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Yukiko Abe

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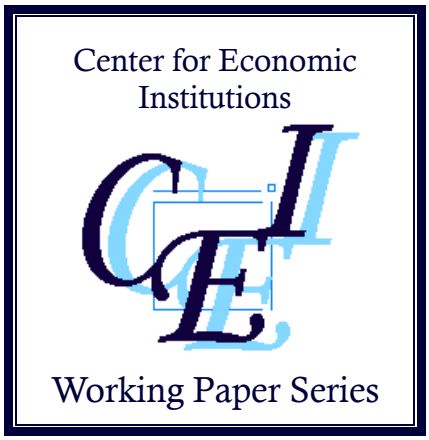

Institute of Economic Research
Hitotsubashi University
2-1 Naka, Kunitachi, Tokyo, 186-8603 JAPAN
http://cei.ier.hit-u.ac.jp/English/index.html
Tel:+81-42-580-8405/Fax:+81-42-580-8333

Regional variations in labor force behavior of women in Japan [*]

Yukiko Abe[**]

Graduate School of Economics and Business Administration,

Hokkaido University

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Abstract

This study uses cross-sectional data to investigate the regional differences in women's participation in the labor market. Women's participation is high in the northern coastal region of Japan. Their high rate of participation is caused by the fact that married women with children participate as regular full-time employees. A possible explanation for the high participation in the northern coastal region is a combination of (1) a high degree of manufacturing in the northern coastal region and (2) supply side factors that motivate women to work.

Keywords: Regional differences, regular employment, part-time employment, Japan.

JEL Classification: J21, R23

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[**] Corresponding author: Graduate School of Economics and Business Administration, Hokkaido University, Kita 9 Nishi 7, Kita-ku, Sapporo, 060-0809 Japan. Phone 81-11-706-3860, Fax 81-11-706-4947, Email: abey@econ.hokudai.ac.jp

1. Introduction

It is widely believed that Japan is a country in wihch women's participation in the labor market lags behind that of other developed countries. While women's participation rates have risen continuously over time, the cross-sectional participation profile in 2007 still exhibits an M-shaped pattern in Japan, while the profiles of many other developed countries are inverse U-shaped (Abe and Oishi 2007; Blau, Ferber, and Winkler 2010).

The shape of the participation profile, however, differs significantly across regions within Japan. The participation rates are quite high in the northern coastal area from Yamagata to Shimane; the employment-population ratio (E-P ratio) of women aged 25-54 residing in this region was 77 percent in 2007, while that in Tokyo was 62 percent.[1] Figures 1a and 1b plot the E-P ratio of females and males in four areas in Japan: (1) suburban Tokyo (Saitama, Chiba, and Kanagawa); (2) Tokyo; (3) the northern coastal prefectures (Yamagata, Niigata, Toyama, Ishikawa, Fukui, Tottori, and Shimane); and (4) the Kansai metropolitan area (Kyoto, Osaka, and Hyogo). The figures show three notable patterns. First, the E-P ratio of women is much higher in the northern coastal area than in other areas, irrespective of age. Second, while the E-P ratio falls between ages 30 and 39 in all regions, the extent of fall is much smaller in the northern

[1] The participation rate in areas outside of the northern coastal area and outside of Tokyo is 65 percent.

coastal area than in other areas. In other words, the age profile of the E-P ratio in the northern coastal area is less like an M-shape than in other areas. Finally, a comparison of males and females shows that female participation has greater regional variations than male participation.

In this paper, I document the regional differences in participation behavior by focusing on the following four aspects: (1) participation in regular full-time work and part-time work, (2) educational attainment, (3) marital status, and (4) presence of children. In addition, I examine the possible roles of supply and demand factors in creating the regional differences in participation.

Previous studies have examined the regional variations in women's participation behavior in several different contexts. Acemoglu, Autor, and Lyle (2004) show that different mobilization patterns during the World War II era across the United States led to regional differences in women's participation. While mobilization created regional variations in women's participation, the authors show that this phenomenon was transitory. Olivetti and Petrongolo (2008) use cross-country data and show that substantial differences exist in women's labor force participation across European countries and the United States, and examine the implications of these differences on

the gender wage gap.[2] These papers point out the existence and implications of regional variations in women's employment during certain periods and locations, although they do not attempt to explain permanent differences in women's participation behavior across regions.

Several studies have examined the relationship between women's participation and residential choices. Costa and Kahn (2000) show that highly educated "power couples" in the United States became more likely to locate in the Metropolitan Statistical Areas (MSAs) from 1940 to 1990. They attribute this change to the colocation problem, i.e., the difficulty of finding a residence convenient to both spouses' workplaces. In contrast, Compton and Pollak (2007) analyze panel data and argue that colocation is not a major cause of the concentration of power couples in large MSAs. These papers do not pay much attention to the level of women's participation rate.

Abe (2011b) builds a theoretical model that explains the participation differences in regular full-time work and part-time work by women residing in Tokyo and suburban Tokyo based on commuting costs and residential choice. Commuting costs or housing prices can successfully explain the differences within the Tokyo metropolitan area (Tokyo and suburban Tokyo) but probably are less successful in

[2] Hunt (2002) makes a similar point in the context of time-series changes in employement and the gender wage gap in East Germany in the early 1990s.

explaining the differences among non-metropolitan areas. In particular, commuting costs do not provide a satisfactory explanation for the significant differences between the northern coastal area and the other non-metropolitan area.

The contribution of this paper is two-fold. First, this study uses the microdata of the Employment Status Survey (ESS; Ministry of Internal Affairs and Communication of Japan) to analyze the sources of regional differences in women's participation. The microdata allow me to assess the effects of education, marital status, and presence of children, which had been difficult to assess in previous studies that used aggregate data. Second, I explore the roles of supply and demand factors that may explain the regional variations by examining the occupational variations of workers in various demographic and educational groups and by conducting regression analysis.

I find that the high degree of participation in the northern coastal area comes mainly from participation in regular full-time work by married women with children. While balancing work and family is considered to be difficult in Japan, women in the northern coastal region achieve it in the most challenging way: women who have the highest degree of household responsibilities (married women with children) work in regular employment (for which working hours tend to be more inflexible than other types of employment). For the causes of regional differences, I conclude that a

combination of supply side factors (including work norms) and a demand factor (industry structure) would be a reasonable interpretation for high participation in the northern coastal region.

This paper proceeds as follows. In the next section, basic facts about the northern coastal regions are reported. In Section 3, data used in the analysis are explained, and definitions are introduced. Section 4 presents the patterns of regional variations from raw tabulations of data. Section 5 presents regression results. In Section 6, I explore the possible interpretations of the findings. Section 7 concludes.

2. The high-participation region

Women's participation varies greatly in Japan, depending on region. The main focus of this paper is the area where women's participation is much higher than elsewhere: the northern coastal area of Honshu Island, prefectures between Yamagata and Shimane. Three major metropolitan areas (Tokyo, Chubu, and Kansai) are also a major focus of this paper. As explained in the Introduction, the northern coastal region is unique in its high rate of women's participation.

To create a sense of the economic characteristics of the high participation region, I report basic facts about this region and other regions in this subsection.[3] Table

[3] The northern coastal region is not the only place outside of the metropolitan areas that has a high degree of women's participation. Other non-metropolitan areas included in "other" regions (e.g.,

1a shows the population share and population growth of six regions in Japan. The regional classification used here is the four metropolitan areas (Tokyo, suburban Tokyo, Chubu, and Kansai), the northern coastal areas, and the rest of Japan; the “rest of Japan” is called the “other region” in this paper. The northern coastal region's population contains 6 percent of the total population of Japan, which is about the same as half the population of Tokyo. Furthermore, from 1992 to 2007, the population of this region was shrinking; the degree of population decline in the northern coastal area is greater (in absolute value) than in the “other” area, which is the general non-metropolitan area in Japan.

The income and wage levels in each of the regions are shown in columns (5) and (6) of Table 1a. The income per capita is highest in Tokyo, followed by the three metropolitan areas, and is lower in the northern coastal regions and the rest of Japan. The mean hourly wage of male full-time workers is shown in column (6). It is highest in Tokyo, followed by the metropolitan areas. The male full-time wage in the northern coastal region is slightly lower than in the "other" area. In sum, the northern coastal region is a low-income, low-wage area.

Table 1b shows the industry composition of employment for male and female

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Kochi and Nagano prefectures) have a uniquely high degree of participation. However, these prefectures are surrounded by other prefectures with low participation by women.

workers, for selected industries that have large regional variations. The northern coastal region and the Chubu region are unique in their high proportions of the manufacturing sector. The high share for Chubu is especially notable for men: it is because that this region contains a high concentration of the auto industry.[4] Tokyo has especially high share of the service sector, for both male and female workers.

3. Data and definitions

The data used in this paper are the microdata of the ESS, which is a large scale cross-sectional survey conducted every 5 years; the data I use are from years 1982 and 2007.[5] I mostly use the cross sectional data from 2007 in this paper. The region variable used is the region of residence and not that of employment, because the ESS does not collect information on the region of employment. The data have advantages from those used in previous research; they are microdata, and they contain the prefectural codes. Previous research on regional differences in participation in the labor market used aggregate data (e.g., Abe, Kondo, and Mori 2008; Hashimoto and Miyagawa 2008). The microdata allow me to assess the effect of education, marital status, and presence of children, which was difficult with aggregate data. In order to confine attention to those

[4] Chubu is the region where the headquarters of Toyota Motor Co. are located.

[5] The ESS is conducted every 5 years by the Ministry of Internal Affairs and Communications of Japan. In 2007, the survey was conducted for adults in 450,000 households; the size of the original sample was 1 million persons aged 15 and over. The ESS is widely used in empirical studies of the Japanese labor market (e.g., Kato 2001; Kawaguchi and Naito 2006; Kawaguchi and Mori 2009; Abe and Tamada 2010; Abe 2011a).

who finished schooling and are below the mandatory retirement age, the analysis here mostly uses a sample of women aged 25–54 years.

In addition to the E-P ratio, two measures are used for gauging participation in the labor market: participation in regular employment and participation in part-time employment. In Japan, employment as a regular full-time employee and that as a non-regular employee (typically, a part-time worker) are quite different in terms of wages, hours, fringe benefits, and working conditions (Ogawa and Ermisch, 1996; Houseman and Osawa, 2003). Therefore, the regular employment and the part-time employment are examined separately. Furthermore, I include executives of private corporations in the set of regular employees because many of them are promoted to executive positions from regular employee positions.[6]

The regular employment ratio (RER) and part-time employment ratio (PTER) are defined as follows:

$$RER = \frac{\text{Number of Regular Employees}}{\text{Population}}, \tag{1}$$

$$PTER = \frac{\text{Number of Part-time Employees}}{\text{Population}}, \tag{2}$$

where the "Number of Regular Employees" is the sum of regular employees and executives and the "Population" is the population for each cell defined by birth-year,

[6] See Abe (2011a) for issues concerning this treatment.

education, and age group.[7] To have a sufficient number of observations per cell, the age group is defined in 5-year intervals (i.e., 25–29, 30–34, and so on). Note that the two measures above are calculated as shares of the population in each cell, so the denominator includes non-workers. These measures are derived for those who finished schooling; those who are in school are excluded both from the numerator and from the denominator. The level of education I consider in this paper are the following two groups: (1) senior high school or junior college graduates, and (2) university graduates or over.[8]

4. Facts on participation: raw tabulations

In this section, I report detailed facts on regional patterns in participation as raw tabulations. In particular, I focus on differences between employment status (regular or part-time), education, marital status, and presence of children. In Figure 2a, the RER is plotted against age. This ratio is higher for university graduates than for the less-educated group, but it is obvious that more women engage in regular employment in the northern coastal area than in other metropolitan areas, irrespective of age and education. Except for university graduate women in Tokyo aged 40 or younger, the RER

[7] Part-time workers in the numerator of equation (2) include both part-timers and arbeit workers in the ESS. Part-time workers in the ESS correspond to those who are called part-timers in the workplace. Therefore, they include non-regular employees whose working hours are relatively long.
[8] Junior high school graduates, who finished the compulsory schooling of 9 years, consist another group, but I do not report the results for this group in this paper.

is higher in the northern coastal area than in any other area.

Figure 2b plots the PTER in a way similar to Figure 2a. For all regions, part-time employment is more prevalent for older ages. The regional patterns in part-time employment are quite different from regular employment: the PTERs in the northern coastal region are at similar levels as other areas shown here. Taken together, the high E-P ratio in the northern coastal area is caused by high participation in regular employment and not in part-time employment.

It is important to note that regional patterns in women's employment have changed over time. Most notably, the high degree of participation by women in the northern coastal region has diminished in recent years. As Figure A1 in the Appendix shows, in 1982, the regular employment ratio of women was uniformly higher in the northern coastal region than in Tokyo; Figure 2a shows that in 2007, the same ratio was at similar levels for women younger than 40. Women who recently received a university education increasingly chose to live and work as regular full-time employees in metropolitan areas.

Figures 3a to 3c plot the E-P ratio, RER, and PTER for married women with children. For this group, the high rate of participation in regular employment is even more pronounced in the northern coastal region than for all women, especially over age

40 (Figure 3b). On the other hand, participation in part-time work is not particularly high in the northern coastal region (Figure 3c). For senior high school and junior college graduates, relative levels of the PTER differ across age: at ages younger than 40, the PTER is high in the northern coastal region, while at older ages, it is lower in the northern coastal region than elsewhere. For university graduates, PTER levels are similar across regions.

5. Regression analysis of regional effects

The raw tabulations in the previous section show that regional variations exist in women's labor force behavior. How large are the regional effects quantitatively? In particular, are there any observable factors that contribute to the regional differences? To answer these questions, I turn to the regression analysis of the cell-mean data and microdata. The advantages of cell-mean data are that the estimation is simple and the results are robust (Donald and Lang 2007). The advantage of microdata regressions is that it allows to control for individual-specific covariates at micro unit level. Also, the microdata regressions are commonly used in previous studies.

The regression equation using cell-mean data has the following form:

$$\bar{y} = AgeD + RegionD + Education\,, \tag{3}$$

where $\bar{y}$ is the average of one of the labor force measures (E-P ratio, RER, or PTER),

AgeD is the set of age dummies, RegionD is the set of region dummies, and Education is the set of education dummies. $\bar{y}$ are derived for the cell defined by the combination of region, age group, and education. The cell-mean regressions are estimated by weighted least squares using the inverse sampling variance of the dependent variable as a weight.

Regional effects (RegionD in Eq. (3)) are estimated by including dummy variables for the five regions ((1) Suburban Tokyo; (2) Tokyo; (3) northern coastal region; (4) Chubu (Gifu, Aichi, and Mie); and (5) Kansai Metropolitan Area), and by setting the rest of Japan as the base group. Among the five regions other than the base group, all but the northern coastal area are the large metropolitan areas.[9] Unless otherwise noted, regressions are estimated from the cross sectional data of the 2007 ESS.

5.1. Cell-mean regression results for all women

As a starting point, I estimate and compare the regional effects for men and women. Column (1) of Table 2 reports estimates from women's E-P ratio, and column (2) reports estimates of men's E-P ratio. The regional effects are clearly greater for women than for men: the E-P ratio of women in the northern coastal area is 9 percent

[9] Suburban Tokyo and Tokyo belong to the Tokyo metropolitan area, Chubu is the metropolitan area around Nagoya, and the Kansai metropolitan area is around Osaka. Hashimoto and Miyagawa (2008) report that the E-P ratio is low in the metropolitan areas.

higher than the base group, and that in the Kansai area is 7 percent lower than the base group; for men, the absolute values of the regional effects are less than 2 percent. It is also noteworthy that women living in the metropolitan areas are less likely to participate in the labor market. This is especially so for the suburban Tokyo and Kansai areas. The coefficients of education indicate that junior high school graduates are much less likely to work, while university graduates are 4 percent more likely to work, compared with the base group of senior high school and junior college graduates.

Next, the regional effects of regular employment of women are examined by taking the RER as the dependent variable (column (3)). The effect of the northern coastal area is of similar size to the one in the E-P ratio (column (1)), but the effects for Tokyo and Chubu are different from those in the E-P ratio. Women living in Tokyo are no less likely to work in regular full-time jobs than the base group, while women residing in the Chubu area are less likely to work in regular employment than the base group. The effects of education show that university graduate women are 15 percent more likely to work in regular employment than senior high school and junior college graduates.

Column (4) reports the results for the part-time employment ratio, for which the regional patterns are very different from those of regular employment. Part-time

employment is clearly lower in Tokyo and is at similar levels elsewhere. The coefficients of education show that university graduate women are 14 percent less likely to work in part-time employment, which is consistent with previous research. Taken together, women's high participation in the northern coastal area is the result of high participation in regular employment, not in part-time employment.

Next, I examine the impact of marital status and presence of children. Column (5) reports the results for married women. The positive effects for the northern coastal region are even more pronounced for married women, especially because Tokyo's effect is negative and statistically significant for this group. The specification in column (6) includes the interaction terms of a northern coastal area dummy and age over 40 dummy and the interaction of a Tokyo dummy and age over 40 dummy to allow for the possibility that regional effects differ depending on age. The regular employment ratio of married women in the northern coastal area is 4 percent higher than the younger age group.

Column (7) reports results for regular employment with the sample of single women. The magnitude of regional effects is generally small for single women. For example, single women in the northern coastal regions are 5 percent more likely to work in regular employment than women in the "other" area; this is much smaller than the 13

percent for married women.

Finally, columns (8) and (9) report results for the sample of married women with children. The pattern of regional effects is very close to that of married women (columns (5) and (6)). Therefore, the high E-P ratio in the northern coastal area is the outcome of married women with children working as regular employees in that region.

5.2. Cell-mean regression results for educational subgroups

Are strong regional effects shown in the previous section present for all education groups? Raw tabulations in Section 4 suggest that regional effects might be different depending on education. To examine this issue, I present estimates in this section similar to the ones in Table 2 for the two education groups: (1) senior high school and junior college graduates and (2) university graduates or over.

The analysis in the previous section confirms that regional differences are most pronounced for married women with children. For this group, it is possible to control for covariates that are related to husband and household: husband's income, husband's education, and whether the household is three-generation household or not. Therefore, I augment Eq. (3) as follows:

$$y = AgeD + RegionD + \overline{Z}\gamma . \quad (4)$$

Here, $\overline{Z}$ is the regional average of individual characteristics (co-residence with one of

the parents, husband's education, and husband's earnings).[10] [11] Previous studies find that these factors are related to women's participation in the labor market in Japan (e.g., Sasaki 2002; Nawata and Ii 2004).

5.2.1. Senior high school and junior college graduates

Table 3a presents estimates from regressions for senior high school and junior college graduates. The northern coastal region still has a high regular employment ratio for this group. The effects for other metropolitan areas are different, however. The effect of Tokyo is close to zero for all women but negative and statistically significant for married women, suggesting that regular employment is common for unmarried women who reside in Tokyo.

Columns (4) and (5) report results for married women with children. The regional effects are close to those of married women (column (2)). Column (5) includes the interaction terms of a dummy for those over age 40 and Tokyo and a dummy for those over age 40 and the northern coastal area. While the effect of (Tokyo)×(age over 40) is small and statistically insignificant, the effect of (Northern coastal area) ×(age over 40) is 0.05 and statistically significant. Therefore, the high RER in the northern

[10] The "Education" variables are excluded from Eq.(3) because regressions in this section are done for education subgroups.

[11] Any factor that is capable of explaining the regional differences in female participation should have regional differences as regional average (or regional aggregate).

coastal region is more pronounced for ages over 40.

Controlling for the region-level average of covariates (column (6)) decreases the coefficients of northern coastal region somewhat (from 0.11 to 0.07 for the northern coastal dummy, and from 0.05 to 0.02 for the (Northern coastal area) ×(age over 40) dummy), but it is still the case that women residing in the northern coastal area are more likely to work in regular full-time employment.

5.2.2. University graduates

Table 3b reports results from the sample of university graduate women. Similar to Tables 2 and 3a, the northern coastal area has a high regular employment ratio for university graduates. The effect for Tokyo is different: for the highly educated group, single women living in Tokyo are more likely to work in regular employment than those who reside in the base group (column (3)). However, this positive effect turns negative for married women. Furthermore, the effect of the interaction term of (age over 40)× (Tokyo) shows that the negative coefficient of Tokyo is more pronounced for those aged over 40. This is consistent with Figure 2a, in which the regular employment ratio is at similar levels in Tokyo and the northern coastal area for ages below 40, but there is a divergence over age 40.

The regional effects for married women with children are greater in magnitude

for university graduates than for senior high school and junior college graduates. In particular, the negative effects for metropolitan areas are greater in absolute value, while the positive effects for the northern coastal areas are at a similar magnitude for the less-educated group (column (4) of Tables 3a and 3b). The region coefficients for married women (column (2)) and married women with children (column (4)) differ slightly for suburban Tokyo and Tokyo, while the coefficients for other regions are close.

Controlling for the region-level average of covariates (column (6)) decreases the coefficient of the northern coastal dummy significantly, from 0.08 to 0.03. The coefficient of (Northern coastal area) ×(age over 40) dummy becomes smaller too, from 0.1 to 0.075, but the magnitude of this coefficient still remains large.

5.3. Microdata regression results

Previous studies used microdata to estimate reduced-form labor supply equations. To compare the estimates to previous studies, in this subsection I report microdata regression results. Specifically, I estimate microdata regressions of the following form:

$$y_i = AgeD + RegionD + Z_i\gamma, \tag{5}$$

where Z_i includes a dummy for co-residence (three-generation household), husband's

earnings, and husband's education. Standard errors are corrected to allow for arbitrary correlations of error terms across individuals within each prefecture. Eq. (5) is estimated for the sample of education subgroups and results are shown in column (7) of Table 3a and 3b.[12] The coefficients of individual covariates have signs that are broadly consistent with previous studies: co-residence increases participation and higher husband's income decreases participation.

In the cell-mean regressions that include $\overline{Z}$ (the regional mean of Z), the impact of Z is estimated from "between-region" variations in $\overline{Z}$. On the other hand, in microdata regressions that include region dummies and Z_i, the impact of Z is estimated from "within-region" variations in Z_i. For instance, male income have across-region variations (high-income area and other area), but there are also within-region variations across households. Furthermore, by construction, the amount of variations in $\overline{Z}$ (cell-mean regressions with 36 observations) and that in Z_i (microdata regressions with 80000 observations for senior high school and junior college sample) are different: for the case of husband's income reported in Table 3a, the standard deviation of $\overline{Z}$ is 0.17, while that of Z_i is 1.09. Therefore, the magnitude of coefficients is generally greater in the cell-mean regressions. Comparison of estimates

[12] The linear probability results are reported, but the probit estimates yield the marginal effects values that are similar to the linear probability estimates.

in columns (6) and (7) indicate that the coefficients of "within" and "between" variations are sometimes very different.

The coefficients of regional effects reported in columns (5) and (7) of Tables 3a and 3b are close. In particular, women in the northern coastal region are more likely to participate in regular full-time employment than women residing in the base group region, for both education groups. Therefore, controlling for individual Z_i do not change the magnitude of regional effects much.

6. What are the explanations?

The results so far have established that the high E-P ratio in the northern coastal area is the result of married women with children being more likely to work as regular employees in that region. This pattern is present both for the highly educated and less-educated groups. The high degree of regular employment of women residing in the northern coastal region is found in various specifications of various demographic and educational groups and is quite robust.

This observation is somewhat surprising for the following reasons. Generally, it is believed that balancing work and family is not easy for Japanese women. Therefore, even though women’s participation has risen over time, the increase has been attributed

to (1) the increase in part-time employment among women and (2) the rise in regular employment of young women (younger than age 40). Regular employment for married women has not advanced much over time (Abe 2011a). Nonetheless, in the region with a relatively small population, women's regular employment is high, particularly so for married women with children. What are the causes for these consistent regional differences? In the rest of this section, I explore the supply and demand factors that might explain the regional effects.

6.1. Demand side factors

One might expect that industry structure of the region has something to do with regional differences in participation. Given the evidence presented in Sections 4 and 5, however, this explanation requires caution. The consistent pattern seen in this paper is that the high degree of participation in the northern coastal areas is found for married women with children. If the region has an industry structure that accompanies a strong demand for women's labor, it has to be a strong demand for *married* women's labor to explain the pattern across marital statuses. It is not clear what kind of industries particularly favor married women's labor to the extent to create the large differences in participation. Furthermore, since participation in part-time employment is similar across regions, the types of regional variations in labor demand have to be such that a stronger

demand for *regular* employment instead of part-time employment.

With that caveat in mind, Table 4a shows the occupational distribution of women in each region in 2007. The major occupational classifications in the ESS are as follows: professional, managerial, clerical, sales, service, security, agricultural, transportation, and manual. To circumvent problems associated with the level of participation in regular employment, the category "Not working as regular employees" is added as one of the occupation categories in tabulating Table 4a. In this table, the single women's sample is restricted to those younger than 40. I exclude occupational categories for which the proportion of regular workers in that occupation is less than 2 percent for all of the six regions. For purpose of comparison, Tables 4b and 4c show the similar occupational distributions for married women working as part-time employees and men working as regular employees, respectively.

Several notable patterns stand out. First, the occupational distributions differ significantly across educational lines. For regular employment of female university graduates, the proportions of manual and service occupations are low; instead, senior high school and junior college graduates work in these occupations. Highly educated women who work in regular employment tend to work in professional and clerical occupations.

Second, regional differences in occupational distribution are small for single women working as regular employees, for men working as regular employees, and for women working as part-time employees; on the other hand, they differ significantly for married women across education groups. For married women with a high school or junior college education, the northern coastal area has a high fraction of manual workers; the proportion of this occupation is low for other regions. For university graduate married women, professional occupations have a higher proportion in the northern coastal area than elsewhere. Therefore, it is not the case that certain industries favor female labor or that these industries attract women into regular employment for the two education groups; if that were the case, women of different education groups would be working in similar occupations.

The high participation of the less-educated group in manual occupations in the northern coastal region could be related to a high proportion of manufacturing in this region. The presence of the manufacturing sector does not automatically mean that women are more likely to work, however: in the Chubu region, where the share of the manufacturing sector is high, single women work more in manual jobs, although married women do not.

6.2. Supply side factors

One might think that the regional differences in childcare resources explain the participation differences of women. Indeed, childcare resources are more available in the northern coastal regions than in the metropolitan areas.[13] For instance, the number of children waiting for a vacancy in a nursery school is high in the metropolitan areas, while the number is zero for most of the northern coastal region. However, this may not be the main reason for the high participation of women over age 40 because children of women of these ages are much less likely to enroll in nursery schools; note that the high participation in regular full-time work in the northern coastal region is more pronounced for this age group (Tables 3a and 3b).[14]

As reported in Tables 3a and 3b, co-residence increases regular full-time work by married women with children, and controlling for co-residence and husband's education and earnings decreases the absolute value of regional effects; however, the regional effects remain for senior high school graduates and university graduates aged over 40. Therefore, co-residence and other observable supply-side characteristics partially explain the regional differences.

The fact that observable supply-side characteristics do not fully explain

[13] Hashimoto and Miyagawa (2008) and Unayama (2009a, 2009b) point this out as one of the leading factors in explaining regional differences in fertility.

[14] Regarding the positive correlation of childcare resources and participation, the reverse causality is also possible: more childcare services are provided *because* women have higher incentives for work in the northern coastal region.

regional differences, especially for senior high school and junior college group, is consistent with the pattern of the occupational distribution reported in Tables 4a–4c. If supply-side factors explain most of regional differences, occupational distributions are unlikely to differ much from those in areas with similar industry distribution (e.g., northern coastal region and Chubu).

7. Conclusions

This study uses cross-sectional data to investigate the regional differences in women's participation in the labor market. Women's participation is high in the northern coastal region of Japan. A higher proportion of married women with children participate as regular full-time employees in the northern coastal region than in other regions; the regional differences are small for married women’s participation in part-time work and for single women’s participation in regular full-time work. Since the degree of regional variations differs depending on marital status and presence of children, supply-side factors are likely to play an important role for the regional differences in participation. In fact, the proportion of three-generation household in the region and the mean male earnings explain a part of regional differences. Nevertheless, controlling for supply-side factors do not eliminate regional differences.

The occupational distributions across regions reveal that married women with

less education in the northern coastal region are more likely to work in manual occupations than women residing elsewhere. This fact, together with the fact that the share of manufacturing employment is high in the northern coastal region, suggests that industry composition plays some role in women's high participation in that region. Therefore, a combination of (1) supply-side factors that motivates women to work, including work norms and (2) a high degree of manufacturing in the northern coastal region would probably be a reasonable explanation for the high participation in the northern coastal region.

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Table 1a
Population share and population growth of each region

	(1)	(2)	(3)	(4)	(5)	(6)
Region	Population share in 2007	population growth of aged 25-54 (1992-2007)	population growth of aged 25-39 (1992-2007)	Share of university graduates in population in 2007	Income per capita (in 1000 yen)	Male FT hourly wage (in 1000 yen)
Suburban Tokyo	0.183	0.005	0.186	0.319	3109	2.076
Tokyo	0.111	0.050	0.192	0.420	4540	2.550
Northern Coast	0.058	-0.092	-0.002	0.203	2736	1.703
Chubu	0.090	0.001	0.179	0.266	3377	2.017
Kansai	0.133	-0.074	0.118	0.293	2996	2.088
Other	0.424	-0.067	0.021	0.214	2707	1.792
Populaton growth for all regions	---	-0.039	0.094			

Note: Population share in 2007 is based on those aged 25-54.
Population growth is calculated between year 1992 and 2007.

Source: Employment Status Survey (published version), Prefecture Income Statistics, Basic Survey of Wage Structure

Table 1b
Industry share of workers (workers' age range=25-54)

Male

Region	Agriculture	Manufacturing	Service
Suburban Tokyo	0.009	0.244	0.235
Tokyo	0.003	0.182	0.296
Northern Coast	0.022	0.250	0.199
Chubu	0.011	0.345	0.181
Kansai	0.005	0.256	0.208
Other	0.031	0.224	0.213

Female

Region	Agriculture	Manufacturing	Service
Suburban Tokyo	0.015	0.156	0.367
Tokyo	0.003	0.123	0.416
Northern Coast	0.024	0.254	0.346
Chubu	0.019	0.243	0.325
Kansai	0.005	0.186	0.358
Other	0.041	0.183	0.365

Notes: The shares are calculated from the number of workers, without adjusting for working hours.
Source: Employment Status Survey (published version)

Table 2
Regional differences in women's and men's participation in the labor market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	EPR	EPR	RER	PTER	RER	RER	RER	RER	RER
	all women	all men	all women	all women	married women	married women	single women	married women with kids	married women with kids
Suburban Tokyo	-0.055**	0.005**	-0.055**	0.002	-0.063**	-0.063**	-0.019*	-0.070**	-0.070**
	(0.011)	(0.002)	(0.007)	(0.012)	(0.005)	(0.005)	(0.008)	(0.005)	(0.004)
Tokyo	-0.020	0.003	-0.002	-0.042**	-0.039**	-0.019*	0.023	-0.050**	-0.044**
	(0.018)	(0.003)	(0.013)	(0.011)	(0.008)	(0.008)	(0.016)	(0.006)	(0.005)
Northern Coast	0.086**	0.012**	0.099**	-0.017	0.126**	0.103**	0.047**	0.129**	0.099**
	(0.010)	(0.002)	(0.008)	(0.010)	(0.007)	(0.011)	(0.011)	(0.009)	(0.011)
Chubu	-0.001	0.020**	-0.027**	0.021	-0.036**	-0.036**	0.024*	-0.039**	-0.039**
	(0.011)	(0.002)	(0.006)	(0.013)	(0.007)	(0.007)	(0.010)	(0.007)	(0.007)
Kansai	-0.067**	-0.007**	-0.062**	-0.000	-0.076**	-0.076**	-0.032**	-0.078**	-0.078**
	(0.008)	(0.002)	(0.006)	(0.009)	(0.006)	(0.006)	(0.008)	(0.006)	(0.006)
Tokyo×(Age>40)						-0.036**			-0.011
						(0.013)			(0.010)
(Northern Coast)×(Age>40)						0.040**			0.053**
						(0.013)			(0.013)
Junior High Grads	-0.116**	-0.105**	-0.146**	0.023	-0.093**	-0.093**	-0.306**	-0.084**	-0.084**
	(0.012)	(0.007)	(0.015)	(0.012)	(0.006)	(0.006)	(0.017)	(0.006)	(0.006)
University Grads	0.035**	0.024**	0.148**	-0.136**	0.125**	0.125**	0.148**	0.111**	0.111**
	(0.010)	(0.001)	(0.006)	(0.007)	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)
Observations	108	108	107	108	106	106	107	104	104
R-squared	0.858	0.917	0.930	0.926	0.950	0.958	0.954	0.946	0.956

Notes: Age dummies and a constant are included in all regressions.
Robust standard errors in parentheses.
* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests).

Source: Author's calculation from the ESS, 2007 (microdata).

Table 3a: Regression results for senior high school and junior college graduates
Dependent variable: Regular Employment Ratio

	cell-mean regresions						microdata regressions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	all women	married women	single women	married women with kids	married women with kids	married women with kids	married women with kids
Suburban Tokyo	-0.054**	-0.063**	-0.019*	-0.067**	-0.067**	-0.042	-0.053**
	(0.007)	(0.006)	(0.008)	(0.005)	(0.004)	(0.026)	(0.008)
Tokyo	-0.005	-0.034**	0.007	-0.042**	-0.042**	0.006	-0.027**
	(0.008)	(0.006)	(0.013)	(0.004)	(0.005)	(0.023)	(0.008)
Northern Coast	0.102**	0.130**	0.045**	0.133**	0.107**	0.073**	0.095**
	(0.010)	(0.007)	(0.012)	(0.011)	(0.012)	(0.018)	(0.014)
Chubu	-0.029**	-0.031**	0.013	-0.034**	-0.035**	-0.055	-0.029**
	(0.007)	(0.008)	(0.009)	(0.008)	(0.009)	(0.031)	(0.008)
Kansai	-0.063**	-0.071**	-0.047**	-0.073**	-0.073**	-0.042**	-0.063**
	(0.006)	(0.008)	(0.006)	(0.007)	(0.007)	(0.014)	(0.013)
Tokyo × (Age>40)					0.001	0.034*	0.009*
					(0.009)	(0.012)	(0.004)
(Northern Coast) × (Age>40)					0.045**	0.020	0.040**
					(0.013)	(0.015)	(0.011)
three-generation household						0.197	0.087**
						(0.114)	(0.010)
husband educ=junior high						0.434	-0.007
						(0.221)	(0.007)
husband educ=university						-0.353*	-0.019**
						(0.147)	(0.004)
log(husband's earnings)						0.155	-0.011**
						(0.134)	(0.002)
Observations	36	36	36	36	36	36	87697
R-squared	0.966	0.973	0.916	0.972	0.983	0.991	0.032

Notes: Age dummies and a constant are included in all regressions.
Robust standard errors in parentheses.
The base group for husband's education is senior high school or junior college graduates.
For column (6), the explanatory variables of the covariates are the mean value of each region; for column (7), they are values for individuals.
* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests).

Source: Author's calculation from the ESS, 2007 (microdata).

Table 3b: Regression results for university graduates
Dependent variable: Regular Employment Ratio

	cell-mean regresions						microdata regressions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	all women	married women	single women	married women with kids	married women with kids	married women with kids	married women with kids
Suburban Tokyo	-0.059**	-0.074**	0.001	-0.104**	-0.104**	-0.065	-0.084**
	(0.021)	(0.021)	(0.011)	(0.022)	(0.022)	(0.044)	(0.018)
Tokyo	0.013	-0.068*	0.071**	-0.100**	-0.065**	-0.046	-0.049**
	(0.040)	(0.032)	(0.025)	(0.018)	(0.019)	(0.055)	(0.015)
Northern Coast	0.092**	0.126**	0.047**	0.128**	0.075**	0.029	0.061**
	(0.026)	(0.029)	(0.010)	(0.032)	(0.018)	(0.025)	(0.020)
Chubu	-0.038	-0.067**	0.043**	-0.079**	-0.079**	-0.072	-0.069**
	(0.023)	(0.019)	(0.014)	(0.024)	(0.026)	(0.039)	(0.022)
Kansai	-0.067**	-0.101**	-0.012	-0.115**	-0.115**	-0.070*	-0.099**
	(0.016)	(0.013)	(0.017)	(0.015)	(0.014)	(0.030)	(0.020)
Tokyo × (Age>40)					-0.058*	0.018	-0.033*
					(0.023)	(0.025)	(0.014)
(Northern Coast) × (Age>40)					0.106**	0.075*	0.111**
					(0.032)	(0.032)	(0.024)
three-generation household						0.610*	0.131**
						(0.282)	(0.021)
husband educ=university						0.556*	0.000
						(0.260)	(0.009)
log(husband's earnings)						-0.058	-0.035**
						(0.146)	(0.005)
Observations	36	36	36	36	36	36	12223
	0.844	0.793	0.710	0.863	0.902	0.932	0.036

Notes: Age dummies and a constant are included in all regressions.
Robust standard errors in parentheses.
The base group for husband's education is "not university."
For column (6), the explanatory variables of the covariates are the mean value of each region; for column (7), they are values for individuals.
* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests).

Source: Author's calculation from the ESS, 2007 (microdata).

Table 4a
Occupational distribution of female regular full-time workers, by region: Women

Education	Marital Status	Occupation	Suburban Tokyo	Tokyo	Northern Coast	Chubu	Kansai	Other
Senior High & Junior College Grads	Single	Not Regular emp	0.524	0.502	0.447	0.491	0.547	0.496
		Professional	0.110	0.111	0.130	0.127	0.120	0.138
		Clerical	0.212	0.227	0.195	0.206	0.187	0.193
		Sales	0.053	0.067	0.057	0.044	0.037	0.047
		Service	0.049	0.047	0.086	0.059	0.052	0.068
		Manual	0.029	0.027	0.071	0.061	0.035	0.043
Senior High & Junior College Grads	Married	Not Regular emp	0.828	0.799	0.634	0.796	0.836	0.763
		Professional	0.041	0.050	0.084	0.047	0.042	0.065
		Clerical	0.079	0.094	0.134	0.083	0.067	0.086
		Sales	0.016	0.015	0.027	0.017	0.015	0.019
		Service	0.016	0.017	0.039	0.022	0.017	0.028
		Manual	0.011	0.012	0.073	0.028	0.016	0.028
University Grads	Single	Not Regular emp	0.357	0.276	0.310	0.315	0.373	0.362
		Professional	0.205	0.222	0.250	0.225	0.201	0.244
		Clerical	0.300	0.327	0.327	0.329	0.285	0.273
		Sales	0.078	0.097	0.046	0.068	0.080	0.055
		Service	0.020	0.018	0.026	0.018	0.013	0.021
		Manual	0.017	0.015	0.025	0.019	0.017	0.021
University Grads	Married	Not Regular emp	0.702	0.687	0.509	0.701	0.732	0.633
		Professional	0.139	0.114	0.289	0.138	0.122	0.216
		Clerical	0.118	0.145	0.137	0.115	0.092	0.103
		Sales	0.013	0.024	0.016	0.016	0.024	0.016

Notes: Entries for the "Not Regular emp" are the proportions of people who are not regular employees among population, including non-workers.
Single women's sample is restricted to those aged below 40.
Source: Author's calculation from the ESS, 2007 (microdata).

Table 4b
Occupational distribution of female part-time workers, by region: Married women

Education	Marital Status	Occupation	Suburban Tokyo	Tokyo	Northen Coast	Chubu	Kansai	Other
Senior High &	Married	Not Part	0.683	0.744	0.716	0.659	0.708	0.693
Junior College Grads		Professional	0.029	0.027	0.022	0.036	0.033	0.028
		Clerical	0.093	0.093	0.086	0.096	0.084	0.083
		Sales	0.041	0.031	0.035	0.041	0.035	0.039
		Service	0.068	0.057	0.051	0.062	0.060	0.061
		Manual	0.073	0.038	0.081	0.094	0.067	0.085
University Grads	Married	Not Part	0.844	0.866	0.872	0.840	0.822	0.863
		Professional	0.036	0.035	0.031	0.040	0.035	0.033
		Clerical	0.062	0.047	0.050	0.060	0.073	0.053
		Sales	0.011	0.012	0.012	0.014	0.023	0.013
		Service	0.020	0.022	0.018	0.024	0.028	0.018

Notes: Entries for the "Not Part" are the proportions of people who are not part-time employees among population, including non-workers.
Single women's sample is restricted to those aged below 40.
Source: Author's calculation from the ESS, 2007 (microdata).

Table 4c
Occupational distribution of female regular full-time workers, by region: Men

Education	Occupation	Suburban Tokyo	Tokyo	Northern Coast	Chubu	Kansai	Other
Senior High &	Not RegFT	0.213	0.276	0.184	0.191	0.261	0.227
Junior College Grads	Professional	0.090	0.100	0.061	0.061	0.069	0.062
	Managerial	0.017	0.028	0.020	0.022	0.017	0.020
	Clerical	0.120	0.111	0.094	0.089	0.095	0.100
	Sales	0.110	0.112	0.109	0.089	0.113	0.098
	Service	0.040	0.060	0.036	0.029	0.044	0.038
	Security	0.032	0.012	0.027	0.025	0.021	0.033
	Transp	0.053	0.048	0.056	0.055	0.048	0.057
	Manual	0.300	0.228	0.392	0.415	0.309	0.343
University Grads	Not RegFT	0.105	0.140	0.111	0.110	0.149	0.130
	Professional	0.258	0.235	0.265	0.228	0.228	0.246
	Managerial	0.032	0.043	0.045	0.034	0.037	0.040
	Clerical	0.242	0.226	0.210	0.210	0.188	0.213
	Sales	0.202	0.202	0.166	0.200	0.216	0.174
	Service	0.011	0.018	0.016	0.018	0.020	0.020
	Security	0.019	0.020	0.022	0.020	0.019	0.026
	Manual	0.093	0.071	0.143	0.154	0.108	0.125

Notes: Entries for the "Not Regular emp" are the proportions of people who are not regular employees among population, including non-workers.

Source: Author's calculation from the ESS, 2007 (microdata).

Figure 1a
Female participation in 2007

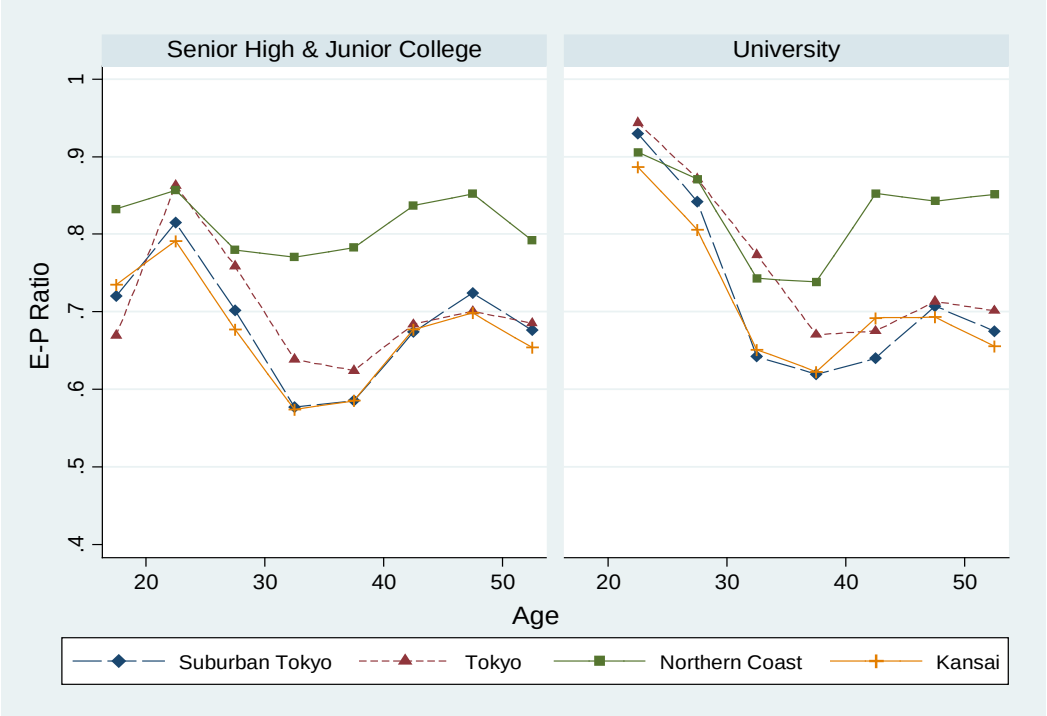
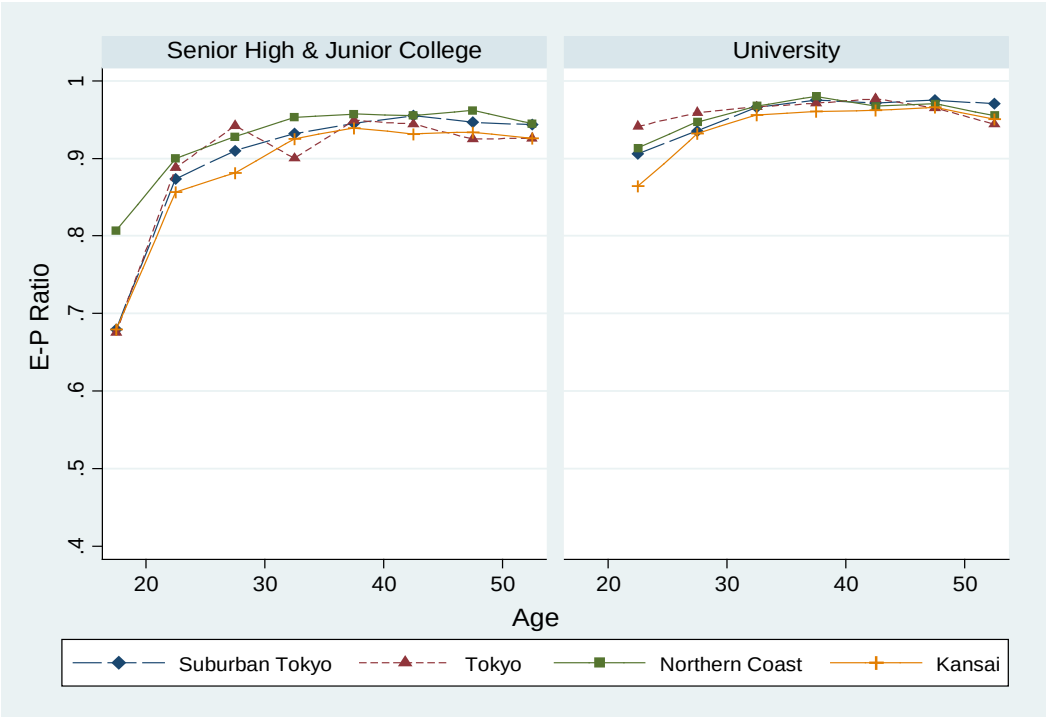


Figure 1b
Male participation in 2007



Source: Author's calculation from the ESS (micro data).

Fig 2a
Female regular employment ratio

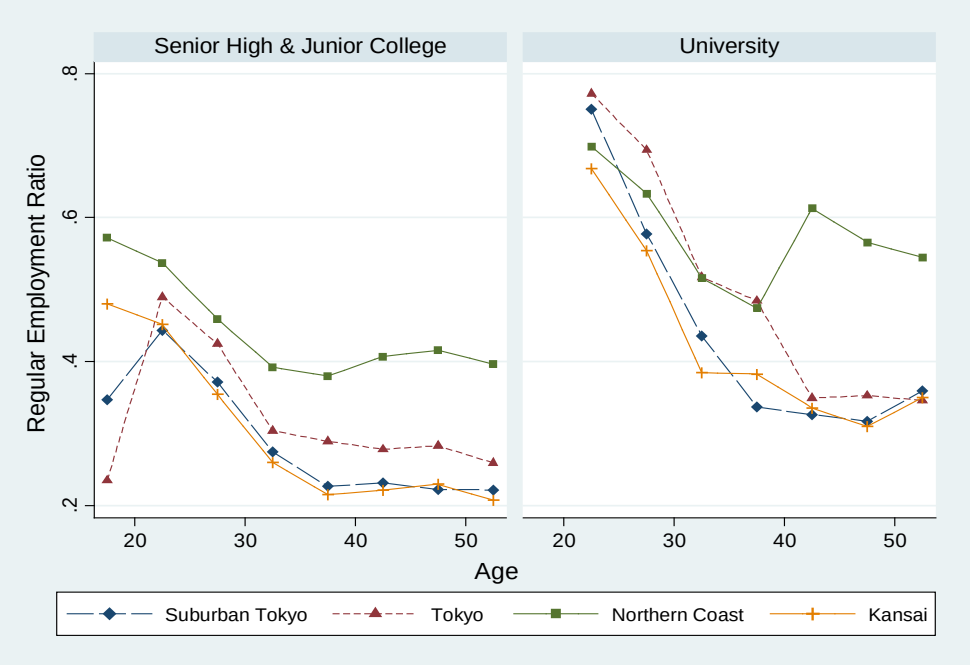
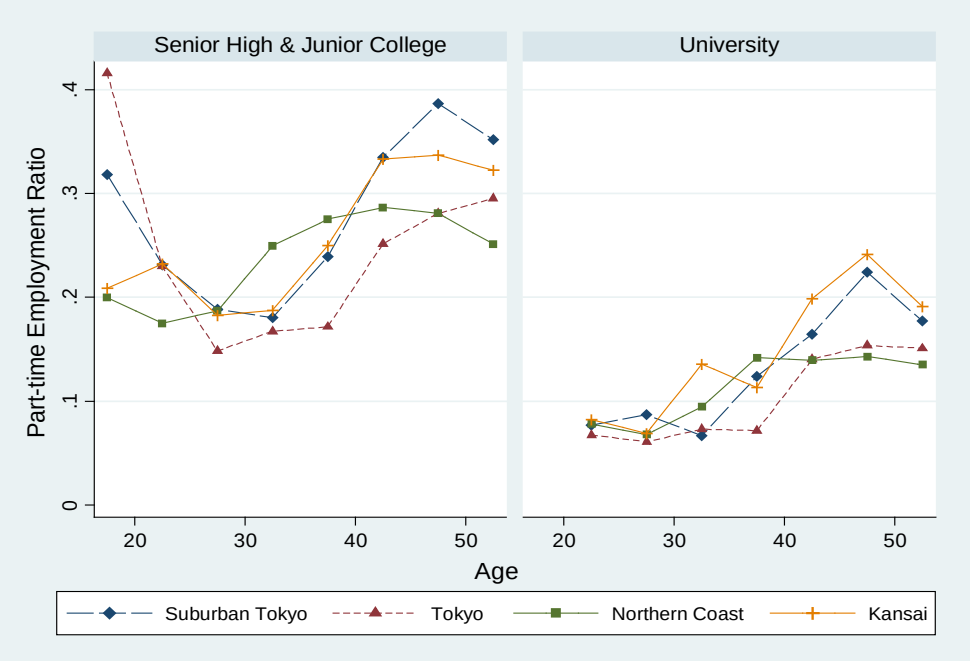


Fig 2b
Female part-time employment ratio



Source: Author's calculation from the ESS (micro data).

Fig 3a
Employment-Population ratio of married women with children

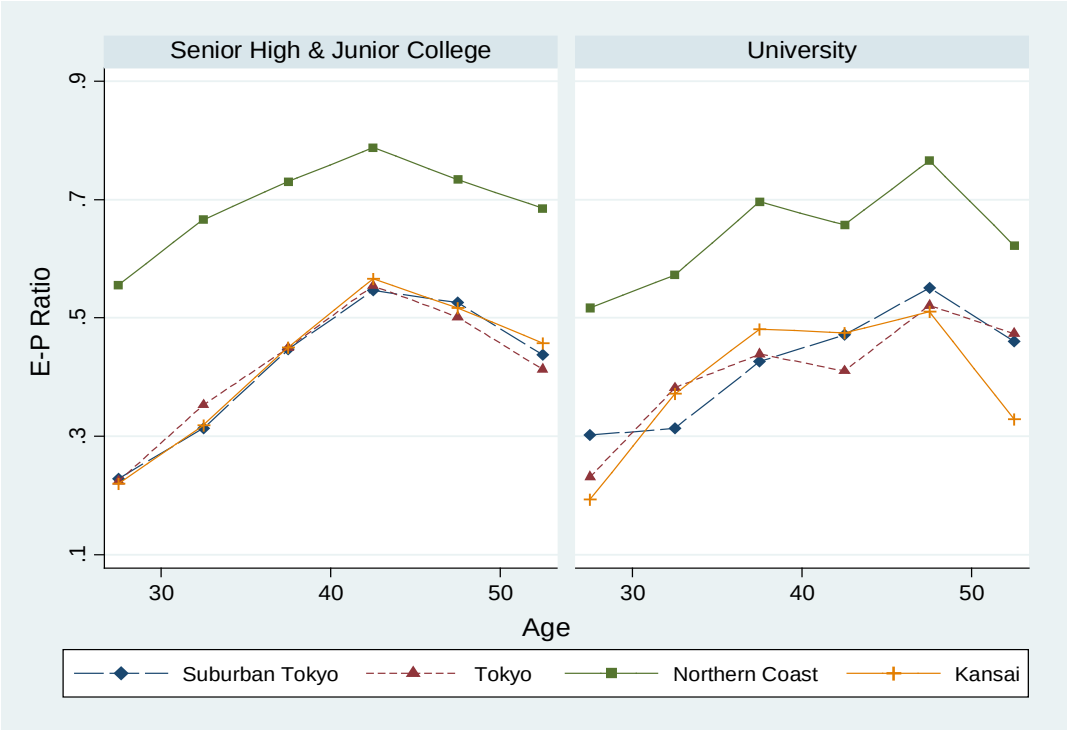


Fig 3b
Regular employment ratio of married women with children

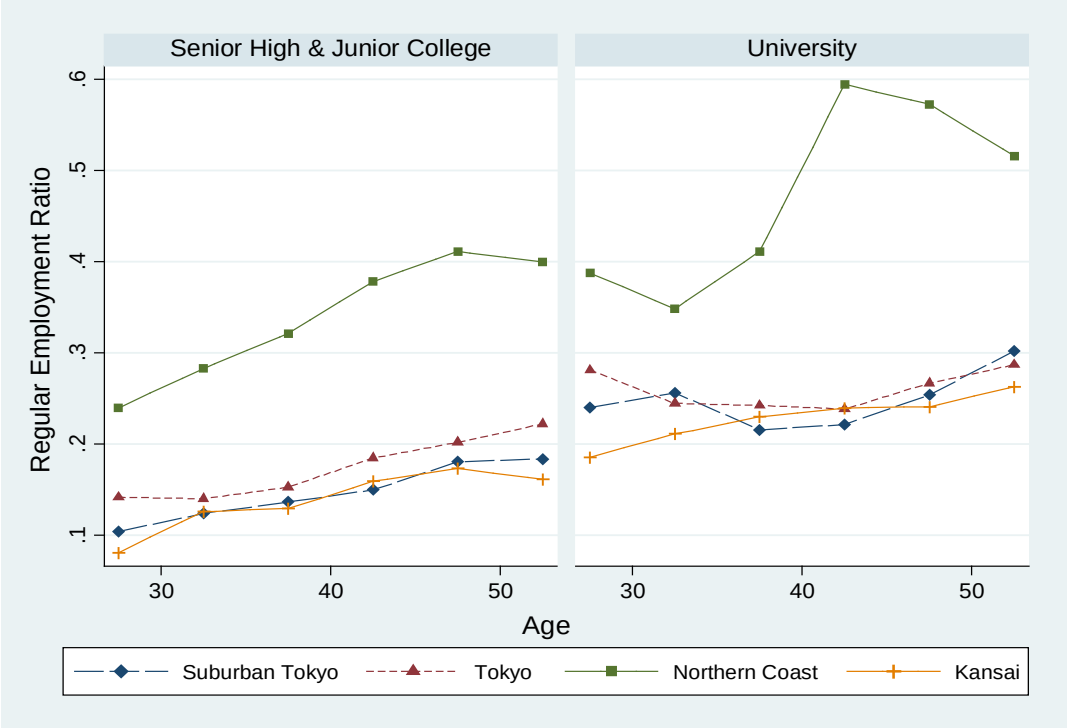
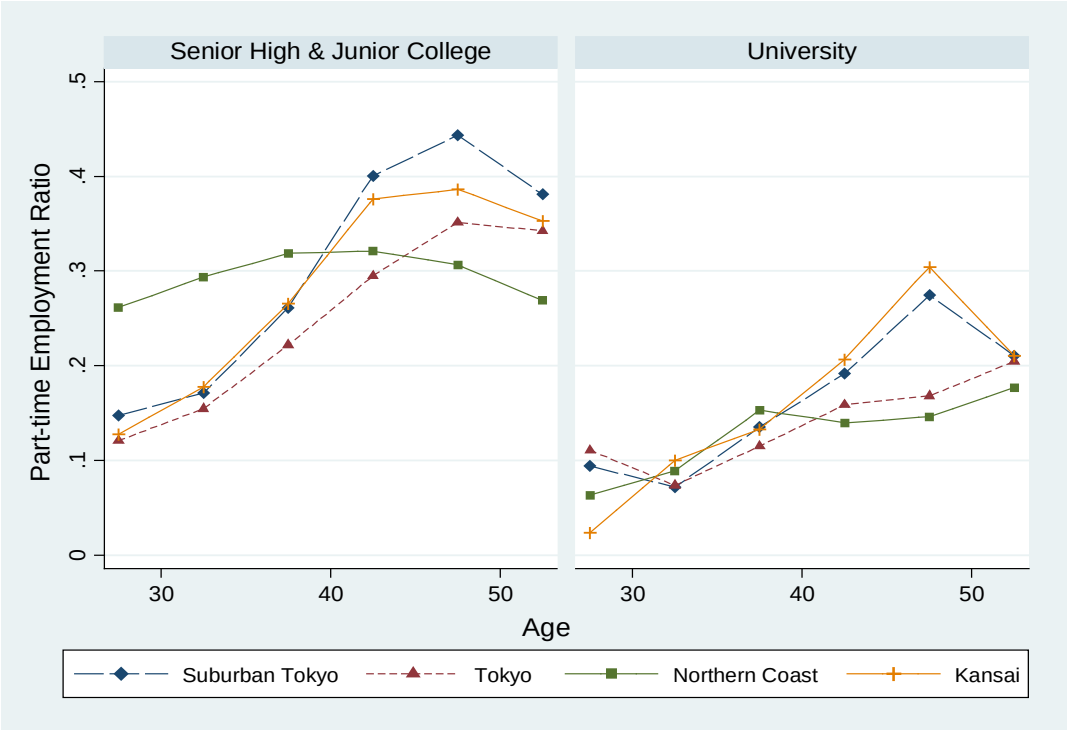
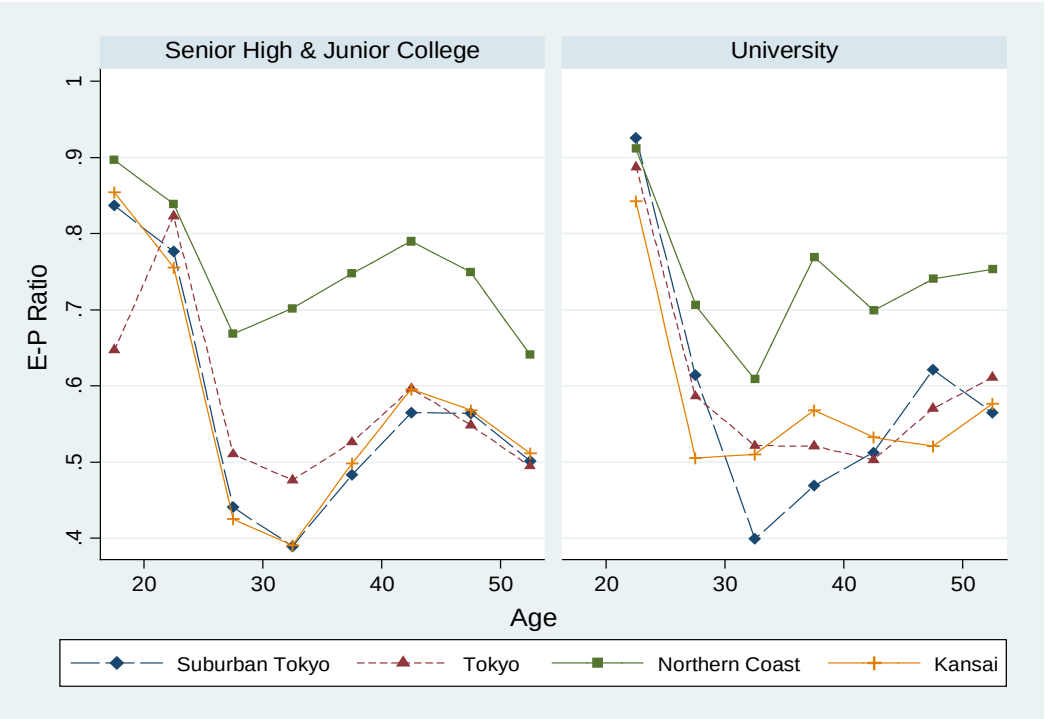


Fig 3c
Part-time employment ratio of married women with children



Source: Author's calculation from the ESS (micro data).

Figure A1
Female participation in 1982



Source: Author's calculation from the ESS (micro data).