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Welfare Benefits and Labor Supply: Evidence from a natural experiment in Japan*

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Abstract

We use municipal amalgamations implemented in Japan between 2000 and 2005 as a natural experiment to identify the impact of welfare benefits on labor supply. In Japan's Public Assistance (PA) program, the maximum benefit level for a person with zero income depends on the recipient's residency area. Each municipality is assigned to one of six class-areas, each with different benefit levels. In the case of an amalgamation among municipalities that belong to different class-areas, the highest among them must be applied to the new municipality, as per governmental notification. Exploiting this event, we use a difference-in-differences approach to identify the effect of the increase in PA benefits after the municipal amalgamations on the labor supply. The results show that the increases in PA benefit levels raised the recipient rate, but did not affect the employment rate of the working-age population on average. However, the analysis by demographic group shows that these effects are substantial and strongly significant for prime-age unmarried males and females. The exogenous increase in public assistance benefits in the 2000s decreased the employment rate for those who are likely to receive public assistance benefits by at least one percentage point, and perhaps by as much as two percentage points.

Keywords: Public assistance, Labor supply, Natural experiment, Difference in differences

JEL classification: H53; J22

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I. Introduction

In this study, we use the municipal amalgamations implemented in Japan between 2000 and 2005 as a natural experiment to identify the impact of welfare benefits on labor supply. As in many countries, the maximum benefit level of the Public Assistance program in Japan for a person with zero income depends on the recipient's residency area, as well as on individual attributes such as age and family type. Each municipality is assigned to one of six class-areas, each with different benefit levels. In the case of an amalgamation among municipalities of different class-areas, the highest class-area must be applied to the new municipality, as per governmental notification. While the Japanese government strongly promoted municipal amalgamations in order to reduce the number of municipalities in the early 2000s, the public assistance program itself did not change, and the real guaranteed amount of public assistance benefits in each class-area remained constant during the same period. Therefore, only the municipal amalgamations caused an exogenous increase in the guaranteed amount of public assistance benefits, in real terms, for residents of an amalgamation of different benefit levels.

Historically, analyses of public assistance programs have focused on the effects of benefit levels and benefit reduction rates. The canonical static model of labor supply predicts that an increase in a maximum benefit level available to non-workers inevitably undermines work incentives, as a result of the income effect and/or substitution effect. In the empirical literature, most of the first wave of studies consisted of structural or quasi-structural models, and found almost universally that public assistance programs negatively affect the labor supply, as reviewed in Moffitt (1992; 2002). Since the latter half of the 1990s, most developed countries have conducted welfare reforms that intensify their activation strategies. Among others, welfare reform legislation in the United States, such as the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, and the Luxembourg Employment Guidelines adopted by the EU in 1997 were key events defining the vision of active labor market policy based on activation principles (Organization for Economic Co-operation and Development (OECD) 2005). In the United States, in particular, a key provision in the legislation gave states considerable discretion on setting eligibility rules and benefit levels for many assistance programs, which generated a further wave of studies utilizing cross-state variations of public assistance programs (Moffitt 2002).

However, as Blank (2002) pointed out, there are difficulties in evaluating the effects of the welfare reforms on work incentives, such as the coincidence and interaction of the historic economic boom and the implementation of the welfare reforms, multiple policy changes being implemented at the same time; and the implementation a new public assistance program, the Temporary Assistance for Needy Families (TANF), at about the same time in all states, and there were no cross-state variations after the introduction of new program. To overcome these evaluation difficulties, Lemieux and Milligan (2008) exploit an age-based policy adopted by the social-assistance program in the province of Quebec, Canada, and use a regression discontinuity design to identify the impact of welfare payments on various labor

market outcomes.[1] They found that a greater level of social assistance benefits reduces the employment rate among less-educated men without children by about 3–5%. Bargain and Doorley (2011) employ a similar empirical strategy to identify the effect of a social assistance program in France, called RMI, and find that it reduces the employment of less-educated single men by 7–10%.

The natural experiment we employ in this study can also overcome the evaluation difficulties pointed out in the literature. First, we do not study welfare reforms *per se*, but evaluate the impact of the *unintended* increase in public assistance benefits that occurred after the municipal amalgamations. In general, the central and/or local government conducts welfare reforms to manage changes in the economic environment, such as high unemployment and high costs of public assistance programs. This means that the implementation of welfare reforms is not necessarily random, and cannot be regarded as a natural experiment. From this perspective, the Japanese welfare system is characterized by nation-wide implementation, and there is no policy variation among regions. The Public Assistance system was reformed to intensify the activation strategy by introducing a job search requirement and in-work benefits in the mid-2010s. However, there was no change in the policy during the 2000s, that is, the observation period of this study. Therefore, an increase in the guaranteed amount of public assistance benefits after amalgamations of municipalities with different benefit levels can be regarded as a natural experiment, without any sort of welfare reforms. Moreover, because municipal amalgamations do not always result in changes in the guaranteed amount of public assistance benefits, we use them as a control group in order to control for the effect of the municipal amalgamation *per se* on regional employment.

Second, although the recent wave of studies focusing on age-based policies utilizes the advantage of random assignment to treatment groups, the estimated effects are restricted to a particular age group. For example, both Lemieux and Milligan (2008) and Bargain and Doorley (2011) found evidence that the transfer program reduces the employment rate of less-educated single males as they turn 30 or 25. Therefore, it is difficult to generalize their results to a broader population. In contrast, the event we utilize in this study affects all low-income households living in the affected municipalities. Thus, we can examine not only the average effect for the sub-population, but also the average treatment effect for a broader population.

Finally, an advantage of our study is that it leaves out the effects of minimum wages on welfare recipients. Previous studies suggest that minimum wages have positive impacts on public assistance caseloads (Page et al. 2002). The minimum wage in Japan is stipulated according to the Minimum Wage Law, and set by industry and by prefecture level. While the Law was officially amended in 2007 in response to the lack of efficiency of the legal minimum wage as a safety net (Sekine 2008), there were minimal changes in the minimum wage levels in the early 2000s.

[1] Fortin, Lacroixa, and Droletb (2004) utilize the same policy change to estimate the effect of social assistance on the duration of social assistance spells using the difference-in-differences approach.

Exploiting these advantages, we use a difference-in-differences approach to identify the effect of the increase in public assistance benefit levels on the labor supply. The results show that the increase in public assistance benefit levels after the municipal amalgamations in the early 2000s (the so called, *Great Heisei Amalgamations*) raised the recipient rate by 0.5‰ points, but did not affect the employment rate of the working-age population on average. However, the results of the analysis by demographic group show that these effects are substantial and strongly significant for prime-age unmarried males and females and for bereaved and divorced persons in the middle and long term.

The rest of the paper is organized as follows. Section II explains the institutional backgrounds and discusses the main features of the municipal amalgamations. Section III describes the data and the empirical model. Section IV reports the main findings, and Section V provides a robustness check and additional results. Lastly, Section VI concludes the paper.

II. Institutional Background

A. Public Assistance program in Japan

The Public Assistance program in Japan is legally based on the Public Assistance Act of 1950.[2] The objective of the program is to guarantee *the right to existence* under the 25th article of the Constitution of Japan. Although all citizens have a right to claim the assistance, it must be supplementary to a person's best efforts and available resources: the person is required to use all available resources, including assets, ability to work, as well as assistance from those who are required to support the person by law. The guaranteed amount of the Public Assistance benefit for those with zero income is called the "minimum cost of living," which is derived from seven categories of expenses: livelihood, housing, educational, medical, maternity, occupational, and funeral expenses. The calculation of the minimum cost of living considers the differences in living costs among regions, as well as household members' ages. More specifically, the amount of livelihood assistance is determined by the number of children and adults, household members' ages, and residency area. The residency area also determines the amount of housing assistance. All assistance is provided as a cash transfer, except for categories such as medical costs, which are provided in-kind. The amount of assistance is calculated by subtracting the household's final income from the minimum cost of living.[3] If the minimum cost of living exceeds the final income, the difference is given as assistance. Thus, once a person receives assistance, she/he faces close to 100% marginal tax rate in case of employment.

[2] The description of Public Assistance program is based on the National Institute of Population and Social Security Research (IPSS; 2014).

[3] There exists earned income deduction in the program. And another income deduction for job finders are added in order to encourage recipients to work. However, the amount of the deductions remains relatively small, and the effective marginal tax rates that recipients face amount from 83% to over 100% in case of employment (Iwamoto and Hamaaki 2008).

Figure 1 shows the change in the Public Assistance recipient rate, defined as a portion of a household. The recipient rate was lowest, at 14.0‰, in 1996, and then increased rapidly to 32.2‰ in 2012 (monthly average). The number of PA recipients increased during the same period, and reached a record 1,618 thousand households and 2,172 thousand persons in December 2014 (monthly average). Furthermore, the majority of recipient households are elderly households (43.7% of all recipient households in 2012) and households with a disabled or sick individual (30.6%, 2012). Then, the number of "other types of households" and single-mother households, which are regarded as the working population, also increased, reaching 26.0% of all recipient households in 2012. Therefore, an examination of the causal relationship between work incentives and the Public Assistance program is needed.

Previous studies mainly address the reasons why public assistance use increased as fast as it did in Japan, and find that the rapid aging of Japan's population and unemployment were the main determinants of variations in Public Assistance recipient rates (Suzuki and Zhou 2007, Zhou and Suzuki 2012). To the best of our knowledge, the work of Abe and Tamada (2007) is one of the few empirical studies that examine the effect of Public Assistance benefit levels on the labor supply. Their objective is to assess the extent of regional disparities in the ratio of earnings by low-wage labor (such as minimum wage jobs or part-time jobs) to Public Assistance benefit levels. The study examines the relationship between the relative level of low-wage earnings to benefit levels, and the employment–population ratio for men. Their findings show a positive relationship between the relative level of part-time earnings and employment ratio for less-educated men only. Although this suggests that a (relative) increase in benefit levels reduces the labor supply for the specific worker group, the causal relationship between the two remains unclear.

B. Municipal amalgamation as a Natural Experiment

This subsection focuses on the regional variations in the minimum cost of living. Under the second paragraph of Article 8 from the Public Assistance Act, livelihood assistance, which makes up a significant part of the minimum cost of living, varies by recipient residency areas owing to differences in price levels and ways of living among regions. This "Class-Area System" was launched in 1978, when all municipalities in Japan were classified into three class-areas. Then, in 1987, each area was subdivided into two groups, resulting six class-areas. Table 1 shows the class-area classifications since 1987. All municipalities are ranked according to the size of their population and their price level. For example, large cities, such as special wards of Tokyo, Yokohama city, and Osaka city, are ranked as 1st class-area-1 (Area 1-1), and all towns and village municipalities are ranked as either 3rd class-area-1 (Area 3-1) or 3rd class-area-2 (Area 3-2). Since April 1992, the differences in livelihood assistance among areas has been set at 4.5%. Therefore, the difference between the highest (Area 1-1) and the lowest (Area 3-2) class-areas has been maintained at 22.5%.

While the minimum cost of living levels are set periodically by regulations, the revision of the Public Assistance program was uniform throughout the nation, and did not account for regional variations in benefit levels. The unique feature of the municipal amalgamations considered in this study is that, for residents of municipal amalgamations of different benefit levels, they acted as a source of exogenous increases in the minimum cost of living for residents of municipal amalgamations of different benefit levels. According to a notification from the Social Welfare Bureau, Ministry of Health and Welfare to the Prefectural Governors and Mayors of Designated Cities issued in 1966,[4] "in case of amalgamations among municipalities ranked under different class-areas, the highest class-area among them must be applied to the new municipality." In other words, residents in lower class-areas inevitably experienced an increase in the minimum cost of living after the municipal amalgamations.

Although municipal amalgamations do not occur frequently, Japan experienced large-scale municipal amalgamations in the early 2000s. Since 1995, the Japanese government had repeatedly revised the Special Municipal Amalgamation Law with the aim of consolidating municipalities in order to strengthen their administrative and financial foundation for efficient and effective implementation (Yokomichi 2007). Amendments to the Law were made on the basis of the Uniform Decentralization Law in July 1999, and central government displayed a positive attitude toward amalgamations. The amendments contained a number of measures meant as incentives for municipal amalgamations, including extending the periods for the calculation of exceptional local allocation taxes and for establishing special amalgamation bonds. In response to these measures, many municipalities adhered to the process of merging with neighboring municipalities when the Municipal Amalgamation Law (so called the Great Heisei Amalgamation) was effective. As a result, the total number of municipalities in Japan declined sharply. Figure 2 shows the trend in the number of municipalities in the 2000s. The figure indicates that the number of small-scale municipalities, such as towns and villages, declined dramatically, resulting in a decrease in the total number of municipalities from 3,229 in April 1999 to 1,821 in March 2006, at the end of the Great Heisei Amalgamation.

As mentioned previously, small municipalities such as towns and villages have a low class-area rank. Thus, when they amalgamate with larger municipalities, the residents of the former small municipalities often face an exogenous increase in the minimum cost of living. There are at least four important features of the Great Heisei Amalgamation as a natural experiment that should be highlighted. First, it did not aim to reform the Public Assistance program *per se*, but rather to strengthen the administrative and financial foundations of the municipalities through economies of scale and scope (Miyazaki 2005). Consequently, the guaranteed amounts of benefits changed automatically after an amalgamation. Second, note that the guaranteed amounts of benefit levels did not always change after an amalgamation. Even when several towns and villages are consolidated and form a new city, the standard

[4] "Guidance of Area Classification Concerning Standards of Public Assistance Act" (Notification No. 160 dated May 18, 1966)

amount of livelihood assistance does not change, except in the case of amalgamations of municipalities from different class-areas. Therefore, we can use these municipalities as a control group to rule out unobservable effects of the amalgamations on outcomes such as caseloads of Public Assistance and employment. Third, since the exogenous change in the guaranteed amount of benefits affects all low-income households living in the affected municipalities, we can examine not only the average effect for the sub-population, but also the average treatment effect for a broader population. Finally, the increase in livelihood assistance in some municipalities during the Great Heisei Amalgamation is the unique source of the change in regional variations during the first half of the 2000s. The standard amount of livelihood assistance was revised regularly after 1984, according to the change in the consumption levels of the general public. Then, the nominal amount of livelihood assistance was reduced by 1% from FY 2000 to FY 2005 owing to the decline in consumption levels, and the supplementary payment to public assistance recipients over the age of 70 was abolished in FY 2006. However, these revisions were uniform throughout the country. Thus, we can control for the change in the average benefit level and identify the effect of the exogenous increase in the benefit on certain outcomes.

In summary, low-income households from town and village municipalities that amalgamated with larger cities during the Great Heisei Amalgamation faced an exogenous increase in the guaranteed amount of benefits. Given that the effective marginal tax rate in the Public Assistance program amounts to nearly 100%, the standard static labor supply model predicts that an increase in the guaranteed amount of social assistance must induce low-wage workers to leave the labor market. Thus, the model predicts that adjustments of workers takes place mostly at the extensive margin (adjustment of employment), rather than at the intensive margin (adjustment of hours worked).

III. Data and Estimation

A. Data Description

Our analysis relies on aggregate data for the municipalities. With regard to the demographic attributes and the labor market performance of the municipalities, we use aggregate data from the 1995, 2000, 2005, and 2010 *Population Census* conducted by the Statistics Bureau, Ministry of Internal Affairs and Communications (MIAC). The survey contains information about the population, the number of people employed, and the number of people unemployed per reference week for every five years and per municipality. In addition, as the source of data on the class-areas in the Public Assistance system, we use the *Handbook of Public Assistance* (*Seikatsu Hogo Techo*), which contains data on each class-area per municipality in April of each year.

Although the Great Heisei Amalgamation started in April 1999 and finished in March 2006, a number of amalgamations occurred between FY 2003 and FY 2005. The annual number of amalgamations were in single digits from FY 1999 to FY 2002, and then increased to 30 in FY 2003, 215 in FY 2004, and

325 in FY 2005. Since we can only observe the employment outcome for municipalities every five years, our analysis focuses on the period from 2000 to 2005 to examine the impact of the amalgamations that occurred between FY 2001 and FY 2004.

We construct municipal panel data as follows: First, we restrict our sample to municipalities that amalgamated with others from April 1, 2001, to April 1, 2005, because our data are annual data and, thus, can only define data on only these municipalities as being in a pre- or post-amalgamation period. Second, we set our municipality sample as of March 31, 2011, and merge all data for pre- and/or post-amalgamations at the unit level for all amalgamated municipalities.[5] Finally, we divide our municipality sample into two groups: (1) amalgamated municipalities without a change in class-area; and (2) amalgamated municipalities with a change in class-area. We regard the former as a "control group," and the latter as a "treatment group," because low-wage workers experienced an exogenous increase in the minimum cost of living after the municipal amalgamations. Although, no municipalities ranked in the highest class-area among the "treatment group" experienced changes in their class-area, a previous study suggests that the Great Heisei Amalgamation promoted inter-municipality mobility, especially between central cities and peripheral towns and villages (Hatakeyama 2013). Therefore, we regard those amalgamated municipalities *including* municipalities that experienced a change in their class-area as a "treatment group". The final sample consists of 270 municipalities, of which 153 amalgamated without a change in class-area, and 117 did experience a change in class-area.

Table 2 shows the weighted average of the employment rate among working-age (15–64 years) population. As shown, heterogeneity exists between the two regions in terms of their labor markets: the employment rates of the amalgamated municipalities without a class-area change (control) are consistently higher than those of amalgamated municipalities with a class-area change (treatment). The change in the employment rate does not show a systematic tendency: the employment rate for the control group declined sharply during pre- and post-amalgamation periods, while that for the treatment group declined primarily during the era of the Great Heisei Amalgamation. According to the descriptive statistics, there is no clear evidence that an exogenous change in guaranteed PA benefits during the first half of the 2000s induced recipients to leave the labor market. Therefore, it is necessary to control for observable characteristics of municipalities that affect the employment rate, and then to examine the impact of the exogenous increase in PA benefits on the outcomes.

B. Estimation Model

Based on the nature of the event and the data we utilize, we use a standard difference-in-differences (DID) approach, with the following first-difference regression model (FD-DID):

[5] We omit the wards of the designated cities from the sample, except for the special ward of Tokyo, because these wards should be treated as part of the city to which they belong.

$$\Delta emp_{ijt} = \beta_0 + \beta_1 r_{ij} + \Delta x_{ijt}\gamma + \delta p_{ijt-5} + \phi_{ct} + c_{jt} + \mu_{ijt}, \quad (1)$$

where Δemp_{ijt} is the change in the employment rate for municipality *i* of prefecture *j* from year *t*-5 to year *t*; r_{ij} is a dummy variable indicating whether the amalgamated municipalities include municipalities that experienced a change in their class-area between FY 2001 and FY 2004; Δx_{ijt} denotes changes in control variables from year *t*-5 to year *t*, including the logarithm of the working-age population (or the working-age population as a share of the population) and the unemployment rate of prime-age (25–54) males; p_{ijt-5} denotes the public employment share in municipality *i* in year *t*-5, which controls for the effect of the consolidation of municipal offices on local employment. Then, ϕ_{ct} denotes a region-specific effect for the lowest class-area in 2000, which captures heterogeneous trends in the regional labor markets; c_{jt} denotes prefecture-specific trends, which capture the differences in labor market conditions by prefecture, including the prefectural minimum wages, industrial structure, economic growth rate, and so on; and u_{ijt} is an error term. Since we rule out the unobservable effect of amalgamations on employment, as well as of other determinants, we can regard the DID estimator, β_1, as an average treatment effect (ATE) of the increase in the guaranteed amount of benefits caused by the Great Heisei Amalgamation. Note that all estimations in this study use weights based on the size of the population in year t-5 for a corresponding group, and calculates robust standard errors clustered at the prefecture level.

Although the above approach can identify the effect of an exogenous increase in public assistance benefits during the Great Heisei Amalgamation on the labor supply, we cannot evaluate the effect quantitatively. Ideally, we should calculate the average change in the benefits that residents faced, by municipality, and use these estimated benefits to identify, for example, the elasticity of labor participation with respect to the marginal increase in the benefit level. Unfortunately, because a guaranteed level of benefits depends on age and family structure, as well as region, we cannot estimate the benefit levels precisely owing to the lack of detailed municipality data.

We address this issue by classifying the treatment group so as order to capture the increase in benefits in detail. Specifically, we classify the treatment group into three categories, according to the extent of changes in the lowest class-area from 2000 to 2005: (1) change by one class-area; (2) change by two class-areas; and (3) change by three or more class-areas. Here, the control groups are categorized into group (0), because they did not experience changes in terms of class-area. Table 3 shows the pattern of amalgamations between municipalities by lowest class-area in 2000. For example, 83 of 243 municipalities include municipalities that were ranked as Area 3-2 in 2000, and 1 of 24 municipalities includes municipalities that were ranked as Area 3-1 in 2000, which amalgamated with municipalities ranked as Area 3-1 and Area 2-2, respectively. Thus, residents in pre-amalgamation municipalities ranked as lower class-areas experienced about a 4.5 % increase in the amount of livelihood assistance. Similarly, 17 (= 2 + 4 + 11) municipalities include municipalities that amalgamated with a two-rank increase, and 16 (= 1 +

15) municipalities include municipalities that amalgamated with a three-rank increase in class-area, or higher.

Based on the above definition, we estimate the following regression model:

$$\Delta emp_{ijt} = \theta_0 + \sum_{k=0}^{3} \theta_1 r_{ijk} + \Delta x_{ijt}\gamma + \delta p_{ijt-5} + \phi_{ct} + c_{jt} + \nu_{ijt}, \quad (2)$$

where r_{ijk} is a set of dummy variables indicating the four patterns of municipality amalgamations, and ν_{ijt} is an error term. Although r_{ijk} does not show the (affected) population-adjusted increase in the guaranteed amount of benefits, we can, in general, consider that the guaranteed benefits of municipalities that amalgamated with cities of a higher class-area increased with the change in class-area.

Summary statistics of the independent variables, both by municipality group and by year, are displayed in Table 4. As a whole, Japanese municipalities have experienced a decrease in the working-age population and an increase in the unemployment rates of prime-age males since 1995. Among the municipality groups, amalgamated municipalities with a class change (treatment group) are characterized by their relatively large size and poor labor market performance in terms of the unemployment rate.

IV. The Effects of an Exogenous Increase in Welfare Benefits on Labor Participation

A. Basic Results for First-Difference Estimates

The estimation results of equation (1) are presented in Table 5. The weighted FD-DID estimates for the working-age population are reported in Panel (a), and the results for prime-age (25–54 yeas) and elderly (55–64 yeas) persons are presented in Panels (b) and (c), respectively.

The coefficients of the changes in regional labor market conditions (i.e., the unemployment rate for prime-age males) have the expected signs and are statistically significant for all models. Recall that we focus on the municipality amalgamations from 2001 to 2004. Thus, given that both the control and the treatment group have parallel trends, we can observe the treatment effects only during the period of the Great Heisei Amalgamation. As a result, the coefficients of the class-area change dummy for the period 2000–2005 are almost consistently negative (from -0.02% to -0.06%), but are statistically insignificant. This also holds for the alternative variables, which capture the extent of the class-area change after the municipality amalgamations (Column (4) in each Panel). Although the magnitude of the estimated effects is not negligible compared with the sample mean change in the employment rate in the early 2000s (-0.2 %), the effects for the working-age population are not statistically significant.[6]

B. Allowing for Heterogeneous Effects by Demographic Groups

[6] Although we also conduct estimations by gender and age, the results show no systematic or statistically significant effects of the area-change dummy.

So far, we have found non-negligible, but statistically insignificant impacts of the increase in PA benefits on employment, on average. However, given that the risk of poverty and employment opportunity are unevenly distributed in the economy, the impacts of the changes in public assistance benefit levels on the labor supply would vary across demographic groups. In particular, according to the *National Survey on Public Assistance Recipients* conducted by Ministry of Health, Labour and Welfare (MHLW) in 2004, among households on public assistance, single-mother households have the highest participation rate, at approximately 50%, followed by other types of households (38%). Then, households with a disabled or sick individual exhibit low participation rates (Komamura, 2008). Therefore, we should examine the impacts of PA benefits on employment by demographic sub-groups. These include (1) females and males who are bereaved or divorced, (2) females and males who never married, and (3) females and males who are married. The age range in all three cases is 25–49 years. Here, we regard the first, second and third groups as a single parent household, household without spouse and children, and household with spouse and child, respectively.

Tables 6 and 7 provide the estimates for the demographic sub-groups. First, during the treatment period, the negative effects of the increase in PA benefits on the employment rate are large (-1.4 to -1.6) and statistically significant for those who never married and who fall within the prime-age group (males and females). This result suggests that there are many people without a spouse and earning a low income, and that they face a choice between receiving Public Assistance benefits and participating in the labor market. Second, the negative effects for those who are bereaved or divorced (males and females) are large (-1.2) and statistically significant *only after* the treatment period. As previously mentioned, these groups are regarded as single-parent households, whose recipient rates are higher than the population average. Since the results imply that there is an unobserved specific trend for these groups, or lagged effects of the increase in the benefits on employment, we explore this point in the next section. Finally, the exogenous increase in the benefit has no impact on the employment rate for prime-age married persons: almost no significant effects for males, and sometimes positive and statistically significant effects for females. Considering that Japan's Public Assistance requires that people use all available resources, including assistance from those who are required to support the person by law, it is reasonable that married females and married males were not significantly affected by the change in the minimum cost of living.

In summary, the results show that the increase in the benefit levels lower the employment rate of those who never married (males and females) by 1.4 to 1.6% points in the early 2000s. The magnitude of the estimated effects is substantial, as compared with the sample mean change in the employment rate for these groups during the same period (-1.8% points for females, and -3.9% point for males).

V. Robustness Checks

A. Effect on the Recipient Rate

We have assumed so far that the exogenous increase in the minimum cost of living in some cases of municipal amalgamations affected low-wage workers whose final income fell below the new standards of minimum living costs, inducing them to leave the labor market. In order to confirm this point, we evaluate the impact on the public assistance recipient rate by estimating the first-difference model, similarly to equations (1) and (2).

The data on the number of public assistance recipients is aggregated from the *Case Reports of Social Welfare Administration* reported by the MHLW. The data contain (monthly) averages of the number of public assistance recipients within each fiscal year, grouped by municipality. Since data on the number of public assistance recipients by town or village are not reported for nine prefectures (Hokkaido, Akita, Fukushima, Fukui, Yamanashi, Nagano, Hyogo, Ehime, and Kochi), we omit the municipalities of these prefectures from the sample.[7] In addition, we restrict our observation period to 1995–2005 owing to the lack of data on the number of recipients in 2010.

Table 8 shows the results of the FD-DID estimates, where the dependent variables are the change in the recipient rate among the population under the age of 65 in the late 1990s (columns (1) and (2)) that for the same group and in the early 2000s (columns (3) and (4)).[8] As expected, the results indicate that an exogenous increase caused by the municipal amalgamations raised the recipient rate only during the treatment period; the average recipient rate in the affected municipalities rose by 0.5 ‰ points more than that in non-affected municipalities. Of the former group, the estimated effect is high and statistically significant for municipalities that include municipalities that were classified as a lower class-area before the amalgamations. The magnitude of the estimated effects is non-negligible, as compared with the sample mean change of the recipient rate in the early 2000s (+ 1.2 ‰ points).

B. The Long-term effect of the exogenous increase in the benefits on employment

In the previous section, we examined the impact of an exogenous increase in the benefit levels during the early 2000s. However, many of the municipal amalgamations of the sample took place in FY 2004, which means we should regard these estimated effects as being short term. In addition, since we have so far omitted municipalities from the sample that amalgamated after April 1, 2005, in our analysis, many amalgamations during the period of the Great Heisei Amalgamation dropped out of the analysis.

Thus, we focus on the analysis period 2000 to 2010, and examine the relatively long-term impact of the amalgamations that occurred between FY 2004 and FY 2006 on the labor supply. For the alternative analysis, the sample consists of 490 municipalities, of which 263 amalgamated without a change in class-area, and 227 amalgamated with a change in class-area.

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[7] We omit the wards of the designated cities from the sample, except for the special ward of Tokyo, because these wards should be treated as part of the city to which they belong.

[8] When calculating the recipient rate, that is, the number of recipients of public assistance divided by the total population, we use the data on the population under the age of 65 at of the end of March in each year from the *Basic Resident Registration* by MIAC.

Table 9 provides the FD-DID estimates for the working-age population as a whole (row a), and for various sub-groups (rows b–e). For the working-age population, the coefficients of the area-change dummy no longer show a negative sign when long-term effects are considered. In contrast, the negative effects for unmarried males and females are still substantial and statistically significant. The results also indicate that the exogenous increase in welfare benefits induce a part of the group of bereaved or divorced persons to drop out of the labor market.

Combining these results, we conclude that the increase in public assistance benefits during the period of the Great Heisei Amalgamations decreased the employment rate for those who are likely to receive public assistance benefits by at least one percentage point, and perhaps by as much as two percentage points.

VI. Conclusion

In this study, we examine the impact of welfare benefits on the labor supply utilizing the exogenous increase in Public Assistance benefits in the case of municipal amalgamations. Since the Japanese welfare system is characterized by nation-wide implementation, and the municipal amalgamation implemented in the early 2000s is the only source of the changes in regional variations of guaranteed amounts of benefit levels, the event provides an ideal natural experiment to identify the impact. Moreover, since the event we utilize in this study affects all low-wage workers living in the affected municipalities, we can examine the impact for a broader population than those in previous studies. Our main finding is that the municipal amalgamations with an increase in public assistance benefits certainly raised the recipient rate by 0.5‰ points, but did not affect the employment rate of the working-age population on average. However, the results of the examination by demographic group show that these effects are substantial and strongly significant for those who are prime-age and unmarried (males and females), and for those who are bereaved or divorced (females and males) from a long-term perspective. Given that these groups form low-income households, and are more like to receive public assistance benefits, the results are in line with idea the that labor participation responses may be strongest for those who have the lowest potential earnings (Eissa and Liebman 1996; Bargain and Dooley 2011).

Our findings are limited for several reasons. Although we examine the impact of the amalgamations with increases in welfare benefits, we could not identify the elasticity of labor participation with respect to the marginal increase in the benefit level owing to the lack of detailed municipality data. Furthermore, previous authors have suggested that low-wage workers do not necessarily receive public assistance, and that the coverage rate of public assistance among working-poor households under the age of 65 is extremely low in Japan (Komamura 2008). Therefore, we should further examine the labor participation response to the changes in welfare benefit levels at the individual level.

References

Abe Yukiko and Keiko Tamada (2007). "Saitei Chingin, Seikatsu Hogo no Chiikisa ni kansuru Kosatsu" (On the Regional Differences in Minimum Wages and Welfare Benefits in Japan), *Nihon Rodo Kenkyu Zasshi* (*The Japanese Journal of Labour Studies*) 49 (6): 31-47 (in Japanese).

Bargain, Olivier and Karina Doorley (2009). "Caught in the trap? Welfare's Disincentive and the Labor Supply of Single Men," *Journal of Public Economics* 95 (9–10): 1096–1110.

Blank, Rebecca M. (2002). "Evaluating Welfare Reform in the United States," *Journal of Economic Literature*, 40: 1105-1166.

Eissa, Nada and Jeffery B. Liebman (1996). "Labor Supply Response to the Earned Income Tax Credit," The Quarterly Journal of Economics, 111 (2): 605–637.

Fortin, Bernard, Guy Lacroixa, and Simon Droletb (2004). "Welfare Benefits and the Duration of Welfare Spells: Evidence from a Natural Experiment in Canada," *Journal of Public Economics* 88: 1495–1520.

Hatakeyama, Teruo (2013). "Geppei go no Shichoson ni okeru Shuhenbu no Kasoka no Kensho" (Validation of Depopulation at the Periphery of the Municipalities after the Municipality Merger), Chiri Shiso (Annals of the Geography) 54(2): 16-25 (in Japanese).

Iwamoto, Yasushi and Junya Hamaaki (2008). "Sozei Shakai Hosho Seido ni yoru Saibunpai no Kozo no Hyoka" (Perspectives on Income Redistribution through Taxation and Social Security), *Kikan Shakai Hosho Kenkyu* (*The Quarterly of Social Security Research*) 44 (3): 266-277 (in Japanese).

Komamura, Kohei (2008). "The Working Poor, Borderline Poor, and Developments in Public Assistance Reform," *Japan Labor Review*, 5 (4): 67-94.

Lemieux, Thomas and Kevin Milligan (2008). "Incentive Effects of Social Assistance: A Regression Discontinuity Approach," *Journal of Econometrics* 142: 807-828.

Miyazaki, Takeshi. (2005). "Shichoson-Gappei niha Saisyutsu Sakugen Koka ga Arunoka? (Do Municipal Mergers Have an Effect on Expenditure Cuts?), *Hi-Stat Discussion Paper Series*, No.128, Hitotsubashi University.

Moffitt, Robert A. (1992). "Incentive Effects of the U.S. Welfare System: A Review," *Journal of Economic Literature* 30 (1): 1-61.

Moffitt, Robert A. (2002). "Welfare Programs and Labor Supply," in A. J. Auebach and M. Feldstein (eds) *Handbook of Public Economics*, Vol. 4, Amsterdam, Elsevier, pp. 2393-2430.

National Institute of Population and Social Security Research (IPSS) (2014) *Social Security in Japan 2014* [PDF document]. Retrieved from http://www.ipss.go.jp/s-info/e/ssj2014/PDF/ssj2014.pdf.

Organization for Economic Co-operation and Development (OECD) (2005) *The OECD Employment Outlook*, Paris.

Page, Marianne E., Joanne Spetz and Jane Millar (2002). "Does the Minimum Wage Affect Welfare Caseloads?" *Journal of Policy Analysis and Management*, 24 (2): 273–295.

Sekine, Yuki. (2008) “The Rise of Poverty in Japan: The Emergence of the Working Poor,” *Japan Labor Review*, 5(4): 49-66.

Suzuki, Wataru and Yanfei Zhou (2007). “Welfare Use in Japan: Trend and Determinants,” *Journal of Income Distribution*, 16(3-4): 88-109.

Yokomichi, Kiyotaka (2007). “The Development of Municipal Mergers in Japan,” *COSLOG Up-to-date Documents on Local Autonomy in Japan* No.1. [PDF document]. Retrieved from http://www.clair.or.jp/j/forum/honyaku/hikaku/pdf/up-to-date_en1.pdf.

Zhou, Yanfei and Wataru Suzuki (2012). “Kinnen no Seikatsuhogoritsu Hendo no Yoinbunkai: Choki Jikeiretsudeta ni motoduku Kosatu” (Decomposing the Recent Rise of Welfare Use in Japan: A Study Based on Long-term Time-series Data), *Kikan Shakai Hosho Kenkyu* (*The Quarterly of Social Security Research*) 48 (2): 197-215 (in Japanese).

Table 1. Classification of Class-area

Class area	Example of municipality
1st class area-1 (Area 1-1)	Special wards of Tokyo, Yokohama City, Nagoya City, Osaka City, Kobe City, etc.
1st class area-2 (Area 1-2)	Sapporo City, Chiba City, Otsu City, Okayama City, Hiroshima City, Fukuoka City, etc.
2nd class area-1 (Area 2-1)	Morioka City, Mito City, Shizuoka City, Nara City, Matsue City, Naha City, etc.
2nd class area-2 (Area 2-2)	Hitachi City, Nagaoka City, Mishima City, Kakogawa City, Sasebo City, etc.
3rd class area-1 (Area 3-1)	Hirosaki City, Tochig Cityi, Hikone City, Miki City, Imabari City, etc. And a part of towns and villages are included
3rd class area-2 (Area 3-2)	Yuki City, Sasayama City, Uwajima City and rest of towns and villages.

Source: The Ministry of Health, Labour and Welfare (eds.), The *Handbook of Public Assistance* (*Seikatsu Hogo Techo*) .

Table 2. Employment Rate by Municipality Group and Year

	1995	2000	2005	2010	Change of 2000-1995	Change of 2000-1995	Change of 2000-1995	N
Amalgamated without class-area change	0.722	0.716	0.715	0.711	-0.005	-0.001	-0.003	153
	(0.035)	(0.035)	(0.036)	(0.033)	(0.008)	(0.010)	(0.011)	
Amalgamated with class-area change	0.686	0.681	0.679	0.681	-0.004	-0.002	0.002	117
	(0.040)	(0.041)	(0.040)	(0.037)	(0.007)	(0.010)	(0.011)	

Notes: Standard deviations are in parenthesis. Employment rate is defined as the number of employment divided by working-age population.

Table 3. Pattern of Municipal Amalgamations from 1 April 2001 to 1 April 2005

The lowest class area in 2000	Class area in 2005						
	Area 1-1	Area 1-2	Area 2-1	Area 2-2	Area 3-1	Area 3-2	Total
Area 2-1	2	0	1	0	0	0	3
Area 2-2	0	0	0	0	0	0	0
Area 3-1	0	0	4	1	19	0	24
Area 3-2	0	1	15	11	83	133	243
Total	2	1	20	12	102	133	270

Table 4. Summary Statistics for Independent Variables by Municipality Group and Year

	Log of population		Unemployment rate for prime-age males		Public employment share	
Year	Amalgamated without class-area change	Amalgamated with class-area change	Amalgamated without class-area change	Amalgamated with class-area change	Amalgamated without class-area change	Amalgamated with class-area change
1995	10.623	11.921	0.027	0.029	0.037	0.037
	(1.138)	(0.947)	(0.009)	(0.011)	(0.013)	(0.015)
2000	10.603	11.917	0.034	0.038	0.039	0.038
	(1.146)	(0.957)	(0.009)	(0.011)	(0.014)	(0.015)
2005	10.572	11.894	0.054	0.057	0.039	0.038
	(1.156)	(0.965)	(0.016)	(0.017)	(0.014)	(0.016)
2010	10.537	11.862	0.066	0.064	0.039	0.039
	(1.184)	(0.983)	(0.020)	(0.020)	(0.014)	(0.015)
Num. of Obs.	153	117	153	117	153	117

Notes: Standard deviations are in parentheses.

Table 5. First Difference Estimates of the Effect of Exogenous Increase in Public Assistance Benefits on Labor Supply for Working-age Population

(a) 15-64 years old

	1995-2000		2000-2005		2005-2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ unemployment rate for prime-age males	-0.485***	-0.467***	-0.518***	-0.507***	-0.516***	-0.504***
	(0.111)	(0.111)	(0.0942)	(0.0946)	(0.0807)	(0.0776)
Δ working-age population	0.0247**	0.0207	-0.112***	-0.113***	0.0260	0.00925
	(0.0117)	(0.0148)	(0.0257)	(0.0212)	(0.0370)	(0.0322)
Lag of public employment share	0.0461	0.0330	0.0117	0.00769	0.119**	0.0832**
	(0.0518)	(0.0495)	(0.0618)	(0.0544)	(0.0496)	(0.0341)
Area change dummy	0.00134		-0.000553		0.00367*	
	(0.00117)		(0.00118)		(0.00185)	
Change by one class-area		0.00207		-0.0000347		0.00222
		(0.00150)		(0.00117)		(0.00191)
Change by two class-areas		-0.00139		-0.00205		0.00360
		(0.00174)		(0.00177)		(0.00358)
Change by more than three class-areas		0.00265		-0.0000723		0.00755*
		(0.00193)		(0.00298)		(0.00384)
Num. of Obs.	270	270	270	270	270	270
Adj. R2	0.444	0.456	0.566	0.565	0.564	0.581
F statistics	5.144	7.608	6.637	7.902	16.69	16.80
p-values	0.000	0.000	0.000	0.000	0.000	0.000

(b) 25-54 years old

	1995-2000		2000-2005		2005-2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ unemployment rate for prime-age males	-0.501***	-0.521***	-0.284*	-0.298*	-0.467***	-0.461***
	(0.167)	(0.160)	(0.168)	(0.153)	(0.0640)	(0.0722)
Δ population share	-0.230***	-0.240***	-0.378**	-0.381**	0.133	0.0827
	(0.0740)	(0.0814)	(0.160)	(0.159)	(0.0931)	(0.0871)
Lag of public employment share	0.0582	0.0662	0.0995	0.109	0.125***	0.105***
	(0.0374)	(0.0400)	(0.0959)	(0.101)	(0.0447)	(0.0351)
Area change dummy	-0.000350		0.000105		0.00218	
	(0.00121)		(0.00230)		(0.00214)	
Change by one class-area		0.000000283		0.000128		0.00178
		(0.00108)		(0.00199)		(0.00257)
Change by two class-areas		-0.000117		0.00143		0.00190
		(0.00129)		(0.00421)		(0.00344)
Change by more than three class-areas		-0.00127		-0.00112		0.00559
		(0.00232)		(0.00457)		(0.00482)
Num. of Obs.	270	270	270	270	0.593	0.598
Adj. R2	0.446	0.444	0.456	0.454	16.24	10.29
F statistics	5.388	5.120	2.356	1.656	19.72	16.87
p-values	0.000	0.000	0.047	0.138	0.000	0.000

(c) 55-64 years old

	1995-2000		2000-2005		2005-2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ unemployment rate for prime-age males	-0.820**	-0.684**	-0.324**	-0.309**	-0.584***	-0.562***
	(0.307)	(0.260)	(0.127)	(0.128)	(0.108)	(0.119)
Δ population	0.325***	0.259**	0.0267	0.0000627	-0.332***	-0.317***
	(0.110)	(0.108)	(0.108)	(0.110)	(0.103)	(0.0994)
Lag of public employment share	0.0393	-0.0351	-0.0252	-0.0203	0.120	0.124**
	(0.101)	(0.102)	(0.0911)	(0.0873)	(0.0715)	(0.0603)
Area change dummy	0.00261		-0.000227		0.000243	
	(0.00272)		(0.00249)		(0.00210)	
Change by one class-area		0.00304		0.00150		-0.000776
		(0.00313)		(0.00285)		(0.00239)
Change by two class-areas		-0.00541		-0.00292		0.00363
		(0.00559)		(0.00318)		(0.00621)
Change by more than three class-areas		0.0112***		-0.00104		0.000318
		(0.00346)		(0.00379)		(0.00439)
Num. of Obs.	270	270	270	270	270	270
Adj. R2	0.334	0.380	0.353	0.353	0.504	0.505
F statistics	3.553	7.704	125.7	9.037	28.94	24.27
p-values	0.006	0.000	0.000	0.000	0.000	0.000

Note: Robust standard errors clustered at prefecture level in parentheses. The change in population denotes the change in log of working-age population (panel (a)) or the change in population share to total working-age population (panel (b) and (c)). The lowest class-area dummy variables in 2000, prefecture dummy variables, and constant are included in all estimations. * p<0.10, ** p<0.05, *** p<0.01.

Table 6. First Difference Estimates for Prime-age Females

(a) Bereaved or divorced females 25-49 years old

	1995-2000	2000-2005	2005-2010
Area change dummy	-0.00349	-0.00364	-0.0116**
	(0.00515)	(0.00493)	(0.00521)
Change by one class-area	-0.00373	0.00278	-0.00877**
	(0.00531)	(0.00412)	(0.00406)
Change by two class-areas	-0.00296	-0.00737*	-0.0139
	(0.00539)	(0.00415)	(0.0107)
Change by more than three class-areas	-0.00344	-0.0102	-0.0151*
	(0.00703)	(0.00688)	(0.00816)

(b) Never married females 25-49 years old

	1995-2000	2000-2005	2005-2010
Area change dummy	-0.00662	-0.0135**	0.000733
	(0.00488)	(0.00514)	(0.00515)
Change by one class-area	-0.00458	-0.00682	-0.000267
	(0.00477)	(0.00437)	(0.00405)
Change by two class-areas	-0.00642	-0.0174***	-0.00383
	(0.00481)	(0.00579)	(0.00693)
Change by more than three class-areas	-0.0120	-0.0197*	0.00632
	(0.00767)	(0.0115)	(0.0104)

(c) Married females 25-49 years old

	1995-2000	2000-2005	2005-2010
Area change dummy	0.00150	0.00589**	0.00640**
	(0.00197)	(0.00255)	(0.00262)
Change by one class-area	0.00127	0.00340	0.00316
	(0.00220)	(0.00295)	(0.00259)
Change by two class-areas	0.00190	0.00887*	0.00917*
	(0.00278)	(0.00465)	(0.00507)
Change by more than three class-areas	0.00155	0.0108**	0.0150***
	(0.00326)	(0.00445)	(0.00379)

Note: Standard errors in parentheses are clustered by prefecture. Number of observations are 270, of which 153 for control group and 117 for treatment group. Dependent variables are change in the employment rate for each sub-group. Independent variables are change in unemployment rate for prime-age males, change in population share of each sub-group to total working-age population, lag of public employment share, the lowest class-area dummies in 2000, prefecture dummy variables, and constant. * p<0.10, ** p<0.05, *** p<0.01.

Table 7. First Difference Estimates for Prime-age Males

(a) Bereaved or divorced males 25-49 years old

	1995-2000	2000-2005	2005-2010
Area change dummy	-0.00303	-0.00179	-0.0119*
	(0.00398)	(0.00426)	(0.00673)
Change by one class-area	0.00229	0.000329	-0.00612
	(0.00413)	(0.00569)	(0.00722)
Change by two class-areas	-0.00389	0.00330	-0.0179*
	(0.00568)	(0.00666)	(0.0103)
Change by more than three class-areas	-0.0126**	-0.00885	-0.0183*
	(0.00544)	(0.00674)	(0.00927)

(b) Never married males 25-49 years old

	1995-2000	2000-2005	2005-2010
Area change dummy	-0.00364	-0.0160***	0.00434
	(0.00228)	(0.00445)	(0.00408)
Change by one class-area	-0.000997	-0.0100**	0.00441
	(0.00243)	(0.00390)	(0.00320)
Change by two class-areas	-0.00396	-0.0208***	0.00306
	(0.00403)	(0.00610)	(0.00560)
Change by more than three class-areas	-0.00880***	-0.0221**	0.00550
	(0.00307)	(0.0109)	(0.00911)

(c) Married males 25-49 years old

	1995-2000	2000-2005	2005-2010
Area change dummy	-0.00110*	-0.00200	-0.000617
	(0.000644)	(0.00164)	(0.00169)
Change by one class-area	-0.000799	-0.000986	-0.000262
	(0.000620)	(0.00131)	(0.00209)
Change by two class-areas	-0.00101	-0.00319	-0.0000587
	(0.00111)	(0.00266)	(0.00357)
Change by more than three class-areas	-0.00173**	-0.00396	-0.00294
	(0.000691)	(0.00331)	(0.00384)

Note: Standard errors in parentheses are clustered by prefecture. Number of observations are 270, of which 153 for control group and 117 for treatment group. Dependent variables are change in the employment rate for each sub-group. Independent variables are change in unemployment rate for prime-age males, change in population share of each sub-group to total working-age population, lag of public employment share, the lowest class-area dummies in 2000, prefecture dummy variables, and constant. * p<0.10, ** p<0.05, *** p<0.01.

Table 8. First Difference Estimates of the Exogenous Increase in Public Assistance Benefits on the Recipient Rate for persons under the age of 65

	1995-2000		2000-2005	
	(1)	(2)	(3)	(4)
Δ unemployment rate for working-age population	0.000538	0.0101	-0.000758	0.0214
	(0.0117)	(0.0140)	(0.0270)	(0.0226)
Δ working-age population	-0.00196	-0.00218	-0.00361	-0.00412
	(0.00277)	(0.00264)	(0.00551)	(0.00468)
Lag of public employment share	0.00294	0.000662	0.00878	0.00193
	(0.00682)	(0.00788)	(0.0103)	(0.00731)
Area change dummy	0.000209		0.000513**	
	(0.000136)		(0.000208)	
Change by one class-area		0.0000907		0.000322
		(0.000175)		(0.000463)
Change by two class-areas		0.000160		0.000266
		(0.000203)		(0.000244)
Change by more than three class-areas		0.000592		0.00158***
		(0.000417)		(0.000280)
Num. of Obs.	108	108	108	108
Adj. R2	0.131	0.177	0.257	0.376
F statistics	0.970	1.635	1.623	3.807
p-values	0.450	0.127	0.150	0.001

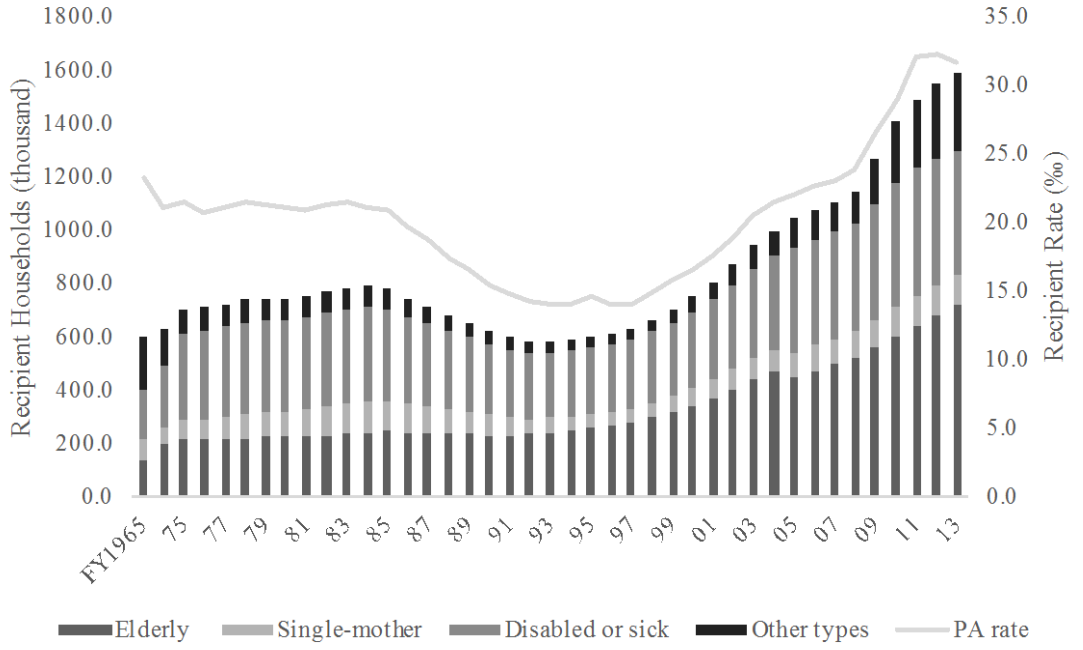
Note: Standard errors in parentheses are clustered by prefecture. Change in population denotes the change in log of working-age population. Constant, the lowest class-area dummy variables in 2000, and prefecture dummy variables are included in all estimations. * p<0.10, ** p<0.05, *** p<0.01.

Table 9. First Difference Estimates of the Effect of Exogenous Increase of Public Assistance Benefits on Labor Supply: 2000-2010

	Area change dummy	Change of the lowest class-area		
		Change by one class-area	Change by two class-areas	Change by more than
a. 15-64 years old	0.00294*	0.00459	0.00442	0.00673***
	(0.00174)	(0.00673)	(0.00272)	(0.00159)
b. Bereaved or divorced females 25-49 years old	-0.0143***	0.00198	-0.00626	-0.0140***
	(0.00353)	(0.0153)	(0.00481)	(0.00370)
c. Never married females 25-49 years old	-0.00763***	0.000293	-0.00641***	-0.00815***
	(0.00213)	(0.00336)	(0.00226)	(0.00285)
d. Bereaved or divorced males 25-49 years old	-0.0120**	0.00899	-0.0113	-0.0198***
	-0.00469	(0.0133)	(0.00710)	(0.00463)
e. Never married males 25-49 years old	-0.00931***	-0.00559	-0.00469	-0.00977***
	(0.00239)	(0.0119)	(0.00423)	(0.00313)

Note: Standard errors in parentheses are clustered by prefecture. Number of observations are 490, of which 263 for control group and 227 for treatment group. Dependent variables are change in the employment rate for each sub-group from 2000 to 2010. Independent variables are change in unemployment rate for prime-age males, change in log of working-age population (row a), change in population share of each sub-group to total working-age population (row b-e), the lowest class-area dummies in 2000, prefecture dummy variables, and constant.

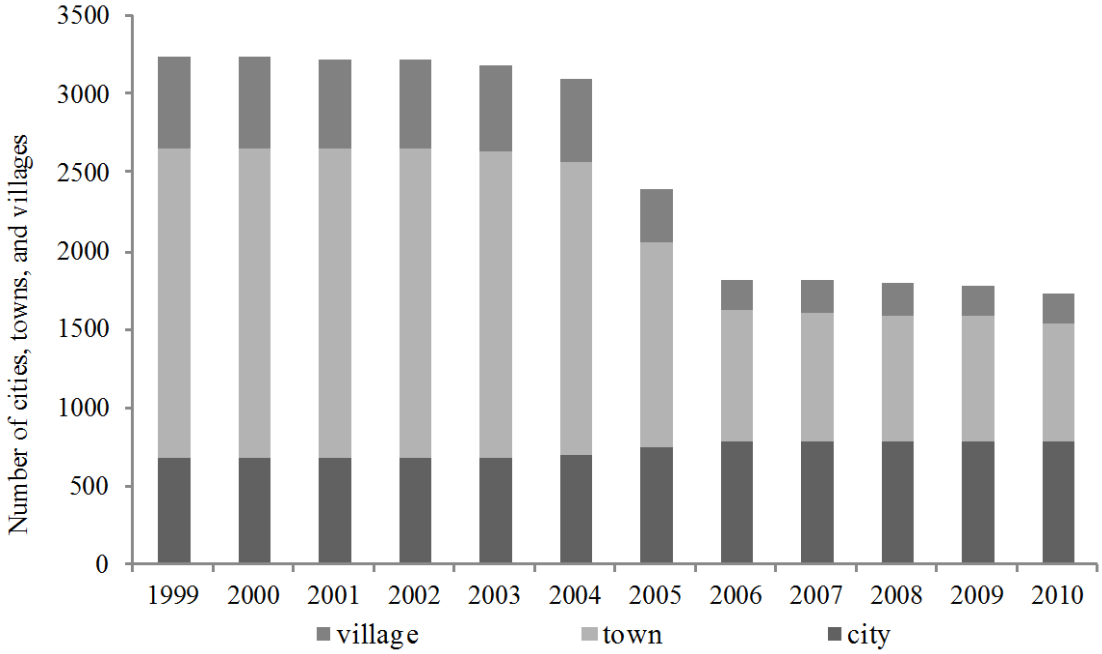
Figure 1. Changes in Public Assistance Use in Japan



Note: The numbers are monthly averages for each fiscal year.

Source: National Institute of Population and Social Security Research (IPSS) “Trend of Public Assistance Recipients and Public Assistance Rate”

Figure 2. Number of Cities, Towns and Villages in Japan



Source: Ministry of Internal Affairs and Communications, “Change in the Number of Municipalities”