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ORIGINAL ARTICLE

Impact of Movement Cost on Income and Expenditure Ratio in Home-Visit Long-Term Care Service Businesses in Japan

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ABSTRACT

There are particular costs that lower the efficiency of providing home-visit long-term care services. These are the costs associated with the time taken to move between homes, such as labor costs and the expenditure incurred for the movement. These costs are collectively referred to here as “movement cost”. To ensure stable business operation, to ensure efficient use of social insurance funding, and to increase service efficiency, it is necessary to examine movement cost and other fixed costs, as well as all associated costs.

In this study, we constructed a model for the income and expenditure ratio of a home-visit long-term care service business,- by using movement time,- and the main determining factor of movement cost, as a variable in order to investigate the influence of movement time on business performance. In addition, we conducted a sensitivity analysis by varying certain parameters to assess the degree of influence on the income and expenditure ratio.

The results demonstrated that a change in the part-time worker fraction can lead to the conditions where the impact of movement time on the income and expenditure ratio precipitates a catastrophic change in business profitability . This result suggests that collective housing, which requires little movement, is a more efficient solution than home-visit care for providing local community-based nursing care for the elderly.

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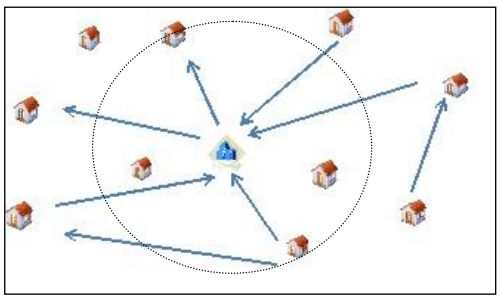
I. Significance of Study

Home-based care is a desirable way to support people who require nursing care to live a life as independently as possible, with dignity, according to their abilities. In practice, however, there are various complications with this approach.

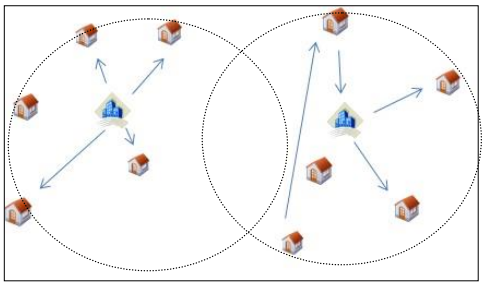
Service users receive home-based care mainly through visits to their home or daytime attendance at a nursing care facility. As the number of elderly people living alone has increased in recent years, there is an urgent need to put in a place a system for providing such services.

Providing home-visit long-term care services involves characteristic costs that lower the efficiency of service provision. These are the costs associated with the time taken to move between the homes of care users, that is, the labor costs and any other expenditure required for the movement. In this study, we refer to these costs collectively as "movement cost".

In home-visit long-term care services, home care workers spend, on average, a significant proportion of their working hours per day in moving, ranging from a few percent to about a dozen percent.[1)] If a care service business could calculate the time spent on movement by the overall care service business and utilize all the time it now spends on movement instead on providing care, it could gain additional profit. In other words, movement cost can be considered a lost profit opportunity.



<Figure1> Schematic of home-visit services



<Figure2> Schematic when there are more care facilities

Figure1 illustrates movement cost. When the employee of care service business at the center (hereinafter "care center") visits the care user at home, movement is required from the care center to the home and between the homes of care users. Obviously, greater distances mean higher incurred costs. Figure2 shows the case that an additional care center is create to decrease the costs associated with moving. In this case, the total movement time spent by each care center for home visits is reduced. On the other hand, creating new care centers results in higher fixed costs; if the number of care users per care center decreases, the care centers earn less profit. There is a risk, then, that the income and expenditure ratio of care businesses may decrease, and possibly threaten the sustainability of the business.

Movement cost involves more than just the time taken for movement. In addition to the

costs directly related to the time, it includes many other sources of expenditure, such as the labor costs for the movement time, lease charges for the vehicles used for movement, fuel costs, rental for car parking at the care center and for business premises, and the expenditure for telephone and other forms of communication. In order to ensure stable business operation and to improve service efficiency, it is necessary to examine movement cost and other fixed costs along with all of their associated costs. For this reason, it is important to clarify the relationship between movement cost and the income and expenditure ratio of care service.

II. Background to Study

In 2000, a national long-term care insurance system was introduced in Japan. This initiative was driven by a dramatic rise in the need for nursing care, due to the country's rapidly aging population, an increase in elderly people requiring nursing care, and also the fact that people required care over a longer period of time. At the same time, the structure of the family, which had traditionally provided care for the elderly, had changed; for example, nuclear families had become the norm, and the mean age of family members required to give care was increasing. In light of this, a care insurance scheme was established so that nursing care support could be provided to the elderly under a public social system.

This long-term care insurance system allowed users to actively select from a multiplicity of care services, based on a care plan, and it was presented as a social insurance scheme that reflected the preferences of users to some extent. This made it a significant departure from the previous system. In fact, the system radically reshaped the landscape of nursing care services in Japan. This major change could be described as a shift from "selectivism", where the system selected the care service users, to one of "universalism", which allows anyone to make use of the services.

Through the revisions to the system every three years, the focus of the long-term care insurance system has shifted substantially from facility-based care to home-based care. This change was designed to better address the growing number of elderly people who live alone and the increasing number of people suffering dementia, to enhance services in the home, and to provide for closer coordination between medical care and nursing care. As a result of this shift, movement cost is having a serious impact on home-visit long-term care service businesses.

III. Survey of Earlier Studies, Research Objectives, and Methodology

1. Survey of Earlier Studies

One earlier study, by the Elderly Service Providers Association (foundation) in 2010, the"survey to assess the business operation of nursing care facilities and to develop a business income and expenditure simulation for providing efficient and effective

services," a business simulation focused on the home-visit long-term care service business, was conducted. This study analyzes aggregate data on the commercial scale, management structure, location, and state of home-visit long-term care service businesses, and it includes an analysis of the impact of movement time on income and expenditure. By using aggregate data on the movement time between care center and homes for the most common category of care user, it has been tried to determine the relationship between movement time and operating income. The study offers only a partial analysis, because it does not analyze how movement time as a proportion of work time influences income.

In a study by Sekita (2000)[2], prior to the introduction of the long-term care insurance system, the relationship between the number of home help service visits and the unit price for care is expressed numerically to clarify the relationship between movement cost and the breakeven point for business income and expenditure. In this study, however, movement cost was defined using the number of home visits, so the influence of movement distance and time were not taken into account in determining the cost of home visits.

Another example of a study dealing directly with movement cost is Hwang et al. (2003)[3]. This study looks at the correlation between the labor costs of home-visit long-term care service businesses and their movement costs. It revealed that as the movement costs associated with delivering services increase, there is a tendency to react by curbing labor costs for management. This study does not examine the effect of movement cost on income and expenditure ratio, however.

In addition, although movement cost is considered to be one of several costs that inhibit service efficiency and management efficiency, no study seems to have verified this theory convincingly as of yet.

A look at South Korean papers related to home-visit long-term care service turns up a study by Y. Kim and E.Kim[4]. According to this study, government contributions in the United States to public care and welfare facilities began increasing in the 1960s, resulting in a large number of private welfare businesses, driven by the concept of "welfare pluralism". In view of this, standards of service quality and management became more stringent, making it necessary to employ effective professional personnel to ensure business sustainability. In South Korea too, under the country's long-term care insurance system, a growing number of private nursing care businesses offer weekend and nighttime care in accordance to needs. Although there have been calls for a unified national standard of quality management to address this increase, no study related to movement cost seems to have been carried out.

According to a study on home-visit long-term care by S.Lee[5], over the past 10 years home-visit long-term care services have played a very important role in home medical care services in South Korea and they have also provided employment opportunities for many low-income women without established careers. However, since wages are not commensurate with the continuous working hours and the nature of the work, the level

of services now being provided is rather low. The study suggests that the current system is leading unavoidably to lower service charges and lower service quality, and that it is producing large numbers of middle- and low-wage workers without appropriate financial assistance from the government. While the study does not specifically point to reduced profitability caused by movement cost in explaining these results, it is very likely that movement cost is a significant factor in reducing the profitability of home-visit long-term care businesses.

To provide nursing care services on a sustainable basis, it is necessary to have sufficient qualified personnel and a solid base of care users. To ensure stable business operation, it is also necessary to increase income and reduce expenditure. Movement cost, however, has the effect of reducing income and increasing expenditure. It follows that attempts to reduce costs and enhance accessibility require research on movement cost.

2. Research Objectives

In this study, we set out to clearly identify the various types of costs that make up movement cost in a home-visit long-term care service business, and then to develop a numerical model to clarify the relationship between the income and expenditure ratio (ratio of gross income to operating expenditure over a fixed period) and movement cost for such a business. Using this numerical model, we try to clearly determine the impact of movement cost on a home-visit long-term care service business and in particular to clearly determine what types of factors have the greatest influence on the income and expenditure ratio.

Finally, on the basis of our analysis results, we examine improvement measures and system modifications that might reduce the impact of movement cost on the income and expenditure ratio.

3. Research Methodology

Firstly, we perform an analysis using a simple numerical model to assess what influence movement cost has on the income and expenditure ratio. Then, separating out movement time from the other costs involved in moving, we construct a model that describes the income and expenditure ratio with a function of movement time, which is a stable, and easy-to-measure variable. We then plot this relationship on graphs to analyze the correlations between the income and expenditure ratio and movement time.

Secondly, we analyze the structure of the function of income and expenditure ratio, and clearly identify the factors that influence the income and expenditure ratio and cause changes in the shape of the abovementioned graphs.

Thirdly, we apply a sensitivity analysis to the factors that lower income and expenditure ratio by varying a parameter factor and we verify what impact the parameter factor has on the income and expenditure ratio.

IV. Relationship between the Income and Expenditure Ratio and Movement Cost and the Model Analysis

1. Numerical Model of Movement Cost

In numerically expressing the model to describe the impact of movement cost, the following points were taken into consideration.

We tried to calculate the service income and expenditure ratio based on the long-term care insurance income earned in one day by a nursing care business and the operating expenditure incurred in one day by the business (e.g. labor costs and other fixed costs, and variable costs). The employees of the business are assumed to be engaged in care services. Under the insurance system, fees for care are paid in accordance with the number of hours of care service actually provided, which is reflected in the model. Thus, the model divides the time into care service time, movement time, care service preparation time, and communication and coordination time (work management time).

1) Variables related to dividing the work time

Assuming an eight-hour workday, work time is divided into three components: service time, movement time, and other work management time.

Service time (Ts): Actual time of care service provided in the home.

Movement time (x): Total time taken for movement from the business office to the home where service is provided and movement between homes. Since this variable is the main indicator of movement cost, it is denoted by x.

Work management time (Tj): Total time taken to prepare for movement and for communication and coordination, to prepare invoices for care charges, and to perform other necessary administrative tasks. Thus, $Ts + x + Tj = 8$.

Preparation time fraction (k): Proportion of service time taken for preparation work.

Preparation time is the time taken for communication and coordination and for preparation of, for example, equipment. This is influenced by service time in accordance with the equation $Tj = k \cdot Ts\ (0 \leqq k \leqq 1)$ *1

Thus, in terms of Tj and Ts, $Ts + (k \cdot Ts) = 8 - x$. Transposing this, we get

$$Ts = \frac{8-x}{k+1} \quad \cdots ①$$

2) Examining the income and expenditure ratio

Income and expenditure ratio (Sr): Ratio of gross operating income to expenditure for one day

Income (R): Gross operating income of business for one day (numerator of Sr formula)

Expenditure (C): Total operating expenditure of business for one day (denominator of Sr formula)

Thus, $Sr = \frac{R}{C}$ ・・・②

The income and expenditure ratio (*Sr*) is defined and analyzed in terms of the variables below.

Care fees/hour (*a*): Average fees earned per full-time employee per hour

Fixed costs (*Fc*): Total of rental charges for business premises, labor costs for full-time employees, vehicle lease charges, etc., per day

Part-time worker cost/hour (*b*): Cost of part-time workers per hour

Movement cost/hour (*c*): Total cost of fuel, public transport, etc., for movement per hour

Number of employees of business (*n*): Total number of full-time (equivalent) employees engaged in care services

Part-time worker fraction (*l*): Proportion of part-time workers in terms of equivalent full-time employees ($0 \leqq l \leqq 1$)

Income (*R*) can be calculated as (mean care fees earned by employee per hour) × (mean number of service hours per employee per day) × (number of (equivalent) full-time employees). Accordingly,

$$R = n \cdot a \cdot \frac{8-x}{k+1} \quad \cdots ③$$

As the value of *x* increases by one hour, R decreases in increments of n ・ a ・ 1/(k+1). That is, revenue decreases by this amount with each extra hour of movement time.

Next, let us consider expenditure (*C*). This amount comprises fixed costs (*Fc*) and variable costs. Variable costs consist of part-time care worker costs and the movement costs of all care workers for one day.

Labor costs per day for part-time workers can be expressed as (hourly pay of part-time workers) × (total work hours of part-time workers). The total number of work hours of part-time workers is obtained by multiplying the total work hours of all employees by the part-timer worker fraction. Then movement costs can be calculated as (total number of employees) × (cost of movement per hour) × (mean movement time per worker per day). Therefore, total expenditure (*C*) = fixed costs *Fc* + part-time worker cost + movement cost, as follows:

$$C = Fc + \frac{b \cdot l \cdot n(8-x)}{k+1} + n c x \quad \cdots \quad ④$$

$$Sr = \frac{R}{C} = \frac{n \cdot a(8-x)}{(k+1)Fc + 8 \cdot l \cdot n \cdot b + \big((k+1)n \cdot c - l \cdot n \cdot b\big)x} \cdots ⑤$$

Equation (5) can be simplified by substituting in the movement time (x) to obtain the following equations:

$$(k+1)Fc + 8\,l\,n\,b = D \cdots ⑥ \qquad \big((k+1)nc - l\,n\,b\big) = E \cdots ⑦$$

where D is a cost-related parameter that always has a positive value, and E is a cost-related parameter that can take on positive or negative values, depending on the part-time worker fraction.

$$Sr = \frac{n \cdot a(8-x)}{D + E\,x} \Rightarrow \left(\frac{8E + D - D - Ex}{D + Ex}\right) \cdot \frac{n \cdot a}{E} \Rightarrow \left(\frac{8E + D}{D + Ex} - 1\right) \cdot \frac{n \cdot a}{E}$$

$$\Rightarrow \frac{8 \cdot n \cdot a \cdot E + D \cdot n \cdot a}{D \cdot E + E^2 \cdot x} - \frac{n \cdot a}{E}. \cdots ⑧$$

The only variable in the income and expenditure ratio model described here is movement time; the remaining factors are expressed as parameters.

3) Properties of parameter E

In the formula for Sr, as mentioned above, although D always takes a positive value, E can be either positive or negative.

In Eq⑦,we can compare the effects of the magnitude of the preparation time fraction (k), movement cost/hour (c), part-time worker cost/hour (b), and part-time worker fraction (l).

When E is positive,

$(k+1)\ n \cdot c > l \cdot n \cdot b \ \Leftrightarrow (k+1) \cdot c > l \cdot b \ \Leftrightarrow \ \frac{(k+1) \cdot c}{b} > l \ \ldots ⑨$

When E is negative,

$(k+1)\mathrm{n} \cdot \mathrm{c} < l \cdot \mathrm{n} \cdot b \Leftrightarrow (k+1) \cdot c < l \cdot b \Leftrightarrow \frac{(k+1) \cdot c}{b} < l \ldots ⑩$

Let us now compare the values on each side of these statements. k+1, c, and b are always greater than or equal to 1. n appears on both sides, so E is unaffected by n. The part-time worker fraction (l) can vary between 0 and 1, which changes the value of E from positive to negative.

If E is 0, then

$(k+1)\ n \cdot c = l \cdot n \cdot b \ \Leftrightarrow\ (k+1) \cdot c = l \cdot b$ ‥⑪

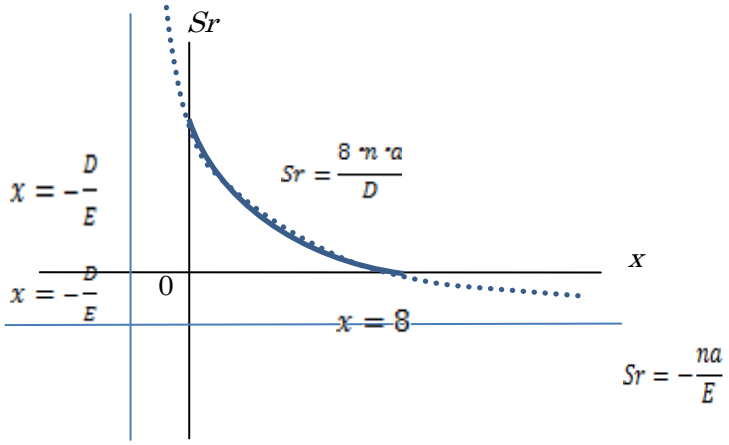
which establishes a constant relationship between these four parameters.

2. Analysis of Movement Cost Model

To examine the characteristics of the formula for Sr, Eq⑧,we plotted it on a graph. We also examined the relationship between the income and expenditure ratio and movement time for both positive and negative values of E.

1) When E is positive

We examined the graph of Sr when E is positive (see Figure3). Under the conditions of Eq. (9), for which the part-time worker fraction (l) is small, we get a hyperbolic function for the movement time (x), which is convex downward. As the movement time (x) increases, the Sr decreases sharply. Conversely, as the movement time (x) decreases, which implies that movement cost decreases, the income and expenditure ratio increases nonlinearly.

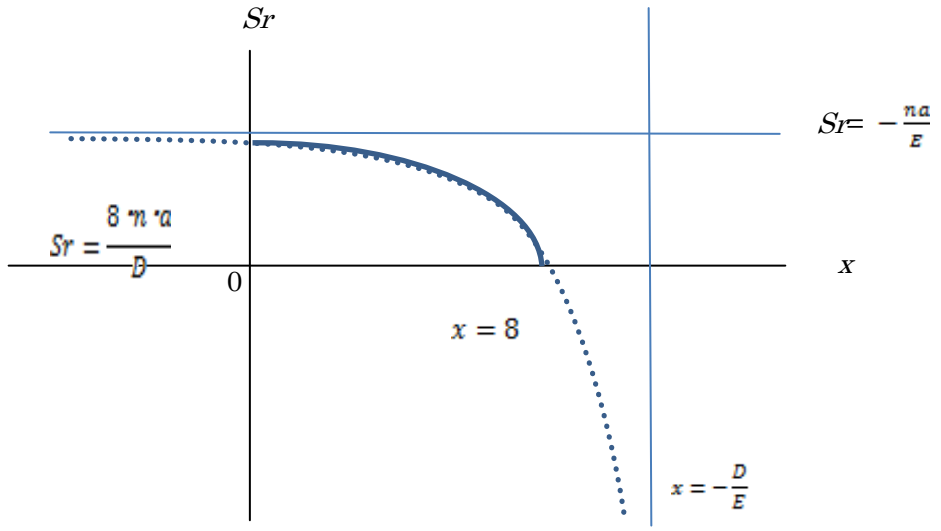


<Figure3> Graph of Sr for E>0

Note) This graph expresses a hyperbolic function, with income and expenditure ratio Sr plotted on the vertical axis and movement time x plotted on the horizontal axis. Thus, the equation for Sr is a hyperbolic function of x, with an asymptote value of $Sr = -\frac{n \cdot a}{E}$ on the x axis and an asymptote value of $x = -\frac{D}{E}$ on the Sr axis. Also, since the value of Sr varies in the range $0 \leqq x \leqq 8$, the minimum value of $Sr = 0$ when $x = 8$, and its

2) When E is negative

Next, we examine what happens to the graph of Sr versus x when E is negative (see Figure4). The value of Sr decreases as movement time increases, just as it did when E was positive, but the drop in Sr is much less dramatic. In this case, the graph is concave downward, rather than convex.



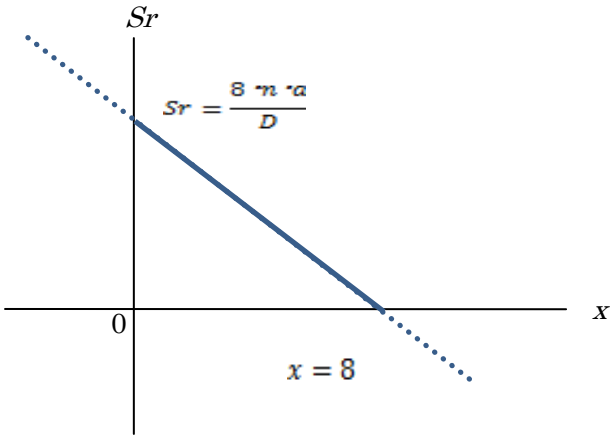
<Figure4> Graph of Sr for E<0

3) When E is 0

When E is 0, Eq. (8) can be expanded, as follows:

$$Sr = \frac{n \cdot a(8-x)}{D+E\,x} \Rightarrow \frac{n \cdot a(8-x)}{D} \Rightarrow \frac{n \cdot a}{D}(8-x) \Rightarrow -\frac{n \cdot a}{D}x + \frac{8 \cdot n \cdot a}{D} \quad .. \quad ⑫$$

Thus, Sr becomes a linear function of x with slope $-\frac{n \cdot a}{D}$ and y-intercept $\frac{8 \cdot n \cdot a}{D}$.



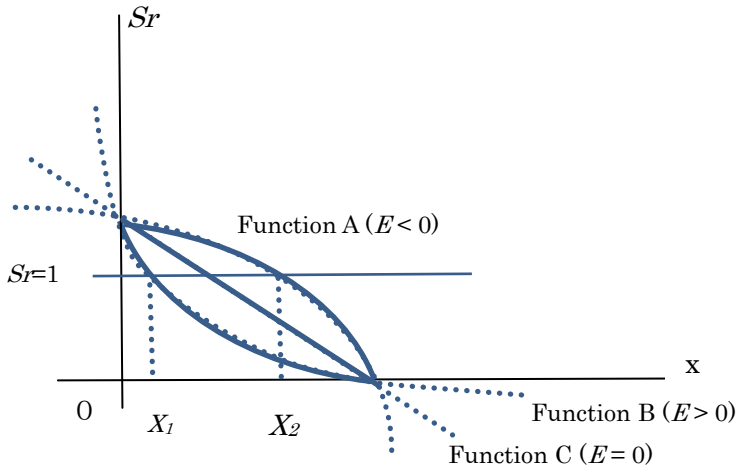
<Figure5> Graph of Sr when E = 0

3) Comparison of graphs

When E is positive and movement time x is short, even a small increase in movement time leads to a dramatic worsening of profitability. On the other hand, when movement time is very long, the influence of movement time on expenditure is marginal, but the expenditure is so large that losses are being incurred. When E is negative and movement time x is short, an increase in movement time has only a small adverse impact on profit. On the other hand, as the movement time becomes longer, the expenditure rises to the breakeven point and then rapidly increase. Figure 6 combines Figs. 3, 4, and 5 to show a comparison of the graphs. As shown, a value change of E leads to a sudden and catastrophic change in Sr.

The formula for E involves four parameters: preparation time fraction (k), movement cost/hour (c), part-time worker cost/hour (b), and part-time worker fraction (l). If other parameters are held constant, an increase in the part-time worker fraction (i.e., a decrease in the full-time worker fraction) leads to a negative value of E, resulting in function A; a decrease in the part-time worker fraction (i.e., increase in the full-time worker fraction) leads to a positive value of E, resulting in function B. If E is exactly 0, function C results; in this case, Sr varies linearly and this can be thought of as the tipping point for structural change. The structure at this point, which is quite different from that of the graph when E is positive and the graph when E is negative, indicates catastrophic change. In other words, a change in the part-time worker fraction (and thus the full-time worker fraction) in this situation can lead to a catastrophic change in the income and expenditure ratio.

Also, for function A ($E>0$) and function B ($E<0$) for Sr as graphed in Fig. 6, the values of x for which $Sr = 1$ (breakeven point) are respectively $x1$ and $x2$. Clearly, $x2 > x1$, which shows that movement time makes a big difference to the breakeven point. What this difference in breakeven point means is that the influence of movement cost on the income and expenditure ratio is less when $E<0$ than when $E>0$.



<Figure6> Comparison of the graphs for $E<0$, $E>0$, and $E=0$

* Horizontal axis plots movement time x, the vertical axis plots income and expenditure ratio Sr.

V. Sensitivity Analysis of Income and Expenditure Ratio Function

1. Sensitivity Analysis Design for Impact of Part-time Worker Fraction (l) on E

According to Eq. (8), the income and expenditure ratio (Sr) is influenced by the variable E, which is determined by the part-time worker fraction (l) and other factors. We saw above how this factor gives rise to catastrophic structural change, but here we attempt a sensitivity analysis to analyze the conditions under which catastrophic change occurs, by varying the part-time worker fraction (l) and preparation time fraction (k), the elements that determine the value of E.

Although part-time worker cost/hour (b) is also an element of E (in addition to the part-time worker fraction(l), in the sensitivity analysis), we use data from applicable survey materials for this factor. Next, we varied the value of the part-time worker fraction (l) in increments of 0.1 from 0 to 1. The preparation time fraction (k) was varied in increments of 0.1 over the range 0 to 0.5, where the upper bound of 0.5 was chosen because (except in extraordinary circumstances) values above 0.5 are unrealistic. A preparation time fraction (k) value of 0 is also not realistic, but this value is computed for theoretical purposes. The preparation time fraction (k) and part-time worker fraction (l) were varied in combination.

The other elements that determine E, namely, the number of full-time (equivalent) workers, part-time worker cost/hour (b), and movement cost/hour (c), are handled as parameters. The number of full-time (equivalent) workers (n) is assumed to be the number of employees of the business (n). For n and b, we incorporated data from

applicable survey materials.[6)7)] The number of full-time (equivalent) workers (n) was taken to be 9.8;[6)] the part-time worker cost/hour (b) was taken to be 1,286 yen/hour;[7)] and the movement cost/hour (c) was assumed to be 450 yen/hour.*2

2. Influence of Part-Time Worker Fraction (l) and Preparation Time Fraction (k) on E

In the sensitivity analysis for Eq. (7), the part-time worker fraction (l) and preparation time fraction (k) are parameter variables that influence the value of E. The sensitivity analysis results obtained by varying each of these parameter variables are listed in Table1.

<Table1> Values of E corresponding to various values of k and l

		Part-time worker fraction (l)										
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Preparation time fraction (k)	0	4410	3166	1923	679	-564	-181	-3052	-4295	-5539	-6783	-8026
	0.1	4851	3607	2364	1120	-123	-137	-2611	-3854	-5098	-6342	-7585
	0.2	5292	4048	2805	1561	318	-926	-2170	-3413	-4657	-5901	-7144
	0.3	5733	4489	3246	2002	759	-485	-1729	-2972	-4216	-5460	-6703
	0.4	6174	6174	4930	3687	2443	1200	-44	-1288	-2531	-3775	-5019
	0.5	6615	5371	4128	2884	1641	397	-847	-2090	-3334	-4578	-5821

*Values are rounded off to nearest whole numbers

As an example, when the part-time worker fraction (l) is 0.6 and the preparation time fraction (k) is 0.2, E = –2170. In this case, E is negative, so the graph of the income and expenditure ratio (Sr) is convex when viewed from above, which indicates that the impact on movement cost is small. In contrast, when E is positive, the graph is convex downward. When the graph is convex downward, the movement cost has a stronger influence on the income and expenditure ratio.

3. Consideration of Sensitivity Analysis Results

It is clear from Table 1 that as the part-time worker fraction (l) increases, the value of E tends to decrease. If the preparation time fraction (k) is varied between 0 and 0.5 at the same time, we find that as the value of k approaches 0, the value of E becomes negative, even if the part-time worker fraction (l) is relatively small. Or in other words, the graph of the income and expenditure ratio (Sr) becomes convex upward. Thus, increasing the part-time worker fraction (l) causes the variable E to become negative, resulting in a catastrophic structural change, and the income and expenditure ratio (Sr) becomes convex upward.

With regard to the influence of the part-time worker fraction (l) on the value of E, it is clear from Table 1 that this influence depends on the preparation time fraction (k). Even if the preparation time fraction (k) is increased to 0.5, any part-time worker fraction (l) value over 0.6 results in a negative value of E. On the other hand, when the part-time worker fraction (l) is 0.3 or less, E is positive even if the preparation time fraction (k) is small. In this case, the income and expenditure ratio graph is convex downward, which means that movement time has a strong impact on the income and expenditure ratio, that is, that the income and expenditure structure makes it difficult to achieve a profit.

Even when the part-time worker fraction (l) is increased, it is possible to reduce the impact of movement cost on the income and expenditure ratio (Sr) by reducing the preparation time fraction (k).

VI. Discussion

As our model analysis of movement cost shows, increasing and decreasing the part-time worker fraction leads to a catastrophic structural change in the graph. This catastrophic structural change can be detected according to whether the value of E in the income and expenditure ratio (Sr) equation is positive or negative. When E is positive, the graph is convex downward. When the value of E is negative, though, the graph is convex upward, which means that a sudden structural change can occur. We can conclude that at this point, an increase or decrease in the part-time worker fraction ( ) can cause a catastrophic change in the income and expenditure structure of business, thereby affecting profit. When E is positive, an increase in movement time x will cause the income and expenditure ratio (Sr) to drop sharply. On the other hand, when the movement time x becomes short, the income and expenditure ratio Sr can rapidly improve. When E is negative, the income and expenditure ratio is not influenced much by movement time x.

It was possible to demonstrate how the income and expenditure ratio of a home-visit long-term care service changes with a function of movement time via an equation-based model using parameters such as preparation time, fixed and labor costs, and movement-related expenditure. This model could be used to clearly define the

relationship between movement time and income and expenditure ratio for individual home-visit long-term care service businesses.

It was also demonstrated that the part-time worker fraction influences the income and expenditure structure of care service businesses.

Businesses that have a high proportion of full-time workers are strongly impacted by movement cost, whereas movement cost has little influence on businesses that have a high proportion of part-time workers. However, since it is feared that increasing the number of part-time workers leads to a deterioration in care quality, it may be necessary to limit the part-time worker fraction in order to maintain a reasonable quality of service.

Even if the number of home-visit long-term care service users increases, it is necessary to ensure sufficient equipment and personnel to provide services, so an increase in service users does not necessarily translate directly into increased profit. An increase in movement time does not mean just an increase in labor costs for the extra time of movement, but also necessitates additional fuel costs for the vehicles used for movement, higher vehicle lease charges, additional workers to provide services, etc.; that is, it drives up costs associated with securing the equipment and workers for the additional movement. However, even if the number of care centers is increased to try to reduce movement costs, as Fig. 2 illustrates, this results in higher fixed costs and quite possibly reduced profit per care center. It is reasonable to conclude, therefore, that movement cost is a factor that can hinder the efficient benefit of home-visit long-term care services by businesses operating under the national long-term care insurance system.

Reducing movement cost may make home-visit long-term care service business operations more stable and also reduce the quantity of benefit delivered to some degree. In addition, since the care service users pay 10 percent of the value of the services that they receive, they also benefit by the scaled back service, by paying less. These kinds of processes have the potential to promote more efficient use of social insurance funding.

Under the kind of integrated community care system that is being pursued now in Japan, the focus is on home-based care. In light of this, the question of how to reduce movement cost is important. One possible solution to reduce movement cost is to provide collective housing for elderly people.

Currently, such collective housing for rental to elderly people, with integrated care services, is being developed. The initial capital investment necessary to construct such housing is great, but since such facilities allow for nursing care service businesses to provide services to the residents of collective housing, over time, home-visit long-term care service businesses can expect to enjoy higher income and expenditure ratios, as a result of lower fixed costs and lower movement costs. In addition, by living in rental housing with integrated care services, the elderly users of home-visit long-term care services can receive care at a lower cost than they would pay if living in their own homes. When a long-term care service business operates at a collective housing facility, the provided care benefit per person is less because less care benefit is provided in collective housing. However, in business terms, it benefits significantly from lower investment in

fixed costs and lower movement costs. Furthermore, collective housing facilities also have access to various social resources, such as the volunteer services of local non-profit organizations (NPOs), and this helps to create a new sense of community for residents. These kinds of interactions also have the potential to revitalize the local community.

In this study, we examined so-called piecemeal services in relation to home-visit care services, the number of home visits, and long-term care insurance income, but there is still a need for further investigation of the relationship between movement time and the income and expenditure ratio for services provided for a fixed monthly fee. In addition to in-home care support services, such fixed monthly fee services include important services related to the integrated community care system, such as periodic/ongoing visits by long-term care providers or nurses and multifunctional long-term care in small-group homes. Movement cost research that surveys and analyzes the impact of movement cost on these kinds of services could make a contribution to the development of an efficient integrated community care system.

Postscript

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*MEXT = Ministry of Education, Culture, Sports, Science and Technology

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