

**Supplier-Induced Demand in Japan's At-home Care Industry:
Evidence from Micro-level Survey on Care Receivers**

by

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Running title: Supplier-Induced Demand in Japan's At-home Care Industry

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. 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.

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

JEL classification: I11

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1. Introduction

Population aging, accompanied with an enormous amount of medical and long-term care expenses, is surely one of the common challenges for developed countries. Japan is not an exception. 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 6.18 trillion yen in FY2004, a 75.4 percent increase from the 3.52 trillion yen of FY 2000. This remarkable expansion was brought about solely by at-home care, the amount of which increased by more than 150% in the same period, rather than by institutional care¹ (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) 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 institutions².

¹ The amount of at-home care use increased by 151.6 percent between FY 2000 and FY 2004, while that of institutional care increased by 37.8 percent during the same period.

² 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))³. 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 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 and are expected to play a role in allocating care demand properly, 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 issues. We frequently observe information asymmetry between suppliers and demanders since

³ 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)).

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 demanders⁴. 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 issue⁵. However, the existence and magnitude of SID are rather inconclusive. There is a large body of research supportive of SID, but most of studies have not succeeded in the distinction between the SID hypothesis and theories with patient preferences. A greater number of suppliers invite the possibility of SID and, at the same time, it affects patient preferences through lower access costs (McGuire (2000))⁶. 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.

This study utilizes original and rich micro-level data from the “Survey on Long-term Care Users”, 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))⁷. Those studies utilized prefecture-level data and evaluated the

⁴ 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.

⁵ 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)).

⁶ A famous counter-intuitive argument on the 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.

⁷ There are other studies to examine SID in the Japanese medical market. 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

relationship between care expenses in each prefecture and intensity of care providers. 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. Our dataset has rich information on household demographics and health status, which is closely related with the household care demand. Moreover, contrary to previous works, this study also focuses on at-home care markets and pays attention to different behavioral characteristics. Before 2000, the Japanese government allowed only nonprofit enterprises to operate in the market to prevent opportunistic behavior among for-profit companies (Noguchi and Shimizutani (2005a, 2005b)). We consider this difference when extracting policy implications for designing the market competition properly.

The remainder of this study is organized as follows. Section 2 describes Japan’s public long-term care insurance and the at-home care industry. Section 3 explains the dataset used in this study. Section 4 turns to empirical evaluation based on the two-phase model, and the final section concludes and discusses some policy implications of our findings.

2. The At-home Elderly Care Market in Japan⁸

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.

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. 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.

⁸ This section heavily depends on Mitchell, et. al. (2004) and Noguchi and Shimizutani (2005b).

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 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 service⁹. 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, et.al. (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

⁹ 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.”

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)¹⁰. In other words, quality competition—not price competition—is intended for at-home care providers.

3. Description of the Data¹¹

The data set used in this study is the micro-level data from the “Survey on Long-term Care Users”. This survey was performed three times, in 2001, 2002 and 2003. 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.¹² The

¹⁰ Currently a unit is worth ¥10-10.72.

¹¹ This section heavily depends on Noguchi and Shimizutani (2005a), which used the same dataset.

¹² 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

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.¹³ 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.

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 home¹⁴. Of those first surveyed in 2002, we sent the questionnaire to 432 households and received replies from 251¹⁵. 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.

whom.

¹³ 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.

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

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

Among those surveys, we will use the 2002 and 2003 results due to the lack of data on the number of care providers at prefecture level in FY 2001 and the lagged income and assets data needed for avoiding possible endogeneity in the estimation. The sample size is 620 for FY 2002 and 624 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 about 60 percent in both surveys. The amount of out-of pocket expenditures on care services is 12,000 yen to 13,000 yen per month.

Next, we turn to household characteristics. The average age of a care receiver is above 80, and more than 70 percent are female. Those persons with care level 2 or 3 occupies less than 40% of the total samples partly because patients with higher care levels tend to be institutionalized. The diseases responsible for the initial care needs are mostly related with those caused by aging such as frailty, bone fractures, and dementia and brain vein diseases. On average, a patient in the sample goes to hospitals and clinics three times per month and his out-of pocket medical expenditure is more than 4,000 yen. As regards a household's economic status, the most frequent bracket for household income is 4-6 billion yen and that for household assets is 30-50 billion yen. We should note that less than 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. Unfortunately, information on sales or capacity of at-home care providers is not available. 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 available¹⁶. 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 services¹⁷. We take the number of the elderly who are approved as the denominator to measure the intensity¹⁸. Table 1 reports that the number of care providing establishments per person is 0.009. In other words, an establishment has averagely 100 customers in each prefecture. The portion of for-profits out of all establishments is around a quarter in FY2002 and increased to more than 30% in FY2003.

4. Specification and Estimation

This section provides our specification and empirical results. We adopt the two-phase model 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

¹⁶ 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.

¹⁷ Some of care service establishments operated a multiple services jointly.

¹⁸ 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.

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 ten regional groups 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 the Tobit model to address the truncated continuous variable due to the sample without any usage. 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. Moreover, the coefficient on the share of for-profit establishments are negative, which implies that we observe less probability to use care services in an area with more nonprofit 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 or negatively significant, which implies that the opportunistic behaviors of for-profits do not invite SID in Japan’s elderly care market.

5. 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 adopting the two-phase model. 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. Our finding is contrast to Noguchi et. al. (2005), which finds a large amount of supplier-induced demand in the high-tech heart attack treatment in Japan. 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. 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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Figure 1 Care Costs through the Long-Term Care Insurance in Japan

(Billion Yen)

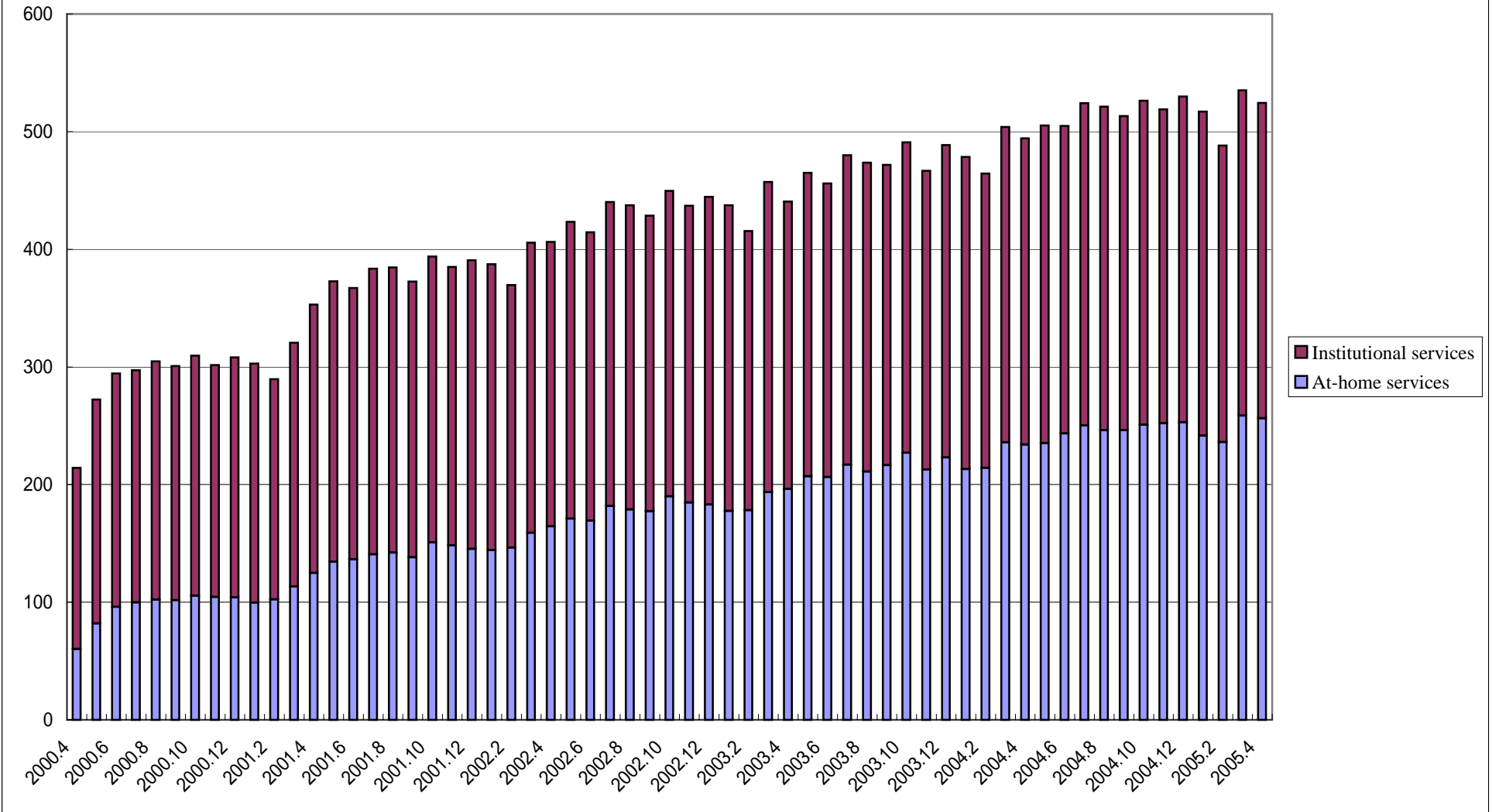


Table 1 : Summary Statistics

Variables	FY2002 (N=620)		FY2003 (N=624)	
	MEAN	S.D.	MEAN	S.D.
1. Portion of care receivers, care costs, duration from approval				
Portion of those who receive at-home care services	0.629	(0.483)	0.595	(0.491)
Care expenditure per month	13,809	(23,015)	12,190	(23,329)
2. Characteristics of Care Receiver				
Sex (female=1)	0.753	(0.431)	0.740	(0.439)
Age	84.058	(6.742)	83.998	(7.004)
Support required	0.055	(0.228)	0.069	(0.254)
Care level 1	0.187	(0.390)	0.188	(0.391)
Care level 2	0.184	(0.388)	0.175	(0.380)
Care level 3	0.115	(0.319)	0.115	(0.320)
Care level 4	0.106	(0.309)	0.090	(0.286)
Care level 5	0.100	(0.300)	0.095	(0.293)
Disease caused care needs : brain vein disease (=1)	0.227	(0.420)	0.205	(0.404)
Disease caused care needs : heart disease (=1)	0.084	(0.277)	0.098	(0.297)
Disease caused care needs : cancer (=1)	0.034	(0.181)	0.038	(0.192)
Disease caused care needs : vision or auditory organs (=1)	0.048	(0.215)	0.042	(0.200)
Disease caused care needs : joint disease (=1)	0.085	(0.280)	0.098	(0.297)
Disease caused care needs : dementia (=1)	0.221	(0.415)	0.184	(0.388)
Disease caused care needs : diabetes (=1)	0.065	(0.246)	0.072	(0.259)
Disease caused care needs : vision or auditory organs (=1)	0.094	(0.291)	0.098	(0.297)
Disease caused care needs : bone fracture (=1)	0.211	(0.409)	0.200	(0.401)
Disease caused care needs : spiral cord damage (=1)	0.016	(0.126)	0.016	(0.126)
Disease caused care needs : frail with aging (=1)	0.226	(0.418)	0.237	(0.426)
3. Medical services				
Days to go to hospitals or clinics per month	3.181	(4.406)	3.272	(4.381)
Medical expenditure per month (self-burden)	4,036	(14,144)	4,512	(11,848)
Hours needed for care per day	6.094	(5.427)	5.583	(5.027)
4. Household demographics				
Care receiver's Insurance (private medical insurance) (=1)	0.266	(0.442)	0.303	(0.460)
Care receiver's Insurance (private life insurance) (=1)	0.102	(0.302)	0.114	(0.318)
Care receiver's Insurance (private cancer insurance) (=1)	0.050	(0.218)	0.090	(0.286)
Care receiver's Insurance (private pension) (=1)	0.040	(0.197)	0.046	(0.211)
Care receiver's Insurance (private LTC insurance) (=1)	0.018	(0.132)	0.014	(0.119)
Household Annual Income: Less than 2 billion yen	0.039	(0.193)	0.045	(0.207)
Household Annual Income: More than 2 billion and less than 3 billion (=1)	0.084	(0.277)	0.074	(0.262)
Household Annual Income: More than 3 billion and less than 4 billion yen (=1)	0.082	(0.275)	0.101	(0.302)
Household Annual Income: More than 4 billion and less than 6 billion yen (=1)	0.227	(0.420)	0.223	(0.416)
Household Annual Income: More than 6 billion and less than 8 billion yen (=1)	0.144	(0.351)	0.178	(0.383)
Household Annual Income: More than 8 billion and less than 10 billion yen (=1)	0.129	(0.336)	0.131	(0.338)
Household Annual Income: More than 10 billion and less than 12 billion yen (=1)	0.139	(0.346)	0.099	(0.299)
Household Annual Income: More than 12 billion and less than 20 billion yen (=1)	0.079	(0.270)	0.080	(0.272)
Household Annual Income: More than 20 billion yen (=1)	0.016	(0.126)	0.014	(0.119)
Household Assets: Less than 3 billion yen (=1)	0.071	(0.257)	0.061	(0.239)
Household Assets: More than 3 billion and less than 8 billion yen (=1)	0.056	(0.231)	0.048	(0.214)
Household Assets: More than 8 billion and less than 12 billion yen (=1)	0.074	(0.262)	0.069	(0.254)
Household Annual Income: More than 12 billion and less than 20 billion yen (=1)	0.102	(0.302)	0.112	(0.316)
Household Annual Income: More than 20 billion and less than 30 billion yen (=1)	0.153	(0.360)	0.162	(0.369)
Household Annual Income: More than 30 billion and less than 50 billion yen (=1)	0.200	(0.400)	0.200	(0.401)
Household Annual Income: More than 50 billion and less than 100 billion yen (=1)	0.158	(0.365)	0.162	(0.369)
Household Annual Income: More than 100 billion and less than 150 billion yen (=1)	0.042	(0.201)	0.054	(0.227)
Household Annual Income: More than 150 billion yen (=1)	0.040	(0.197)	0.045	(0.207)
Number of family members	4.102	(1.409)	4.045	(1.426)
Detached House (=1)	0.887	(0.317)	0.907	(0.291)
5. Intensity (prefecture level)				
Number of establishments per approved persons in a prefecture	0.009	(0.001)	0.010	(0.001)
Share of for-profits	0.249	(0.100)	0.332	(0.114)

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

Variables	FY2002			FY2002			FY2003			FY2003		
	coefficient	S.E.	marginal	coefficient	S.E.	marginal	coefficient	S.E.	marginal	coefficient	S.E.	marginal
2. Characteristics of Care Receiver												
Sex (female=1)	-0.172	(0.178)	-0.061	-0.160	(0.179)	-0.057	0.127	(0.186)	0.050	0.167	(0.189)	0.065
Age	0.016	(0.012)	0.006	0.015	(0.012)	0.005	0.016	(0.012)	0.006	0.014	(0.013)	0.006
Support required	1.557	(0.291)	0.337	a	1.589	(0.292)	0.338	a	2.236	(0.312)	0.459	a
Care level 1	2.312	(0.224)	0.491	a	2.278	(0.225)	0.486	a	2.510	(0.253)	0.583	a
Care level 2	2.217	(0.222)	0.479	a	2.184	(0.222)	0.474	a	2.689	(0.265)	0.587	a
Care level 3	2.148	(0.266)	0.418	a	2.103	(0.268)	0.413	a	2.724	(0.307)	0.530	a
Care level 4	1.961	(0.290)	0.398	a	1.949	(0.292)	0.395	a	2.627	(0.353)	0.496	a
Care level 5	2.085	(0.292)	0.399	a	2.074	(0.295)	0.396	a	2.498	(0.351)	0.496	a
Disease caused care needs : brain vein disease (=1)	0.004	(0.192)	0.001	0.010	(0.192)	0.004	0.397	(0.212)	0.148	c	0.380	(0.213)
Disease caused care needs : heart disease (=1)	-0.323	(0.254)	-0.123	-0.341	(0.287)	-0.130	-0.051	(0.249)	-0.020	-0.055	(0.249)	-0.022
Disease caused care needs : cancer (=1)	-0.619	(0.395)	-0.241	-0.663	(0.398)	-0.258	c	-0.577	(0.417)	-0.227	-0.598	(0.422)
Disease caused care needs : respiratory organs (=1)	-0.529	(0.322)	-0.205	c	-0.535	(0.326)	-0.207	0.011	(0.346)	0.004	-0.023	(0.350)
Disease caused care needs : joint disease (=1)	0.215	(0.249)	0.075	0.175	(0.251)	0.061	-0.012	(0.256)	-0.005	-0.028	(0.261)	-0.011
Disease caused care needs : dementia (=1)	0.215	(0.197)	0.076	0.201	(0.198)	0.071	0.670	(0.229)	0.239	a	0.659	(0.234)
Disease caused care needs : diabetes (=1)	-0.094	(0.284)	-0.035	-0.067	(0.285)	-0.024	0.180	(0.291)	0.069	0.124	(0.292)	0.047
Disease caused care needs : vision or auditory organs (=1)	-0.009	(0.247)	-0.003	0.001	(0.249)	0.001	-0.228	(0.244)	-0.090	-0.193	(0.247)	-0.076
Disease caused care needs : bone fracture (=1)	-0.082	(0.194)	-0.030	-0.056	(0.195)	-0.020	0.110	(0.194)	0.042	0.140	(0.197)	0.054
Disease caused care needs : spiral cord damage (=1)	0.057	(0.591)	0.020	0.082	(0.589)	0.033	-0.257	(0.514)	-0.102	-0.256	(0.526)	-0.101
Disease caused care needs : frail with aging (=1)	-0.093	(0.180)	-0.034	-0.063	(0.181)	-0.023	0.396	(0.193)	0.149	b	0.391	(0.196)
3. Medical services												
Days to go to hospitals or clinics per month	-0.007	(0.017)	-0.003	-0.007	(0.017)	-0.003	0.009	(0.017)	0.003	0.012	(0.018)	0.005
Medical expenditure per month (logarithm)	0.027	(0.020)	0.010	0.026	(0.020)	0.009	0.003	(0.020)	0.001	0.003	(0.021)	0.001
Hours needed for care per day	0.076	(0.017)	0.028	a	0.077	(0.017)	0.028	a	0.068	(0.020)	0.026	a
4. Household demographics												
Care receiver's Insurance (private medical insurance) (=1)	0.365	(0.246)	0.1269	0.353	(0.248)	0.123	0.392	(0.249)	0.148	0.418	(0.251)	0.1571
Care receiver's Insurance (private life insurance) (=1)	0.250	(0.262)	0.086	0.231	(0.263)	0.080	-0.265	(0.248)	-0.105	-0.317	(0.250)	-0.125
Care receiver's Insurance (private cancer insurance) (=1)	-0.362	(0.319)	-0.139	-0.309	(0.319)	-0.118	0.079	(0.272)	0.030	0.065	(0.273)	0.025
Care receiver's Insurance (private pension) (=1)	0.331	(0.390)	0.111	0.244	(0.393)	0.084	-0.389	(0.378)	-0.154	-0.358	(0.377)	-0.142
Care receiver's Insurance (private LTC insurance) (=1)	-0.117	(0.575)	-0.043	-0.080	(0.591)	-0.030	-0.710	(0.598)	-0.276	-0.719	(0.628)	-0.279
Household Annual Income: Less than 2 billion yen [reference]	---	---	---	---	---	---	---	---	---	---	---	---
Household Annual Income: More than 2 billion and less than 3 billion (=1)	-0.324	(0.349)	-0.123	-0.323	(0.351)	-0.123	0.098	(0.366)	0.038	0.170	(0.369)	0.065
Household Annual Income: More than 3 billion and less than 4 billion (=1)	-0.678	(0.331)	-0.263	b	-0.662	(0.332)	-0.256	b	0.802	(0.358)	0.270	b
Household Annual Income: More than 4 billion and less than 6 billion (=1)	0.281	(0.276)	-0.105	-0.277	(0.277)	-0.103	0.221	(0.301)	0.084	0.254	(0.307)	0.096
Household Annual Income: More than 6 billion and less than 8 billion (=1)	-0.225	(0.303)	-0.084	-0.245	(0.304)	-0.092	0.185	(0.308)	0.071	0.188	(0.312)	0.071
Household Annual Income: More than 8 billion and less than 10 billion (=1)	-0.424	(0.308)	-0.162	-0.419	(0.310)	-0.160	-0.031	(0.317)	-0.012	-0.026	(0.322)	-0.010
Household Annual Income: More than 10 billion and less than 12 billion (=1)	-0.043	(0.311)	-0.016	-0.035	(0.312)	-0.013	0.760	(0.372)	0.258	b	0.803	(0.380)
Household Annual Income: More than 12 billion and less than 20 billion (=1)	-0.270	(0.346)	-0.102	-0.241	(0.348)	-0.091	0.191	(0.374)	0.072	0.243	(0.380)	0.091
Household Annual Income: More than 20 billion (=1)	-0.499	(0.637)	-0.194	-0.487	(0.644)	-0.189	0.705	(0.688)	0.235	0.631	(0.692)	0.214
Household Assets: Less than 3 billion yen (=1) [reference]	---	---	---	---	---	---	---	---	---	---	---	---
Household Assets: More than 3 billion and less than 8 billion (=1)	-0.141	(0.331)	-0.053	-0.144	(0.332)	-0.054	0.009	(0.375)	0.003	-0.094	(0.386)	-0.037
Household Assets: More than 8 billion and less than 12 billion (=1)	-0.118	(0.314)	-0.044	-0.073	(0.316)	-0.027	-0.596	(0.349)	-0.234	c	-0.638	(0.355)
Household Annual Income: More than 12 billion and less than 20 billion (=1)	-0.034	(0.285)	-0.012	0.005	(0.285)	0.002	-0.012	(0.302)	-0.005	-0.065	(0.309)	-0.025
Household Annual Income: More than 20 billion and less than 30 billion (=1)	-0.111	(0.260)	-0.041	-0.128	(0.261)	-0.047	0.047	(0.282)	0.018	0.004	(0.286)	0.002
Household Annual Income: More than 30 billion and less than 50 billion (=1)	-0.253	(0.245)	-0.095	-0.200	(0.248)	-0.074	-0.182	(0.269)	-0.071	-0.224	(0.273)	-0.088
Household Annual Income: More than 50 billion and less than 100 billion (=1)	-0.097	(0.254)	-0.036	-0.048	(0.257)	-0.017	-0.101	(0.302)	-0.039	-0.098	(0.307)	-0.038
Household Annual Income: More than 100 billion and less than 150 billion (=1)	-0.552	(0.378)	-0.214	-0.493	(0.379)	-0.190	-0.298	(0.377)	-0.118	-0.284	(0.386)	-0.112
Household Annual Income: More than 150 billion (=1)	-0.417	(0.383)	-0.161	-0.382	(0.383)	-0.146	-0.212	(0.399)	-0.084	-0.255	(0.403)	-0.100
Number of family members	-0.007	(0.057)	-0.003	0.033	(0.057)	0.001	0.115	(0.059)	0.044	c	0.122	(0.060)
Detached House (=1)	0.000	(0.232)	0.000	-0.036	(0.235)	-0.013	-0.144	(0.271)	-0.005	-0.240	(0.279)	-0.090
5. Intensity (prefecture level)												
Number of establishments per approved persons in a prefecture	-48.668	(75.930)	-17.705	-158.439	(92.230)	-57.509	c	55.604	(75.613)	21.590	-5.138	(79.547)
Share of for-profits				-2.695	(1.280)	-0.978	b				-2.951	(0.960)
constant	-1.965	(1.345)		-0.541	(1.508)		-4.824	(1.347)		a		
Number of Observations		614			614			618.000				618
Log-likelihood		-235.217			-232.954			-218.575				-213.640

(Note) All regressions include dummies for regions dummies, which were constructed by grouping prefectures into 10 groups.

a, b, c refer to the significance level of 5%, 10% and 15%, respective

Table 3: Determinants of care expenditure

Variables	FY2002		FY2002		FY2003		FY2003	
	coefficient	S.E.	coefficient	S.E.	coefficient	S.E.	coefficient	S.E.
2. Characteristics of Care Receiver								
Sex (female=1)	-0.705	(0.532)	-0.686	(0.531)	0.890	(0.622)	0.983	(0.620)
Age	0.046	(0.038)	0.047	(0.038)	0.054	(0.041)	0.056	(0.041)
Support required	6.161	(1.107)	a 6.193	(1.107)	a 9.748	(1.158)	a 9.765	(1.153)
Care level 1	11.149	(0.787)	11.085	(0.787)	a 11.971	(0.953)	a 11.962	(0.949)
Care level 2	11.180	(0.780)	a 11.112	(0.781)	a 13.213	(0.980)	a 13.097	(0.975)
Care level 3	11.566	(0.888)	a 11.455	(0.891)	a 13.545	(1.084)	a 13.477	(1.078)
Care level 4	11.656	(0.946)	a 11.611	(0.945)	a 14.352	(1.191)	a 14.311	(1.185)
Care level 5	12.560	(0.958)	a 12.483	(0.958)	a 13.427	(1.181)	a 13.327	(1.174)
Disease caused care needs : brain vein disease (=1)	0.379	(0.601)	0.424	(0.601)	1.502	(0.662)	b 1.528	(0.658)
Disease caused care needs : heart disease (=1)	-1.407	(0.820)	c -1.450	(0.821)	c -0.415	(0.824)	-0.398	(0.819)
Disease caused care needs : cancer (=1)	-1.781	(1.390)	-1.802	(1.390)	0.420	(1.349)	0.462	(1.341)
Disease caused care needs : respiratory organs (=1)	-2.242	(1.062)	b -2.277	(1.062)	b -1.687	(1.261)	-1.748	(1.254)
Disease caused care needs : joint disease (=1)	1.260	(0.797)	1.227	(0.797)	0.527	(0.850)	0.467	(0.845)
Disease caused care needs : dementia (=1)	0.491	(0.573)	0.466	(0.572)	1.654	(0.638)	b 1.565	(0.636)
Disease caused care needs : diabetes (=1)	-0.537	(0.928)	-0.480	(0.929)	0.402	(0.961)	0.395	(0.956)
Disease caused care needs : vision or auditory organs (=1)	-0.050	(0.793)	-0.044	(0.793)	-1.717	(0.888)	c -1.610	(0.883)
Disease caused care needs : bone fracture (=1)	0.548	(0.585)	0.592	(0.586)	0.546	(0.633)	0.606	(0.630)
Disease caused care needs : spiral cord damage (=1)	-0.483	(1.728)	-0.385	(1.727)	-0.272	(1.802)	-0.288	(1.792)
Disease caused care needs : frail with aging (=1)	0.283	(0.563)	0.317	(0.563)	1.368	(0.614)	b 1.360	(0.611)
3. Medical services								
Days to go to hospitals or clinics per month	-0.091	(0.055)	c -0.090	(0.055)	0.033	(0.060)	0.041	(0.060)
Medical expenditure per month (logarithm)	0.199	(0.064)	a 0.196	(0.063)	a 0.105	(0.067)	0.102	(0.067)
Hours needed for care per day	0.148	(0.046)	a 0.150	(0.046)	a 0.160	(0.619)	a 0.160	(0.056)
4. Household demographics								
Care receiver's Insurance (private medical insurance) (=1)	0.382	(0.771)	0.357	(0.770)	1.642	(0.846)	c 1.662	(0.840)
Care receiver's Insurance (private life insurance) (=1)	0.628	(0.805)	0.635	(0.804)	0.361	(0.848)	0.317	(0.843)
Care receiver's Insurance (private cancer insurance) (=1)	0.663	(1.051)	0.737	(1.051)	2.067	(0.906)	b 2.129	(0.900)
Care receiver's Insurance (private pension) (=1)	2.641	(1.161)	b 2.476	(1.169)	b -0.764	(1.246)	-0.644	(1.238)
Care receiver's Insurance (private LTC insurance) (=1)	-1.053	(1.607)	-1.058	(1.608)	-1.727	(2.008)	-1.767	(2.006)
Household Annual Income: Less than 2 billion yen [reference]	---	---	---	---	---	---	---	---
Household Annual Income: More than 2 billion and less than 3 billion (=1)	-0.776	(1.018)	-0.767	(1.017)	0.864	(1.187)	1.027	(1.179)
Household Annual Income: More than 3 billion and less than 4 billion yen (=1)	-2.443	(1.043)	b -2.410	(1.041)	b 0.672	(1.093)	0.673	(1.087)
Household Annual Income: More than 4 billion and less than 6 billion yen (=1)	-0.694	(0.849)	-0.696	(0.848)	0.665	(0.983)	0.672	(0.977)
Household Annual Income: More than 6 billion and less than 8 billion yen (=1)	-0.326	(0.926)	-0.368	(0.926)	0.471	(1.025)	0.515	(1.019)
Household Annual Income: More than 8 billion and less than 10 billion yen (=1)	-1.241	(0.957)	-1.245	(0.956)	0.047	(1.091)	0.040	(1.084)
Household Annual Income: More than 10 billion and less than 12 billion yen (=1)	-0.594	(0.944)	-0.581	(0.943)	1.708	(1.194)	1.715	(1.189)
Household Annual Income: More than 12 billion and less than 20 billion yen (=1)	-0.944	(1.081)	-0.901	(1.080)	1.235	(1.254)	1.321	(1.247)
Household Annual Income: More than 20 billion yen (=1)	-0.789	(1.917)	-0.804	(1.917)	-3.032	(2.883)	-3.112	(2.868)
Household Assets: Less than 3 billion yen (=1) [reference]	---	---	---	---	---	---	---	---
Household Assets: More than 3 billion and less than 8 billion yen (=1)	0.174	(1.023)	0.171	(1.022)	-0.177	(1.261)	-0.363	(1.258)
Household Assets: More than 8 billion and less than 12 billion yen (=1)	-1.277	(0.957)	-1.225	(0.957)	-1.264	(1.118)	-1.281	(1.112)
Household Annual Income: More than 12 billion and less than 20 billion yen (=1)	0.585	(0.884)	0.661	(0.886)	0.273	(0.945)	0.201	(0.941)
Household Annual Income: More than 20 billion and less than 30 billion yen (=1)	0.130	(0.776)	0.092	(0.776)	0.168	(0.880)	0.121	(0.875)
Household Annual Income: More than 30 billion and less than 50 billion yen (=1)	-0.650	(0.747)	-0.577	(0.749)	-0.049	(0.854)	0.002	(0.849)
Household Annual Income: More than 50 billion and less than 100 billion yen (=1)	0.459	(0.779)	0.496	(0.779)	-0.879	(0.937)	-0.804	(0.932)
Household Annual Income: More than 100 billion and less than 150 billion yen (=1)	-0.632	(1.206)	-0.577	(0.749)	-0.062	(1.231)	0.079	(1.226)
Household Annual Income: More than 150 billion yen (=1)	0.215	(1.249)	0.496	(0.779)	-1.064	(1.438)	-1.107	(1.429)
Number of family members	-0.111	(0.175)	-0.541	(1.206)	0.287	(0.189)	0.310	(1.885)
Detached House (=1)	-1.100	(0.714)	0.264	(1.249)	-0.667	(0.867)	-0.824	(0.865)
5. Intensity (prefecture level)								
Number of establishments per approved persons in a prefecture	-63.902	(233.640)	-248.605	(286.282)	387.157	(242.662)	229.675	(249.287)
Share of for-profits			-4.170	(3.734)			-6.947	(2.905)
constant	-4.200	(5.199)	-1.861	(5.596)	-20.379	(4.475)	-17.576	(4.586)
Number of Observations	617		617		619		619	
Log-likelihood	-1,078.061		-1,284.216		-1,208.169		-1,205.318	

(Note) All regressions include dummies for regions dummies, which were constructed by grouping prefectures into 10 groups.
a, b, c refer to the significance level of 5%, 10% and 15%, respectively.