

In this section, we develop two models, the first model focusing on providers' choice of quality, and the second focusing on the costs of production and efficiency. Specifically, let the care demand function be

$$Y=Y(P,Q,Z) \quad (1)$$

Where P is the price charged, Q is quality, Z is a vector of exogenous variables that shift the demand curve, such as the competitiveness of the care provider's local market and the demographic characteristics. On the other hand, the cost function is

$$C=C(Y, Q, W) \quad (2)$$

Where Y is the output of a specific care provider, W is a vector of exogenous factor input price the care provider is facing with. In this analysis, output Y is classified into three categories: hours of physical nursing service (A), hours of housework assistance service (B) and hours of multiple service (C). On the other hand, factor input W includes labor cost (labor cost / overall employment hours) and administrative cost<sup>13</sup> (admin. cost / overall employment hours).

Hence, the care providers choose price and quality to maximize profits I:

$$I=P*Y(P,Q,Z)-C(Y,Q,W) \quad (3)$$

The corresponding first-order conditions are

$$\partial I / \partial Q = 0 \rightarrow P * \partial Y / \partial Q = \partial C / \partial Q \quad (4)$$

While output Y is exogenous<sup>14</sup> and prices P are fixed under the Japanese nursing care price system, the equation (1),(2),(4) can be solved for the endogenous variable Q in terms of exogenous variables Y, W and Z:

$$Q=Q(Y,W,Z) \quad (5)$$

A functional form for the equilibrium quality function (5) could be expressed as follows:

$$Q_i = \alpha_0 + \alpha_1 L_i + \alpha_2 Y_i + Z\rho + u_i \quad (6)$$

Where  $L_i$  is the total labor hours, Z is a vector of exogenous variables for each care provider which includes the market competition level of its location, whether it is for-profit or nonprofit ( $N=1$  if nonprofit provider, 0 otherwise), whether it is a public

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<sup>13</sup> Administrative cost includes the cost of renting office space, the cost of water and heating, as well as the maintenance cost of automobiles.

<sup>14</sup> Strictly speaking, Y is not exogenous even in the case of Japanese nursing care market. To make the model as simple as possible, we assume Y to be exogenous.

provider or not ( $G=1$  if public provider, 0 otherwise), whether it is a new provider or not ( $A=1$  if new provider, 0 otherwise), whether it is a branch office or not (1 if yes, 0 otherwise), and what kind of region it is located<sup>15</sup>.

Turning to the estimation of cost function, this analysis employs a quality-adjusted translog cost function. By using the translog cost function, we can make inferences about the principal economic effects without imposing any restrictive assumptions on elasticities of substitution among inputs and allow return to scale change with respect to output. The empirical counterpart of equation (2) is the following translog cost function (Equation 7):

$$\begin{aligned} \log C = & \alpha_0 + \alpha_y \log Y + \alpha_q \log Q + \sum_{i=1}^n \alpha_{wi} \log W_i + \frac{1}{2} \beta_{yy} (\log Y)^2 + \frac{1}{2} \beta_{qq} (\log Q)^2 + \\ & \frac{1}{2} \sum_i \sum_j \beta_{ij} \ln W_i \ln W_j + \beta_{yq} \log Y \log Q + \sum_i \beta_{yw} \log Y \log W_i + \sum_i \beta_{qw} \log Q \log W_i \\ & + \sum_i \varepsilon_i \log W_i + Z\gamma + u \end{aligned}$$

Since we are interested in the effect of  $Z$ , particularly the market concentration, on cost, we employ  $Z$  as a vector of exogenous variables in the cost function as well. To be consistent with economic theory, the cost function should be linearly homogenous in input prices, and the cross-coefficients must be symmetric. These imply the following restriction on Equation (7):

$$\sum_i \alpha_{wi} = 1, \quad \sum_i \beta_{ij} = \sum_j \beta_{ji} = 0, \quad \sum_i \beta_{yw} = 0, \quad \sum_i \beta_{qw} = 0$$

Using Shephard's Lemma, optimal demand for the  $i$ th input is obtain by differentiating the cost function with respect to the price of  $i$ th input ( $W_i$ ), i.e. price of labor. Letting  $s_i$  denote the cost share of input  $i$ , and differentiating the cost function of equation (3) with respect to  $W_i$  yields the following structure of the cost shares:

$$s_i = \alpha_{wi} + \sum_j \beta_{ij} \log W_j + \beta_{yw} \log Y + \beta_{qw} \log Q + \varepsilon_i \quad (8)$$

where  $j$  denotes the price of inputs other than labor. The cost equation (7) is estimated jointly with the above share equation (8) using non-linear methods subject to the restriction imposed above. In particular,  $Q$  will be treated as an observed and endogenous

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<sup>15</sup> Region dummies consist of three dummies, determined by the public long-term-care payment

variable to emphasize its role as a quality variable. Its predicted value ( $Q_{hat}$ ) obtained from the estimation of quality function, will be employed as an explanatory variable in the cost function.<sup>16</sup>

## 5. Empirical Results

### 5.1 Comparison of Quality

There exist no uniformed criteria in determining the quality of nursing service in Japan yet. For example, it is well known that the city of Kobe, the city of Yokohama, and Hokkaido prefecture have designed their own sets of local criteria respectively and employed them in practical assessment activities. The questionnaire we employed<sup>17</sup>, however, has chosen 14 indexes which could be measured objectively and precisely from a pool of developed indexes. For convenience of analysis, we divided these 14 indexes<sup>18</sup> into four categories: quality management, service convenience, information service, and the ability of home help staffs.

In the following, we compare the average quality of services of care providers in a highly concentrated local market<sup>19</sup> and their counterparts in a sparsely concentrated local market. It should be noted that the concentration level of the local market is computed as the number of care providers per thousand elderly ( $age \geq 65$ ) who are potential users of nursing care services in the area. Table 3 employs the 4 sub-indexes listed in appendix A to compare the mean scores of providers in two different markets. Areas where the number of providers per thousand elderly is less than the average and median values are categorized as highly concentrated (less-competitive) markets, and vice versa.

We prepared two sets of scores to measure the overall quality of care service. The “total score” is calculated by simply adding up the obtained scores of each sub-index, and hence each query is equally weighted. The “score of the first principle factor” is estimated by principle factor analysis, where each index was evaluated with different weights. In

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system.

<sup>16</sup> Gertler and Waldman(1992) treat quality as endogenous, unobservable variable.

<sup>17</sup> Shimizutani and Suzuki (2002) have employed a set of even more comprehensive index draw from a survey performed by the Cabinet Office of Japanese government in 2001.

<sup>18</sup> See Append A for detailed descriptions about the 14 sub indexes.

<sup>19</sup> The common assumption of local market is the municipality in which the care provider is located. There are certainly a few users whose care provider is located in a neighboring municipality, but we assume most users in Japan are using facilities inside their residence municipality.

Table 3, a “+” indicates that the average score of providers in highly competitive (or sparsely concentrated) markets is higher than that of the providers in less-competitive markets. “-” refers to the reverse.

According to the descriptive statistics results of Table 3, the signs of half of the sub-indexes match the null hypothesis that care providers in highly competitive markets are providing better services. A comparison using the total score or the scores of the principle component, a comprehensive index of quality, is in accordance with our expectation. Nevertheless, the quality gaps are quite small, and only the sub index of quality management significantly differs between providers in highly concentrated markets and those in less concentrated markets.

Results of Table 3 are very informative but lack statistical validity and lose important information because the numerical variable of market concentration (number of care providers per thousand elderly in an area) is treated as a binary variable (whether above or below the average level). Furthermore, as the service quality of care providers could be influenced by other factors besides market concentration, it is important to extinguish their separate effects by multiple regressions.

The quality function of equation (6) is estimated by OLS with a Huber-White Sandwich estimator of the variance, and hence the heteroscedasticity is adjusted to some extent.

Table 4 highlights the estimated coefficients on the market competition level. The estimation results presents a little what different image with that of the descriptive statistics in Table 3. Contrary to the outcomes of table 3, competition level has a positive effect on the 3<sup>rd</sup> index of service quality after controlling the effects of other covariates such as ownership dummy and region dummy. That is to say, if the scales of business, region location and business ownership are held constant, information service of home help business improves at a regular pace as market competition rises. However, competition level has no effect on other 3 sub-indexes and 2 comprehensive indexes. In a sum, the effect of market concentration or competition level on service quality, if exists, is quite limited.

## 5.2 Comparison of Efficiency

Table 5 reports results where case 1 employs the sum of total scores as an index of

quality of services and case 2 employs the score of the first principle component as a proxy of quality of service.

As we can easily learn from Table 5, although there are some differences in the magnitude of coefficients and t values, we found no substantial differences between the parameter estimates of these two cases. For the variable of market concentration, which we are mostly concerned about, both case 1 and case 2 indicate that increases in competition are associated with less cost. In other words, the significantly negative coefficient of market concentration index indicated that the number of care providers per thousand elderly is negatively related with cost. This result is in accordance with that of Nyman (1994), but as we mentioned in the introductory section, it is contradicted by the descriptive statistical results of MHWL.

The estimation of cost function has some other interesting implications. Firstly, among the three kinds of home help services, only physical nursing service is significantly associated with higher cost in both cases. This result is consistent with the notion that physical nursing care is the most costly service among the three kinds of home help service. Secondly, running subsidiary businesses imposes no significant effect on cost. This result is somewhat surprising but suggests a lack of compensatory benefits between home help and other at-home nursing care businesses. Thirdly, branch office is running at a lower cost than the headquarters in both cases, and the possible reason could be that the branch office requires lower costs for advertising, information collection or employee training. Fourthly, newer care providers are less cost-efficient than the older care providers (case 1 only), after controlling for ownership effect and quality of services. This result is quite natural since the newer providers should meet more initial investment cost than the older ones. In addition, coefficients of the non-profit provider dummy and public provider dummy are positive and significant in both cases<sup>20</sup>. This outcome is quite plausible because it is well known that non-profit or public providers generally lack incentives to minimize costs. Finally, the coefficient of quality is significantly positive, which implies that a tradeoff relationship exists between quality and cost.

## 6. Concluding Remarks

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<sup>20</sup> Shimizutani and Suzuki (2002), on the contrary, have reported a significantly negative relationship

Because of the dramatic aging process of Japan's population, the nursing care system in Japan has been reformed in order to stimulate the supply of care services and improve quality. This analysis focuses on the home help industry and investigates whether market competition is good for quality and cost saving.

This analysis contributes to Japan's nursing care literature in the following aspects: first, it is the first study using cross-section data to probe the relationship between market concentration, cost and quality in an econometric framework. Second, it estimates the cost function while controlling the effect of quality, an observable and endogenous variable in the model. Hence, the results of this analysis are more statistically reliable. Thirdly, it develops a set of comprehensive and systematic indexes to evaluate the quality of nursing services, which could be a useful reference for government decision-making.

We present our major findings as follows:

(1) Holding the scale of business, geographical location and business ownership constant, we find that only in the case of information service, as market competition increases, so too does the quality of care services. This result shows that the impact of market competition on the quality of care service, if any, is quite limited in 2000.

(2) Contrary to the descriptive perception of the survey results of MHLW, this analysis shows that competition is associated with lower cost. In other words, market competition is good for cost savings in home help care service.

(3) Other interesting findings include evidence of a tradeoff relationship between quality and cost, that running a subsidiary business has few cost-saving premiums, that branch offices run at lower cost than headquarters, and that new or non-profit care providers incur higher costs than their older or for-profit counterparts.

Turning to policy implications, although we are hesitant to apply our findings from the entire nursing care business to other than the home help business, this paper points to at least one policy prescription: there are no foundations for concerns that quality will be sacrificed in the name of cost saving by market-oriented reforms.

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between public provider dummy and cost.

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## **Appendix B : Institutional Setting of At-home Nursing Care Business in Japan**

In Japan, at-home nursing care services include a total of 13 categories: home help service, at-home bathing help, at-home nursing help, at-home rehabilitation help, out-patient rehabilitation help, at-home medical care, management counseling, day-service, short-stay service, group homes for the elderly with dementia, long-term care at private home for the elderly, lending care equipment, and home alteration to meet care needs.

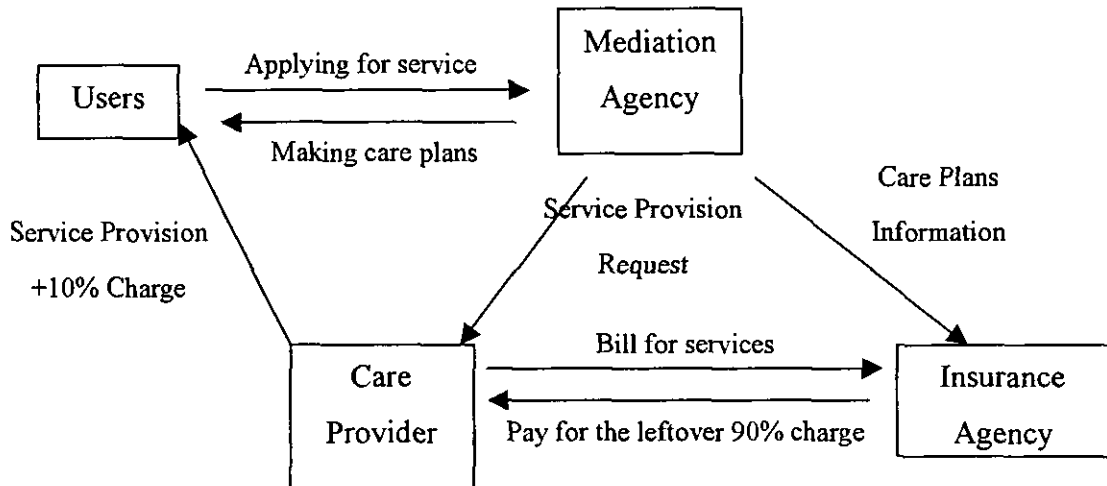
Generally, users afford only 10%<sup>21</sup> of the total cost as long as they do not break the upper limit of use rights, and other expenses are covered by premium incomes (50%), central government subsidy (25%), prefecture subsidy (12.5%) and municipality subsidy (12.5%)<sup>22</sup>. Flow of money and provision of service is summarized in Graph 1. In words, at-home nursing business happens when eligible users apply for service through a mediation agency (care manager). Care providers serve the users based on the care plan made by the care manager and receive payment from both users and insurance agencies.

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<sup>21</sup> There are upper limits for users' burdens.

<sup>22</sup> To improve social welfare, some municipalities have additional subsidy for care providers, which we define as government subsidies in the analysis.

Graph 1 Flow of Money and Service Provision



Source: Ito(2001) p.175

Table 1 Distribution of providers by ownership category

	Ownership	Our survey (obs.)	Our survey %	National wide %
For-profit providers	Stock corporations and limited private companies	204	46.7	40.4
	Individuals	4	0.9	?
Public providers	Local public organizations	2	0.5	2.3
	Social welfare associations	96	22.0	20.1
Nonprofit providers	Social welfare corporations (excluding social welfare associations)	46	10.5	18.2
	Medical corporations	20	4.6	10.0
	Civil corporations	16	3.7	1.9
	Other nonprofit organizations	49	11.2	7.0
Sum		437	100.0	100.0

Note: (1) National wide data are derived from the census data conducted by Ministry of Health, Labor and Welfare in July, 2000. (2) Local public organizations are corporations run by local governments directly. (3) Social welfare associations, established by individuals or organizations, are permitted to run social welfare business only. Although social welfare associations can enjoy equipment subsidies from the government and receive certain tax benefits, they are prohibited to make profit or own estates in personal name. (4) Social welfare corporations are some specific kind of social welfare associations which are run by local public organizations. A social welfare corporations will embrace redundant staffs of local public organizations by external assignment system (Shukko), and can easily achieve agential jobs or underlying subsidies from the government. (5) Medical corporations are nonprofit organizations run by hospitals (5) Civil corporations run public welfare businesses under the supervision of the regulatory authorities. Civil

Table 2 Descriptive Statistics

Variables	Obs.	Mean	S. D.
Total Cost (in 10,000 JPY)	399	1034.52	1952.70
Wage (=labor cost / overall employment hours, in JPY)	344	1172.04	238.44
Admin. cost (=administrative cost / overall employment hours; in JPY)	386	5468.03	14177.37
Total hours of physical nursing service provided	427	192.77	304.40
Total hours of housework assistance service provided	427	307.13	613.51
Total hours of multiple services provided	427	273.94	576.04
Predicted service quality in terms of the total score (Qhat1)	439	8.71	0.72
Predicted service quality in terms of the score of the first principle factor (Qhat2)	439	0.01	0.41
Length of operation (in years)	433	7.11	14.76
Percentage of branch office	445	30.6%	0.46
Percentage of providers in region 1	445	37.3%	0.48
Percentage of providers in region 2	445	16.4%	0.37
Percentage of providers running medical facility business simultaneously	445	2.0%	0.14
Percentage of providers running at-home assistance business simultaneously	445	62.9%	0.48
Percentage of providers running at-home bathing business simultaneously	440	13.6%	0.34
Percentage of providers running day care business simultaneously	445	14.4%	0.35
Percentage of providers running sales and lending business of welfare equipments simultaneously	445	7.9%	0.27
Percentage of providers running food delivery business simultaneously	445	1.1%	0.11
Percentage of providers running short-stay business simultaneously	445	4.7%	0.21
Percentage of providers running at home nursing and rehabilitation business simultaneously	445	2.0%	0.14
Percentage of regular costumors	400	836.1%	2.42
Percentage of costumors secured before the the start of reform	410	404.7%	3.63
Percentage of costumors in need of nursing care certified as band 3 or over	419	350.1%	2.16
Percentage of newer providers	437	56.0%	0.50
Percentage of for-profit providers	437	46.7%	0.50
Percentage of nonprofit providers	437	40.7%	0.49
Percentage of public providers	437	10.8%	0.31
Number of providers per thousand elderly	439	44.8%	0.22

Notes: (1) Minus values of Qhat2 have been transformed to suit for a log form.

Table 3 Comparison of quality of services by market concentration level

	Sub-index of quality of services	All providers	Providers in lowly concentrated market	Providers in highly concentrated market	
1	Quality Management	2.20	2.24	2.10	+ *
2	Service convenience	2.84	2.89	2.74	+
3	Information service	1.65	1.63	1.69	-
4	Ability of the home help staff	1.88	1.87	1.92	-
5	Total score	8.69	8.77	8.55	+
6	Score of the first principle factor	0.000	0.037	-0.069	+

Notes

(1) We define markets where the number of care providers are less than the average level as highly concentrated (less-competitive) market, or we define the markets as lowly concentrated (more-competitive) ones. (2) On the last column of each score, "+" implies that the average score of providers in lowly concentrated market is higher than that in highly concentrated market, while "-" refers to the reverse. (3) "\*" denotes 10% significant level.

Table 4 Estimation of service quality functions

	Dependent variables	Competition level-ratio			Adjusted R <sup>2</sup>
		coeff.		t value	
Case 1	Quality Management	-0.131		-0.58	0.173
Case 2	Service convenience	-0.031		-0.12	0.087
Case 3	Information service	0.273	**	2.37	0.088
Case 4	Ability of the home help staff	0.122		1.17	0.110
Case 5	Total score	0.110		0.29	0.117
Case 6	Score of the first principle factor	0.097		0.56	0.180

Notes:

(1) Estimations are based on the following equation:

$$Q = \beta(0) + \beta(1) * \text{ratio} + \beta(2) * \text{Nonprofit dummy} + \beta(3) * \text{public provider dummy} + \beta(4) * \text{New provider dummy} + \beta(5) * \text{region dummies} + \beta(6) * \text{branch dummy} + \beta(7) * \text{labor hours} + u$$

where Q is the dependent variable which is the score of each sub-index (case 1 to 4), or the total scores (case 5), or the principle component scores (case 6), and ratio is the number of care providers per thousand population.

(2) This table highlights the estimated parameters of ratio only.

(3) The equation in (1) is estimated by OLS with a Huber-White Sandwich estimator of variance, and hence the heteroskedasticity of residuals are adjusted.

(4) \*\*\* means 1% significant level, \*\* means 5% significant level, \* means 10% significant level.

Table 5 Estimation of translog cost functions

	case1: Quality=total score		case2: Quality=first PC	
	Coeff.	t value	Coeff.	t value
ln (Total hours of physical nursing service) -A	1.1850 **	2.40	0.9120 **	2.51
ln (Total hours of physical nursing service)^2	0.0076 ***	3.17	0.0062 ***	2.69
ln (Total hours of house work assistance service)-B	0.6675	0.86	0.8485 *	1.66
ln (Total hours of house work assistance service)^2	0.0015	0.61	0.0010	0.43
ln (Total hours of multiple services) -C	-0.0816	-0.11	-0.5506	-1.06
ln (Total hours of multiple services)^2	0.0074 ***	2.97	0.0062 **	2.54
ln (A)* ln (B)	0.0004	0.17	0.0017	0.72
ln (B)* ln (C)	0.0036	1.54	0.0049 **	2.12
ln (C)* ln (A)	0.0022	0.88	0.0031	1.30
ln (Wage) or ln(W)	2.2347 ***	3.59	1.4320 ***	4.92
ln (Wage)^2	-0.0345	-1.57	-0.0310	-1.47
ln (Admin. cost ) or ln(AC)	-1.2347 **	-1.98	-0.4320	-1.49
ln (AC)^2	0.0508 ***	12.58	0.0494 ***	12.70
ln (W)* ln (AC)	-0.0164	-0.70	-0.0184	-0.82
ln (A) * ln (W)	-0.0322	-0.60	-0.0764	-1.39
ln (B) * ln (W)	0.0056	0.11	-0.0106	-0.21
ln (C) * ln (W)	0.0149	0.21	0.0682	0.95
ln (A) * ln (AC)	0.0022	0.58	0.0023	0.60
ln (B) * ln (AC)	0.0051	1.61	0.0063 **	2.05
ln (C) * ln (AC)	0.0043	0.37	0.0103	0.96
ln(Qhat)	79.5113 ***	4.45	46.1283 ***	5.18
ln(Qhat)^2	-12.4044 ***	-3.13	-8.4008 ***	-2.79
ln(Qhat)*ln(A)	-0.3935 *	-1.82	-0.2020	-1.27
ln(Qhat)*ln(B)	-0.3095	-1.14	-0.5321 ***	-2.84
ln(Qhat)*ln(C)	0.0294	0.11	0.1172	0.60
ln(Qhat)*ln(W)	-0.9191 ***	-3.05	-0.8286 ***	-4.51
ln(Qhat)*ln(AC)	0.9191 ***	3.05	0.8286 ***	4.51
Length of operation	0.0016	0.50	0.0016	0.52
Branch office dummy	-0.7974 ***	-6.36	-1.3453 ***	-8.81
dummy for region 1	-0.7129 ***	-5.71	-0.5752 ***	-5.06
dummy for region 2	-1.0610 ***	-7.21	-0.7165 ***	-5.70
dummy for medical facilities	0.2362	0.79	0.1609	0.56
dummy for at-home assistance business	-0.0218	-0.24	-0.0048	-0.05
dummy for at-home bathing business	-0.0004	0.00	0.0334	0.30
dummy for day care business	0.1115	0.78	0.1815	1.30
dummy for sales and lending business of welfare equipments	-0.1727	-1.19	-0.1826	-1.31
dummy for food delivery business	-0.7331	-1.45	-0.7025	-1.44
dummy for short-stay business	0.0486	0.23	0.0099	0.05
dummy for at home nursing and rehabilitation business	0.0713	0.24	0.0181	0.06
proportion of regular users	-0.0089	-0.47	-0.0173	-0.93
proportion of users secured before 2000	0.0092	0.57	0.0075	0.49
Proportion of users in need of nursing care band 3 or over	0.0056	0.24	0.0140	0.63
dummy for newer provider	0.4581 ***	3.79	-0.1088	-1.01
dummy for nonprofit provider	0.6459 ***	4.62	0.7016 ***	5.21
dummy for public provider	0.3718 **	2.17	1.1954 ***	6.10
Index of market concentration	-0.2815 *	-1.65	-0.3813 **	-2.31
constant	-108.1708 ***	-5.23	-42.0996 ***	-6.17
R squared (observations)	0.7022(306)		0.7193(306)	

Notes:

(1) The dependent variable is the logarithm of the total expenditure (lnC) of individual provider.

(2) Index of market concentration refers to the number of care providers per thousand elderly in each area.

**Appendix A: Measurement of the Quality of Service**

Name of sub-index	Name of items in each sub-index			
	item1	item2	item3	item4
1: Quality Management	Does your establishment acquired silver mark or ISO approval?	Does your establishment have a standard manual for home help service?	Does your establishment regularly hold information exchange meet, case study meet or care conference?	Does your establishment provide your own regular staff training?
2: Service convenience	Are your establishment settling no lower limits for utilization hours?	Can your establishment provide nursing service late in the early morning or late at the night?	Can your establishment always meet emergency needs?	Can your establishment provide services on holidays?
3: Information service	Does your establishment designate staff to process claims from customers?	Does your establishment promulgate its service content through brochures or home pages on the web?		
4: Ability of home help staff	Is the proportion of staff with the qualification of social welfare counselor, welfare caretaker, professional physical therapist (PT), or operational therapist (OT) higher than the sample average?	Is the proportion of qualified staff higher the sample average?	Is the proportion of staff with more than five years' experience as a home helper higher than the sample average?	Is the proportion of staff with less than one year of experience as a home helper lower than the sample average?

Note: (1) "Qualified staff" refers to those who hold at least a certified qualification of 2nd Band Home Helper.

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## **Evaluating Japan's Health Care Reform in the 1990s and Major Issues Coping with the Aging of the Population**

研究者

（社）日本経済研究センター 理事長 八代尚宏

大阪大学大学院国際公共政策研究科／（社）日本経済研究センター 鈴木亘

（社）日本経済研究センター 主任研究員 鈴木玲子

**研究要旨** Although the Japanese health care system has been successful, it will face difficulties in the future mainly because of rapid aging of the population. The government has done a series of health care reforms in the 1990s including the announcement of the new reform in 2003. This paper, firstly, explores the recent official demographic projection, which showed us the magnitude of aging is more serious than the former projection had predicted, secondly summarizes the series of health reforms in the 1990s, thirdly estimates the fiscal impacts of the 2003 policy reform for the budget of various health insurance policies, and lastly surveys the major issues to be solved in the future reform.

### **A. 研究目的**

The government has done a series of health care reforms in the 1990s and is announcing the new reform in 2003. However, it has not been fully investigated whether or not the reforms were effective from economic point of view. There is also an urgent need for an objective forecast of the assumed impact of the proposed reform to be launched in 2003, because the official forecast, which does not make the background data open to the public, might have a bias.

### **B. 研究方法**

In order to evaluate the effect of policy reforms, 1) we surveyed a thorough list of previous economic papers, 2) we built a proprietary Health Insurance Budget Model to estimate the effects by utilizing announced figures and information, as the government does not make the basis of their estimates clear. The model has five blocks of major public health insurance programs in Japan, so that it is possible to make future forecast of fiscal balance of each insurance.

### C. 研究結果

The major results of the estimation are: 1) the baseline case with no institutional changes indicates widening deficit from 1.4 trillion yen in 2002 to 16.9 trillion yen in 2025, 2) after the reform, the aggregated health insurance budget would be improved in the coming few years, but it turns red and the deficit will reach 13 trillion yen in 2025, 3) the effects on the self-employed insurance is exactly the opposite of those on employees' health giving difficulties to self-employed.

### D. 考察

First, the change for the worse of the self-employed insurance comes from the increase of elder enrollees aged 70 to 74 who are shifted from the elderly health policy. Second, the estimated effect by an increase in patient's co-payments to 30% is relatively small, since a ceiling of patient payment is set at a low level. Third, the impact of lowering the fee schedule to doctors by 2.7% is uncertain, because under the fee for service system doctors would easily recover their income by increasing the quantity of the medical services.

### E. 結論

Japan's health care system, which has been successful, is now facing a series of structural problems mainly arising from

the aging of the population. The combination of fees for service with free-access to health services has a potential pressure on increasing expenditures with an increasing number of the elderly. The government has tried to alleviate the pressure by raising the co-payment ratio, but they had only once for all effects. Our simulation results indicate that the recent reform on health insurance schemes is not an exception, and that the effect is merely a shift of the fiscal costs between government and various insurance programs. In order to make the health care system to be sustainable even at the peak of aging, the current fee for service system has to be changed into prospective payment system based on the standardization of medical treatments. Substituting the public insurance partly with private health insurance is another policy goal. The 2003 reform in health insurance is just a first step toward the supply-side reform in the health care services.

### F. 健康危険情報

No

### G. 研究発表

To be presented at the JCER-NBER joint conference in May 11, 2003.

### H. 知的財産権の出願・登録状況



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（社）日本経済研究センター 理事長 八代尚宏  
大阪大学大学院国際公共政策研究科／（社）日本経済研究センター 鈴木亘  
（社）日本経済研究センター 主任研究員 鈴木玲子

**Introduction**

In reviewing Japan's overall health care system, it is important to balance its remarkable achievement in the past and the gloomy prospects in the future. On one hand, the average life expectancy, which was revised in the early 2002, indicates the further improvement from the top level among OECD countries. This has been achieved with relatively low ratio of the health expenditures to GDP among major OECD countries, implying the efficiency of the existing health care system. On the other hand, it is obvious that the current health system cannot be coping with a rapidly proceeding aging society. The official population estimates which was published in January 2002 indicates the higher ratio of the elderly in the total population by 3% points at its peak of the aging from the previous projection in 1997.

The effect of the aging is already reflected in the growing fiscal deficits in health insurance budgets, which are closely related with an increasing number of the elderly who are heavy user of health resources. It is also aggravated by Japan's generous health insurance schemes. Japan's health care system is known as "universal" i.e. every citizen (including the self-employed) is supposed to have some form of health insurance as well as public pension. This is based on German social insurance model, but unlike those in many European countries, the "free access" of patients to hospitals is assured with no gatekeepers. Those who think of themselves as patients can go to clinics and hospitals without long waiting lists. Also, once patients come to hospitals, certain medical services are provided under the "fee for service" fee schedule in the health insurance scheme. In this sense, despite the above wasteful system, it is surprising that Japan's National Health Expenditures have remained at relatively low level particularly.

An interpretation of the above combination of low costs and high achievement of the medical services is that Japan used to have a successful socialism in the field of health. The system has been efficient so long as there is an externality of health care services, strong asymmetry of information, and people's strong preference for egalitarianism. However, with the aging of the population, the major portion of the diseases have shifted from infectious disease or acute disease to chronic disease, which reduces the element of externality as well as the extent to an asymmetry of information. Also, the preference of patients has changed to demand for better medical information and second opinions in order to choose from a variety of health services. It is in this background that major reform in the health system is called for in Japan.

Japan's health system resembles to the U.S. Medicare scheme for the elderly, though the former covers all the people based on social insurance scheme, while the U.S. scheme is applied to a limited numbers of people under its welfare systems. How to reform the current welfare-like health scheme in Japan have many problems in common with the U.S. Medicare reform. The government of Japan has done a series of health care reforms in the 1990s including the recent 2003 health insurance reform. However, the favorable fiscal effect of the reform by raising the patient's share of medical costs is quite limited with the health budget falling into deficit again within five years. By the time the fiscal effect is gone, the reform of the medical service provision has to be achieved. Major issues for the reform include standardization of medical treatments, the better provision of private health insurance replacing partly the role of public health insurance, introduction of the partial managed care system, and of for profit hospitals to stimulate the competition in the health care markets.

The first section in this paper explores the recent demographic developments, which is more pessimistic than the previous ones. The second section summarizes a series of the health reforms in the 1990s. The third section investigates the fiscal impacts of the 2003 health reform across major institutional changes and across different public insurers. The fourth section surveys the current major policy issues for health care reform. The final section concludes the paper.

## 1. Retrospect on Japan's Health System and the Effect of the Aging

### 1) Rapid pace of the population aging

Japan's official demographic projections are revised for every five years, and the most recent 2002 population estimates indicates the more pessimistic scenario in the coming decades.

First, the total fertility ratio (TFR) has been revised downward repeatedly in the

previous projections, and the recent medium projection (the most likely scenario) is to rise from the 1.33 in 2000 and eventually to stabilize at 1.4, which is comparable to 1.6 in the 1997 estimates and 1.8 in the 1992 estimates<sup>1</sup>. Behind these developments, there is a constant increase in the female labor force participation of the working age, resulting in an increasing opportunity costs for women for child-raising, and lowering the demand for women to have a child. Thus, there is no concrete evidence that the fertility ratio would stabilize at the current level as in the 2002 official projection. Rather, with no major policy changes, the lower population estimates indicating that the fertility ratio will not recover in the future to be stabilized at 1.1, the lowest level among OECD countries, can be more plausible scenario.

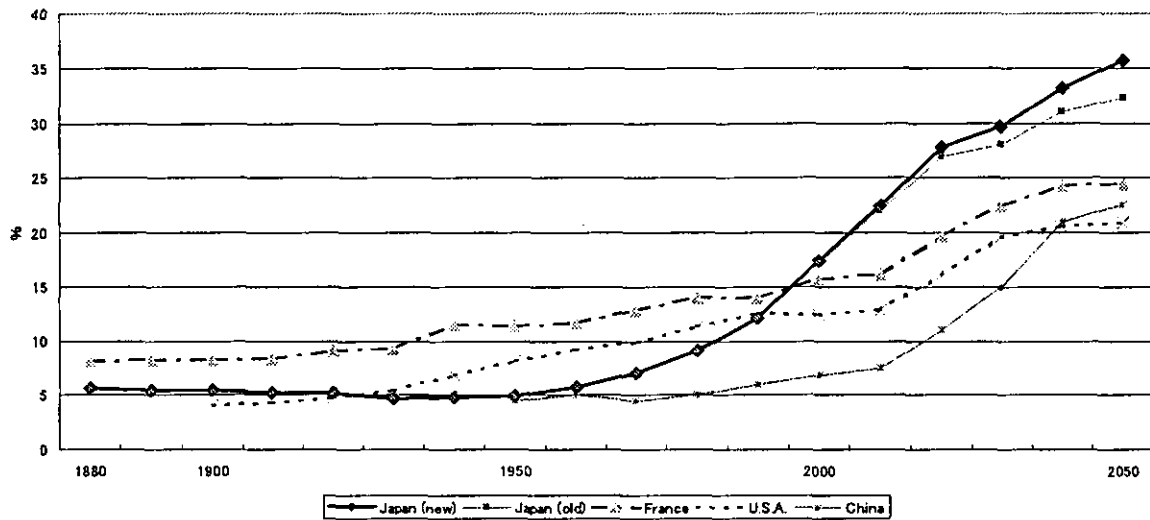
Second, the average life-expectancy at birth, which has continuously been extended, is projected to rise again from the current level of 77.7 years to 79.8 years for men, and from 84.6 years to 87.5 years for women in 2025. The recent increase is not mainly due to the fall in infant mortality, but mainly due to the extension in the life-expectancy of the elderly; for example the males' life-expectancy at age 65 is to estimated to increase from 17.5 years in 2000 to 18.9 years in 2025. Also, a particular characteristic is a widening gap between male and female life-expectancy, which is projected to rise from 6.9 years in 2000 to 7.8 years in 2025. The factor behind this increasing longevity is still unclear, possibly due to the mixture of nutrition, smoking behavior and health service factors.

As the result, the speed of Japan's aging of the population has been accelerating in the 1990s, which is far exceeding that of the United States (Figure 1). The acceleration of the speed of aging, particularly of the very elderly, should impose larger pressure on the health cost expansion.

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<sup>1</sup> An economic interpretation of the continuous decline in the fertility ratio is an increase in the college enrollment of women which rose from 12.3% in 1980 to 33.8% in 2002, and the associated increase in the share in employees from 34.1% to 40.5% in the same period. This increases the opportunity costs of women to raise children, particularly in the rigid labor market practices of long-term employment and seniority-based wages. As one who once leaves the firm for child-raising would find it difficult to be employed at full-time after the child-rearing period (Yashiro 1998).

Figure 1 International Comparison of the Elderly Ratio (age 65 and above)



## 2) Aging and health expenditures

The share of the health costs for the elderly accounts for nearly one-third of the total, but 90% of the marginal increase of the expenses is attributable to the elderly whose par capita expense is close to 5 times of the average in 2000. This is mainly due to the fact that a half and two-thirds of the life-time medical expenses are spent for those 70 years and 60 years and above respectively (Figure 2). It is natural that the average medical expenses grow with one's age, and the older people generally have higher risk to be hospitalized. A major factor for the large increase in health expenditures with age is attributable to the following factors:

--- First, what makes the hospital costs for the elderly more expensive is their longer stay in hospital. The average stay in hospital in Japan is five times longer than that in the U.S., and the number of hospital beds per population in Japan is much larger than that in the other major OECD countries, which is related to the longer average duration of hospitalization (Figure 3). This partly reflects the fact that hospitals are de fact used as nursing care homes for the elderly, mainly due to the limited supply of care services for frail elderly. This misallocation of medical resources is a result of inconsistent policies between free access to health services and limited provision of nursing for frail elderly.

--- Second, the higher costs for the terminal care is another factor for age-related medical expenses. For example, hospital expenses for those who are age 70 and above during one year before death accounts for 19.2% of the total hospital costs for the elderly (Ogura, Fukawa and Suzuki 1994). Another study shows that the health