Impact of Increased Long-term Care Insurance Payments on Employment and Wages in Formal Long-term Care

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Impact of increased Long-term Care Insurance payments on employment and wages in formal long-term care[*]

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Abstract

This paper examines the effect of raising Long-term Care Insurance (LTCI) payments on employment and wages of workers in the long-term care (LTC) industry. Specifically, I use the change in the regional premium in 2012 as an exogenous shock to the insurance fee schedule: the change in the unit price of LTCI service ranges from a decrease of 2.8% to an increase of 4.2%. I find no increase in the number of employees in the establishments, registered under the LTCI scheme, in municipalities where the regional premium increased. The earnings and working hours of LTC workers did not increase, either.

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1. Introduction

With a rapidly ageing population, the demand for formal long-term care (LTC) has been increasing in Japan. At the same time, the working age population is shrinking and the shortage of care workers has emerged as a social concern. In particular, the price regulation by the Long-term Care Insurance (LTCI) system has often been blamed for exacerbating the shortage of care workers, since it makes it difficult for care providers to adjust service price and therefore wages to meet the increased demand. This paper aims to examine whether increasing the unit price in the LTCI fee schedule has any positive effects on employment or earnings of care workers in the LTC industry.

While many economists pointed out that the decrease in the LTCI fees in 2006 may have aggravated the shortage of care workers (Hanaoka 2015), empirical evidence of the effect of the LTCI fee schedule on the employment or wages of workers in the LTC industry is scarce. The only exception that I am aware of is Zhou (2009), who demonstrated that wages of the care workers decreased after 2006. However, this was a nation-wide change and rigorous identification was difficult.

This paper explores the revision of regional premiums in the unit price in 2012 to identify the effect of changes in LTCI fees on employment and earnings in the LTC industry. Following the changes in the regional premiums of national government employees in the late 2000s, the regional premiums for labor costs in the LTCI were revised in 2012. In many municipalities, mainly the three largest metropolitan areas and their surrounding suburbs, the unit price of the LTCI services was raised up to 4.2%, whereas in some municipalities, the price was decreased. I use the variation in this change across municipalities to identify the effect of the price change in LTCI on the number of care workers and their earnings, hours of work, and hourly wages.

I use three datasets for a comprehensive analysis of the effect of LTCI fee changes. I begin with an investigation of the number of employees, capacity, and usage of services at the establishment level, using a panel dataset of LTCI certified care providers, which is taken from the Survey of Institutions and Establishments for Long-term Care. With controls for municipality- or establishment-fixed effects and year effects, an increase in regional premiums on employment does not have any positive effects. Consequently, the capacity of the service did not increase, either.

Next, I examine the effect on earnings, hours of work, and hourly wages using the Basic Survey of Wage Structure. I find no increase in earnings or hours of work.

Given the lack of significant effects on employment and wages, I check whether the total expenditure from LTCI actually increased, using the municipality-level administrative data of LTCI. The increase in the unit prices actually increased the total expenditure. Since the payment to the LTCI providers increased as the regional premium increased, these findings imply that simply raising the LTCI reimbursement may not increase money paid to care workers.

Existing studies show that, in general, higher wages tend to lower the job turnover rate of care workers (Wiener et al. 2009, Morris 2009, Baughman and Smith 2012). In Japan, full-time workers, most of whom are hired by nursing homes or daycare centers, respond to wages. In contrast, higher wages do not prevent turnover of part-time workers, who are mostly women working in home-visit care services (Hanaoka 2009, 2011). Suzuki (2011) demonstrated that higher wage rate of care workers decreases job changes to other industries, as well. Although my data do not allow me to examine job separation, the lack of a positive effect on full-time workers' wages implies that raising the LTCI fee cannot lower the job turnover of care workers.

My findings are different from the existing studies in the United States. Studies that examined the impact of Medicaid reimbursement rates or pass-through subsidies tend to find a positive effect on the number of staff (Cohen and Spector 1996, Grabowski 2001, Harrington et al. 2007, Foster and Lee 2015). However, there are many institutional differences between Medicaid and Japan's LTCI, including population covered (Medicaid covers only financially indigent people) and power to control prices. This paper contributes to the literature by studying a case of public insurance with universal coverage and strict price regulation.

The rest of the paper is organized as follows. Section 2 explains Japan's LTCI and the change in regional premiums that this paper studies. Section 3 describes the data, Sections 4 and 5 present the empirical model and results, respectively. Section 6 discusses potential reasons why I do not find any effects, and Section 7 concludes.

2. Institutional background

2.1 Japan's LTCI system

The Japanese government launched the LTCI in 2000 as a response to the rapidly aging population. All residents in Japan who are older than 40 must enroll and pay a premium and people who are older than 65 and certified as "needing long-term care" can receive fee-for-service reimbursement of various LTC services from the licensed providers, up to a ceiling determined by the level of need.[1]

Although the LTCI is officially a mandatory "insurance" system, half of its costs are covered by general revenues: 25% from national revenue, and 12.5% each from prefectures and municipalities. While the premiums for people aged 40-64 are set nationally, the premiums for people aged 65 or older vary across municipalities and they are higher in municipalities with larger LTCI expenditures relative to the population size.

To receive reimbursement from LTCI, LTC providers need to satisfy certain criteria in the number of employees with various licenses, such as certified care workers and facilities. Providers have to receive authorization for each type of service that they provide under the LTCI.[2] While there were 23 types of services in 2012, this paper focuses on the following three, which are largest[3] in terms of the number of establishments: daycare services, home-visit care, and group home for the elderly with dementia[4].

Like the public health insurance system in Japan, the price of the services covered by LTCI is regulated by a detailed fee schedule called *kaigo hoshu*, which is revised every three years. Each service deserves a number of units specified by the schedule, and the price is determined as the number of units multiplied by the unit price. The default unit price is set to 10 and, in some urban municipalities, regional premiums are added to cover labor costs, as explained in the next subsection. The

[1] See Campbell et al (2010) for more detailed description of the LTCI in Japan.
[2] Providers can operate several kinds of services, so long as they receive authorization for each of the services.
[3] Several different service categories correspond to so-called nursing homes and they are substantially different in terms of the range of services covered by the LTCI, prices, and regulations on the number of licensed employees and facilities. Furthermore, many for-profit nursing homes rely on revenue from services not covered by the LTCI. Thus, I decided not to include them in my analyses, but I tried estimating the same models using data of "welfare facilities for the elderly requiring long-term care" (a.k.a. *tokuyo*), the largest service category of nursing homes (about 6,000 establishments), and results are similar to those of services covered in the main analyses.
[4] The official name of this service category is "long-term care for the elderly with dementia in residential care settings."

users of the service (the recipients of the LTCI) have to pay 10% of the total cost out of their pocket, and the remaining costs are reimbursed directly from the LTCI to the care provider.

The LTCI is confronted with a dilemma between the budget constraint and the short supply of care workers. On the one hand, it faces the pressure to lower the price of LTC, as the elderly population needing LTC is expected to keep increasing, whereas the working age population is decreasing. On the other hand, lower price leads to lower wages in the LTC industry and the shortage of care workers has emerged as a social concern since the late 2000s.

Given the unexpectedly rapid increase in the LTCI expenditures, the Japanese government substantially lowered the average price of LTC services in the revision of the fee schedule in 2006. However, as pointed out by Hanaoka (2015), this revision was blamed for aggravating the labor shortage. Thus, in the next revision in 2009, a temporary subsidy to increase caregivers' wage (*kaigo shokuin shogu kaizen kofukin*) was introduced, and it became permanent in the 2012 revision. Despite these efforts to increase wages of care workers, the average wage in LTC industry did not increase much.[5]

2.2 Changes in regional premiums for labor cost in 2012

In regions where the price and wage levels are high, regional premiums are added to the unit price of services covered by LTCI. Specifically, the baseline rate of premiums is set equal to the regional premiums of national government employee's salary. Then, this baseline rate is multiplied by "the share of labor costs in total costs," which is set to 70%, 55%, or 45%, depending on the service category. For the services covered in this paper, the share of labor costs is 45% for daycare services and group home for the elderly with dementia, and 70% for home-visit care. Thus, for example, the unit price of home-visit care in regions where the baseline premium is 3% is $10+10\times3\%\times70\%=10.21$.

[5] According to the Monthly Labour Survey conducted by the Ministry of Health, Labour and Welfare, the change in the wage index of the LTC industry from 2008 to 2009 was 0.9%, while the industry average was -4.0%. Thus, this subsidy might have mitigated the shock from the financial crisis. But the wages did not continue to increase. From 2009 to 2015, the average annual growth rate of wage index of the LTC industry was -0.3%, lower than the industry average of -0.1%.

Regional premiums for LTCI unit price were revised in 2012,[6] following the revision of regional premiums for government employees, which was gradually implemented in the late 2000s. Table 1 summarizes the number of municipalities by the baseline rate in 2011 and 2012. In most municipalities, the premiums are set equal to the regional premiums of the national government employee's salary. In municipalities where no branch of national government exists, the premiums were set equal to adjacent municipalities. The exceptions are 2 municipalities that moved from 10% to 9% and 4 municipalities that moved from 5 or 6% to 5%. In these municipalities, the premiums for the national government's employees decreased to 6% and 3%, respectively, but the regional premiums for LTCI were not cut as much for fear of shortage of care workers.

The largest increase in the baseline premium is 6% (0% to 6%) and the largest decrease is 4% (10% to 6%). For home-visit care, the share of labor costs in total costs is set to 70%. Thus, the actual change in the unit cost ranges from a decrease of 2.8% to an increase of 4.2%. For daycare services and group home for the elderly with dementia, the share of labor costs is set to 45%. Thus, the change ranges from a decrease of 1.8% to an increase of 2.7%.

Although the regional premiums were not fully adjusted to local labor market conditions for care workers, they were certainly not set randomly. As summarized in Table 2, most of the municipalities with positive regional premiums are in the three largest metropolitan areas: Greater Tokyo area (Tokyo plus Saitama, Chiba, and Kanagawa; Ibaraki, Tochigi, and Gunma located north of them); Kei-han-shin area (Osaka, Kyoto, and Hyogo; surrounded by Shiga, Nara, and Wakayama); and Nagoya area (Aichi, Mie, and Shizuoka). Most of those in other prefectures are the capital cities of relatively large prefectures, such as Sapporo and Fukuoka. There are 20 out of 47 prefectures that do not have any municipalities with positive premiums.

Since the underlying trends of the outcome variable in the large metropolitan areas and its surrounding suburbs may be quite different from those in rural areas with a shrinking population, I limit my sample to the 19 prefectures listed in Table 2. This

[6] At the same time, the number of units for each service is also revised. Since the number of units for each service is the same for all municipalities, unless the share of each services in expenditure is systematically correlated with the change in the regional premium, this change should be absorbed by region-specific year effects. For the three services this paper focuses on, each service's share in total expenditure is not significantly correlated with the change in regional premiums.

covers 392 out of 423 municipalities with positive regional premiums in 2012, in addition to 240 municipalities with zero regional premiums.

3. Data

Since no single dataset covers all outcome variables of interest, I use three different data sources. The number of workers in each establishment is taken from the Survey of Institutions and Establishments for Long-term Care, a panel data of licensed LTC providers. This survey also includes information on capacity and usage of the service. The data for earnings and hours of work are taken from the Basic Survey of Wage Structure, a large cross-sectional survey. The municipality-level data on LTCI claims and expenditures are taken from the Annual Report of LTCI (*kaigo-hoken jigyo jokyo houkoku*).

I merge these datasets with municipality-level baseline regional premiums in each year using the municipality identification number. All datasets cover the period of 2009-2014, that is three years each before and after the change in the regional premium. I do not use data earlier than 2009 or later than 2014 because the LTCI fee schedule was revised in 2009 and 2015 as well. Another reason not to use data prior to 2009 is that the survey scheme of the Survey of Institutions and Establishments for Long-term Care changed between 2008 and 2009. Also, as explained in the last section, the sample is limited to establishments, workers, and municipalities in the 19 prefectures listed in Table 2.

3.1 Employment: Survey of Institutions and Establishments for Long-term Care

The Survey of Institutions and Establishments for Long-term Care, conducted by the Ministry of Health, Labor and Welfare, is designed as a complete census of all licensed LTC providers. However, the response rate varies across types of licensed service: about 80% for home-visit care, slightly less than 90% for daycare service, and about 90% for group home.[7] Aside from the problem of no response, complete

[7] These numbers are for 2009-2014. Prior to 2009, the survey was conducted by prefectures and municipalities that supervise the care providers, thus response rate was higher. From 2009, it was outsourced to a private company, and the response rate decreased substantially between 2008- 2009 and between 2009 - 2010. Thus, I limit my dataset to the period of 2009-2014 and I excluded establishments that existed in the data only in 2009.

panel data of all establishments with licenses of each type of services are available. I used data for 2009-2014.

The survey consists of separate questionnaires for each type of service covered by the LTCI. If an establishment operates two or more services, it is supposed to answer questionnaires of all services it provides. Since the questions vary substantially across types of services, it is difficult to aggregate data for different services. Thus, I constructed three separate datasets using questionnaires for daycare services, home-visit care, and group home for the elderly with dementia.

The survey asks the number of employees by the type of license they have or duty they serve for. The list of licenses varies across services, so I focus on the total number of employees and the number of certified care workers, which are asked in all three services I examine.[8] Since some care workers serve for multiple services operated by the same company and many work only part-time, I also use the full-time equivalent number of employees serving for each service. This full-time equivalent number is used for the periodic assessment of licensed LTC providers by the local government.

Table 3A shows the summary statistics. On average, a daycare service provider hires about 15.2 workers or 8.7 full-time equivalent workers and about half of them are certified care workers. A home-visit care provider hires about 19.6 workers or 8.1 full-time equivalent workers and most of them are certified care workers. A group home hires about 17.8 workers or 13.1 full-time equivalent workers and more than 80% of them are certified care workers. The ratio of care workers is lower in daycare service because daycare providers have to hire staff for functional training, as well as medical staff. A larger difference between the number of employees and full-time equivalent means more employees work part-time. Thus, part-time ratio is higher for home-visit care.

As measures for capacity and usage, I use the following variables. For daycare service, the capacity (the number of seats or beds) is multiplied by the number of working days per months. The usage is measured by the number of user-day per

[8] There are several kinds of licenses for care workers. "Certified care workers" in my data include workers certified as *kaigo fukushi shi*, the higher-grade license and those with lower-grade licenses, such as home-helper 1st and 2nd grades.

month; that is, the sum of the users of each day over a month.[9] For home-visit care, there is no variable for capacity and the usage is measured by the number of visits per month. For the group home, the capacity is measured by the number of beds and the usage is measured by the number of users.[10] Table 3A presents these variables.

Table 3A also reports that more than half of these establishments are owned by for-profit companies. Since the users of LTCI must consult with care managers to make a care plan before starting to use services, many LTC providers also operate care manager offices: 37.5% of daycare service and 55.7% of home-visit care service are jointly operated with care manager offices. Since the service by group homes include care management, no group homes are operated jointly with an independent care manager office. Furthermore, about one-third of daycare services and 30% of home-visit care providers are jointly operated with other services, while the ratio is as low as 17.7% for group homes.[11]

3.2 Earnings and hours: Basic Survey of Wage Structure

The Survey of Institutions and Establishments for Long-term Care does not ask responses for wages, labor costs, or the actual work hours. Thus, for the analysis of wages and work hours, I use the Basic Survey of Wage Structure, a cross-sectional survey of employees in all industries conducted by the Ministry of Health, Labour and Welfare. The survey asks salary and other information as of June every year. I use data for 2010-2014 to be consistent with the employment analysis.

I use industry and occupation codes to identify workers in LTC providers. The three-digit industry code corresponding to the LTC providers is "854 Welfare facilities for elderly and nursing care business." In some specifications, I further limit the sample to those whose occupation code is "223 Home Helper" or "224 Nursing-care worker of welfare facility." "223 Home Helper" roughly corresponds to certified care workers in home-visit care service. "224 Nursing-care worker of welfare facility" includes certified care workers in daycare service and group home, although it also

[9] If a person used the service three times in a month, he or she is counted as 3 user-days.
[10] Unlike the user-day count for daycare service, the same person is counted only once in the number of users of group homes.
[11] In the appendix, I limit the sample to for-profit companies, establishments not jointly operated with other services, and establishments jointly operated with care manager offices. The results do not change much.

includes certified care workers in other types of services, such as short-term stay and various kinds of nursing homes.

The outcome variables are constructed as follows. Monthly earnings are directly taken from the questionnaire item of total monthly salaries, including overtime pay.[12] Total hours of work per month is the sum of scheduled hours and overtime hours. Hourly wages are obtained by dividing the monthly earnings by total hours of work per month.

Table 3B shows the summary statistics.[13] First, compared to the average of all industries, hourly wages are lower and the part-time ratio is higher in the LTC industry. Workers in this industry are predominantly female and older than the average of all industries. These characteristics are even more prominent for home helpers, reflecting that the supply of home-visit care workers rely on female part-time workers in their 40s and 50s. Nursing-care workers of welfare facilities are younger and more likely to work full-time, but their wages are lower.

3.3 Reimbursement claims and expenditures: annual report of LTCI

The annual report of LTCI (*kaigo-hoken jigyo jokyo houkoku*) reports the number of units claimed and total expenditures for each type of service covered by the LTCI. Data are available at the municipality level.

The number of units claimed roughly corresponds to the amount of service consumed under the LTCI. Total expenditures are the sum of reimbursements from the LTCI and the 10% co-payment paid by the users.

Table 3C shows mean and median of these variables for each service type. It also shows expenditure per unit, which should be equal to the unit price and it is indeed very close. Note that the sample is limited to the 19 prefectures that have more municipalities with positive regional premium in 2012. Thus, the average unit price is 1-2% higher than 10, the baseline price without regional premium.

4. Empirical model

[12] Note that this does not include bonuses. Since the survey asks bonus paid in the previous year, while the monthly salaries and other information are as of June of the survey year, I cannot include bonus in the earnings.

[13] Table 3B does not show educational background because it is not available for part-time workers. The definition of "part-time workers" is workers whose scheduled work hours are shorter than the regular full-time workers in the same establishment.

My main specifications are incorporated in the following model:

$$Y_{imrt} = \alpha R_{mrt} + \beta X_{imrt} + \tau_{rt} + \mu_{im} + \varepsilon_{imrt} \ldots (1)$$

where Y_{imt} is a dependent variable, such as the log number of employees or the log hourly wages of establishment or worker *i* in municipality *m* in year *t*. Subscript *r* refers to 5 regions defined by the regional premium in 2011 (0%, 5%, 6%, 10%, and 15%). R_{mrt} is the baseline rate of regional premiums in municipality m in year t. The other explanatory variables included in X_{imrt} vary with data (see the footnote to the regression tables). τ_{rt} and μ_{im} represent region-specific year effects and establishment or municipality fixed effects, respectively. The remaining errors, ε_{imrt}, can be correlated within the municipality, thus the standard errors are clustered at the municipality level.

The coefficient of regional premiums, α, represents % change in the outcome variable caused by a 1%-point increase in the baseline regional premium rate. Although the level of regional premiums is correlated with the price and wage levels of each municipality, I exploit the discontinuous change in R_{mrt} in 2012 and control for municipality fixed effect and region-specific year effects. Assuming that the underlying trends are not systematically different for municipalities, where the premium increased and those where the premium decreased in the same region, α can be interpreted as a causal effect of a raise in regional premium.

5. Results

5.1 The effects on the number of employees, capacity, and utilization at the establishment level

I begin with the estimated effects on the number of employees at the establishment level, taken from the Survey of Institutions and Establishments for Long-term Care. The dependent variables are logarithms of the number of all employees, its full-time equivalent number, the number of certified care workers, and its full-time equivalent number.

Table 4 shows estimated α, the coefficient of regional premiums, in equation (1). Panels A, B, C show the result for daycare service, home-visit care, and group home for the elderly with dementia. For each panel, I try two specifications: all establishments in the sample with control for municipality fixed effects and

establishments that did not move across municipalities with control for establishment fixed effects.[14]

There is no positive effect on the number of employees in any specification or service. Except for a few *negative* ones significant at the 10% level, the coefficients are statistically insignificant, and the point estimates are economically small: a 1%-point increase in the baseline regional premium rate does not change the total number of employees by more than 0.5%. Furthermore, the estimated coefficients tend to be negative. Raising regional premiums does not increase employment by LTC providers.

Table 5 presents the effect on capacity and utilization. The effects of an increase in regional premium on the capacity and utilization of LTC service also tend to be negative and statistically insignificant, except for the users of daycare services.

5.2 The effects on earnings, hours of work, and hourly wages

Turning to the effects on monthly earnings, hours of work, and hourly wages; Tables 6A and 6B show the results using data of LTC industry workers taken from the Basic Survey of Wage Structure. Table 6A includes all workers in the industry regardless of their occupation and Table 6B limits the sample to care workers based on the occupation code. In addition to all workers, I estimate the same model with a subsample of full-time and part-time workers[15] separately.

Table 6A shows that an increase in the regional premium of LTCI fee has no significant effects on earnings, hours, and wages of workers in the LTCI industry, except for the positive effect on part-time workers' hourly wages, which is significant at the 10% level. Furthermore, as shown in Table 6B, this positive effect on part-time workers' wages is not robust to limiting the sample to care workers. Although the coefficients on earnings and hourly wages tend to be positive, the sizes of the coefficients are not very large. Overall, there is no evidence that raising the regional premiums led to increases in wages or hours of work of care workers.

[14] I dropped establishments that moved across municipalities because keeping them makes it difficult to cluster the standard errors at the municipality level. Estimated coefficients do not change much if all establishments are included.

[15] In the Basic Survey of Wage Structure, "part-time workers" are defined as workers who work fewer hours per day or fewer days per week than regular (i.e. full-time) workers.

5.3 The effects on reimbursement claims and expenditures

Despite the public concern that low LTCI unit price prevents care providers from raising their workers' wages and aggravates the shortage of workers, raising the regional premiums did not increase employment or hours of work per worker and the wage increase is limited to part-time workers. Then, why does labor input not increase?

One potential concern is that the raise in the LTCI unit price might not have actually increased the revenue of LTC providers. For instance, if the increase in the unit price discouraged users, the amount of service provided through the LTCI might decrease. To check this possibility, I estimate equation (1) using the log of the number of units claimed and expenditures for each service, taken from the annual report of LTCI, as dependent variables.

Table 7 presents the results. Panel A shows the sum of all services (not limited to the three services in Panel B) and Panel B shows the result for each service. Except for the case of group home, results are qualitatively the same: where the regional premiums increase, total expenditures increase. This implies that raising the regional premiums actually increased the revenue of LTC providers.

Furthermore, the last column confirms that the expenditure per unit, which should be equal to the unit price, indeed increased. A 1%-point increase in the regional premiums should increase the unit price of home-visit care by 0.7% and that of daycare service and group home by 0.45%. This should be an increase of 0.07 yen and 0.045 yen, respectively. The estimated coefficients are slightly smaller but close to these numbers.

6. Why no effect on employment and wages?

So far, I have shown that, although the total expenditure from LTCI increased in municipalities where regional premiums increased, there is no increase in the number of care workers in each establishment and negligible effects on monthly earnings and hours of work of care workers. In this section, I discuss why I do not find positive effects on employment or wages.

First possibility is that the increased revenue of LTC providers was actually paid to the workers, but not in the form captured by the data. An important limitation of the Basic Survey of Wage Structure is that bonuses are measured at different timings than monthly earnings. It asks for bonus in the previous calendar year, while

monthly earnings are as of June of the survey year. Therefore, earnings and hourly wages in my data do not include bonuses. However, as presented in the appendix, there is no significant correlation between bonuses in the previous calendar year and regional premiums applied in the April-December period of the previous year. Thus, it is unlikely that a large part of the increased revenue of the provider was spent as bonuses to the workers.

Another possibility is that the increased regional premiums induced new entry of LTC providers. Thus, even though the number of employees in each establishment did not increase, the total number of care workers increased. In theory, if the supply of care workers is wage-elastic, the total employment increases substantially and wages do not change much. Since no reliable statistics for the number of establishments or workers is available at the municipality level, I cannot empirically test this possibility.

It is also possible that the LTC providers used the increased revenue for other purposes. As pointed out by Suzuki (2011), raising the LTCI reimbursement rate does not necessarily increase care workers' earnings because the companies can use it for capital investment or keep it as internal reserves. The lack of financial data makes it difficult to investigate further at this point. However, the negligible effects on capacity imply that little investment to increase capacity was made.

Finally, the change in the regional premium might have been too small to cause significant changes in wages or employment. In most cases, regional premiums changed up to 3% and this is multiplied by 0.75 for home-visit care and 0.45 for daycare and group homes. Thus, the actual change in the price is about 2.3% for home visit care and 1.5% for other services. If the changes were more drastic, the results might have been different.

7. Conclusion

The increase in the regional premiums of LTCI fees in 2012 did not increase wages and earnings, number of employees or hours of work for care workers in the LTC industry. The result so far implies that simply raising the LTCI fees does not improve care workers' working conditions. Thus, it cannot mitigate the shortage of care workers. As discussed in Section 6, the change might have been too small. However, in reality, the revision of LTCI fee usually involves similarly small, gradual changes.

Since the elderly population needing LTC is expected to keep growing, solving the shortage of care workers is an urgent policy goal in Japan. Provided that raising the LTCI reimbursement does not increase earnings of care workers, the next question would be what prevents the earnings of care workers from increasing. As discussed in Section 6, such an investigation requires financial data that is not currently available. This task needs to be taken up in the future.

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Table 1 Number of municipalities by regional premium for labor cost in 2011 and 2012

		Baseline rate of premiums in 2012									
		0%	3%	5%	6%	9%	10%	12%	15%	18%	Total
Baseline rate of premiums in 2011	0%	1,318	264	--	1	--	--	--	--	--	1,583
	5%	--	15	3	47	--	1	--	--	--	66
	6%	--	1	1	12	--	5	--	--	--	19
	10%	--	--	--	2	2	21	20	5	--	50
	15%	--	--	--	--	--	--	--	--	23	23
	Total	1,318	280	4	62	2	27	20	5	23	1,741

Table 2 Number of municipalities by regions (prefectures) and changes in the regional premium for labor cost between 2011 and 2012

	0% in 2011		≦5% in 2011		
	No change	Increased	Decreased	No change	Increased
Tokyo	10	3	0	5	44
	(16.1%)	(4.8%)	(0.0%)	(8.1%)	(71.0%)
Saitama, Chiba, Kanagawa	47	60	3	3	37
	(31.3%)	(40.0%)	(2.0%)	(2.0%)	(24.7%)
Ibaraki, Tochigi, Gunma	60	44	0	0	0
	(57.7%)	(42.3%)	(0.0%)	(0.0%)	(0.0%)
Osaka, Kyoto, Hyogo	35	24	12	28	11
	(31.8%)	(21.8%)	(10.9%)	(25.5%)	(10.0%)
Shiga, Nara, Wakayama	48	35	2	0	3
	(54.5%)	(39.8%)	(2.3%)	(0.0%)	(3.4%)
Aichi, Mie, Shizuoka	40	76	0	0	2
	(33.9%)	(64.4%)	(0.0%)	(0.0%)	(1.7%)
Other prefectures	1,078	23	4	0	4
	(97.2%)	(2.1%)	(0.4%)	(0.0%)	(0.4%)
Total	1,318	265	21	36	101
	(75.7%)	(15.2%)	(1.2%)	(2.1%)	(5.8%)

Table 3 Summary statistics

A. Survey of Institutions and Establishments for Long-term Care

	Daycare service	Home-visit care	Group home for the elderly with dementia
Number of all employees	15.2	19.6	17.8
Full-time equivalent	8.7	8.1	13.1
Number of certified care workers	7.2	18.9	15.0
Full-time equivalent	4.9	7.8	11.6
Capacity multiplied by the number of working days per month	575.9	--	--
Total number of user-day per month	395.7	--	--
Total number of visits per month	--	686.1	--
Number of beds	--	--	15.4
Number of users	--	--	14.7
Owned by for-profit companies	57.1%	68.4%	59.2%
Jointly operated with care manager offices	37.5%	55.7%	--
Jointly operated with other services except for care manager offices	33.4%	30.0%	17.7%
Sample size (observations)	86,563	80,769	24,091
Sample size (establishments)	23,463	21,900	5,426

Note: The sample is limited to establishments in the 16 prefectures listed in Table2.

B. Basic Survey of Wage Structure

	All workers in all industries	Workers in long-term care industry[*1]	Home helper[*2]	Nursing-care worker of welfare facility[*3]
Monthly earnings (100 yen)	2639.5	1827.7	1160.6	1868.2
Total hours of work per month	144.8	130.4	88.6	145.2
Hourly wages (100 yen)	17.8	14.0	13.5	12.7
Age	41.3	45.3	50.6	40.9
Female	41.2%	76.8%	90.0%	74.2%
Part-time	29.1%	39.1%	70.3%	28.6%
Sample size	3,471,009	46,461	9,585	19,598

Note: the sample is limited to workers employed by establishments in the 16 prefectures listed in Table2.

*1: Employed in 3-digit industry “854 Welfare facilities for elderly and nursing care business”.

*2: Employed in 3-digit industry “854 Welfare facilities for elderly and nursing care business” and with occupation code “223 Home Helper.”

*3: Employed in 3-digit industry “854 Welfare facilities for elderly and nursing care business” and with occupation code “224 Nursing-care worker of welfare facility.”

C. **Annual report of Long-term Care Insurance**

	Mean	Median
Total number of claimed units (1)		
All services	669,375	309,471
Home-visit care	75,786	21,226
Daycare service	108,020	46,846
Group home for the elderly with dementia	34,847	15,016
Expenditures (reimbursement + out-of-pocket) (2)		
All services	6,963,101	3,143,653
Home-visit care	800,231	215,696
Daycare service	1,110,679	472,932
Group home for the elderly with dementia	358,129	151,726
(1)/(2) = Expenditure per unit		
All services	10.2	10.1
Home-visit care	10.2	10.1
Daycare service	10.1	10.0
Group home for the elderly with dementia	10.1	10.0
Number of municipalities	621	

Note: the sample is limited to municipalities in the 16 prefectures listed in Table2.

Table 4 Effect of the regional premium of labor cost on employment

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.004*	0.000	-0.002	0.001	-0.006**	-0.002	-0.004*	-0.002
premiums	[0.002]	[0.002]	[0.002]	[0.001]	[0.003]	[0.002]	[0.003]	[0.002]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	86,563	86,461	86,563	86,461	86,355	86,253	86,355	86,253
Number of establishments	23,463	23,442	23,463	23,442	23,449	23,428	23,449	23,428

Note: Columns (1), (3), (5) and (7) include establishments that moved across municipalities. Other columns include only those stayed in the same municipality. Explanatory variables omitted from the table are year dummies interacted with region dummies based on regional premium in 2011, and dummies for corporation type (for-profit companies, medical corporation, social welfare corporation, other; odd-numbered columns only). Standard errors clustered at municipality level are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Effect of the regional premium of labor cost on employment

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.001	-0.002	-0.001	-0.002	0.000	-0.001	-0.001	-0.002
premiums	[0.003]	[0.003]	[0.003]	[0.002]	[0.003]	[0.003]	[0.003]	[0.002]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	80,769	80,488	80,769	80,488	80,765	80,484	80,765	80,484
Number of establishments	21,900	21,830	21,900	21,830	21,900	21,830	21,900	21,830

Note: Columns (1), (3), (5) and (7) include establishments that moved across municipalities. Other columns include only those stayed in the same municipality. Explanatory variables omitted from the table are year dummies interacted with region dummies based on regional premium in 2011, and dummies for corporation type (for-profit companies, medical corporation, social welfare corporation, other; odd-numbered columns only). Standard errors clustered at municipality level are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Effect of the regional premium of labor cost on employment

C. Group home for the elderly with dementia

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.006	-0.005*	-0.005	-0.003	-0.005	-0.004	-0.005	-0.003
premiums	[0.004]	[0.003]	[0.004]	[0.003]	[0.004]	[0.003]	[0.004]	[0.003]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	24,091	24,076	24,091	24,076	24,090	24,075	24,090	24,075
Number of establishments	5,426	5,423	5,426	5,423	5,426	5,423	5,426	5,423

Note: Columns (1), (3), (5) and (7) include establishments that moved across municipalities. Other columns include only those stayed in the same municipality. Explanatory variables omitted from the table are year dummies interacted with region dummies based on regional premium in 2011, and dummies for corporation type (for-profit companies, medical corporation, social welfare corporation, other; odd-numbered columns only). Standard errors clustered at municipality level are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5 Effect of the regional premium of labor cost on capacity and utilization

A. Municipality FE

Service	Daycare service		Home-visit care	Group home for the elderly with dementia	
Y	Capacity multiplied by the number of working days per month	Total number of user-day per month	Total number of visits per month	Number of beds	Number of users
regional premiums	-0.002 [0.002]	-0.009** [0.004]	0.000 [0.005]	-0.002 [0.003]	-0.001 [0.003]
Observations	86,271	85,770	78,916	24,139	23,830
R-squared	0.054	0.046	0.038	0.297	0.267

B. Establishment FE, excluding establishments that moved across municipalities

Service	Daycare service		Home-visit care	Group home for the elderly with dementia	
Y	Capacity multiplied by the number of working days per month	Total number of user-day per month	Total number of visits per month	Number of beds	Number of users
regional premiums	0.000 [0.001]	-0.004* [0.002]	-0.004 [0.004]	-0.002 [0.002]	0.000 [0.002]
Observations	86,174	85,671	78,641	24,124	23,815
R-squared	0.036	0.024	0.012	0.02	0.005

Standard errors clustered at municipality level are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Explanatory variables omitted from the table are year dummies interacted with region dummies based on regional premium in 2011, and dummies for corporation type (for-profit companies, medical corporation, social welfare corporation, other; panel A only).

Table 6 Effects of the regional premium of labor cost on earnings, hours of work and hourly wages

A. All occupations

Dependent variable	Y=log(earnings)			Y=log(hours)			Y=log(hourly wages)		
Sample	All workers	Full-time	Part-time	All workers	Full-time	Part-time	All workers	Full-time	Part-time
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regional premium	0.011	0.002	0.007	0.001	-0.004	-0.01	0.007	0.006	0.014*
	[0.012]	[0.005]	[0.019]	[0.012]	[0.003]	[0.020]	[0.005]	[0.006]	[0.008]
Observations	43,010	25,527	16,472	42,996	25,513	16,472	42,996	25,513	16,472
R-squared	0.174	0.14	0.084	0.18	0.078	0.118	0.104	0.151	0.136

Note: Sample is limited to workers employed in 3-digit industry "854 Welfare facilities for elderly and nursing care business." Explanatory variables omitted from the table are female dummy, age, age squared, year dummies interacted with the five region dummies based on regional premium in 2011, average log(Y) of all workers in other industry in the same municipality, and municipality fixed effects. Standard errors clustered at municipality level are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6 Effects of the regional premium of labor cost on earnings, hours of work and hourly wages

B. Care workers only

Dependent variable	Y=log(earnings)			Y=log(hours)			Y=log(hourly wages)		
Sample	All workers	Full-time	Part-time	All workers	Full-time	Part-time	All workers	Full-time	Part-time
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regional premium	0.013	0.001	0.019	0.007	-0.004	0.012	0.001	0.005	0.003
	[0.014]	[0.005]	[0.022]	[0.015]	[0.004]	[0.024]	[0.005]	[0.006]	[0.008]
Observations	27,022	15,224	11,096	27,015	15,217	11,096	27,015	15,217	11,096
R-squared	0.223	0.17	0.103	0.239	0.1	0.154	0.147	0.191	0.273

Note: Sample is limited to workers employed in employed in 3-digit industry "854 Welfare facilities for elderly and nursing care business" and with occupation codes "223 Home Helper" or "224 Nursing-care worker of welfare facility." Explanatory variables omitted from the table are female dummy, age, age squared, year dummies interacted with the five region dummies based on regional premium in 2011, average log(Y) of all workers in other industry in the same municipality, and municipality fixed effects. Standard errors clustered at municipality level are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7 The effect of regional premium on expenditure from LTCI

A. Sum of all services

Y	Log(Expenditures)	Expenditure per unit
Regional premium	0.011***	0.040***
	[0.002]	[0.003]
Observations	3,726	3,726

B. By services

Dependent variable	Log(Expenditures)			Expenditure per unit		
Service	Home visit	Daycare	Group home	Home visit	Daycare	Group home
Regional premium	0.019***	0.019***	-0.004	0.041***	0.056***	0.029**
	[0.004]	[0.005]	[0.009]	[0.003]	[0.003]	[0.014]
Observations	3,719	3,721	3,641	3,719	3,721	3,640

Note: The unit of observation is municipality, and the sample is limited to 621 municipalities in the 16 prefectures.

Appendix

Table A1 Effect of the regional premium of labor cost on employment, for-profit companies only

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.004	0	-0.004	-0.001	-0.010**	-0.004	-0.010**	-0.007**
premiums	[0.003]	[0.002]	[0.003]	[0.002]	[0.004]	[0.003]	[0.004]	[0.004]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	49,347	49,290	49,347	49,290	49,204	49,147	49,204	49,147
Number of establishments	15,474	15,472	15,474	15,472	15,474	15,461	15,474	15,461

Note: Replication of Table 4 with establishments operated by for-profit companies.

Table A1 Effect of the regional premium of labor cost on employment, for-profit companies only

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	0.001	0.000	0.000	-0.001	0.001	0.001	0.000	-0.001
premiums	[0.004]	[0.003]	[0.003]	[0.003]	[0.004]	[0.003]	[0.003]	[0.003]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	55,160	54,921	55,160	54,921	55,157	54,918	55,157	54,918
Number of establishments	16,026	15,965	16,026	15,965	16,026	15,965	16,026	15,965

Note: Replication of Table 4 with establishments operated by for-profit companies.

Table A1 Effect of the regional premium of labor cost on employment, for-profit companies only

C. Group home for the elderly with dementia

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.005	-0.005**	-0.005	-0.003	-0.004	-0.004	-0.004	-0.001
premiums	[0.003]	[0.002]	[0.004]	[0.003]	[0.004]	[0.003]	[0.005]	[0.004]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	14,249	14,240	14,249	14,240	14,249	14,240	14,249	14,240
Number of establishments	3,308	3,306	3,308	3,306	3,308	3,306	3,308	3,306

Note: Replication of Table 4 with establishments operated by for-profit companies.

Table A2 Effect of the regional premium of labor cost on employment, establishments not jointly operated with other services

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	0.001	0.001	0.002	0.000	-0.002	-0.003	0.001	-0.004
premiums	[0.003]	[0.002]	[0.004]	[0.002]	[0.004]	[0.003]	[0.006]	[0.003]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	46,624	46,566	46,624	46,566	46,487	46,429	46,487	46,429
Number of establishments	15,419	15,404	15,419	15,404	15,419	15,393	15,419	15,393

Note: Replication of Table 4 with establishments not jointly operated with other services.

Table A2 Effect of the regional premium of labor cost on employment, establishments not jointly operated with other services

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.001	0.002	-0.005	-0.006*	-0.001	0.003	-0.004	-0.006
premiums	[0.004]	[0.004]	[0.004]	[0.003]	[0.005]	[0.004]	[0.004]	[0.004]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	29,953	29,806	29,953	29,806	29,950	29,803	29,950	29,803
Number of establishments	10,614	10,566	10,614	10,566	10,614	10,566	10,614	10,566

Note: Replication of Table 4 with establishments not jointly operated with other services.

Table A2 Effect of the regional premium of labor cost on employment, establishments not jointly operated with other services

C. Group home for the elderly with dementia

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.007*	-0.006**	-0.007*	-0.004	-0.006	-0.005	-0.007*	-0.004
premiums	[0.004]	[0.003]	[0.004]	[0.003]	[0.004]	[0.003]	[0.004]	[0.003]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	19,821	19,806	19,821	19,806	19,820	19,805	19,820	19,805
Number of establishments	4,541	4,538	4,541	4,538	4,541	4,538	4,541	4,538

Note: Replication of Table 4 with establishments not jointly operated with other services.

Table A3 Effect of the regional premium of labor cost on employment, establishments jointly operated with care manager offices

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.005	-0.004	-0.001	0.000	-0.007**	-0.005*	-0.004	-0.002
premiums	[0.003]	[0.003]	[0.003]	[0.002]	[0.003]	[0.003]	[0.004]	[0.003]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	32,438	32,400	32,438	32,400	32,377	32,339	32,377	32,339
Number of establishments	8,058	8,046	8,058	8,046	8,058	8,043	8,058	8,043

Note: Replication of Table 4 with establishments jointly operated with care manager offices.

Table A3 Effect of the regional premium of labor cost on employment, establishments jointly operated with care manager offices

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		Y=log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional	-0.003	-0.002	-0.001	0.001	-0.002	-0.001	0.000	0.001
premiums	[0.004]	[0.003]	[0.003]	[0.002]	[0.004]	[0.003]	[0.003]	[0.002]
Municipality FE	yes		yes		yes		yes	
Establishment FE		yes		yes		yes		yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	45,018	44,904	45,018	44,904	45,018	44,904	45,018	44,904
Number of establishments	12,048	12,009	12,048	12,009	12,048	12,009	12,048	12,009

Note: Replication of Table 4 with establishments jointly operated with care manager offices.

※ **Group homes offer care-plan as a part of their service, so no group homes are operated jointly with care-manager offices as a separate service.**

Table A4 Effects of the regional premium of labor cost on bonus

A. All occupations

Dependent variable	Y=log(bonus), excluding 0			Y=1 if bonus>0		
Sample	All workers	Full-time	Part-time	All workers	Full-time	Part-time
	(1)	(2)	(3)	(4)	(5)	(6)
Regional premium	-0.017	0.019	-0.05	0.01	0.003	0.017
	[0.035]	[0.029]	[0.056]	[0.011]	[0.009]	[0.018]
Observations	29,341	22,023	7,263	46,461	27,629	17,768
R-squared	0.219	0.156	0.279	0.143	0.118	0.223

B. Care workers only

Dependent variable	Y=log(bonus), excluding 0			Y=1 if bonus>0		
Sample	All workers	Full-time	Part-time	All workers	Full-time	Part-time
	(1)	(2)	(3)	(4)	(5)	(6)
Regional premium	-0.038	0.02	-0.101	0.014	0.003	0.028
	[0.045]	[0.033]	[0.062]	[0.014]	[0.013]	[0.021]
Observations	17,852	13,005	4,811	29,183	16,504	11,942
R-squared	0.27	0.177	0.335	0.178	0.127	0.278

Note: same as Table 6.