesthesia	31~5,100
11. * Radiology	80~10,000
12. Hospital day (per day)	
Basic nursing care	
Less than 6 months since the first consultation	318
More than 6 months since the first consultation	308

Note: * follows the same criteria as one for all other ages.
a/ 1 for a haustus and 4 for an internal medicine.
b/ for example, 15 for hypodermical injection, 120 for a venous injection and 250 for spinal injection.
Source: Department of Insurance, and Department of Health Insurance and Welfare of the Elderly, *Tensu Hyo no Kaishaku 1993* (Interpretation of points table 1993), Tokyo, the Ministry of Health and Welfare, 1993.

TABLE 3
Elderly Expenditures for the Share by Type of Service provided
Elderly age 65 and over under the Law of Elderly Health Insurance

	Cancer	Heart related disease	Mental
amount per claim	410,713 ye	324,372 yen	272,193 yen
US$ ($1=102)	$4,027	$3,180	$2,669
Medication	9.4 %	10.9 %	11.1 %
Injection	20.6	11.6	4.6
Examination	9.5	7.6	3.7
Hospital day	41.2	56.4	67.0
General treatment	2.9	4.1	2.4
Mental treatment	0.2	0.0	1.6
Consultation	1.4	1.6	0.9
Home care	0.2	0.2	0.2
Image diagnosis	7.8	2.9	7.8
Operation	4.6	2.1	0.1
Physiotherapy	0.1	2.4	0.5
Other	2.1	0.2	0.1
	100.0	100.0	100.0

Note: Radiology and anesthesia are included in "Other" in this statistics.
Sources: Department of Statistics and Information, the Ministry of Health and Welfare. *Shakai Iryo Shinryo Koibetsu Chosa Houkoku 1989, 1990 and 1991* (The survey report of social and medical examinations and treatments), 1 and 2: Tokyo: Health and Welfare Statistics Association, 1991, 1992 and 1993.

TABLE 4 Definition of Variables (Types of services provided)

Days
A number of hospital treatment days per claims by a monthly financial statements.

Services
A number of units service per day under a fixed fee for each item of service in the fee-for-service system.

R.medication
Reimbursement price of medication (yen). It includes internal medicine, dose of medicine, external medicine, preparation, and others.

R.injection
Reimbursement price of injection (yen). It includes fee for injection skill, medicine, materials, and others.

R.examination
Reimbursement price of examination (yen). It includes physical test, excrement test, blood test, biochemistry test, immunity test, somatic test, supersonic-wave test, ophthalmology exam, endoscopy, and others.

R.hospital (day)
Reimbursement price of hospital day (yen). It includes room, standard bed and bedclothes, nurse, serious illness, food, special management, and others.

R.treatment(general)
Reimbursement price of general treatment (yen). It includes general treatment, first aid treatment, dermatology, bladder treatment, uterus treatment, ophthalmology treatment, otolaryngology treatment, and other.

R.radiology
Reimbursement price of radiology (yen). It includes external and internal X-ray, and others.

R.mental
Reimbursement price of mental treatment (yen). It includes standard mental analysis, counseling, group therapy, night care and special dementia treatment.

R.anesthesia
Reimbursement price of anesthesia (yen). It includes vein, spinal cord, nervous system, and others.

R.consultation
Reimbursement price of consultation (yen). It includes first visit, revisit, medical management of chronic disease, medical management for elderly outpatient, guidance, and others.

R.home care
Reimbursement price of home care (yen). It includes medical examination and treatment of home care, medical guidance and nurse for bedridden elderly, medical treatment and guidance at home, and others.

R.image
Reimbursement price of image diagnosis (yen). It includes X-rayed diagnosis, special photographing, endoradiography photographing, computer tomogram, diagnosis of nucleus medical science, and others.

TABLE 4 (continued)

R.operation
Reimbursement price of operation (yen). It includes skin transplantation, muscle, nervous system, operation related to ophthalmology, operation related to otolaryngology, breast, chest, heart, stomach, and others.

R.physiotherapy
Reimbursement price of physiotherapy (yen). It includes phototherapy, actinotherapy, exercise therapy, electric therapy, speech therapy, special treatment for mental illness, and others.

R.other*
Reimbursement price of unclassified other medical services (yen).

Insurance.D*
This is a dummy variable taking the value 0 for the Government-managed Health Insurance and 1 for the National Health Insurance.

Age.D*
This is a dummy variable taking the value 0 for aged 65-69 and 1 for 70 and over.

Year.D*
This is the dummy variable taking on the value of 1 if 1990, 0 otherwise.

Note: * indicates that additional definition of variables for the regression of the Elderly People with Government-managed Health Insurance and National Health Insurance aged 65 and over in Table 6-1.

TABLE 5-1 Means and Standard Deviations
Elderly People with Government-managed Health Insurance and National Health Insurance aged 65 and over (Types of services provided)

	Means	STD
Days	4.785	1.934
Services	12.043	3.833
R.medication	217.856	63.339
R.injection	1861.758	1332.885
R.examination	950.507	711.265
R.hospital (day)	7791.703	855.600
R.treatment (general)	1211.162	2363.208
R.radiology	5356.541	1308.562
R.mental	1464.497	597.003
R.anesthesia	12803.715	21868.148
R.consultation	910.339	149.053
R.home care	7133.511	8029.191
R.image	1565.738	1179.037
R.operation	24369.945	18348.212
R.physiotherapy	996.325	3471.255
R.other	644.239	56.167
Observation	120	120

TABLE 5-2 Means and Standard Deviations
Three Leading Disease among the Elderly (Types of services provided)

	(Cancer)		(Heart-related disease)		(Mental)	
	Means	STD	Means	STD	Means	STD
Days	11.054	8.751	13.166	10.302	25.948	54.923
Services	16.200	9.176	15.220	8.349	13.813	9.988
R.medication	369.829	204.897	213.172	49.345	205.580	68.331
R.injection	3183.066	1906.896	2071.454	1688.130	1412.031	817.274
R.examination	1057.466	216.753	1029.911	272.608	996.605	467.112
R.hospital (day)	8766.978	606.686	7482.867	705.792	6481.897	366.222
R.treatment (general)	1026.213	858.393	651.279	336.629	590.664	262.951
R.radiology	6327.170	499.048	---	---	---	---
R.mental	1937.284	1655.428	1864.230	1031.630	1674.047	849.350
R.anesthesia	17228.133	23085.464	11284.948	23330.654	2375.719	11360.245
R.consultation	2489.464	1550.551	1851.387	934.337	1685.254	926.854
R.home care	16784.957	14059.880	8850.228	13000.875	5966.409	3245.110
R.image	2611.760	1456.625	2150.908	1429.790	2331.425	2191.047
R.operation	38901.746	79057.808	36796.437	45834.239	241151.728	1094730.332
R.physiotherapy	1077.120	606.979	1080.397	390.066	918.650	355.339
Observation	48 for cancer		54 for heart-related disease		48 for mental	

Note: R.radiology is a reimbursement price of radiology treatment. It was dropped from a mean calculation for heart related disease and mental illness because of inadequate observations.

TABLE 6-1 Estimated Coefficients
Elderly People with Government-managed Health Insurance and National Health Insurance aged 65 and over (Types of services provided)

	Days	Services
Services	-0.7787b (-2.49)	
Days		-0.2496b (-2.37)
R.medication	-0.2450 (-1.05)	-0.5124a (-5.77)
R.injection	0.1683b (2.36)	-0.0164 (-0.36)
R.examination	0.5231b (2.36)	0.4338a (3.99)
R.hospital (day)	-0.7406c (-1.91)	0.0559 (0.23)
R.treatment (general)	0.1158b (2.10)	0.1050a (4.05)
R.radiology	0.1346c (1.86)	0.0834b (2.09)
R.mental	0.0280 (0.33)	-0.0274 (-0.58)
R.anesthesia	-0.0009 (-0.04)	0.0015 (0.12)
R.consultation	-0.3083 (-0.95)	0.3203c (1.67)
R.home care	-0.1853 (-1.31)	---
R.image	0.0338 (0.42)	0.0808c (1.78)
R.operation	0.0680 (1.25)	0.0969a (3.66)
R.physiotherapy	-0.3161b (-2.21)	-0.2238a (-3.13)
R.other	---	0.0849 (0.12)
Insurance.D	-0.2264b (-2.11)	-0.1129c (-1.83)
Age.D	0.1961a (2.68)	0.0696 (1.55)
Year.D	0.2914b (2.47)	0.0967 (1.05)
Constant	9.2611b (2.49)	-1.7466 (-0.39)
R^2	0.42	0.68
F statistics	4.42a	12.85a
WU test F	4.74a	5.46a

Note: t-statistics are in parentheses. a, b and c are statistically significant at the 1%, 5% and 10% level, respectively.

TABLE 6-2 Estimated Coefficients
Three Leading Disease among the Elderly (Types of services provided)

	Cancer		Heart related disease		Mental	
	Days	Services	Days	Services	Days	Services
Services	-1.5145a		-0.9776a		-1.3024a	
	(-9.94)		(-4.26)		(-10.68)	
Days		-0.4258a		-0.5357a		-0.7133a
		(-4.99)		(-5.18)		(-10.43)
R.medication	-0.1787b	-0.0561	-0.4443b	-0.2127c	0.3975a	0.2449b
	(-2.09)	(-1.10)	(-2.56)	(-1.81)	(3.52)	(2.70)
R.injection	-0.0383	0.0053	0.1958b	0.0105	0.0790	-0.0364
	(-0.85)	(0.20)	(2.18)	(0.17)	(0.45)	(-0.27)
R.examination	-0.1680b	-0.1021b	-0.3819c	0.0752	0.1742	0.0943
	(-2.53)	(-2.72)	(-1.71)	(0.51)	(0.78)	(0.55)
R.hospital	0.5766	0.6938c	-1.3790b	-0.3833	0.4837	0.5672
(day)	(0.94)	(1.77)	(-2.60)	(-1.02)	(0.40)	(0.57)
R.treatment	-0.1116b	-0.0942a	0.1992a	0.0875b	-0.0057	0.0505
(general)	(-2.64)	(-4.10)	(3.29)	(2.03)	(-0.09)	(0.63)
R.radiology	-2.9690a	-1.5153b	---	---	---	---
	(-3.02)	(-2.61)				
R.mental	-0.1720b	-0.0777c	---	---	-0.7555a	-0.5784b
	(-2.53)	(-2.00)			(-2.79)	(-2.18)
R.anesthesia	-0.0271	-0.0235	---	---	---	---
	(-1.06)	(-1.68)				
R.consultation	---	-0.0961	0.7279a	-0.0168	-0.5419c	-0.3844c
		(-0.71)	(3.25)	(-0.09)	(-2.01)	(-1.85)
R.home care	0.2202a	---	-0.1167c	---	-0.2365	-0.2640
	(2.79)		(-2.00)		(-1.32)	(-1.35)
R.image	---	-0.0834c	---	-0.0220	-0.0221	0.0105
		(-1.69)		(-0.37)	(-0.20)	(0.11)
R.operation	0.0767c	---	0.0340	-0.0169	-0.0614c	---
	(1.71)		(0.91)	(-0.75)	(-1.70)	
R.physiotherapy	---	---	0.2405b	0.1509b	---	-0.2153
			(2.13)	(2.11)		(-0.67)
Constant	28.577a	14.182b	12.883b	6.532b	9.428	7.537
	(2.92)	(2.44)	(2.63)	(2.03)	(0.87)	(0.95)
R^2	0.950	0.94	0.96	0.95	0.93	0.91
F statistics	81.57a	65.17a	143.34a	112.03a	58.31a	41.70a

Note: t-statistics are in parentheses. a, b and c are statistically significant at the 1%, 5% and 10% level, respectively.