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Evidence from Micro-level Survey on Care Receivers

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Evidence from Micro-level Survey on Care Receivers<sup>1</sup>**

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**Abstract**

We observed a remarkable increase in elderly care expenses in Japan after the introduction of public elderly care insurance in 2000. This study explores the possibility that a greater number of care providers under the deregulation of the entry policy stimulated care utilization. We take advantage of an original household-level survey data on care receivers to address the existence of supplier-induced demand in Japan's elderly at-home care market, by distinguishing between demand for care receivers and for suppliers. Our empirical results based on the two-phase model found little evidence of supplier-induced demand in the Japanese at-home care market. We also observed that a higher portion of for-profits did not induce care demand.

JEL classification: I11

Key words: supplier-induced demand; at-home care; long-term care insurance; survey on care receivers

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## 1. Introduction

After the introduction of public long-term care insurance in Japan in fiscal year 2000, we observed a rapid increase in elderly care utilization through this new scheme. According to the Ministry of Health, Labour and Welfare, the long-term care costs through the insurance began to increase rapidly after fiscal year 2001. The sum of expenses on care use totaled 5.68 trillion yen, a 43.7 percent increase from the 3.95 trillion yen of FY 2000. This remarkable expansion was brought about solely by at-home care, the amount of which doubled in the same period, rather than by institutional care<sup>4</sup> (Figure 1).

Together with the unprecedented speed of population aging in Japan, this steadily increasing trend is expected to create an enormous future fiscal burden. The Ministry of Health, Labour and Welfare (2003), the Ministry in charge of long-term care policy, has warned that the amount of expenditure on elderly care will probably come to some 20 trillion yen in 2025—the peak of the share of the elderly in the overall population—which occupies 3.5 percent of national income and 11.4 percent of social security expenditure. Those anticipated catastrophes have encouraged many policy debates on designing a sustainable long-term care insurance scheme. The public elderly insurance is now the center of debates on fundamental reform in 2006 being legislated in the law. The current proposals include (1) introducing “preventive care” to replace a part of care provision for lower care levels, and (2) collecting living expenses from residents in care institutions<sup>5</sup>.

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<sup>4</sup> The amount of at-home care use increased by 99.4 percent between FY 2000 and FY 2003, while that of institutional care increased by 16.6 percent during the same period.

<sup>5</sup> In the process of policy debates from 2004, other options were also discussed, including: (1) lowering the age of the insured who contribute to premiums (currently age 40 or over) and (2) integrating the current LTC insurance with a related institution to support expenditure for disabilities.

It is inevitable that Japan will face an enormous demand for elderly care due to the drastic demographic change in the population. In 2000, government deregulation along with the introduction of the long-term insurance scheme allowed for-profit providers of at-home care for the elderly to compete directly with nonprofit operators (Shimizutani and Noguchi (2004), Mitchell, et. al. (2004))<sup>6</sup>. The deregulation policy aimed to break through the bottleneck of care supply and the number of new providers that entered the market after 2000. The simultaneous expansions of care supply and demand are often explained by realization of potential demand for elderly care, which was suppressed before 2000.

However, we should also suspect that the rapid demand expansion was driven by suppliers, rather than demanders. Concretely, a growing number of firms are, in turn, alleged to stimulate care demand, which contributed to rapidly increasing costs after FY 2001. Under the public insurance system, care suppliers are reimbursed on a fee-for-service basis. Prices are regulated for each type of service by the central government, and are applicable to all care providers in Japan, which motivates suppliers to stimulate care needs under officially- fixed output prices in Japan's elderly care market. Moreover, care managers—who are in charge of determining care needs for each eligible person—are expected to play a role in allocating care demand properly, and some care managers might have incentives to increase care needs for a care provider he belongs to. In other words, there is a room that care suppliers induce unneeded care to make profits; their motivation has become more intense under the increased congestion of care providers.

This type of a supplier's moral hazard has been discussed as supplier-induced demand (henceforth, SID) in the health economics literature, as one of the most debated and unresolved

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<sup>6</sup> Before 2000, under the “distribution system,” only the wealthy were able to afford them, and the market was accordingly small. Everyone else was assigned to nonprofit providers as part of the government's welfare policy (Shimizutani and Noguchi (2004), Mitchell, et. al. (2004)).

issues. We frequently observe information asymmetry between suppliers and demanders since suppliers have high-skilled knowledge. In most cases, consumers with less information cannot reject any services proposed by suppliers. To make profits, suppliers take advantage of information asymmetry and stimulate unnecessary needs for demanders. Beginning with the classical studies such as Feldstein (1970), Evans (1974) and Fuchs (1978), there has been a tremendous volume of previous studies on this issue.

This study utilizes original and rich micro-level data from the “Survey on Long-term Care Users” compiled by the Cabinet Office, government of Japan, to examine whether SID is observed in Japan’s at-home care market. As far as we know, there are two previous studies that examined SID in Japan’s elderly care markets (Yamauchi (2003), Yuda (2004)). Those studies utilized prefecture-level data and evaluated the relationship between care expenses in each prefecture and intensity of care providers. As discussed in the next section, a number of studies that examined SID had difficulties with identification problems. To our best knowledge, this is the first study to use micro-level survey to examine SID in the elderly care market, empowered by the “two-phase model” to discriminate between client-induced demand and SID. Moreover, contrary to the previous works, this study focuses on at-home care markets where both nonprofits and for-profits compete in the same market, and pays attention to how composition of different types of providers affects SID.

The remainder of this study is organized as follows. The next section provides a brief survey on previous SID studies. Section 3 describes Japan’s public long-term care insurance and the at-home care industry. Section 4 explains the dataset used in this study. Section 5 turns to empirical evaluation based on the two-phase model, and the final section concludes and discusses some policy implications of our findings.

## 2. Previous Studies

This section briefly reviews previous studies on SID<sup>7</sup>. During the past decades, a number of valuable studies have contributed to SID, both theoretically and empirically, stemming from Feldstein (1970), Evans (1974) and Fuchs (1978). This line of studies has a direct important policy implication for medical market design,<sup>8</sup> and many of them challenged the conventional models of supply and demand (McGuire (2000)). The simple model assumes a competitive market for medical services with an upward supply curve and a downward demand curve. A greater number of suppliers make the supply curve shift out, which lowers the equilibrium price and supplier's revenue when price elasticity of demand is less than one. To prevent profit losses, suppliers take advantage of information asymmetry to shift the demand curve out. Another approach is modeled by the principal-agent relationship to insist that an improper incentive mechanism invites the agent (supplier) to utilize information asymmetry to induce patient's demand.

Researchers in this area have reached a consensus on the definition of SID over the past two decades; physician-induced demand exists when the physician influences a patient's demand for care against the physician's interpretation of the best interest of the patient (McGuire (2000)). However, the existence and magnitude of SID are rather inconclusive. There is a large body of research which is supportive of SID, but most of studies have not succeeded in the distinction between the SID hypothesis and theories with patient preferences, since a greater number of suppliers invite the possibility of SID. At the same time, it affects patient preferences through lower access costs (McGuire (2000), Yuda (2004)). A famous counter-intuitive argument on the

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<sup>7</sup> McGuire (2000) provides a comprehensive survey on SID.

<sup>8</sup> The Japanese government has controlled the number of beds in each region to prevent the supplier-induced demand, but empirical evidence has not been offered.

econometric method to address the SID was proposed by Dranove and Wehner (1994), which finds an unrealistic but statistically positive relationship between the number of physicians and childbirth.

One effective way to discriminate between supply-side and demand-side factors is the two-phase model (Escarce (1992), Rossiter and Wilensky (1984)). This model divides total medical costs into two components: the probability of receiving medical services, and medical costs per patient. Escarce (1992) found that the intensity of physicians affects the share of patients who go to receive medical services, but this is not the case for medical expenditure for the patients.

As far as we know, the pioneering study on SID in Japan is Nishimura (1987), which found a positive relationship between medical expenditure per unit and medical doctors per person at the prefecture level. After the 1990s, while Yamada (2002) was supportive of SID, Suzuki (1998) and Kishida (2001) found little effect of SID on medical costs for the elderly and medical expenditures in the second medical area<sup>9</sup>. In addition, Yamauchi (2003) and Yuda (2004) tackled SID in the long-term care market. Especially, Yuda (2004) applied the two-phase model to prefecture-level data and insisted that the intensity of care providers affects patient care costs in several types of care services, but does not alter care costs per care user.

Based on the two-phase model, we take advantage of an original and rich micro-data set on households with a care receiver to examine the existence and the magnitude of SID. Our dataset has rich information on household demographics and health status, which is closely related with the household demand, as discussed below in Section 4. Moreover, contrary to previous works, this study focuses on at-home care markets and pays attention to different behavioral characteristics. Before 2000, the Japanese government allowed only nonprofit

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<sup>9</sup> Yuda (2004) provides a concise survey on SID studies in Japan.

enterprises under non-distributional constraints to operate in the market to prevent opportunistic behavior among for-profit companies (Noguchi and Shimizutani (2005a, 2005b)). We also consider this difference when extracting policy implications for designing the market competition properly.

### **3. The At-home Elderly Care Market in Japan<sup>10</sup>**

The elderly care market fundamentally changed in Japan after the introduction of public long-term care insurance program in 2000 (Shimizutani and Noguchi (2004), Mitchell, Piggott and Shimizutani (2004)). Before 2000, only lower-income households were eligible to receive elderly care services provided by the local government as a measure of social welfare. Although the burden to use publicly provided services was negligible, those households had no choice of providers and service contents to receive.

However, under the rapid aging population, a new public insurance was introduced under four objectives; to mitigate onerous care burden traditionally borne by women, to make more transparent the relationship between benefits received and premiums paid into the system, to provide a means by which customers would receive comprehensive care and health services from a variety of institutions of their choice, and to reduce the number of “social hospitalization” cases where elderly were hospitalized simply because of lack of viable alternatives, which pushed up the medical costs (Ministry of Health, Labor and Welfare (2002)).

Under the new insurance program, all insured persons are entitled to use care services once they are certified to be in need of long-term care by the local government. This widened the range and number of care receivers. It is explicitly intended to provide in-home services (at-home

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<sup>10</sup> This section heavily depends on Noguchi and Shimizutani (2005b).

care) and services at facilities (institutional care). Depending on care levels, the insured are free to use elderly care from any providers at a 10-percent copayment of officially fixed prices specific to each type of care service<sup>11</sup>. Turning to financing, the Japanese public LTC system is a pay-as-you-go program, financed by a combination of earmarked premiums levied on insured persons and general tax revenue, both of which contribute up to 50 percent of the total costs respectively (Mitchell, Piggott and Shimizutani (2004)).

At the same time, to satisfy the rapidly increasing care needs, the entry regulation policy was also transformed to be more market-oriented. That is, to stimulate the supply of elderly care service, for-profits are allowed to enter the at-home care market for the first time where nonprofits were dominant, though this is not the case for the institutional care market. Under the public elderly care program, care providers are not able to set their prices freely since uniform nationwide rates are applicable for all covered LTC services, which are also standardized. The Ministry of Health, Labour and Welfare has associated a given number of standard "units" for particular services; it then values each unit depending on the service involved and by region (to take into account regional wage differentials of service providers)<sup>12</sup>. In other words, quality competition—not price competition—is intended for at-home care providers.

#### **4. Description of the Data**<sup>13</sup>

The data set used in this study is the micro-level data from the “Survey on Long-term Care Users” in 2002 and 2003. This survey was performed three times, in 2001, 2002 and 2003.

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<sup>11</sup> After spending up to a threshold depending on care levels, the consumer must pay 100 percent of any additional costs, until hitting a stop-loss threshold called the “high-cost long-term care service limit.”

<sup>12</sup> Currently a unit is worth ¥10-10.72.

<sup>13</sup> This section heavily depends on Noguchi and Shimizutani (2005a), which used the same dataset.

The first survey was conducted from November to December, 2001, by the Price Policy Division of the Cabinet Office. The objects of the survey come from respondents of a research company's survey. Those households were randomly chosen based on Japan's household registration system, and the distribution resembles the census data.

A care receiver is any elderly person who needs care in daily life. If a care receiver uses care services through public insurance, he needs to receive approval by the local government to be in need of care; he is not entitled to care without government certification. The sample in this study includes certified elderly persons as well as the uncertified. Those living separately from family members in institutions are excluded from the sample. Among all samples, we selected households with a care receiver randomly and chose samples with only one receiver.<sup>14</sup> The research company mailed the questionnaires to 1,300 households, and received responses from 1,005 households (for a response rate of 77.1 percent).

The second "Survey on Long-term Care Users" was conducted by the Economic and Social Research Institute by outsourcing to the same research firm in October and November 2002. The notable merit of this survey was to perform a similar survey on the same households in the 2001 survey. Of the 1,005 households in the first survey, we obtained responses from 822 (a response rate of 81.8 percent). Among those responses, 617 still lived at home with family members and received at-home care.<sup>15</sup> In addition, we selected new households with one care receiver and added 457 households to the sample. Thus, the sample size for 2002 is 1,074 households.

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<sup>14</sup> The screening results show that households with one care receiver account for 71.1 percent of the total, those with two care receivers account for 26.9 percent, and the remainder are households with more than two care receivers. The survey sample is limited to those households with one care receiver since a household with two or more care receivers is very different from those with one care receiver in that care burden is more onerous, and care is possibly provided by two or more caregivers, which makes it hard to identify who cares for whom.

<sup>15</sup> Of the 205 elderly care receivers who no longer lived at home with family members, 75 entered an unspecified type of institution, 68 died, and 29 were hospitalized.

The third survey was also implemented by the Economic and Social Research Institute, in December 2003. The data were obtained following the same methodology as in 2002. Of the households surveyed both in 2001 and 2002, we mailed the questionnaire to 544, and obtained responses from 381 households with a care receiver at home<sup>16</sup>. Of those first surveyed in 2002, we sent the questionnaire to 432 households and received replies from 251<sup>17</sup>. In addition, we mailed the survey to 423 households which were newly chosen in 2003, and had responses from 349. Thus, the sample size for 2003 is 981 households.

The respondents to the survey were the main caregivers in the household. The questionnaire covers a variety of items to establish patterns of care use over a period of several years, including the health condition of caregivers and receivers and household demographics. Among those surveys, we will use the 2002 and 2003 results only due to the lack of data on the number of care providers at prefecture level in FY 2001. The sample size is 585 for FY 2002 and 663 for FY 2003, since we confine our sample only to those variables that are available and, in our estimation, necessary. The portion of those who actually receive any at-home care services is slightly less than 60 percent in both surveys. The amount of expenditures on care services is 85,000 yen in FY 2002 and it decreases to 74,000 in FY 2003. The time from approval for entitlement is about 20 months, which is longer for those in FY 2003.

Next, we turn to household characteristics. The average age of a care receiver is above 80, and more than 70 percent are female. The diseases responsible for the initial care needs are mostly related with those caused by aging such as frailty, bone fractures, and dementia and other brain diseases. As regards a household's economic status, average amounts of household income

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<sup>16</sup> 133 elderly care receivers no longer lived at home with family members; 39 entered an unspecified type of institution, 44 died, and 14 were hospitalized.

<sup>17</sup> 142 elderly care receivers no longer lived at home with family members; 29 entered an unspecified type of institution, 62 died, and 13 were hospitalized.

and assets are 7.1-7.2 million yen and 42-44 million yen, respectively. The share of elder family members out of total assets is around 50 percent. We should note that only 5 percent join in private long-term care insurance. The portion of those with their own detached house is around 90 percent.

Finally, we look at the intensity measure of care suppliers. Due to the limitation of available data, we use the number of at-home care establishments as our intensity measure. The information is available as of the end of September in each year, which is available from “Survey on Care Service Institutions and Establishments (Kaigo Service Shisetsu Jigyosho Chousa),” compiled annually by the Ministry of Health, Labour and Welfare. This is a census survey to collect information from all care providers from all areas of Japan, and the prefecture-level data are available<sup>18</sup>. As stated above, a household in our survey lives together with a care receiver, and those who receive institutional care are excluded. In accordance with this sample, the number of care establishments is the sum of those that serve home-visit service, home-visit bathing, home-visit nursing and day care services<sup>19</sup>. We take the number of the elderly who are approved as the denominator to measure the intensity<sup>20</sup>. Table 1 reports that the number of care providing establishments per person is 0.009. The portion of for-profits out of all establishments is around a quarter.

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<sup>18</sup> Ideally, we might have to use the intensity measure at city/town/village level but this study uses prefecture-level data for two reasons. One is that, so far, we cannot obtain data on the number of establishments in the past in the WAM-NET, which provides a comprehensive map for care providers. The other is that there are some cases in which household use care services from providers outside their own city/town/village. In this case, the number of providers in those local government is underestimated.

<sup>19</sup> Some of care service establishments operated a multiple services jointly.

<sup>20</sup> Yamauchi (2003) takes the number of those who actually receive any types of services as the denominator, but, as Yuda (2004) suggests, there is a gap between those who are eligible and those who receive any services, that is, there are some eligible persons who do not use any care services through the insurance. We are inclined to echo Yuda (2004) because any eligible persons could be induced to use any care services and the number of actual care receivers is underestimated in the context of SID.

## 5. Specification and Estimation

This section provides our specification and empirical results. We adopt the two-phase model as discussed in Section 3 to identify care receiver-induced demand and supplier-induced demand. Concretely, we will explore determinants of the probability to use any care services (patient-induced) and per unit care expenditure (supplier-induced) separately and evaluate the effect of provider's intensity on either of factors. In accordance with the sample design in our survey, we define the portion of those who actually use any services as that of any persons who benefits from any at-home service, including home-visit services, home-visit bathing, home-visit nursing, home-visit rehabilitation, and day care services. The definition of care expenditure is also that paid for those services monthly.

The specifications we employ are as follows.

(1) probability to receive care services

$$Y_i^* = \varphi_0 + \varphi_1 X_i + \varphi_2 Intensity_i + \varepsilon_i$$

(2) monthly expenditure on care services per person

$$\ln(Exp)_i = \varphi_0 + \varphi_1 X_i + \varphi_2 Intensity_i + \varepsilon_i$$

The dependent variable in (1) is the probability to receive any at-home care services. We cannot observe the propensity  $Y_i^*$  directly, but we have information on whether a household actually received any types of at-home care. Thus, the dependent variable is a binary variable that takes 1 if a household receives any services, and takes 0 otherwise. The independent variables include household characteristics and the intensity measure described in Table 1, as well as dummy variables for each prefecture to capture indigenous regional characteristics. We will perform the probit estimation using cross-sectional data in FY 2002 and 2003 separately to

explore any changes in the effect of intensity.

On the other hand, the dependent variable in (2) is the logarithm of expenditure on care services per month. It is set to be zero if a household did not receive any care services. We estimate specification (2) by two types of estimation method. One is the Tobit model to address the truncated continuous variable due to the sample without any usage. The other is the ordinary least squares (OLS) only including any samples with positive expenditure on care services. The independent variables in (2) are identical with those in (1) except an additional variable of the share of for-profits in the total providers. For-profits providers might contribute to improve the efficiency in the market and pursue a higher quality of care but, at the same time, there are anxieties for for-profits to appeal to opportunistic behavior to create profits (Noguchi and Shimizutani (2005b)).

In what follows, we will focus on the coefficients on the intensity measure in Tables 2 and 3. Table 2 reports that the coefficients on the intensity measure are not statistically significant and implies that a higher intensity does not invite a higher probability of care receipt. In the SID literature, the effect of this term measures “access costs” in that a higher intensity of care providers reduce accessibility of patients to providers. Table 3 also shows that the coefficient on the intensity measure is not significant. This term is often considered as “pure” SID, but we find little evidence that monthly expenditure on care services is stimulated by a higher number of providers per person. What interests us is the coefficient on the share of for-profits is insignificant, which implies that the opportunistic behaviors of for-profits do not invite SID in Japan’s elderly care market.

## **6. Conclusion and Policy Implications**

We observe a remarkable increase in elderly care costs in Japan after the introduction of the public elderly care insurance in 2000. This study explores the possibility that a greater number of providers, under the deregulation of the entry policy, stimulated care utilization. We take advantage of rich and original survey data on care receivers to address the supplier-induced demand in Japan's elderly care market by distinguishing between demand from patients and suppliers. Our empirical results find little evidence on supplier-induced demand in the Japanese at-home care market. We also observe that a higher portion of for-profits does not induce demand.

Although the simultaneous expansions of care providers and care costs are observed after 2001, our study does not support the possibility that this trend has been caused by supply-side factors. Rather, realization of potential demand for elderly care—which was suppressed before 2000—and the speed of aging are more plausible candidates to explain the expansion. Previous studies on SID emphasize the information asymmetry between suppliers and demanders, and suppliers take advantage of the situation to induce unnecessary demand for their profits (Noguchi and Shimizutani (2005c)). One reason why SID is not observed in Japan's long-term care market is that the information asymmetry is not very critical in the at-home care market. In other words, people have more knowledge about long-term care, and it is difficult for suppliers to stimulate demand at their will. Rather, discipline for care managers in charge of making care plans is indispensable for proper use of care services.

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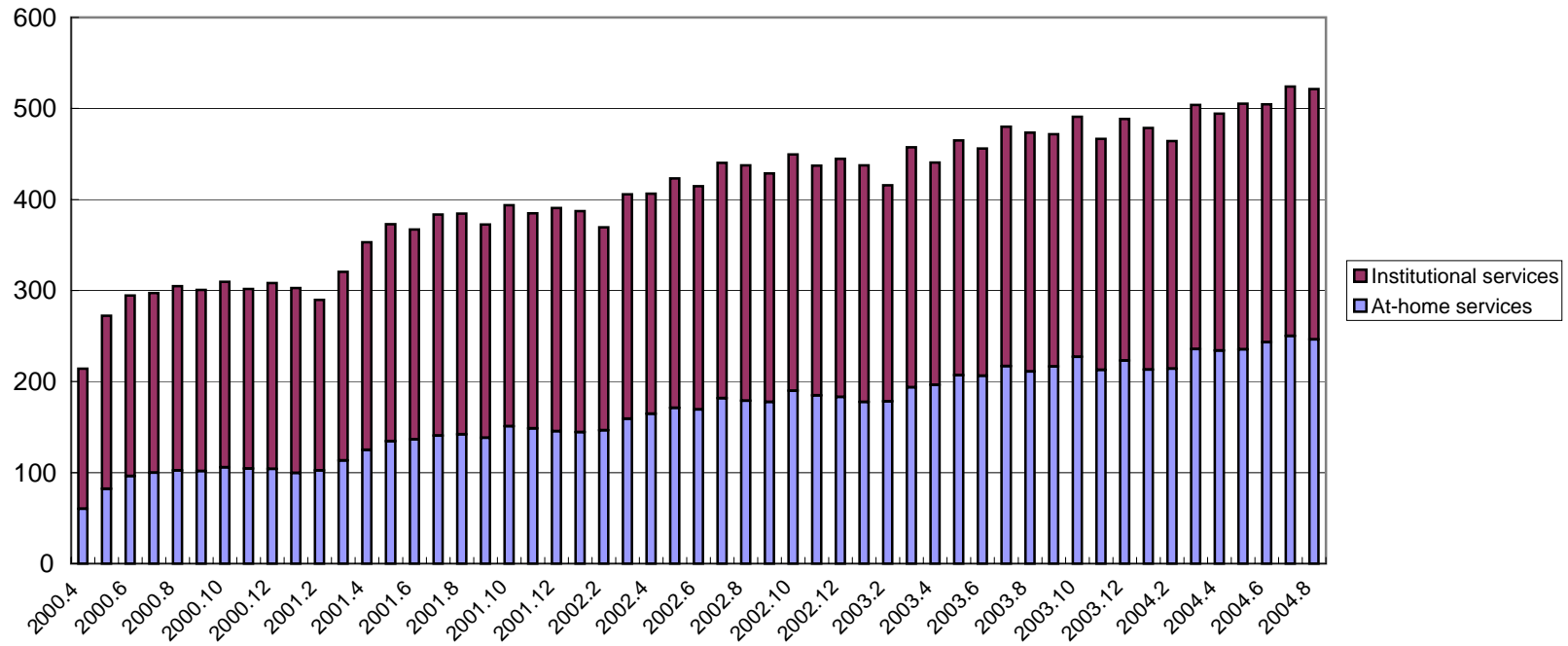
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**Figure 1 Care Costs through the LTC insurance**

(billion yen)



**Table 1: Summary Statistics**

Variables	<u>FY2002</u> (N=585)		<u>FY2003</u> (N=663)	
	MEAN	S.D.	MEAN	S.D.
<b>1. Portion of care receivers, care costs, duration from approval</b>				
Portion of those who receive at-home care services	0.595	(0.491)	0.566	(0.496)
Care expenditure per month	85,448	(76,189)	73,742	(89,032)
Duration from approval (months)	18.929	(12.705)	20.258	(17.821)
<b>2. Characteristics of Care Receiver</b>				
Sex (female=1)	0.723	(0.448)	0.725	(0.447)
Age	83.207	(6.958)	83.539	(7.019)
Care level 1	0.221	(0.013)	0.200	(0.400)
Care level 2	0.176	(0.381)	0.164	(0.370)
Care level 3	0.099	(0.298)	0.111	(0.314)
Care level 4	0.066	(0.249)	0.085	(0.279)
Care level 5	0.056	(0.229)	0.093	(0.291)
Support required = > Care level 1	0.007	(0.081)	0.022	(0.148)
Support required = > Care level 2	0.013	(0.113)	0.015	(0.120)
Care level 1 = > Care level 2	0.020	(0.142)	0.034	(0.180)
Disease caused care needs : brain vein disease	0.200	(0.400)	0.200	(0.400)
Disease caused care needs : heart disease	0.086	(0.280)	0.065	(0.247)
Disease caused care needs : cancer	0.047	(0.213)	0.024	(0.152)
Disease caused care needs : respiratory organs	0.045	(0.207)	0.028	(0.165)
Disease caused care needs : joint disease	0.095	(0.293)	0.059	(0.237)
Disease caused care needs : dementia	0.187	(0.390)	0.198	(0.398)
Disease caused care needs : diabetes	0.066	(0.249)	0.070	(0.255)
Disease caused care needs : vision or auditory organs	0.098	(0.297)	0.086	(0.281)
Disease caused care needs : bone fracture	0.215	(0.411)	0.153	(0.360)
Disease caused care needs : spiral cord damage	0.020	(0.139)	0.017	(0.129)
Disease caused care needs : frail with aging	0.250	(0.433)	0.255	(0.436)
<b>3. Medical services</b>				
Days to go to hospitals or clinics per month	3.686	(4.556)	3.343	(4.157)
Medical expenditure per month (self-burden)	4,705	(12,948)	4,334	(7,702)
Hours for careper day when care was needed	5.836	(5.163)	5.180	(5.070)
<b>4. Household demographics</b>				
Care receiver's Insurance (private medical insurance)	0.301	(0.459)	0.312	(0.464)
Care receiver's Insurance (private life insurance)	0.110	(0.313)	0.130	(0.337)
Care receiver's Insurance (private cancer insurance)	0.086	(0.280)	0.065	(0.247)
Care receiver's Insurance (private LTC insurance)	0.049	(0.217)	0.053	(0.224)
Care receiver's Insurance (private pension)	0.015	(0.121)	0.024	(0.152)
Household Annual Income (yen)	7,185,955	(4,202,138)	7,094,502	(4,153,944)
Household assets (yen)	44,018,229	(39,293,313)	4,190,593	(3,917,821)
Share of the elderly's assets	0.484	(0.337)	0.546	(0.677)
Number of family memmners	3.123	(1.422)	4.078	(1.453)
Detached House (=1)	0.899	(0.302)	0.955	(0.207)
<b>5. Intensity (prefecture level)</b>				
Number of providers per the approved	0.010	(0.001)	0.009	(0.001)
Share of for-profits	0.230	(0.098)	0.258	(0.097)

**Table 2: Determinants to receive at-home care services (probit model)**

Variables	FY2002			FY2003				
	coefficient	S.E.	marginal	coefficient	S.E.	marginal		
<b>1. Portion of care receivers, care costs, duration from approval</b>								
Duration from approval (months)	0.086	(0.011)	0.032	a	0.015	(0.004)	0.004	a
<b>2. Characteristics of Care Receiver</b>								
Sex (female=1)	0.036	(0.211)	0.013		0.092	(0.153)	0.028	
Age	0.028	(0.014)	0.010	a	0.0001	(0.011)	0.00004	
Care level 1	1.326	(0.234)	0.399	a	0.652	(0.199)	0.171	a
Care level 2	1.438	(0.223)	0.417	a	0.905	(0.229)	0.216	a
Care level 3	1.197	(0.315)	0.343	a	1.084	(0.239)	0.229	a
Care level 4	0.842	(0.341)	0.259	a	1.003	(0.261)	0.210	a
Care level 5	1.243	(0.400)	0.330	a	1.136	(0.274)	0.227	a
Support required => Care level 1	1.108	(0.896)	0.294		0.419	(0.396)	0.105	
Support required => Care level 2	1.846	(0.624)	0.367	a	0.746	(0.671)	0.160	
Care level 1 => Care level 2	0.358	(0.444)	0.125		0.485	(0.359)	0.119	
Disease caused care needs : brain vein disease	-0.040	(0.216)	-0.015		0.126	(0.170)	0.036	
Disease caused care needs : heart disease	-0.354	(0.292)	-0.138		-0.150	(0.248)	-0.047	
Disease caused care needs : cancer	-0.663	(0.423)	-0.260		-0.495	(0.434)	-0.171	
Disease caused care needs : respiratory organs	-0.870	(0.383)	-0.336	a	-0.200	(0.362)	-0.064	
Disease caused care needs : joint disease	0.014	(0.290)	0.005		-0.219	(0.278)	-0.070	
Disease caused care needs : dementia	0.244	(0.220)	0.089		0.169	(0.165)	0.049	
Disease caused care needs : diabetes	-0.184	(0.285)	-0.071		-0.047	(0.250)	-0.014	
Disease caused care needs : vision or auditory organs	-0.088	(0.327)	-0.033		-0.253	(0.238)	-0.081	
Disease caused care needs : bone fracture	-0.256	(0.212)	-0.098		0.138	(0.187)	0.040	
Disease caused care needs : spiral cord damage	0.112	(0.527)	0.041		-0.410	(0.408)	-0.139	
Disease caused care needs : frailty	-0.107	(0.217)	-0.041		0.407	(0.165)	0.111	a
<b>3. Medical services</b>								
Days to go to hospitals or clinics per month	0.027	(0.016)	0.0102	b	-0.017	(0.025)	-0.0052	
Medical expenditure per month (self-burden)	-0.072	(0.035)	-0.027	a	0.000003	(0.00002)	0.000001	
Hours for care per day when care was needed	0.054	(0.019)	0.020	a	0.022	(0.014)	0.007	c
<b>4. Household demographics</b>								
Care receiver's Insurance (private medical insurance)	0.392	(0.211)	0.020	b	0.231	(0.154)	0.066	c
Care receiver's Insurance (private life insurance)	0.066	(0.290)	0.141		0.024	(0.211)	0.007	
Care receiver's Insurance (private cancer insurance)	-0.335	(0.420)	0.025		-0.150	(0.287)	-0.047	
Care receiver's Insurance (private LTC insurance)	-0.178	(0.381)	-0.130		-0.026	(0.311)	-0.008	
Care receiver's Insurance (private pension)	1.585	(1.271)	-0.068		-0.566	(0.436)	-0.198	
Household Annual Income (yen)	0.008	(0.166)	0.343		0.037	(0.015)	0.011	a
Household assets (yen)	0.028	(0.097)	0.003		-0.013	(0.014)	-0.004	
Share of the elderly's assets	0.170	(0.262)	0.011		0.009	(0.024)	0.003	
Number of family memmers	0.028	(0.063)	0.064		-0.009	(0.045)	-0.003	
Detached House (=1)	-0.390	(0.291)	0.011		-0.017	(0.311)	-0.005	
			-0.137					
<b>5. Intensity (prefecture level)</b>								
Number of providers per the approved	-136.864	(159.956)	-51.464		2.227	(189.527)	0.664	
Constant	-2.198	(3.405)			-0.666	(2.168)		
Number of Observations		563				636		
Log Likelihood		-185.438				-302.883		

(Note) All regressions include dummies for each prefecture. a, b, c refer to the significance level of 5%, 10% and 15%, respectively.

**Table 3: Determinants of care expenditure**

Variables	FY2002		FY2002		FY2003		FY2003					
	coefficient	S.E.	coefficient	S.E.	coefficient	S.E.	coefficient	S.E.				
	Tobit model		OLS		Tobit model		OLS					
<b>1. Portion of care receivers, care costs, duration from approval</b>												
Duration from approval (months)	0.188	(0.018)	a	0.012	(0.009)		0.031	(0.017)	b	0.004	(0.003)	
<b>2. Characteristics of Care Receiver</b>												
Sex (female=1)	0.045	(0.329)		-0.049	(0.143)		1.301	(0.598)	a	0.124	(0.125)	
Age	0.0665	(0.022)	a	0.0127	(0.010)		0.0242	(0.042)		0.0039	(0.008)	
Care level 1	2.990	(0.368)	a	-0.085	(0.170)		3.937	(0.869)	a	0.423	(0.202)	a
Care level 2	2.943	(0.328)	a	-0.008	(0.148)		6.049	(0.966)	a	0.841	(0.216)	a
Care level 3	3.287	(0.452)	a	0.126	(0.193)		7.802	(0.981)	a	1.200	(0.218)	a
Care level 4	2.035	(0.488)	a	0.198	(0.198)		7.041	(1.040)	a	1.489	(0.229)	a
Care level 5	2.922	(0.534)	a	0.146	(0.218)		7.410	(1.043)	a	1.673	(0.229)	a
Support required => Care level 1	2.420	(1.404)	b	-1.469	(0.568)	a	1.921	(1.418)		0.280	(0.272)	
Support required => Care level 2	4.567	(0.780)	a	-0.334	(0.307)		3.281	(1.723)	b	0.238	(0.307)	
Care level 1=> Care level 2	0.822	(0.641)		0.046	(0.260)		-1.050	(1.267)		0.011	(0.254)	
Disease caused care needs : brain vein disease	0.418	(0.341)		0.348	(0.148)	a	0.376	(0.638)		-0.260	(0.125)	a
Disease caused care needs : heart disease	0.045	(0.455)		0.417	(0.203)	a	-2.438	(1.005)	a	0.102	(0.215)	
Disease caused care needs : cancer	-0.948	(0.720)		-0.176	(0.355)		0.746	(1.780)		-0.557	(0.383)	c
Disease caused care needs : vision or auditory organs	-1.698	(0.667)	a	-0.901	(0.312)	a	0.895	(1.492)		0.215	(0.312)	
Disease caused care needs : joint disease	-0.035	(0.465)		0.009	(0.211)		-0.171	(1.082)		0.114	(0.220)	
Disease caused care needs : dementia	0.816	(0.335)	a	0.419	(0.140)	a	-0.007	(0.610)		-0.056	(0.121)	
Disease caused care needs : diabetes	-0.381	(0.449)		0.283	(0.196)		1.602	(0.946)	b	-0.274	(0.182)	c
Disease caused care needs : vision or auditory organs	-0.335	(0.509)		-0.262	(0.223)		-0.762	(0.967)		-0.017	(0.195)	
Disease caused care needs : bone fracture	-0.235	(0.337)		-0.049	(0.147)		0.260	(0.720)		0.048	(0.141)	
Disease caused care needs : spiral cord damage	1.069	(0.802)		0.006	(0.347)		-4.533	(1.952)	a	0.105	(0.505)	
Disease caused care needs : frailty	0.086	(0.343)		0.224	(0.152)		1.319	(0.619)	a	0.065	(0.124)	
<b>3. Medical services</b>												
Days to go to hospitals or clinics per month	0.026	(0.026)		-0.007	(0.012)		-0.068	(0.097)		0.005	(0.021)	
Medical expenditure per month (self-burden)	#####	(0.04892)	b	0.019455	(0.01982)		0.000038	(0.00005)	#####	(0.00001)	a	
Hours for caregiver day when care was needed	0.081	(0.026)	a	0.034	(0.011)	a	0.082	(0.049)	b	0.018	(0.010)	b
<b>4. Household demographics</b>												
Care receiver's Insurance (private medical insurance)	0.729	(0.336)	a	-0.141	(0.147)		0.496	(0.599)		0.029	(0.122)	
Care receiver's Insurance (private life insurance)	-0.032	(0.476)		0.360	(0.219)		0.314	(0.842)		0.001	(0.172)	
Care receiver's Insurance (private cancer insurance)	-1.048	(0.698)		-0.402	(0.321)		0.598	(1.129)		0.191	(0.238)	
Care receiver's Insurance (private LTC insurance)	-0.740	(0.668)		-0.738	(0.318)	a	-0.668	(1.188)		0.239	(0.245)	
Care receiver's Insurance (private pension)	2.906	(1.322)	a	1.355	(0.515)	a	-3.518	(1.882)	a	0.145	(0.432)	
Household Annual Income (yen)	0.112	(0.268)		0.236	(0.116)	a	0.131	(0.056)	a	-0.005	(0.011)	
Household assets (yen)	0.032	(0.156)		-0.056	(0.071)		-0.056	(0.051)		0.011	(0.010)	
Share of the elderly's assets	0.244	(0.402)		-0.090	(0.176)		0.091	(0.094)		0.002	(0.019)	
Number of family members	0.034	(0.100)		-0.041	(0.043)		-0.147	(0.175)		0.031	(0.036)	
Detached House (=1)	-0.998	(0.444)	a	0.322	(0.187)	b	1.351	(1.265)		0.387	(0.270)	
<b>5. Intensity (prefecture level)</b>												
Number of providers per the approved	-92.060	(232.483)		-12.980	(86.558)		183.688	(640.668)		-22.943	(114.845)	
Share of for-profits	-4.960	(12.452)		1.727	(4.830)		-1.361	(16.827)		1.716	(3.019)	
Constant	-7.634	(4.970)		4.936	(2.098)	a	-3.986	(7.851)		8.685	(1.466)	a
Number of Observations	563			317			660			487		
Log Likelihood	-1,078.061						-1,704.412					
Adjusted R squared				0.222						0.237		

(Note) All regressions include dummies for each prefecture. a, b, c refer to the significance level of 5%, 10% and 15%, respectively.