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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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DISCUSSION PAPER SERIES

IZA DP No. 12383

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ABSTRACT

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

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.

JEL Classification: I11, J30, J48

Keywords: long-term care insurance, care workers

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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. One of the few exceptions 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. To overcome this limitation, Ueno and Hamaaki (2017) used the difference in difference method exploiting the rise of regional premium in 2009 applied only to the 23 wards in Tokyo.

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 taken from the Survey of Institutions and Establishments for Long-term Care. With controls for municipality- or establishment-fixed effects and region-

specific year effects, an increase in regional premiums does not have any positive effects on employment. Consequently, the capacity of the service did not increase, either. Next, I examine the effect on monthly 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 positive effects on employment and earnings, I check whether the total expenditure from LTCI actually increased, using the municipality-level administrative data of LTCI. I confirm that the increase in the unit prices increased the total expenditure, that is, the payment to the LTCI providers. I also find suggestive evidence that bonus increased with a one-year lag.

My empirical strategy is similar to that of Ueno and Hamaaki (2017), who examined the effect of the revision of regional premium in 2009 using the differences in differences method with repeated cross section data of LTC providers. An important distinction of this paper from Ueno and Hamaaki (2017) is that, unlike the 2009 revision that affected only the 23 wards in Tokyo, the 2012 revision affected much more municipalities in different prefectures and with different level of regional premiums before the change,¹ allowing me to control for underlying trends in more flexible way. Also, the outcome variables are different. Ueno and Hamaaki (2017) find no significant changes on scheduled monthly earnings and work hours, while bonus increased and turnover rates decreased with a one-year lag. In addition, I examine the effect on employment using establishment level panel data, while I do not have information on turnover rates. My results on earnings, bonus and work hours are consistent with their results.

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.

¹ In the 2009 revision, the regional premium was changed only for the 23 wards in Tokyo, the most expensive and densely populated area in Japan.

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 on employment and monthly earnings, 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.²

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.³ While there were 23 types of services⁴ in 2012,

² See Campbell et al (2010) for more detailed description of the LTCI in Japan.

³ Providers can operate several kinds of services, so long as they receive authorization for each of the services.

⁴ Note that 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.

this paper focuses on the following three, which are largest in terms of the number of establishments⁵: daycare services, home-visit care, and group home for the elderly with dementia⁶.

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 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.⁷

⁵ The number of establishments licensed by LTCI is 184,392 in 2012, and the share of daycare services, home-visit care, and group home for the elderly with dementia are 18.5%, 16.9%, and 6.4%, respectively, according to the Survey of Institutions and Establishments for Long-term Care. The share of total LTCI expenditure in 2012 are 16.2% (2nd largest), 9.9% (4th) and 6.2% (5th), respectively, according to the Annual Report of LTCI.

⁶ The official name of this service category is “long-term care for the elderly with dementia in residential care settings.”

⁷ 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

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 $10+10\times 3\%\times 70\%=10.21$.

Regional premiums for LTCI unit price were revised in 2012,⁸ 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

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%.

⁸ 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.

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 16 prefectures listed in Table 2. This covers 392 out of 423 municipalities with positive regional premiums in 2012, in addition to 240 municipalities with zero regional premiums. Appendix table A1 lists all municipalities with non-zero regional premiums in the 16 prefectures included in my data.

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 16 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.⁹ Aside from the problem of no response, complete 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.¹⁰ 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.

⁹ 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.

¹⁰ 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.

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 month; that is, the sum of the users of each day over a month.¹¹ 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.¹² 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.¹³

¹¹ If a person used the service three times in a month, he or she is counted as 3 user-days.

¹² Unlike the user-day count for daycare service, the same person is counted only once in the number of users of group homes.

¹³ In the appendix, I limit the sample to for-profit companies (Table A2), establishments not jointly operated with other services (A3), establishments jointly operated with care manager offices (A4), daycare establishments jointly operated with services of higher labor cost share (A5), and home-visit care establishments jointly operated with services of lower labor cost share (A6). Comparing Tables 4A, A3A and A5, the weakly negative effect on daycare establishments disappears when the

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 2009-2014 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 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. 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. While the monthly salaries and hours of work are those as of June of the survey year, data on bonus are the amount paid in the previous calendar year. Thus, for the analysis of bonus, I use data from 2010-2015 survey (paid in calendar year 2009-2014) matched with the regional premiums in fiscal year 2009-2014.

sample is limited to those not jointly operated with other services, and the size of this negative coefficient becomes slightly larger when the sample is limited to those jointly operated with services of higher labor cost share. This might appear suggestive evidence for labor reallocation from services with low labor cost share to high labor cost share; however, the number of employees *decreased* in home-visit care establishments jointly operated with services of lower labor cost share, opposite to this story. Also, the results on group home are not in line with those on daycare services. Thus I cannot draw any strong conclusion from this analyses.

Table 3B shows the summary statistics.¹⁴ 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. Reflecting the high part-time ratio, the fraction with non-zero bonus is smaller for home helper, but the average amount for nursing-care worker of welfare facility is also much lower than the average of all industry.

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

My main specifications are incorporated in the following model:

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

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

¹⁴ 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.

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.

To reassure the validity of this assumption, two robustness checks are presented in the appendix. First, Appendix tables A7-9 replicate Tables 6A, 8A and 9A using workers in other industries¹⁵ as a placebo test. The estimated coefficients of regional premiums and lagged regional premiums are close to zero and statistically insignificant, except for two weakly significant negative ones. This implies the absence of differential trend in monthly earnings, work hours and bonus among the municipalities where regional premium was increased and the others. Second, Appendix tables A10-15 replicate Tables 4-9 with subsample data of Kanto area, Tokai area and Kinki area, to check if there is any bias caused by differential trends across regions that were not captured by the region-specific year effects. The results from Kanto area data are mostly the same as the main results. Although those from Tokai and Kinki data tend to be unstable, probably because of fewer variations of the change in regional premiums, none of the tables suggests positive effect of regional premiums on employment, earnings or hours of work.

5. Results

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

¹⁵ The average Y of all industries is dropped from the right hand side.

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.¹⁶

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 workers¹⁷ separately.

¹⁶ 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.

¹⁷ 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.

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.

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 in the form of temporary bonuses. Thus, using the Basic Survey of Wage Structure, I regressed bonuses paid in the calendar year 2010-2014 (reported in 2011-2015 surveys) on regional premiums applied in the April-December period of the corresponding year.¹⁸ Table 8 shows that there is no significant correlation between bonuses and regional premiums, except for the weakly negative one for part-time care workers. However, as shown in Table 9, bonuses and regional premiums applied in the previous year are positively correlated. Ueno and Hamaaki (2017) also show that an increase in regional premiums in 2009 had a positive effect on bonus paid in 2010, not 2009. These results suggest that the increased revenue of LTC providers was at least partly distributed to care workers in the form of temporary bonuses with a one-year lag, although it is not clear what causes this one-year lag. Also, as presented in the appendix, the lagged regional premiums do not have systematic effects on employment, suggesting that this increase in bonus did not mitigate labor shortage.¹⁹

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

¹⁸ Note that it is not feasible to examine the effect on the total compensation including both monthly salaries and bonuses, because bonuses are measured at different timings than monthly earnings.

¹⁹ Appendix tables A16-19 replicate Tables 4-7, replacing R_{mrt} in equation (1) with R_{mrt-1} . Like R_{mrt} , R_{mrt-1} does not significantly increase employment, monthly earnings or hours of work. Although R_{mrt-1} is significantly positively correlated with expenditures, this is probably picking up the effect of R_{mrt} , given that the size of the coefficient is smaller than that of R_{mrt} .

workers is available at the municipality level, I cannot empirically test this possibility.²⁰

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 (except for bonus with a one-year lag), 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 may not improve care workers' working conditions. 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. Although data used in this paper do not allow me to examine the effect on turnover of care workers, existing

²⁰ The response rate of the Survey of Survey of Institutions and Establishments for Long-term Care is not 100%, and it varies overtime: for example, the response rate for home-visit care service was 77.8% in 2011 and 80.1% in 2012. Furthermore, there is no clue how the response rate varies across municipalities, thus I cannot obtain reliable numbers of establishments operating in each municipality by aggregating the microdata of the survey. Although the "basic questionnaire (*kihon-hyo*)" should have been census and 100% response, the data prior to 2012 were discarded, according to the Ministry of Health, Labour, and Welfare. I also tried to identify new entrants using the panel structure of the data, but it did not work because I was not able to distinguish establishments that really entered the market in 2012 and those that existed but did not respond to 2011 survey.

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 (Hanaoka 2009, 2011). Although the direct evidence for the effect of wages on part-time workers is mixed, Ueno and Hamaaki (2017) find turnover rate of part-time workers significantly decreased with one-year lag after regional premium increased in the 23 wards in Tokyo in 2009, and they interpret this as the result of increase in bonus payment. How turnover rate changed with the 2012 revision would be an important question to be investigated in future.

Another important question would be what prevents the monthly earnings of care workers from increasing, whereas the increase in the regional premium was deemed to be permanent. 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									Total
		0%	3%	5%	6%	9%	10%	12%	15%	18%	
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			$\geq 5\%$ in 2011	
	No change	Increased	Decreased	No change	Increased
Tokyo	10 (16.1%)	3 (4.8%)	0 (0.0%)	5 (8.1%)	44 (71.0%)
Saitama, Chiba, Kanagawa	47 (31.3%)	60 (40.0%)	3 (2.0%)	3 (2.0%)	37 (24.7%)
Ibaraki, Tochigi, Gunma	60 (57.7%)	44 (42.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Osaka, Kyoto, Hyogo	35 (31.8%)	24 (21.8%)	12 (10.9%)	28 (25.5%)	11 (10.0%)
Shiga, Nara, Wakayama	48 (54.5%)	35 (39.8%)	2 (2.3%)	0 (0.0%)	3 (3.4%)
Aichi, Mie, Shizuoka	40 (33.9%)	76 (64.4%)	0 (0.0%)	0 (0.0%)	2 (1.7%)
Other prefectures	1,078 (97.2%)	23 (2.1%)	4 (0.4%)	0 (0.0%)	4 (0.4%)
Total	1,318 (75.7%)	265 (15.2%)	21 (1.2%)	36 (2.1%)	101 (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%
Bonus in the previous calendar year ^{*4}	6520.6	3122.5	847.6	3357.4
% with non-zero bonus	62.6%	64.4%	42.1%	72.2%
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.”

*4: Average of 2010-2015 survey, including those with zero bonus.

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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.004* [0.002]	0.000 [0.002]	-0.002 [0.002]	0.001 [0.001]	-0.006** [0.003]	-0.002 [0.002]	-0.004* [0.003]	-0.002 [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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.001 [0.003]	-0.002 [0.003]	-0.001 [0.003]	-0.002 [0.002]	0.000 [0.003]	-0.001 [0.003]	-0.001 [0.003]	-0.002 [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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.006 [0.004]	-0.005* [0.003]	-0.005 [0.004]	-0.003 [0.003]	-0.005 [0.004]	-0.004 [0.003]	-0.005 [0.004]	-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	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 Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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 Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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**

Y Sample	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.011 [0.012]	0.002 [0.005]	0.007 [0.019]	0.001 [0.012]	-0.004 [0.003]	-0.01 [0.020]	0.007 [0.005]	0.006 [0.006]	0.014* [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**

Y Sample	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.013 [0.014]	0.001 [0.005]	0.019 [0.022]	0.007 [0.015]	-0.004 [0.004]	0.012 [0.024]	0.001 [0.005]	0.005 [0.006]	0.003 [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*** [0.002]	0.040*** [0.003]
Observations	3,726	3,726

B. By services

Y Service	Log(Expenditures)			Expenditure per unit		
	Home visit	Daycare	Group home	Home visit	Daycare	Group home
Regional premium	0.019*** [0.004]	0.019*** [0.005]	-0.004 [0.009]	0.041*** [0.003]	0.056*** [0.003]	0.029** [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.

Table 8 Effects of the regional premium of labor cost on bonus**A. All occupations**

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	0.000 [0.032]	0.036 [0.026]	-0.039 [0.058]	0.009 [0.011]	0.005 [0.010]	0.015 [0.018]
Observations	26,161	19,560	6,557	40,647	24,306	15,467
R-squared	0.23	0.16	0.30	0.151	0.118	0.251

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	-0.027 [0.044]	0.034 [0.027]	-0.108* [0.062]	0.014 [0.015]	0.007 [0.013]	0.028 [0.020]
Observations	16,016	11,600	4,391	25,606	14,587	10,446
R-squared	0.277	0.181	0.349	0.188	0.131	0.311

Note: same as Table 6.

Table 9 Lagged effects of the regional premium of labor cost on bonus**A. All occupations**

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.114** [0.044]	0.074** [0.032]	0.186*** [0.058]	-0.001 [0.012]	0.013 [0.012]	-0.023 [0.018]
Observations	19,843	14,765	5,060	30,843	18,437	11,753
R-squared	0.24	0.177	0.325	0.16	0.132	0.275

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.117** [0.050]	0.089** [0.038]	0.153** [0.062]	-0.009 [0.014]	0.003 [0.015]	-0.021 [0.023]
Observations	12,203	8,781	3,409	19,402	11,086	7,890
R-squared	0.279	0.199	0.352	0.2	0.151	0.328

Note: same as Table 6.

Appendix to “Impact of increased Long-term Care Insurance payments on employment and wages in formal long-term care”

Table A1 List of municipalities with non-zero regional premium

<p>2009-11: 0%</p> <p>2012-14: 3%</p>	<p>Ibaraki: Mito, Tsuchiura, Furukawa, Ishioka, Yuki, Ryugasaki, Shimotsuma, Joso, Toride, Ushiku, Tsukuba, Moriya, Naka, Chikusei, Bando, Inashiki, Sakuragawa, Tsukubamirai, Ami, Kawachi, Yachiyo, Goka, Sakaimachi, Tone.</p> <p>Tochigi: Utsunomiya, Tochigi, Kanuma, Nikko, Oyama, Moka, Otawara, Sakura, Shimotsuke, Mibu, Nogi.</p> <p>Gunma: Maebashi, Takasaki, Isesaki, Ota, Shibukawa, Shinto-mura, Tamamura, Chiyoda, Oizumi</p> <p>Saitama: Gyoda, Hanno, Kazo, Higashimatsuyama, Kasukabe, Hanyu, Konosu, Ageo, Iruma, Okegawa, Kuki, Yashio, Misato, Hasuda, Sakado, Satte, Tsurugashima, Hidaka, Yoshikawa, Shiraoka, Moroyama, Ogose, Namegawa, Ranzan, Kawajima, Yoshimi, Hatoyama, Tokigawa, Miyashiro, Sugito, Matsubushi</p> <p>Chiba: Kisarazu, Noda, Sakura, Togane, Ichihara, Nagareyama, Yachiyo, Abiko, Kamagaya, Kimitsu, Sodegaura, Yachimata, Inzai ,Shiroi, Tomisato, Yamatake, Oamishirasato, Shisui, Sakae, Nagara, Chonan</p> <p>Tokyo: Mizuho, Hinohara</p> <p>Kanagawa: Hadano, Ninomiya, Nakai, Oi, Yamakita, Hakone, Aikawa, Kiyokawa</p> <p>Shizuoka: Hamamatsu, Numazu, Mishima, Fujinomiya, Shimada, Fuji, Iwata, Yaizu, Kakegawa, Fujieda, Gotemba, Fukuroi, Susono, Kosai, Kannami, Shimizu, Nagaizumi, Oyama, Kawanehon, Mori</p> <p>Aichi: Toyohashi, Okazaki, Ichinomiya, Seto, Handa, Kasugai, Toyokawa, Tsushima, Hekinan, Kariya, Toyota, Anjo, Nishio, Gamagōri, Inuyama, Jiangnan, Komaki, Inazawa, Shinshiro, Tokai, Obu, Chita, Chiryu, Owariasahi, Takahama, Iwakura, Toyoake, Nisshin, Aisai, Kiyosu, Kitanagoya, Yatomi, Miyoshi, Kaifu, Nagakute, Togo, Toyoyama, Oguchi, Fuso, Kanie, Tobishima, Agui, Higashiura, Kota</p> <p>Mie: Tsu, Yokkaichi, Kuwana, Suzuka, Nabari, Kameyama, Inabe, Iga, Kisosaki, Toin, Asahi, Kawagoe</p> <p>Shiga: Hikone, Nagahama, Kusatsu, Moriyama, Ritto, Koka, Yasu, Takashima, Maibara, Taga,</p>
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	<p>Kyoto: Kameoka, Joyo, Yawata, Kyotanabe, Nandan, Kizugawa, Kumiyama, Ide, Ujitawara, Kasagi, Seika, Minamiyamashiro</p> <p>Osaka: Toyono, Misaki, Chihayaakasaka</p> <p>Hyogo: Kakogawa, Miki, Takasago, Ono, Kasei, Kato, Inagawa, Inami, Harima</p> <p>Nara: Tenri, Kashihara, Sakurai, Gojo, Kashiba, Katsuragi, Uda, Yamazoe, Heguri, Misato, Ikaruga, Ando, Kawanishi, Tawaramoto, Soni, Asuka, Kanmaki, Oji, Koryo, Kawai, Yoshino</p> <p>Wakayama: Hashimoto, Kinokawa, Iwade, Katsuragi</p>
<p>2009-11: 0%</p> <p>2012-14: 6%</p>	<p>Tokyo: Hinode</p>
<p>2009-11: 5%</p> <p>2012-14: 3%</p>	<p>Saitama: Soka</p> <p>Kanagawa: Odawara, Miura</p> <p>Kyoto: Muko, Nagaokakyo</p> <p>Osaka: Sennan, Hannan, Tajiri</p> <p>Hyogo: Himeji</p> <p>Nara: Ikoma</p> <p>Wakayama: Wakayama</p>
<p>2009-11: 5%</p> <p>2012-14: 5%</p>	<p>Hyogo: Akashi</p>
<p>2009-11: 5%</p> <p>2012-14: 6%</p>	<p>Saitama: Kawagoe, Kawaguchi, Tokorozawa, Sayama, Koshigaya, Warabi, Toda, Asaka, Shiki, Wako, Niiza, Fujimi, Fujimino, Miyoshi.</p> <p>Chiba: Ichikawa, Funabashi, Matsudo, Narashino, Kashiwa, Urayasu, Yotsukaido</p> <p>Tokyo: Higashiyamato, Musashimurayama, Ome, Fussa, Kiyose, Hamura, Akiruno,</p> <p>Kanagawa: Sagami-hara, Hiratsuka, Fujisawa, Chigasaki, Atsugi, Yamato, Isehara, Ebina, Zama, Ayase, Samukawa</p> <p>Shizuoka: Shizuoka</p>

	<p>Shiga: Otsu</p> <p>Kyoto: Uji</p> <p>Osaka: Kawachinagano</p> <p>Hyogo: Sanda</p> <p>Nara: Nara, Yamatokoriyama</p>
<p>2009-11: 5%</p> <p>2012-14: 10%</p>	<p>Tokyo: Higashikurume</p>
<p>2009-11: 6%</p> <p>2012-14: 3%</p>	<p>Osaka: Kashiwara</p>
<p>2009-11: 6%</p> <p>2012-14: 5%</p>	<p>Osaka: Kumatori</p>
<p>2009-11: 6%</p> <p>2012-14: 6%</p>	<p>Kanagawa: Zushi, Hayama</p> <p>Osaka: Kishiwada, Izumiotsu, Kaizuka, Izumisano, Tondabayashi, Izumi, Habikino, Fujiidera, Osakasayama, Tadaoka</p>
<p>2009-11: 6%</p> <p>2012-14: 10%</p>	<p>Saitama: Saitama</p> <p>Chiba: Chiba</p> <p>Osaka: Takaishi, Shimamoto</p>
<p>2009-11: 10%</p> <p>2012-14: 6%</p>	<p>Osaka: Matsubara, Katano</p>
<p>2009-11: 10%</p> <p>2012-14: 9%</p>	<p>Hyogo: Itami, Kawanishi</p>
<p>2009-11: 10%</p> <p>2012-14: 10%</p>	<p>Tokyo: Mitaka, Koganei, Higashimurayama</p> <p>Kanagawa: Yokosuka</p> <p>Kyoto: Kyoto</p>

	Osaka: Sakai, Toyonaka, Ikeda, Takatsuki, Moriguchi, Hirakata, Ibaraki, Yao, Daito, Mino, Kadoma, Settsu, Higashi-Osaka, Shijōnawate Hyogo: Kobe, Amagasaki
2009-11: 10% 2012-14: 12%	Tokyo: Hachioji, Tachikawa, Musashino, Fuchu, Akishima, Chofu, Machida, Kodaira, Hino, Kokubunji, Kunitachi, Komae Kangawa: Yokohama, Kawasaki Aichi: Nagoya Osaka: Suita, Neyagawa Hyogo: Nishinomiya, Ashiya, Takarazuka
2009-11: 10% 2012-14: 15%	Tokyo: Tama, Inagi, Nishitokyo Kangawa: Kamakura Osaka: Osaka
2009-11: 15% 2012-14: 18%	Tokyo: Chiyoda, Chuo, Minato, Shinjuku, Bunkyo, Taito, Sumida, Koto, Shinagawa, Meguro, Ota, Setagaya, Shibuya, Nakano, Suginami, Toshima, Kita, Arakawa, Itabashi, Nerima, Adachi, Katsushika, Edogawa

Table A2 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.004 [0.003]	0 [0.002]	-0.004 [0.003]	-0.001 [0.002]	-0.010** [0.004]	-0.004 [0.003]	-0.010** [0.004]	-0.007** [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 A2 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	0.001 [0.004]	0.000 [0.003]	0.000 [0.003]	-0.001 [0.003]	0.001 [0.004]	0.001 [0.003]	0.000 [0.003]	-0.001 [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 A2 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.005 [0.003]	-0.005** [0.002]	-0.005 [0.004]	-0.003 [0.003]	-0.004 [0.004]	-0.004 [0.003]	-0.004 [0.005]	-0.001 [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 A3 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	0.001 [0.003]	0.001 [0.002]	0.002 [0.004]	0.000 [0.002]	-0.002 [0.004]	-0.003 [0.003]	0.001 [0.006]	-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	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 A3 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.001 [0.004]	0.002 [0.004]	-0.005 [0.004]	-0.006* [0.003]	-0.001 [0.005]	0.003 [0.004]	-0.004 [0.004]	-0.006 [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 A3 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.007* [0.004]	-0.006** [0.003]	-0.007* [0.004]	-0.004 [0.003]	-0.006 [0.004]	-0.005 [0.003]	-0.007* [0.004]	-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 A4 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.005 [0.003]	-0.004 [0.003]	-0.001 [0.003]	0.000 [0.002]	-0.007** [0.003]	-0.005* [0.003]	-0.004 [0.004]	-0.002 [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 A4 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.003 [0.004]	-0.002 [0.003]	-0.001 [0.003]	0.001 [0.002]	-0.002 [0.004]	-0.001 [0.003]	0.000 [0.003]	0.001 [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 A5 Effect of the regional premium of labor cost on employment, daycare establishments jointly operated with services of higher labor cost share

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.007 [0.005]	-0.003 [0.003]	-0.005 [0.004]	0.003 [0.003]	-0.008* [0.005]	-0.005 [0.004]	-0.010** [0.005]	-0.003 [0.005]
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	17,720	17,699	17,720	17,699	17,691	17,670	17,691	17,670
Number of establishments	4,709	4,704	4,709	4,704	4,707	4,702	4,707	4,702

Note: Replication of Table 4A with establishments jointly operated with services of 70% labor cost share (home visit care, Home visit bathing service, and nighttime home-visit care).

Table A6 Effect of the regional premium of labor cost on employment, home-visit care establishments jointly operated with services of lower labor cost share

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.007 [0.005]	-0.010*** [0.003]	-0.004 [0.006]	-0.006 [0.004]	-0.006 [0.005]	-0.009*** [0.003]	-0.004 [0.006]	-0.006 [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	18,401	18,358	18,401	18,358	18,400	18,357	18,400	18,357
Number of establishments	4,806	4,795	4,806	4,795	4,806	4,795	4,806	4,795

Note: Replication of Table 4B with establishments jointly operated with services of 55% or 45% labor cost share (all services except home visit bathing service, nighttime home-visit care, care manager offices and rental/sales of assistive equipment).

Table A7 Effects of the regional premium of labor cost on earnings, hours of work and hourly wages for workers in other industries

Dependent variable	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	-0.003 [0.002]	-0.001 [0.001]	-0.002 [0.002]	-0.002* [0.001]	0.000 [0.001]	-0.002 [0.003]	0.000 [0.001]	-0.001 [0.001]	0.000 [0.002]
Observations	3,410,851	2,377,655	961,843	3,407,452	2,374,257	961,843	3,407,452	2,374,257	961,843
R-squared	0.358	0.349	0.158	0.163	0.055	0.102	0.358	0.328	0.132

Note: Sample is limited to workers *not* 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, 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 A8 Effects of the regional premium of labor cost on bonus for workers in other industries

Y	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	0.003 [0.004]	0.002 [0.004]	-0.018 [0.013]	-0.001 [0.001]	-0.001 [0.001]	-0.001 [0.002]
Observations	1,796,499	1,612,475	183,531	2,869,630	1,992,647	817,483
R-squared	0.212	0.152	0.082	0.154	0.050	0.103

Note: same as Table A7.

Table A9 Lagged effects of the regional premium of labor cost on bonus for workers in other industries

Y	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.007 [0.005]	0.006 [0.004]	-0.017 [0.016]	-0.002 [0.001]	-0.001 [0.002]	-0.004** [0.002]
Observations	1,447,557	1,298,514	148,749	2,323,073	1,608,713	669,372
R-squared	0.214	0.151	0.086	0.157	0.052	0.102

Note: same as Table A7.

Table A10(1) Replication of Table 4 using data from Kanto area only

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.005 [0.004]	0.001 [0.003]	-0.005 [0.004]	0.002 [0.003]	-0.006 [0.005]	0.001 [0.004]	-0.007 [0.005]	0.001 [0.005]
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	43,392	43,284	43,392	43,284	43,287	43,179	43,287	43,179

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.005 [0.008]	-0.004 [0.004]	-0.002 [0.006]	-0.003 [0.004]	-0.004 [0.008]	-0.003 [0.004]	-0.002 [0.006]	-0.003 [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	37,233	36,973	37,233	36,973	37,231	36,971	37,231	36,971

C. Group home for the elderly with dementia

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.007 [0.005]	-0.009*** [0.003]	-0.005 [0.006]	-0.009* [0.005]	-0.005 [0.005]	-0.006 [0.004]	-0.004 [0.007]	-0.007 [0.005]
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	12,451	12,445	12,451	12,445	12,451	12,445	12,451	12,445

Table A10(2) Replication of Table 4 using data from Tokai area only

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	0.002 [0.009]	0.006 [0.004]	0.004 [0.008]	0.007 [0.005]	-0.007 [0.010]	0.002 [0.007]	-0.004 [0.010]	0.006 [0.008]
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	17,078	17,078	17,078	17,078	17,041	17,041	17,041	17,041

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.011 [0.009]	-0.011* [0.007]	-0.007 [0.009]	-0.014* [0.008]	-0.013 [0.010]	-0.012* [0.007]	-0.008 [0.009]	-0.017** [0.008]
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	11,154	11,141	11,154	11,141	11,154	11,141	11,154	11,141

Table A10(3) Replication of Table 4 using data from Kinki area only

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	-0.005** [0.002]	-0.004*** [0.001]	-0.002 [0.002]	0 [0.002]	-0.009*** [0.003]	-0.007*** [0.002]	-0.006** [0.003]	-0.006*** [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	26,093	26,091	26,093	26,091	26,027	26,025	26,027	26,025

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	0.001 [0.003]	0.000 [0.002]	-0.002 [0.003]	-0.001 [0.002]	0.001 [0.003]	0.001 [0.002]	-0.002 [0.003]	0.000 [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	32,382	32,335	32,382	32,335	32,380	32,333	32,380	32,333

C. Group home for the elderly with dementia

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
regional premiums	0 [0.005]	0.001 [0.002]	0.002 [0.004]	0.005** [0.002]	0 [0.004]	0.001 [0.002]	0 [0.004]	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	6,813	6,804	6,813	6,804	6,812	6,803	6,812	6,803

Table A11(1) Replication of Table 5 using data from Kanto area only

A. Municipality FE

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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	-0.006 [0.005]	-0.007 [0.008]	-0.008 [0.010]	-0.001 [0.004]	0.002 [0.005]
Observations	43,267	42,946	36,448	12,469	12,330
R-squared	0.049	0.039	0.037	0.314	0.276

B. Establishment FE, excluding establishments that moved across municipalities

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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	0.004* [0.002]	0.001 [0.004]	-0.012** [0.006]	-0.005*** [0.002]	-0.001 [0.003]
Observations	43,164	42,841	36,196	12,463	12,324
R-squared	0.033	0.021	0.011	0.018	0.006

Table A11(2) Replication of Table 5 using data from Tokai area only

A. Municipality FE

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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	0.005 [0.009]	-0.001 [0.014]	-0.007 [0.016]	0.007 [0.006]	0.011 [0.007]
Observations	17,027	16,926	10,925	4,834	4,766
R-squared	0.059	0.045	0.044	0.268	0.238

B. Establishment FE, excluding establishments that moved across municipalities

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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	0.010** [0.005]	0.001 [0.008]	-0.003 [0.011]	-0.001 [0.004]	0.004 [0.005]
Observations	17,027	16,926	10,914	4,834	4,766
R-squared	0.044	0.028	0.014	0.022	0.005

Table A11(3) Replication of Table 5 using data from Kinki area only

A. Municipality FE

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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 [0.002]	-0.012** [0.005]	0 [0.007]	0.001 [0.004]	-0.001 [0.004]
Observations	25,977	25,898	31,543	6,836	6,734
R-squared	0.059	0.058	0.038	0.289	0.271

B. Establishment FE, excluding establishments that moved across municipalities

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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 [0.001]	-0.008*** [0.003]	-0.001 [0.004]	0.001 [0.002]	0.002 [0.002]
Observations	25,975	25,896	31,496	6,827	6,725
R-squared	0.04	0.03	0.014	0.036	0.011

Table A12(1) Replication of Table 6 using data from Kanto area only**A. All occupations**

Y	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.011 [0.034]	-0.007 [0.009]	-0.001 [0.048]	-0.005 [0.031]	-0.002 [0.009]	-0.045 [0.049]	0.008 [0.010]	-0.005 [0.013]	0.029** [0.012]
Observations	22,742	13,258	9,055	22,736	13,252	9,055	22,736	13,252	9,055
R-squared	0.192	0.17	0.085	0.202	0.096	0.133	0.128	0.181	0.187

B. Care workers only

Y	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.028 [0.035]	-0.004 [0.011]	0.015 [0.062]	0.012 [0.035]	0.003 [0.011]	-0.028 [0.071]	0.002 [0.012]	-0.007 [0.012]	0.023 [0.018]
Observations	14,445	7,949	6,174	14,443	7,947	6,174	14,443	7,947	6,174
R-squared	0.247	0.211	0.104	0.264	0.124	0.161	0.184	0.237	0.331

Table A12(2) Replication of Table 6 using data from Tokai area only

A. All occupations

Y	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.000 [0.021]	0.017 [0.016]	-0.013 [0.041]	-0.016 [0.016]	-0.005 [0.009]	-0.042 [0.027]	0.015 [0.019]	0.02 [0.022]	0.036 [0.026]
Observations	8,170	5,172	2,808	8,165	5,167	2,808	8,165	5,167	2,808
R-squared	0.176	0.133	0.147	0.181	0.077	0.18	0.102	0.142	0.109

B. Care workers only

Y	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	-0.04 [0.026]	-0.002 [0.010]	-0.04 [0.038]	-0.025 [0.021]	-0.01 [0.011]	-0.004 [0.036]	-0.017 [0.016]	0.004 [0.016]	-0.031 [0.024]
Observations	4,947	3,090	1,748	4,943	3,086	1,748	4,943	3,086	1,748
R-squared	0.232	0.164	0.187	0.239	0.092	0.237	0.124	0.174	0.249

Table A12(3) Replication of Table 6 using data from Kinki area only

A. All occupations

Y Sample	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.006 [0.014]	-0.002 [0.005]	0.011 [0.020]	0.003 [0.011]	-0.002 [0.003]	0.005 [0.020]	0.001 [0.006]	0.001 [0.006]	0.006 [0.007]
Observations	15,391	9,147	5,802	15,386	9,142	5,802	15,386	9,142	5,802
R-squared	0.172	0.132	0.107	0.171	0.095	0.129	0.096	0.144	0.122

B. Care workers only

Y Sample	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0.008 [0.015]	-0.001 [0.006]	0.024 [0.023]	0.008 [0.015]	-0.002 [0.003]	0.024 [0.023]	-0.002 [0.005]	0.002 [0.007]	0.000 [0.007]
Observations	9,685	5,437	3,945	9,682	5,434	3,945	9,682	5,434	3,945
R-squared	0.215	0.168	0.13	0.229	0.128	0.177	0.13	0.176	0.241

Table A13(1) Replication of Table 7 using data from Kanto area only

A. Sum of all services

Y	Log(Expenditures)	Expenditure per unit
Regional premium	0.012*** [0.002]	0.036*** [0.002]
Observations	1,884	1,884

B. By services

Y Service	Log(Expenditures)			Expenditure per unit		
	Home visit	Daycare	Group home	Home visit	Daycare	Group home
Regional premium	0.017*** [0.006]	0.024*** [0.008]	-0.006 [0.013]	0.035*** [0.003]	0.048*** [0.004]	0.041*** [0.002]
Observations	1,877	1,879	1,846	1,877	1,879	1,846

Table A13(2) Replication of Table 7 using data from Tokai area only

A. Sum of all services

Y	Log(Expenditures)	Expenditure per unit
Regional premium	0.017*** [0.004]	0.042*** [0.002]
Observations	666	666

B. By services

Y Service	Log(Expenditures)			Expenditure per unit		
	Home visit	Daycare	Group home	Home visit	Daycare	Group home
Regional premium	0.032*** [0.007]	0.027** [0.013]	0.013 [0.016]	0.042*** [0.003]	0.062*** [0.002]	0.042*** [0.001]
Observations	666	666	661	666	666	661

Table A13(3) Replication of Table 7 using data from Kinki area only

A. Sum of all services

Y	Log(Expenditures)	Expenditure per unit
Regional premium	0.004* [0.003]	0.039*** [0.007]
Observations	1,176	1,176

B. By services

Y Service	Log(Expenditures)			Expenditure per unit		
	Home visit	Daycare	Group home	Home visit	Daycare	Group home
Regional premium	0.007 [0.007]	0.009 [0.007]	-0.01 [0.016]	0.045*** [0.007]	0.056*** [0.005]	-0.011 [0.055]
Observations	1,176	1,176	1,134	1,176	1,176	1,133

Table A14(1) Replication of Table 8 using data from Kanto area only**A. All occupations**

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	0.068 [0.080]	-0.032 [0.059]	0.052 [0.148]	0.002 [0.022]	-0.016 [0.017]	0.016 [0.034]
Observations	12,342	9,239	3,092	19,799	11,651	7,816
R-squared	0.25	0.176	0.355	0.177	0.138	0.274

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	0.101 [0.074]	-0.001 [0.057]	0.059 [0.154]	-0.004 [0.024]	-0.031 [0.019]	0.026 [0.039]
Observations	7,656	5,509	2,141	12,610	7,001	5,380
R-squared	0.307	0.204	0.415	0.226	0.157	0.335

Table A14(2) Replication of Table 8 using data from Tokai area only

A. All occupations

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	0.157** [0.071]	0.042 [0.039]	0.183 [0.120]	-0.041 [0.028]	-0.026 [0.016]	-0.001 [0.044]
Observations	4,888	3,718	1,166	7,180	4,566	2,451
R-squared	0.234	0.161	0.32	0.121	0.112	0.258

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	0.151* [0.086]	0.041 [0.039]	0.094 [0.101]	-0.027 [0.026]	-0.021 [0.017]	0.033 [0.048]
Observations	2,943	2,210	733	4,389	2,761	1,538
R-squared	0.267	0.18	0.386	0.142	0.111	0.325

Table A14(3) Replication of Table 8 using data from Kinki area only**A. All occupations**

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	-0.041 [0.037]	0.043 [0.032]	-0.052 [0.052]	0.021* [0.011]	0.027*** [0.010]	0.015 [0.023]
Observations	8,931	6,603	2,299	13,668	8,089	5,200
R-squared	0.191	0.124	0.266	0.122	0.109	0.211

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium	-0.097** [0.047]	0.04 [0.035]	-0.130** [0.058]	0.026** [0.013]	0.033*** [0.011]	0.035 [0.021]
Observations	5,417	3,881	1,517	8,607	4,825	3,528
R-squared	0.242	0.145	0.302	0.158	0.129	0.291

Table A15(1) Replication of Table 9 using data from Kanto area only**A. All occupations**

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.274*** [0.099]	0.158* [0.082]	0.433*** [0.111]	0 [0.023]	0.008 [0.023]	-0.033 [0.039]
Observations	9,192	6,853	2,331	14,779	8,675	5,862
R-squared	0.275	0.206	0.401	0.195	0.159	0.311

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.325*** [0.088]	0.236*** [0.077]	0.495*** [0.100]	-0.018 [0.027]	-0.002 [0.026]	-0.033 [0.036]
Observations	5,712	4,092	1,615	9,367	5,210	3,993
R-squared	0.324	0.244	0.438	0.249	0.182	0.372

Table A15(2) Replication of Table 9 using data from Tokai area only**A. All occupations**

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.07 [0.070]	-0.126* [0.071]	0.278** [0.111]	-0.023 [0.042]	-0.009 [0.029]	-0.014 [0.054]
Observations	3,488	2,628	860	5,183	3,253	1,832
R-squared	0.224	0.156	0.364	0.128	0.12	0.302

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.11 [0.086]	-0.087* [0.051]	0.254*** [0.068]	-0.035 [0.031]	-0.013 [0.024]	-0.01 [0.053]
Observations	2,139	1,586	553	3,238	2,002	1,181
R-squared	0.25	0.187	0.436	0.15	0.119	0.347

Table A15(3) Replication of Table 9 using data from Kinki area only

A. All occupations

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.087* [0.045]	0.079*** [0.026]	0.137** [0.059]	-0.007 [0.015]	0.025* [0.013]	-0.044** [0.019]
Observations	7,163	5,284	1,869	10,881	6,509	4,059
R-squared	0.197	0.142	0.271	0.124	0.115	0.218

B. Care workers only

Y Sample	log(bonus), excluding 0			Y=1 if bonus>0		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)
Regional premium in the previous year	0.051 [0.050]	0.059* [0.035]	0.111 [0.072]	-0.018 [0.016]	0.015 [0.018]	-0.047** [0.019]
Observations	4,352	3,103	1,241	6,797	3,874	2,716
R-squared	0.243	0.154	0.289	0.16	0.139	0.289

Table A16 Lagged effect of the regional premium of labor cost on employment

A. Daycare service

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regional premiums	-0.003	-0.001	-0.001	0	-0.006***	-0.002	-0.004	-0.002
In the previous year	[0.002]	[0.001]	[0.002]	[0.001]	[0.002]	[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	76,140	76,038	76,140	76,038	76,017	75,915	76,017	75,915
Number of establishments	20,847	20,827	20,847	20,827	20,836	20,816	20,836	20,816

Note: same as Table 4.

Table A16 Lagged effect of the regional premium of labor cost on employment

B. Home-visit care

Y	log(all employees)		log(fulltime equivalent of all employees)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regional premiums	-0.001	-0.005*	-0.002	-0.004	-0.001	-0.005	-0.002	-0.004
In the previous year	[0.003]	[0.003]	[0.003]	[0.002]	[0.003]	[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	68,072	67,820	68,072	67,820	68,070	67,818	68,070	67,818
Number of establishments	18,508	18,458	18,508	18,458	18,508	18,458	18,508 ^v	18,458

Note: same as Table 4.

Table A16 Lagged 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)		log(certified care workers)		log(fulltime equivalent of certified care workers)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regional premiums	-0.006*	-0.006**	-0.005	-0.005*	-0.003	-0.003	-0.004	-0.003
In the previous year	[0.003]	[0.002]	[0.004]	[0.003]	[0.003]	[0.002]	[0.004]	[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	21,839	21,827	21,839	21,827	21,835	21,823	21,835	21,823
Number of establishments	5,149	5,147	5,149	5,147	5,149	5,147	5,149	5,147

Note: same as Table 4.

Table A17 Lagged effect of the regional premium of labor cost on capacity and utilization

A. Municipality FE

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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	-0.001	-0.005	0.005	-0.002	-0.001
Premiums t-1	[0.003]	[0.004]	[0.005]	[0.003]	[0.003]
Observations	75,962	75,795	66,944	21,885	21,647
R-squared	0.056	0.048	0.045	0.308	0.285

B. Establishment FE, excluding establishments that moved across municipalities

Service Y	Daycare service		Home-visit care	Group home for the elderly with dementia	
	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	-0.001	-0.004	-0.002	-0.002	-0.002
Premiums t-1	[0.001]	[0.002]	[0.003]	[0.002]	[0.002]
Observations	75,865	75,694	66,696	21,873	21,635
R-squared	0.024	0.004	0.003	0.015	0.002

Note: same as Table 5.

Table A18 Lagged effects of the regional premium of labor cost on earnings, hours of work and hourly wages

A. All occupations

Y Sample	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	0	0.003	0.017	-0.002	0.003	0.004	0.001	0	0.013*
In the previous year	[0.009]	[0.004]	[0.015]	[0.008]	[0.002]	[0.018]	[0.004]	[0.004]	[0.006]
Observations	51,955	31,122	19,861	51,928	31,095	19,861	51,928	31,095	19,861
R-squared	0.171	0.143	0.089	0.175	0.083	0.125	0.105	0.153	0.144

B. Care workers only

Y Sample	log(earnings)			log(hours)			log(hourly wages)		
	All workers (1)	Full-time (2)	Part-time (3)	All workers (4)	Full-time (5)	Part-time (6)	All workers (7)	Full-time (8)	Part-time (9)
Regional premium	-0.009	-0.003	0.014	-0.007	0.001	0.013	-0.004	-0.004	0.000
In the previous year	[0.012]	[0.005]	[0.019]	[0.011]	[0.003]	[0.023]	[0.004]	[0.005]	[0.008]
Observations	32,666	18,717	13,320	32,646	18,697	13,320	32,646	18,697	13,320
R-squared	0.217	0.173	0.105	0.23	0.11	0.155	0.144	0.199	0.261

Note: same as Table 6

Table A19 Lagged effect of regional premium on expenditure from LTCI

A. Sum of all services

Y	Log(Expenditures)	Expenditure per unit
Regional premium	0.010***	0.028***
In the previous year	[0.002]	[0.002]
Observations	3,726	3,726

B. By services

Y Service	Log(Expenditures)			Expenditure per unit		
	Home visit	Daycare	Group home	Home visit	Daycare	Group home
Regional premium	0.014***	0.019***	-0.001	0.030***	0.041***	0.015
In the previous year	[0.005]	[0.006]	[0.008]	[0.002]	[0.003]	[0.018]
Observations	3,718	3,718	3,640	3,718	3,718	3,640

Note: same as Table 7.