

# Spillover Effect of Japanese Long-Term Care Insurance as an Employment Promotion Policy for Family Caregivers <sup>1</sup>

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# Highlights

## We confirm:

- The *positive effect* of the *LTCL introduction* on the *labor force participation* of family caregivers

## We find:

- The *negative effect* of the *LTCL amendment* on the *labor force participation* of family caregivers

# Outlines

## Highlights

- I. Background
- II. Literature Review
- III. Data and Measurements
- IV. Empirical Strategies
- V. Results
- VI. Conclusions and Policy Implications

# I. Background: super-aged Japan

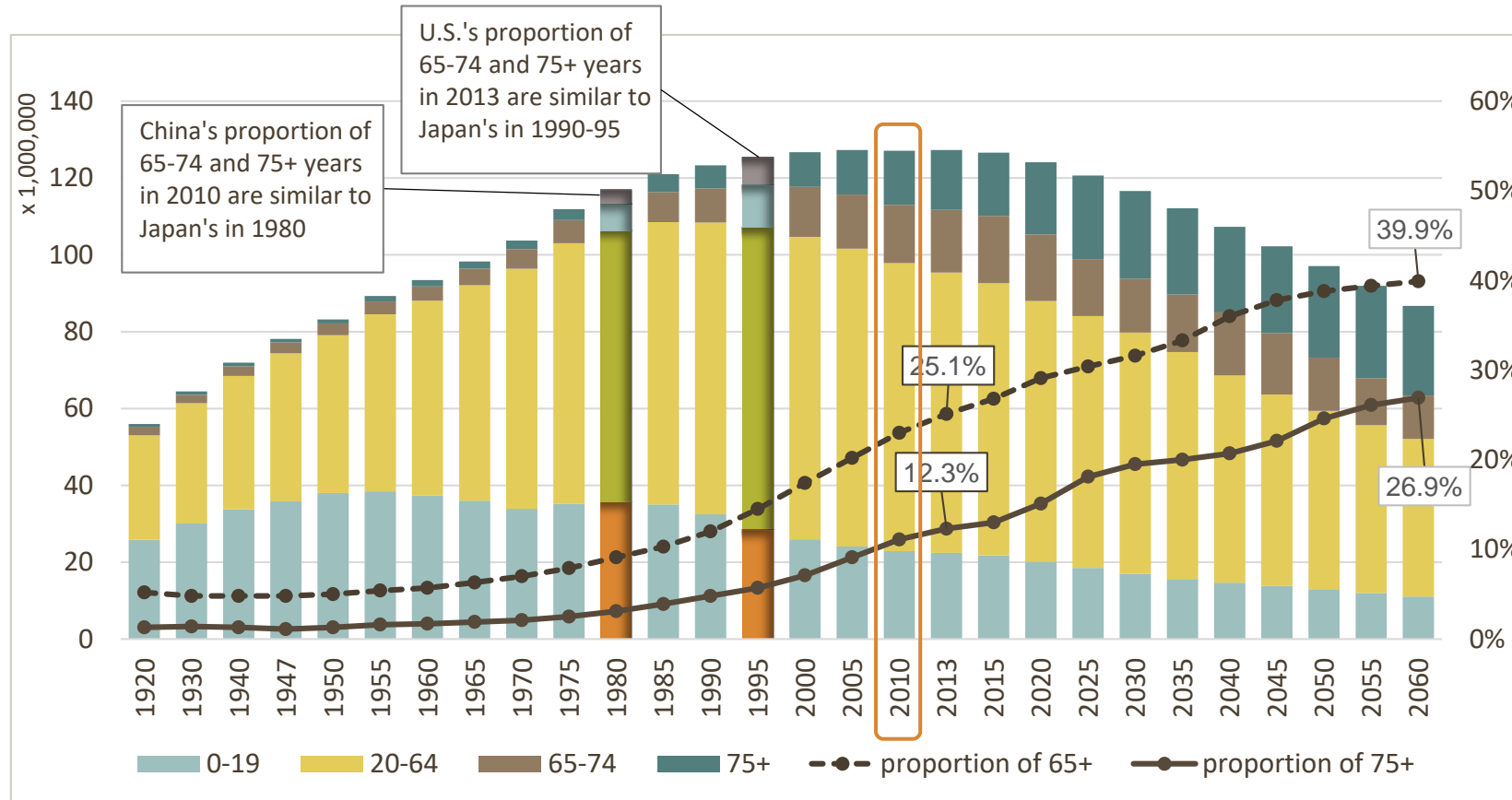


Figure 1. Trend in Population Structure and Proportion of Elderly in Japan: 1920-2060

Data source: National Institute of Population and Social Security Research (NIPSS), Population Statistics 2015, <http://www.ipss.go.jp/syoushika/tohkei/Popular/Popular2015.asp?chap=2>; National Bureau of Statistics of China, 2010 Population Census, <http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/indexch.htm>; United States Census Bureau, Current Population Survey 2012, <http://www.census.gov/population/age/data/2012.html>.

# I. Background: urgent issues

## Super-aged Society → Demand on Health and Long-term Care (LTC)

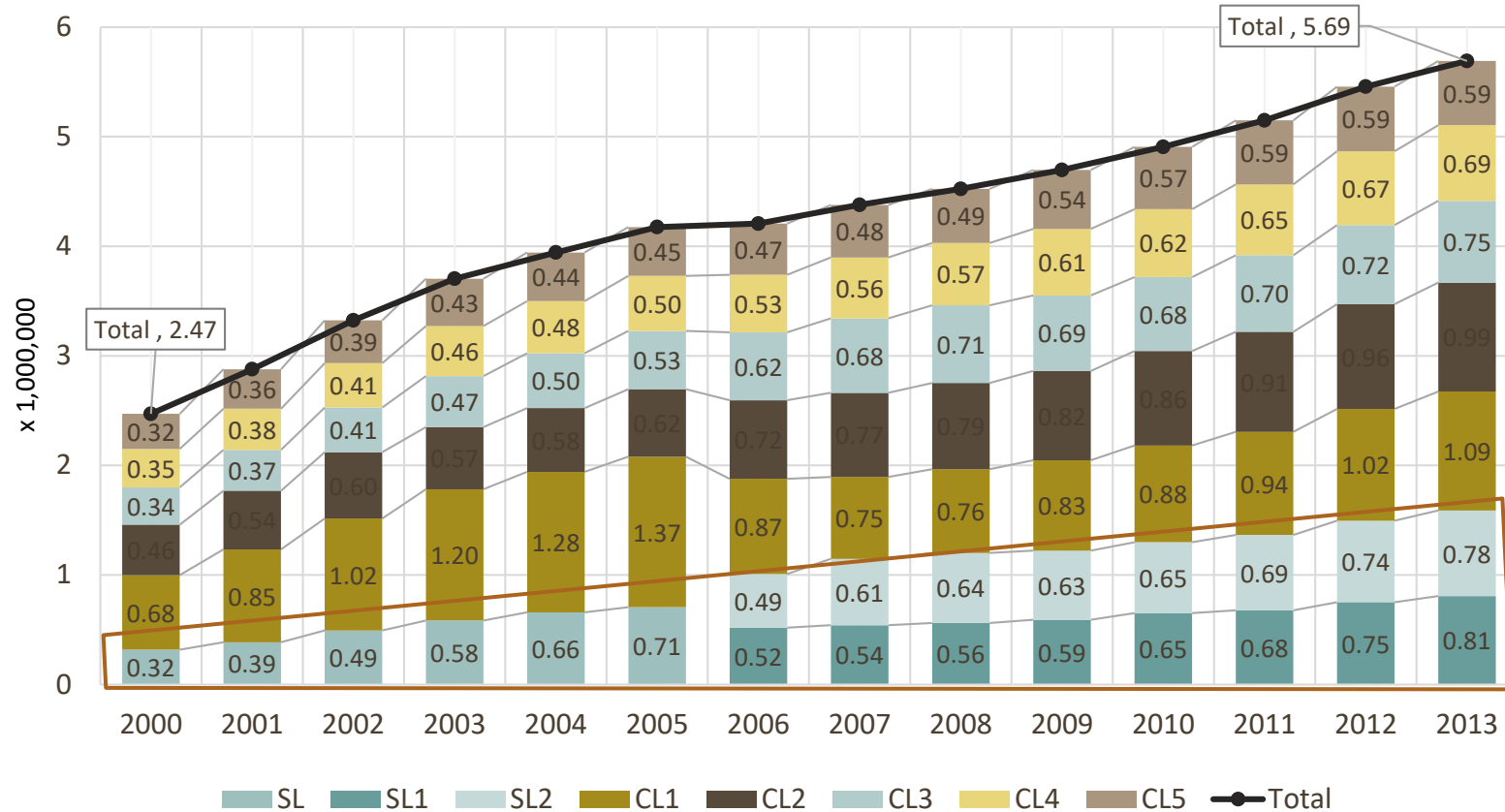
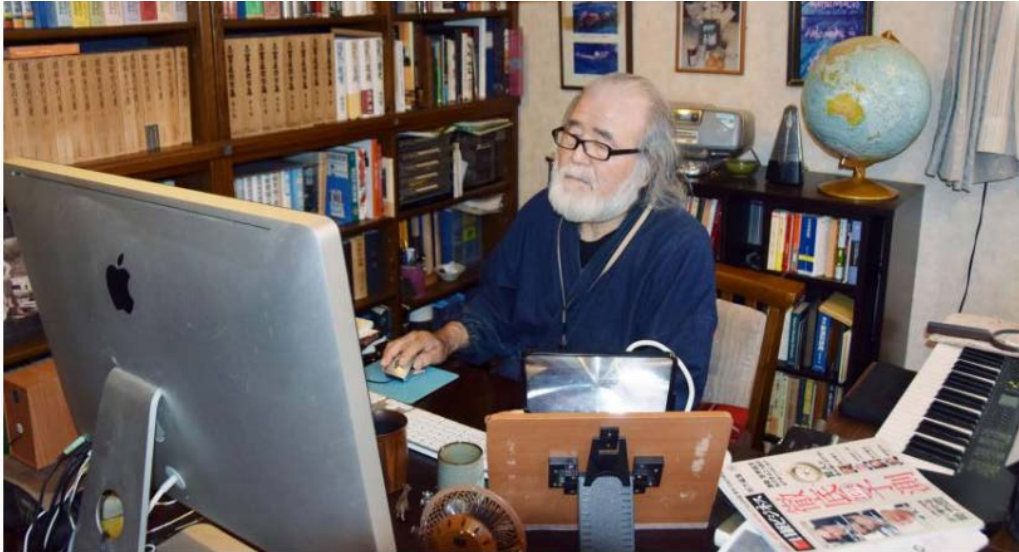


Figure 2. Trend in the Number of Care Recipients 65+ Requiring Support and Care in Japan: 2000-13  
 Data source: Ministry of Health, Labour and Welfare, Annual Report on the status of Long-Term Care Insurance, <http://www.e-stat.g.jp/SG1/estat/NewList.do?tid=000001031648>.  
 Note 1: SL, support level; SL1-2, support level 1-2; CL1-5, care level 1-5.  
 Note 2: Definition of SL(SL1-2) and CL1-5 were changed in 2006 by a reformation of LTCI.

# I. Background: urgent issues

## Super-aged Society → Labor Shortage



Yasuharu Shimamura works at his home in Okegawa, Saitama Prefecture, on May 16. | KYODO

NATIONAL

### Japan's retirees heading back to work as firms face labor shortages

BY MAYUKO MATSUMOTO

KYODO

Some companies are bringing retirees back into the office to pass on know-how gained through decades on the job.

Such workers can offer valuable insights and placement agencies are increasingly accommodating them as Japan faces a looming labor shortage.

Sakae Kajita, 67, retired two years ago after a career with an electronic parts

Source: Japan Times. <http://www.japantimes.co.jp/news/2016/06/21/national/japans-retirees-heading-back-work-firms-face-labor-shortages/>

JUN 21, 2016

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## Corporate Japan struggles to promote women workers

Abe womenomics policy sets sights on cultural change but progress is slow



With the plan: female Japanese construction workers © Getty



JANUARY 12, 2016 by: Leo Lewis and Yukio Ishizuka

For those hoping to [empower Japan's women](#) and unleash the economic might of the country's "silent asset", the term *kensetsu komachi* offers hope. It literally means "construction — young women" and relates to a generation of females working in Japan's chauvinistic building industry.

Source: Financial Times. <https://www.ft.com/content/45fc28da-78d8-11e5-a95a-27d368e1ddf7>

# I. Background: Long-term Care Insurance (LTCI) in Japan

- In response to the demand on LTC, *public long-term care insurance (LTCI)* was launched in 2000 in Japan ([Campbell and Ikegami, 2000](#)).
- The LTCI is a *mandatory* insurance for people aged 65 and older (65+) with universal coverage.
- Its main object is to “*socialize*” responsibility of LTC of old persons:
  1. eligible old persons would receive *formal care* from suppliers in the LTC market
  2. be *financially* supported by the government to pay for the fees

# I. Background: Long-term Care Insurance (LTCI) in Japan

- As formal and informal care are partial substitutes ([Stabile et al., 2006](#)), the LTCI is expected to mitigate unpaid family caregivers' burden by outsourcing their duties to the society.
- *Released from long hours of commitment for caregiving, economically active caregivers may opt to increase their labor force participation (LFP), both extensively and intensively.*
- We aim to demonstrate this positive spillover effect of LTCI on caregivers' LFP to shed a more comprehensive insight into the importance of the LTCI.



## II. Literature Review: Disadvantages of LFP of caregivers

- **Inconclusive findings in western countries,**
  - ✓ [Pavalko and Artis \(1997\)](#) and [Lilly et al. \(2010\)](#) find that caregivers in the US and Canada are at **lower LFP**.
  - ✓ [Carmichael and Charles \(2003\)](#) find that providing care more than ten hours per week results in **lower LFP** in UK, regardless of gender.
  - × [Dentinger and Clarkberg \(2002\)](#) find that US male caregivers **postpone their retirement** than non-caregiving men.
  - × [McGarry \(2006\)](#) argues that US female caregivers **cut back on leisure time** for care.
- **Findings in Japan** continuously show **negative impact** of caregiving on LFP ([Fukahori et al., 2105](#); [Iwamoto, 2001](#); [Sugawara and Nakamura, 2014](#); [Yamada and Shimizutani, 2015](#)).

## II. Literature Review: Effect of the LTCI on LFP in Japan

- Inconclusive findings ,

- ✓ [Tamiya et al. \(2011\)](#) show *a higher LFP* of caregivers with high household income *after introduction of the LTCI* in 2000
- ✓ [Sugawara and Nakamura \(2014\)](#) find *improved LFP* of female caregivers as well
- × [Fukahori et al. \(2015\)](#) and [Sakai and Sato \(2007\)](#) find *no significant evidence* for the positive spillover effect of LTCI on LFP improvement

## II. Literature Review: Room left for us

### 1. The literature measures LFP among caregivers aged 16 to 64 years,

- Under the current demographic changes in Japan, it overlooks an increasing extent to which old persons participate into labor force.
- As over half of the caregivers in Japan are 65+ ([MHLW, 2013](#)), investigations of LFP among caregivers aged 65+ bring concrete evidences for family and labor policy making in the case of super-aged society.
- *We extend the upper age limit of LFP among Japanese caregivers to 69 years.*

## II. Literature Review: Room left for us

### 2. Potential endogeneity between LFP and caregiving activity is often overlooked,

- People have weaker/stronger attachment to labor force are more/less likely to self-select into the caregiving ([Carmichael et al., 2008](#); [Henz, 2004](#); [Mutschler, 1994](#)).
- As many of the studies focus exclusively on caregivers and utilize cross-sectional data, it is difficult to adjust for the endogeneity and the results may be inaccurate ([Heitmueller, 2007](#); [Fukahori et al., 2015](#)).
- *We apply a difference-in-difference propensity score matching (DID-PSM) approach ([Heckman et al., 1997](#)) to control observable demographic and socio-economic differences between caregivers and non-caregivers.*

## II. Literature Review: Room left for us

### 3. Literature in Japan exclusively focuses on female caregivers,

- Men's caregiving is not a rarity in Japan.
- According to the [MHLW \(2013\)](#), the rate of male caregivers was 31.3% in 2013, which is found to associate with raising unemployment rate among male workers ([Takahashi, 2015](#)).
- *In this study, LFP of male caregivers is concerned as well as that of female caregivers, and we especially focus on the gender differences in caregivers' LFP to provide evidences for relative policies.*

## II. Literature Review: Room left for us

### 4. **None of the literature shows a potential negative spillover effect of the LTCI amendment in 2006,**

- The LTCI operated as a pay-as-you-go program, the increasing demand for LTC left great fiscal difficulty with the government.
- During its first five years, the expenditure on LTCI soared from 3.6 to 6.4 trillion yen, much faster than expected.
- To contain the cost, the Japanese government amended the LTCI in April 2006. A new series of preventive long-term care (PLTC) services were constructed for recipients with mild care needs.
- For recipients utilized PLTC services, the caregiving burden that has been transferred to social sectors came back to households.
- *We further examine this impact to assess the overall spillover effects of the LTCI.*

## II. Literature Review: special column of the 2006 LTCI amendment

- Initially, care recipients were categorized into six groups,
  1. The mildest support required level: **SL**
  2. More assistance in terms of IADL compared to SL: **CL1**
  - .....
  5. The most severe care level 5: **CL5**
- *The amendment targeted recipients in SL and CL1.*

## II. Literature Review: special column of the 2006 LTCI amendment

- Stable structure from April/2005 to March/2006
- Most of SL in March/2006 were shift to Temporary SL (TSL) in April/2006
- Re-categorization from TSL to SL1/2 was rapidly conducted
- TSL almost disappeared in April/2007
- Most of TSL(SL) recipients were re-categorized into SL1
- Many of CL1 recipients were re-categorized into SL2

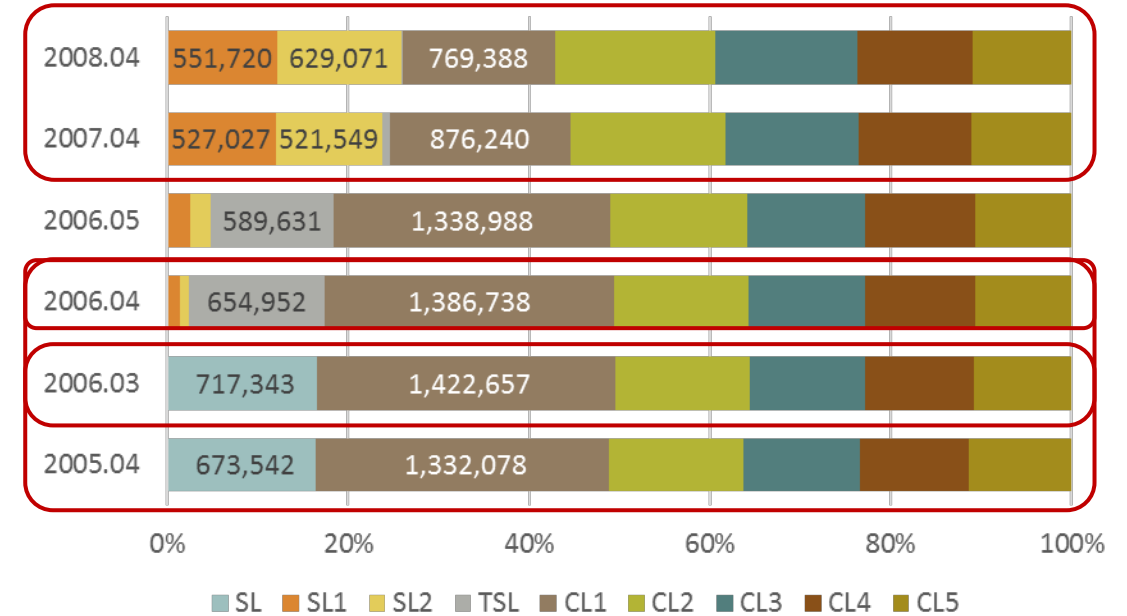


Figure 1. Trends in Proportions of Care Level during LTCI Amendment  
 Note: SL is the abbreviation for support required level, TSL for temporary support required, SL1-2 for support required level 1-2, and CL1-5 for care level 1-5.  
 Data Source: Monthly report of Fact-finding Survey on Project of Long-term Care  
<http://www.mhlw.go.jp/topics/0103/tp0329-1.html#itiran>



## II. Literature Review: special column of 2006 amendment

- The PLTC aimed to *prevent SL1(2) recipients from deteriorating*.
- Compared to the LTC, PLTC covers *limited types* of services.
- The monthly *upper limit of allowance* payment for PLTC recipients was *reduced*

Table 1. Upper limits of allowance for (P)LTC services before and after 2006 amendment

| Care Level | Service | Upper Limits <sup>1</sup> (2001) |                | 2006 | Care Level | Service | Upper Limits <sup>1</sup> (2014) |                |
|------------|---------|----------------------------------|----------------|------|------------|---------|----------------------------------|----------------|
|            |         | point                            | % <sup>2</sup> |      |            |         | point                            | % <sup>2</sup> |
| SL         | LTC     | 6,150                            | 17.2           | →    | SL1        | PLTC    | 5,003                            | 13.9           |
|            |         |                                  |                | →    | SL2        | PLTC    | 10,473                           | 29.0           |
| CL1        | LTC     | 16,580                           | 46.3           | →    | CL1        | LTC     | 16,692                           | 46.3           |
| CL2        | LTC     | 19,480                           | 54.4           | →    | CL2        | LTC     | 19,616                           | 54.4           |
| CL3        |         | 26,750                           | 74.7           | →    | CL3        |         | 26,931                           | 74.7           |
| CL4        |         | 30,600                           | 85.4           | →    | CL4        |         | 30,806                           | 85.4           |
| CL5        |         | 35,830                           | 100.0          | →    | CL5        |         | 36,065                           | 100.0          |

<sup>1</sup> The upper limits for (P)LTC care utilization, in terms of medical fee point. Generally, one point corresponds to around 10 yen, and this unit price varies among regions and services. For instance, one point corresponds to 10-11.4 yen in Tokyo, but to 10-10.21 in Hokkaido.

<sup>2</sup> The percentages are derived in terms of the points for CL5, respectively.

# III. Empirical Strategies

- **DID-PSM Approach,**

1. **LTCI Introduction in 2000**

- **Treatment group ( $D_{2000} = 1$ ):** respondents aged 30 years and older (30+) who are main caregivers for co-residential care-needing elderly person(s) aged 65+
- **Control group ( $D_{2000} = 0$ ):** respondents aged 30+ who are not caregivers but co-resident with elderly person(s) aged 65+
- **Outcome (LFP):**
  - ① *Find*: a transition in work status from being non-working in the previous year to be working currently
  - ② *Lose*: a probability of working respondents losing jobs.

# III. Empirical Strategies

- DID-PSM Approach,

1. LTCI Introduction in 2000

- A **real change** in outcome  $E(Y_{t+s}^1 - Y_t^0 | D_{2000} = 1)$  v.s. a **counterfactual change**  $E(Y_{t+s}^0 - Y_t^0 | D_{2000} = 1)$
- The counterfactual change, in turn, is an actual change for control group:  $E(Y_{t+s}^0 - Y_t^0 | D_{2000} = 0)$
- **The common trend assumption:**  $E(Y_{t+s}^0 - Y_t^0 | D_{2000} = 1) = E(Y_{t+s}^0 - Y_t^0 | D_{2000} = 0)$ 
  - Ideally, control group shall be *caregivers* randomly or naturally extracted to be in the absence of LTCI.
  - Unfortunately, it is impossible to do so as the LTCI is a universal coverage program in Japan.
  - Extracting the control group (i.e. non-caregivers) to match the treatment group (i.e. caregivers) basing on their similarity in terms of **propensity scores**.

# III. Empirical Strategies

- **DID-PSM Approach,**

1. **LTCI Introduction in 2000**

- $DID - PSM = \frac{1}{N_{D_1}} \sum_{i \in D_1 \cap C} [(Y_{i,t+s}^1 - Y_{i,t}^0) - \sum_{j \in D_0 \cap C} w_{ij} (Y_{j,t+s}^0 - Y_{j,t}^0)], \quad (1)$

- $D_1$  denotes caregivers ( $D_{2000} = 1$ ),
- $D_0$  non-caregivers ( $D_{2000} = 0$ ),
- $C$  the area of common support,
- $w_{ij}$  the matching weight.

# III. Empirical Strategies

- DID-PSM Approach,

- 2. LTCI Amendment in 2006

- *Same method to assessment of LTCI introduction in 2000*

- **treatment group ( $D_{2006} = 1$ ):** caregivers 30+ taking care of recipient(s) 65+ re-categorized to be SL before 2006, and SL1 after 2006

- **control group ( $D_{2006} = 0$ ):** caregivers of CL2-CL5

- **Outcome (LFP):**

- ① *Work*: takes unity for respondents currently working and zero otherwise.

## IV. Data

- **The Comprehensive Survey of Living Conditions (CSLC)**
  - Nationally representative *repeated cross-sectional survey* of the non-institutionalized population in Japan, conducted *once every three years* from 1986 by the Ministry of Health, Labour and Welfare (MHLW).
- **Household, Health, Income/saving, Long-term Care Questionnaire**
  - The household and health questionnaires cover *full* respondents
    - *Around 0.6-0.8 million people* from approximately 0.3 million households in each survey year
  - The income/saving and long-term care questionnaires *complementarily* cover *a part of* the full respondents
    - The income/saving questionnaire covers *0.1 million respondents*
    - The long-term care questionnaire covers *6-7 thousand respondents*

# V. Results: Covariates Balancing Test

Table 2. Covariates balancing by gender for 2000 introduction: mean differences before and after matching

|                            | PSM<br>Status <sup>1</sup> | Find           |                |                   |                |                |                   | Lose           |                |                   |                |                |                   |
|----------------------------|----------------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|
|                            |                            | Male           |                |                   | Female         |                |                   | Male           |                |                   | Female         |                |                   |
|                            |                            | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> |
| Age                        | U                          | 54.52          | 54.86          |                   | 55.05          | 57.19          | ***               | 54.52          | 54.86          |                   | 55.05          | 57.19          | ***               |
|                            | M                          | 59.12          | 58.96          |                   | 56.56          | 56.25          |                   | 53.06          | 51.98          |                   | 52.18          | 51.16          |                   |
| Age squared                | U                          | 3063.4         | 3200.3         |                   | 3117.6         | 3434.7         | ***               | 3063.4         | 3200.3         |                   | 3117.6         | 3434.7         | ***               |
|                            | M                          | 3583.8         | 3594.6         |                   | 3290.1         | 3265.3         |                   | 2899.9         | 2825.6         |                   | 2789.5         | 2692.2         | *                 |
| Married                    | U                          | 0.69           | 0.84           | ***               | 0.87           | 0.82           | ***               | 0.69           | 0.84           | ***               | 0.87           | 0.82           | ***               |
|                            | M                          | 0.60           | 0.61           |                   | 0.90           | 0.89           |                   | 0.73           | 0.71           |                   | 0.81           | 0.77           |                   |
| House ownership            | U                          | 0.87           | 0.92           | ***               | 0.93           | 0.91           | **                | 0.87           | 0.92           | ***               | 0.93           | 0.91           | **                |
|                            | M                          | 0.81           | 0.83           |                   | 0.92           | 0.92           |                   | 0.89           | 0.89           |                   | 0.93           | 0.93           |                   |
| Three generation Household | U                          | 0.41           | 0.43           |                   | 0.56           | 0.45           | ***               | 0.41           | 0.43           |                   | 0.56           | 0.45           | ***               |
|                            | M                          | 0.23           | 0.24           |                   | 0.55           | 0.59           |                   | 0.47           | 0.48           |                   | 0.59           | 0.62           |                   |
| Number of household member | U                          | 3.81           | 4.15           | ***               | 4.38           | 4.10           | ***               | 3.81           | 4.15           | ***               | 4.38           | 4.10           | ***               |
|                            | M                          | 3.26           | 3.42           |                   | 4.40           | 4.49           |                   | 4.02           | 4.12           |                   | 4.34           | 4.41           |                   |
| Saving level               | U                          | 6.39           | 6.75           | *                 | 6.83           | 6.80           | *                 | 6.39           | 6.75           | *                 | 6.83           | 6.80           | *                 |
|                            | M                          | 6.23           | 6.07           |                   | 6.71           | 6.67           |                   | 6.41           | 6.41           |                   | 7.07           | 6.99           |                   |

<sup>1</sup> "U"=unmatched; "M"=matched

<sup>2</sup> "T"=treated, i.e. caregivers; "C"=control, i.e. non-caregivers

<sup>3</sup> Inference: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

# V. Results: Covariates Balancing Test

Table 3. Covariates balancing by age for 2000 introduction: mean differences before and after matching

|                            | PSM<br>Status <sup>1</sup> | Find           |                |                   |                |                |                   |                |                |                   | Lose           |                |                   |                |                |                   |                |                |                   |
|----------------------------|----------------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|
|                            |                            | 30-49          |                |                   | 50-64          |                |                   | 65-69          |                |                   | 30-49          |                |                   | 50-64          |                |                   | 65-69          |                |                   |
|                            |                            | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> |
| Male                       | U                          | 0.14           | 0.54           | ***               | 0.12           | 0.15           | ***               | 0.14           | 0.48           | ***               | 0.14           | 0.54           | ***               | 0.12           | 0.15           | ***               | 0.14           | 0.48           | ***               |
|                            | M                          | 0.13           | 0.15           | *                 | 0.10           | 0.10           |                   | 0.16           | 0.22           | *                 | 0.24           | 0.28           | *                 | 0.23           | 0.23           |                   | 0.38           | 0.42           | *                 |
| Married                    | U                          | 0.83           | 0.74           | ***               | 0.83           | 0.97           | ***               | 0.89           | 0.84           | ***               | 0.83           | 0.74           | ***               | 0.83           | 0.97           | ***               | 0.89           | 0.84           | ***               |
|                            | M                          | 0.89           | 0.86           |                   | 0.89           | 0.90           |                   | 0.90           | 0.88           |                   | 0.78           | 0.76           |                   | 0.79           | 0.80           |                   | 0.89           | 0.89           |                   |
| House ownership            | U                          | 0.91           | 0.94           | ***               | 0.92           | 0.90           | ***               | 0.92           | 0.90           |                   | 0.91           | 0.94           | ***               | 0.92           | 0.90           | ***               | 0.92           | 0.90           |                   |
|                            | M                          | 0.91           | 0.92           |                   | 0.92           | 0.93           |                   | 0.91           | 0.90           |                   | 0.91           | 0.92           |                   | 0.93           | 0.92           |                   | 0.92           | 0.91           |                   |
| Three generation Household | U                          | 0.74           | 0.69           | ***               | 0.48           | 0.24           | ***               | 0.36           | 0.33           |                   | 0.74           | 0.69           | ***               | 0.48           | 0.24           | ***               | 0.36           | 0.33           |                   |
|                            | M                          | 0.78           | 0.76           |                   | 0.48           | 0.48           |                   | 0.38           | 0.35           |                   | 0.70           | 0.70           |                   | 0.48           | 0.49           |                   | 0.32           | 0.29           |                   |
| Number of household member | U                          | 4.82           | 5.15           | ***               | 4.10           | 3.43           | ***               | 3.98           | 3.59           | ***               | 4.82           | 5.15           | ***               | 4.10           | 3.43           | ***               | 3.98           | 3.59           | ***               |
|                            | M                          | 5.06           | 5.11           |                   | 4.17           | 4.19           |                   | 4.03           | 3.96           |                   | 4.61           | 4.77           |                   | 4.07           | 4.20           |                   | 3.80           | 3.51           |                   |
| Saving level               | U                          | 6.35           | 6.60           | **                | 7.10           | 7.02           |                   | 6.60           | 6.83           |                   | 6.35           | 6.60           | **                | 7.10           | 7.02           |                   | 6.60           | 6.83           |                   |
|                            | M                          | 6.06           | 6.13           |                   | 7.08           | 7.05           |                   | 6.51           | 6.54           |                   | 6.62           | 6.65           |                   | 7.13           | 7.15           |                   | 6.96           | 7.38           |                   |

<sup>1</sup> "U"=unmatched; "M"=matched

<sup>2</sup> "T"=treated, i.e. caregivers; "C"=control, i.e. non-caregivers

<sup>3</sup> Inference: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.



# V. Results: Covariates Balancing Test

Table 4. Covariates balancing by gender and age for 2006 amendment: mean differences before and after matching

|                            | PSM<br>Status <sup>1</sup> | Gender         |                |                   |                |                |                   | Age            |                |                   |                |                |                   |                |                |                   |
|----------------------------|----------------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|
|                            |                            | Male           |                |                   | Female         |                |                   | 30-49          |                |                   | 50-64          |                |                   | 65-69          |                |                   |
|                            |                            | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> | T <sup>2</sup> | C <sup>2</sup> | Test <sup>3</sup> |
| Age                        | U                          | 55.05          | 57.64          | ***               | 55.14          | 56.98          | ***               | -              | -              | -                 | -              | -              | -                 | -              | -              | -                 |
|                            | M                          | 55.09          | 55.17          |                   | 55.15          | 55.56          |                   | -              | -              | -                 | -              | -              | -                 | -              | -              | -                 |
| Age squared                | U                          | 3097.3         | 3399.1         | ***               | 3106.3         | 3316.5         | ***               | -              | -              | -                 | -              | -              | -                 | -              | -              | -                 |
|                            | M                          | 3101.5         | 3110.3         |                   | 3106.8         | 3150.5         |                   | -              | -              | -                 | -              | -              | -                 | -              | -              | -                 |
| Gender                     | U                          | -              | -              | -                 | -              | -              | -                 | 0.21           | 0.18           | **                | 0.23           | 0.17           | ***               | 0.25           | 0.21           | **                |
|                            | M                          | -              | -              | -                 | -              | -              | -                 | 0.21           | 0.20           |                   | 0.23           | 0.18           |                   | 0.25           | 0.24           |                   |
| Married                    | U                          | 0.58           | 0.64           | **                | 0.85           | 0.85           |                   | 0.71           | 0.72           |                   | 0.81           | 0.83           |                   | 0.87           | 0.87           |                   |
|                            | M                          | 0.57           | 0.57           |                   | 0.85           | 0.85           |                   | 0.70           | 0.73           |                   | 0.81           | 0.82           |                   | 0.87           | 0.87           |                   |
| House ownership            | U                          | 0.91           | 0.89           | *                 | 0.97           | 0.94           | ***               | 0.96           | 0.92           | **                | 0.97           | 0.93           | ***               | 0.91           | 0.94           | *                 |
|                            | M                          | 0.91           | 0.91           |                   | 0.97           | 0.98           |                   | 0.96           | 0.96           |                   | 0.97           | 0.97           |                   | 0.91           | 0.92           |                   |
| Three generation Household | U                          | 0.29           | 0.32           | *                 | 0.59           | 0.50           | ***               | 0.66           | 0.64           | *                 | 0.51           | 0.46           | *                 | 0.33           | 0.30           | *                 |
|                            | M                          | 0.29           | 0.30           |                   | 0.59           | 0.56           |                   | 0.66           | 0.67           |                   | 0.51           | 0.50           |                   | 0.33           | 0.32           |                   |
| Number of household member | U                          | 3.20           | 3.40           | *                 | 4.31           | 4.13           | **                | 4.40           | 4.52           | **                | 3.99           | 3.95           |                   | 3.76           | 3.61           |                   |
|                            | M                          | 3.20           | 3.25           |                   | 4.31           | 4.30           |                   | 4.41           | 4.43           |                   | 3.99           | 4.02           |                   | 3.76           | 3.67           |                   |

<sup>1</sup> "U"=unmatched; "M"=matched

<sup>2</sup> "T"=treated, i.e. caregivers of recipients with mild care needs and utilizing PLTC services after the amendment; "C"=control, i.e. caregivers of recipients with intensive care needs and continuously utilizing LTC services after the amendment

<sup>3</sup> Inference: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

# V. Results: LFP after LTCI Introduction

Table 5. Probability of Finding and Losing Jobs by Gender – DID-PSM Estimates Before and After 2000<sup>1</sup>

| Outcome Variables | Gender | Number of Observations | Baseline Before 2000 |         |                    |                      | Follow-up After 2000 |         |                    |                      | DID-PSM            |                      | R-square |       |      |
|-------------------|--------|------------------------|----------------------|---------|--------------------|----------------------|----------------------|---------|--------------------|----------------------|--------------------|----------------------|----------|-------|------|
|                   |        |                        | Control              | Treated | Diff. at Baseline  |                      | Control              | Treated | Diff. at Follow-up |                      | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |          |       |      |
|                   |        |                        |                      |         | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |                      |         | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |                    |                      |          |       |      |
| Find              | Male   | 11,416                 | 1.448                | 1.297   | -0.151             | ***                  | 0.047                | 1.427   | 1.425              | -0.002               | 0.048              | 0.149                | **       | 0.066 | 0.20 |
|                   | Female | 36,257                 | 0.674                | 0.628   | -0.046             | ***                  | 0.012                | 0.704   | 0.677              | -0.027               | **                 | 0.017                | 0.018    | 0.020 | 0.04 |
| Lose              | Male   | 47,028                 | -0.360               | -0.329  | 0.031              |                      | 0.020                | -0.318  | -0.328             | -0.010               | 0.017              | -0.041               |          | 0.027 | 0.11 |
|                   | Female | 28,994                 | -0.244               | -0.200  | 0.044              | ***                  | 0.016                | -0.355  | -0.370             | -0.015               | 0.013              | -0.059               | ***      | 0.021 | 0.10 |

<sup>1</sup> Covariates for PSM are age, age squared, married (or not), owning a house (or not), belonging to a three-generation family (or not), number of household members, and saving levels. Added covariates for further DID are: regularly visiting hospitals (or not), self-rated health status, and survey years.

<sup>2</sup> "Coef." = coefficients. Inference: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

<sup>3</sup> "S. Err." = clustered robust standard error

- Caregivers are less likely by 4.6% to find jobs and more likely by 4.4% to lose their jobs before the LTCI introduction
- Male caregivers are found less likely by considerably 15.1% to find jobs
- The disadvantages of caregivers' LFP appear to be mitigated with introduction of the LTCI
- Non-working male caregivers become more likely by 14.9% to find jobs
- Working female caregivers become less likely by 5.9% to lose their jobs

# V. Results: LFP after LTCI Introduction

Table 6. Probability of Finding and Losing Jobs by Age – DID-PSM Estimates Before and After 2000 <sup>1</sup>

| Outcome Variables | Age   | Number of Observations | Baseline Before 2000 |         |                    |                      |         | Follow-up After 2000 |                    |                      |                    |                      | DID-PSM |     | R-square |      |
|-------------------|-------|------------------------|----------------------|---------|--------------------|----------------------|---------|----------------------|--------------------|----------------------|--------------------|----------------------|---------|-----|----------|------|
|                   |       |                        | Control              | Treated | Diff. at Baseline  |                      | Control | Treated              | Diff. at Follow-up |                      | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |         |     |          |      |
|                   |       |                        |                      |         | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |         |                      | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |                    |                      |         |     |          |      |
| Find              | 30-49 | 13,045                 | 0.358                | 0.232   | -0.126             | ***                  | 0.027   | 0.362                | 0.350              | -0.012               |                    | 0.046                | 0.114   | *** | 0.051    | 0.10 |
|                   | 50-64 | 14,339                 | 1.136                | 1.061   | -0.075             | ***                  | 0.016   | 1.111                | 1.055              | -0.056               | *                  | 0.022                | 0.019   | *   | 0.027    | 0.07 |
|                   | 65-69 | 20,100                 | 0.881                | 0.841   | -0.040             | **                   | 0.019   | 0.898                | 0.914              | 0.016                | *                  | 0.026                | 0.057   | *   | 0.032    | 0.02 |
| Lose              | 30-49 | 36,837                 | 0.162                | 0.254   | 0.091              | ***                  | 0.019   | 0.078                | 0.085              | 0.006                | **                 | 0.013                | -0.085  |     | 0.023    | 0.09 |
|                   | 50-64 | 20,607                 | -0.602               | -0.524  | 0.079              | ***                  | 0.020   | -0.640               | -0.619             | 0.020                |                    | 0.014                | -0.059  | **  | 0.024    | 0.09 |
|                   | 65-69 | 9,840                  | 0.780                | 0.914   | 0.133              | **                   | 0.059   | 0.650                | 0.655              | 0.005                |                    | 0.063                | -0.128  | *   | 0.086    | 0.10 |

<sup>1</sup> Covariates for PSM are gender, married (or not), owning a house (or not), belonging to a three-generation family (or not), number of household members, and saving levels. Added covariates for further DID are: regularly visiting hospitals (or not), self-rated health status, and survey years.

<sup>2</sup> "Coef." = coefficients. Inference: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

<sup>3</sup> "S. Err." = clustered robust standard error

- Significant disadvantages of LFP for caregivers in all groups before LTCI introduction
- The disadvantages got improved after LTCI introduction
- The LTCI stimulates LFP of caregivers regardless of age, with one exception for working caregivers aged 30-49

# V. Results: LFP after LTCI Amendment

Table 7. Probability of Working – DID-PSM Estimates Before and After 2006 <sup>1</sup>

| Outcome Variables | Gender/Age | Number of Observations | Baseline Before 2006 |         |                    |                      | Follow-up After 2006 |         |                    |                      | DID-PSM            |                      | R-square |       |      |
|-------------------|------------|------------------------|----------------------|---------|--------------------|----------------------|----------------------|---------|--------------------|----------------------|--------------------|----------------------|----------|-------|------|
|                   |            |                        | Control              | Treated | Diff. at Baseline  |                      | Control              | Treated | Diff. at Follow-up |                      | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |          |       |      |
|                   |            |                        |                      |         | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |                      |         | Coef. <sup>2</sup> | S. Err. <sup>3</sup> |                    |                      |          |       |      |
| Work              | Male       | 1,898                  | 1.758                | 1.777   | 0.019              | 0.031                | 1.749                | 1.764   | 0.015              | 0.028                | -0.004             | 0.042                | 0.15     |       |      |
|                   | Female     | 5,707                  | 1.361                | 1.453   | 0.092              | ***                  | 0.028                | 1.413   | 1.426              | 0.013                | 0.013              | -0.078               | **       | 0.034 | 0.10 |
|                   | 30-49      | 1,352                  | 0.534                | 0.745   | 0.211              | ***                  | 0.037                | 0.619   | 0.67               | 0.051                | 0.043              | -0.160               | ***      | 0.057 | 0.05 |
|                   | 50-64      | 4,124                  | 1.918                | 2.008   | 0.090              | ***                  | 0.027                | 1.969   | 1.992              | 0.023                | 0.030              | -0.067               | *        | 0.040 | 0.09 |
|                   | 65-69      | 1,379                  | 1.512                | 1.479   | -0.033             |                      | 0.059                | 1.571   | 1.525              | -0.045               | 0.062              | -0.012               |          | 0.077 | 0.03 |

<sup>1</sup> Covariates for PSM by gender: age, age squared, married (or not), owning a house (or not), belonging to a three-generation family (or not), number of household members; added covariates are: regularly visiting hospitals regularly (or not), self-rated health status, bedridden degree of care recipients, and survey years. Covariates for PSM by age: gender, age, age squared, married (or not), owning a house (or not), belonging to a three-generation family (or not), number of household members; added covariates are the same to that for gender specific analysis

<sup>2</sup> "Coef." = coefficients. Inference: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

<sup>3</sup> "S. Err." = clustered robust standard error

- Before the 2006 amendment, treated female caregivers are more likely to work
- Treated caregivers younger than 65 are more likely to work as well
- The advantages vanish completely after the amendment, regardless of gender or age
- Treated female caregivers are less likely by 7.8% to work after the amendment
- Treated caregivers aged 30-49 and 50-64 become less likely by 16% and 6.7% to work

## VI. Discussion and Conclusion

- **We confirm and find that,**

1. **LTCI introduction in 2000**

- Increased LFP for both male and female caregivers; Effective to reduce probability of losing job for all age cohorts

2. **LTCI Amendment in 2006**

- Female Caregivers and Caregivers younger than 65 years to recipients with moderate needs became less likely to work

## VI. Discussion and Conclusion

- **Our findings,**
  1. **Parallel family policy to improve LFP introduced in the same period was not effective,**
    - For instance, *Child Care and Family Care Leave Act* was found ineffective to improve mothers' LFP (Asai et al., 2015).
    - *In the context of super aged society*, LTCI has larger effect on extensive margin of LFP than other family policies
    - *Caregivers to elderly* have *heavier burden* and are *less voluntary* compared to caregivers to children, and thus more sensitive to relative policies
  2. **Consistent to previous results in Japan, but unique from an international perspective,**
    - *Negative effect on LFP* found in *Germany* (Geyer and Korfhage, 2015)
    - *Cash allowance* counteracts incentive for LFP

## VI. Discussion and Conclusion

- Further discussions,

1. Living Arrangement

- Caregivers who intend quit their job, who are less willing to find job may *tend to choose to* live with the elderly who need care
- Living arrangement is *not exogenous*, while we could not identify caregivers live apart from the elderly who need care
- Fukahori, Sakai, and Sato (2015) found *no significant influence from co-residence on work status*

# VI. Discussion and Conclusion

## 2. Gender Difference

- LTCI benefits *not-working male caregivers* and *working female caregivers*, partially thanks to *increasingly flexible work schedules*
- On the other side, neither before nor after 2000, *working male caregivers* show difference in probability of losing jobs compared to non-caregivers; and disadvantages of *non-working female caregivers* to find jobs are not improved after 2000
- Further research required for these cohorts.



## VI. Discussion and Conclusion

- **Who suffers as of 2006?**
  - ***Female caregivers good at homemaking skill***, as provision of housekeeping services which share a great portion in at-home services was strictly restricted (Tokunaga, Hashimoto and Tamiya, 2014).
  - ***Caregivers in households with economic difficulties***, as monthly utilization limitation got more restricted ( a vicious circle)

## VI. Discussion and Conclusion

- **LTCI Cost Containment vs Labor Shortage**

- Skyrocketing cost on LTC may be naturally mitigated, as *absolute* number of Japanese people aged 65 years and older will soon level off.
- *Ratio of LTC cost to GDP*, however, may continuously increase, as the economy may further deflate due to the shrinking labor force.
- *There is no golden rule for the tradeoff, but we argue that the spillover effect of LTCI on LFP will be increasingly important in the context of a super aged society.*

# Q & A

*Thanks !*

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