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

Yukiko Abe[**]

Graduate School of Economics and Business Administration,
Hokkaido University
July 2012

Abstract

This study uses cross-sectional data to investigate regional differences in women's participation in the labor market. Women's participation is high in the northern coastal region of Japan. This high rate of participation is caused by the fact that married women with children participate as regular full-time employees. Supply and demand factors explain part of the differences, but regional effects remain even after controlling for them. I attribute the high participation in the northern coastal region to long-standing norms regarding women's work.

Keywords: Regional differences, regular employment, part-time employment, Japan, norm.
JEL Classification: J21, R23

---

[*] This paper uses microdata of the Employment Status Survey (ESS) made available by the Ministry of Internal Affairs and Communication of Japan under Article 33-2 of the Statistics Act. Microdata cannot be released due to the terms of usage of the data. For some of the analysis using aggregate data of Census, I used the data from the Center for Spatial Science, University of Tokyo. The map appearing in Figure 1 was created by editing the "Shiro-chizu KenMap" using software by Teruo Kamada. I thank Keiko Tamada for sharing the data on welfare participation, and Yusuke Asahi for able research assistance. I thank Giorgio Brunello, Hank Farber, Richard Freeman, Lisa Kahn, Shiori Kondo, Kunie Mori, Chiaki Moriguchi, Hiroshi Ono, Daisuke Oyama, Yasuhiro Sato, Jacques Thisse, Emiko Usui, Atsushi Yoshida and seminar participants at Hitotsubashi University, Hokkaido University, Kansai Labor Economics Research Group, the Japanese Economic Association Meeting (Kansai Gakuin University, 2010), the OEIO conference at University of Tokyo, the TPLS conference at Doshisha University for helpful discussions. Remaining errors are my own. This research is supported by the Japan Society for Promotion for Science Grant-in-Aid for Scientific Research (Grant Numbers C-20530188 and C-23530261).
[**] 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 which women's participation in the labor market lags behind that in other developed countries. While women's participation rates in Japan have risen continuously over time, the cross-sectional participation profile in the late 2000s shows that women exit the labor force during the childbearing age, and return in later life stages. The M-shaped pattern of female labor force participation in Japan stands a contrast to the profiles of many other developed countries which resemble an inverse U-shape (Abe and Oishi 2007; Blau, Ferber, and Winkler 2010).

There is, however, a conspicuous pattern of female labor supply in Japan that has escaped the attention of Western scholars: the shape of the participation profile 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 years residing in this region was 77 percent in 2007, while the ratio in Tokyo was 62 percent.[1] Figure 1 depicts the northern coastal region on a map of Japan, and Figures 2 plots the E-P ratio of (a) females and (b) males in six regions of Japan.[2] The figures

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

[2] The six regions are: (1) suburban Tokyo (Saitama, Chiba, and Kanagawa prefectures); (2) Tokyo; (3) the northern coastal prefectures (Yamagata, Niigata, Toyama, Ishikawa, Fukui, Tottori, and Shimane prefectures); (4) the Kansai metropolitan area (Kyoto, Osaka, and Hyogo prefectures); (5) the Chubu area (Aichi, Gifu, Mie prefectures); and (6) other region (the prefectures that do not belong to any of the four categories above; non-metropolitan regions other than the northern coastal region).

show three notable patterns. First, the E-P ratio of women is much higher in the northern coastal area than elsewhere, irrespective of age.[3] Second, while the E-P ratio decreases between ages 30 and 39 years in all regions, the extent of decrease is much smaller in the northern coastal area than in other areas. In other words, the age profile of the E-P ratio is less like an M-shape for the northern coastal area than for elsewhere. Finally, a comparison of males and females shows that female participation has greater regional variations than male participation.

Although it is known that women's participation is uniquely high in the northern coastal region, the causes for that pattern is little known. In this paper, I explore reasons for the regional variations in three ways. First, I examine whether regional variations exist after conditioning on education, marital status, and presence of children. Second, I explore the possible roles of supply and demand factors in causing the regional differences in participation. Finally, data from old censuses are used to understand how the regional differences evolved over time.

I find that the high degree of participation in the northern coastal area arises mainly from participation in regular full-time work by married women with children. While balancing work and family is considered difficult in Japan, women in the northern coastal region achieve this in the most challenging way: women who have the highest degree of household responsibilities (i.e., married

[3] It is also true that the E-P ratios are lower in metropolitan areas than in non-metropolitan areas, irrespective of education. Tokyo has a high E-P ratio for highly educated women of younger ages, but this is a recent phenomenon; Figure B1 plots the E-P ratio in 1982, which shows that E-P ratios for Tokyo were low.

women with children) work in regular employment (for which working hours tend to be less flexible than for other types of employment). Supply-side factors (e.g., childcare availability, three-generation households, husband's income, etc.) and a demand factor (i.e., industry structure) explain part of the regional differences.[4] However, the high participation in the northern coastal region still exists even after controlling for supply and demand factors. Historical evidence is consistent with the notion that regional differences in norms regarding women's work play a role in this pattern. Old census data suggest that the norm of high participation by women enabled the main sector of women's employment to be transformed from agriculture to manufacturing and service sectors in this region between 1955 and 1975.

This paper proceeds as follows. The next section provides a review of related literature. Section 3 reports basic facts about the northern coastal region. In Section 4, data used in the analysis are explained and definitions are introduced. Section 5 presents the patterns of regional variations from raw tabulations of data. Section 6 reports regression results. In Section 7, historical evidence is presented. Section 8 concludes.

2. Literature review

Previous studies have examined regional variations in women's

[4] A three-generation household is a household consisting of a couple, the couple's child(ren), and the couple's parent(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 argue that this phenomenon was transitory. Fogli and Veldkamp (2011) show that the female labor force participation rate in the United States has had large regional variations and that it changed in different manners in different areas. They interpret the spatial correlations in participation as being created by informational flows: that is, women who reside close to other working mothers have a greater propensity to participate in the labor market because they know that being a working mother is a viable option.[5] Using cross-country data, Olivetti and Petrongolo (2008) 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 for the gender wage gap.[6] Antecol (2000) and Fernández and Fogli (2009) show that, in the United States, participation by immigrant women is significantly affected by their country of origin. They interpret this pattern as being caused by the influence of culture on participation decisions.

[5] In related studies, Costa and Kahn (2000) and Compton and Pollak (2007) examine residential decisions of highly educated "power couples" in the U.S.

[6] Hunt (2002) makes a similar point in the context of time-series changes in employment and the gender wage gap in East Germany in the early 1990s. Antecol (2001) estimates the gender wage gap for immigrants in the U.S.

Some studies explain regional differences in women's participation in terms of commuting costs. For a sample of U.S. cities, Black, Kolesnikova, and Taylor (2010) show that commuting costs and women's participation are negatively correlated. Abe (2011b) builds a theoretical model that explains 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. However, commuting costs do not provide a satisfactory explanation for the significant differences between the northern coastal area and other non-metropolitan areas in Japan. Commuting costs are low in both areas, yet the participation rate of women is much higher in the northern coastal region than in other non-metropolitan areas.

3. The high-participation region

Women's participation varies greatly in Japan, depending on the 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 focus of this paper.[7] As seen in Figure 2, the E-P ratios in the metropolitan areas are lower than those in the northern coastal region or in

[7] Of these, the Tokyo metropolitan area is divided into Tokyo and suburban Tokyo because women's participation behavior differs between the two areas.

other non-metropolitan areas.[8] As explained in the Introduction, the northern coastal region is unique in its high rate of women's participation. In this section, I discuss (A) the selection of region categories and (B) the economic characteristics of the northern coastal region.

A. Selection of the region

The selection of the northern coastal region, as shown in Figure 1 and used in the rest of the paper, does not follow a standard grouping of regions within Japan. Instead, selection is based on two criteria: geographical features and level of women's participation. This procedure allows for the selection of a set of prefectures with a uniquely high level of participation and common geographical features.

Specifically, a prefecture is included in the northern coastal category if the following two criteria are met. The first criterion is geographical: the prefectures are located along the northern coast line of Honshu Island and do not face the sea at the other side. Several prefectures (i.e., Aomori, Kyoto, Hyogo, and Yamaguchi) are excluded, even though they have a coast line facing to the north. They are excluded because they also face the sea on the other side, either the Pacific Ocean (Aomori) or the Seto Inland Sea (Kyoto, Hyogo, and Yamaguchi). The second criterion is the level of women's participation: to determine this, I use

[8] The fact that participation among highly educated women is lower in metropolitan areas than in non-metropolitan areas in Japan is somewhat at odds with the facts shown by Costa and Kahn (2000) for the U.S.

the participation rates for those aged 25–54 years. Akita faces the northern coast on one side only but is excluded from the northern coastal region because it does not always have the highest participation rate. According to these two criteria, the seven prefectures shown in Figure 1 are identified as “the northern coastal region.” The remarkable fact is that these seven prefectures have the highest E-P ratio for many of the large-scale data sets (ESS in 2002 and 2007, Census in 1990 and 2000); Appendix A summarizes participation levels for these years.

B. Economic characteristics of the northern coastal region

To gain a sense of the economic characteristics of the northern coastal region, I report basic facts about this region and other regions in this subsection. Table 1a shows the population share and population growth rates of six regions in Japan. The northern coastal region 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 decreased; 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. Taken together, the northern coastal region is a low-income, low-wage area. Despite the low wages and income, the welfare participation rate is low in the northern coastal region, as shown in column (7) of Table 1a. One of the reasons for this low welfare participation is the high level of participation in the labor market by women.

Table 1b shows the industry composition of employment for male and female 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 and is because this region contains a high concentration of the auto industry.[9] Tokyo has an especially high share of the service sector, for both male and female workers.

4. Data and definitions

The data used in this paper are microdata of the ESS, which is a large scale cross-sectional survey conducted every 5 years. 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 several

[9] The headquarters of Toyota Motor Co. are located in the Chubu region.

advantages over those used in previous research: they are microdata, and they contain the prefectural codes. Previous studies on regional differences in participation use aggregate data (e.g., Abe, Kondo, and Mori 2008; Hashimoto and Miyagawa 2008). The microdata allow me to assess the effects of education, marital status, and presence of children, factors that were difficult to assess with aggregate data. To confine attention to those who have 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 to gauge participation in the labor market: (1) participation in regular employment and (2) participation in part-time employment. In Japan, employment as a regular full-time employee and as a non-regular employee (typically, a part-time worker) is quite different in terms of wages, hours, fringe benefits, and working conditions (Ogawa and Ermisch 1996; Houseman and Osawa 2003; Gaston and Kishi 2007).[10] 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.[11]

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

[10] Recently, the wages and job satisfaction of part-time workers have attracted much attention internationally (e.g., Booth and Wood 2008; Manning and Petrongolo 2008; Booth and van Ours 2008).
[11] See Abe (2011a) for issues concerning this treatment.

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

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

where "Number of Regular Employees" is the sum of regular employees and executives and "Population" is the population for each cell defined by birth year, education, and age group.[12] To obtain 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 have finished schooling; those who are in school are excluded from both the numerator and the denominator.

5. 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 3a, 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 elsewhere,

[12] Part-time workers in the numerator of Eq. (2) include both part-timers and casual (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.

irrespective of age and education. Except for university graduate women in Tokyo aged 40 or younger, the RER is higher in the northern coastal area than in any other area. Participation is generally lower in the metropolitan area than in the non-metropolitan areas.

Figure 3b plots the PTER in a way similar to RER in Figure 3a. For all regions, part-time employment is more prevalent for older ages. The regional patterns in part-time employment are quite different from those of 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. The high degree of participation by women in the northern coastal region has diminished in recent years. As Figure B1 in Appendix B shows, the E-P ratio of women in 1982 was uniformly higher in the northern coastal region than in Tokyo; Figure 3a shows that in 2007, the RER was at similar levels for women younger than 40 years. Women who recently received a university education increasingly chose to live and work as regular full-time employees in metropolitan areas.

Figures 4 plots the (a) E-P ratio, (b) RER, and (c) 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 years (Figure 4b). On the other hand, participation in part-time work is not particularly high in the northern coastal region (Figure 4c). For senior high school or junior college graduates, relative levels of the PTER differ across age groups: for ages younger than 40 years, the PTER is high in the northern coastal region, while for older ages, it is lower in the northern coastal region than elsewhere. For university graduates, PTER levels are similar across regions.

6. Regression analysis of regional effects

The raw tabulations in the previous section show that significant regional variations exist in women's labor force behavior. How large are the regional effects quantitatively? Do any observable factors contribute to the regional differences? To answer these questions, I turn to regression analysis. The focus of interest here is across-group effects, and not the impact of individual characteristics (such as husband's income) on participation. Within-region effects of husband's income may well differ across regions, but the precise estimation of such parameters is not the focus of the present analysis. Rather, the interest here is why people residing in certain regions, as a whole, behave differently from people in other regions.

A. Regression specification and covariates

The regression analysis is performed in two steps: in the first step, the microdata are aggregated into cell level, in which cells are defined by the combination of region (47 prefectures), age group, and education.[13] In the second step, the cell-level data are regressed on region dummies, age dummies, and observable supply and demand variables. Unobserved characteristics that differ across regions and affect participation (e.g., norm) are reflected in the region effects.

The advantages of cell-mean (grouped) data are that the estimation is simple and the estimates of standard errors are conservative (Donald and Lang 2007). The second point is especially relevant in this application because the within-region correlations in participation behavior are potentially large, especially in the presence of a common work norm within a region.

The behavior at the individual level is modeled as follows:

$$y_i = RegionD + AgeD + Education + X_p\beta + Z_i\gamma + \varepsilon_i, \quad (3)$$

where *i* is the index for individuals, and *p* is the index for prefectures. *RegionD* is the set of five region dummies (excluding the base group), *AgeD* is the set of age dummies, *Education* is the set of education dummies, X_p is the prefecture-level

[13] Most of the cells here are different from those in the raw tabulations, in that the region variable for the cell data for regression is 47 prefectures instead of six broad regions. The reason for using 47 prefectures is that it is appropriate to use prefectural-level data for some of the important supply and demand variables (e.g., childcare availability index).

characteristics (e.g., childcare availability), Z_i is the set of individual or household characteristics, and ε_i is the error term. The regression equation using cell-mean data is obtained by aggregating Eq. (3) over i for the cell defined by age, education, and 47 prefectures, leading to the following expression:

$$\bar{y}_j = RegionD + AgeD + Education + X_p\beta + \bar{Z}_j\gamma + \bar{\varepsilon}_j, \quad (4)$$

where j is the index for the cell defined by age group, education, and prefecture, and $\bar{y}_j$ is the average of one of the labor force measures (E-P ratio, RER, or PTER) for cell j. Note that $\bar{Z}_j$ is the average of the supply-related characteristics for cell *j*. Any factor that is capable of explaining the *across-cell* differences in female participation should have regional differences in the *across-cell average*. For example, suppose women residing in the northern coastal region work more than those in other areas because many households in the northern coastal region are three-generation households (Table 2) and women in those households are more likely to participate in the labor market (Sasaki 2002; Nawata and Ii 2004). Then, it must be the case that the cell-level proportion of three-generation households in the northern coastal region is higher than that in other regions.[14] The grouped-data regressions of Eq. (4) are estimated as logit using the quasi-maximum likelihood, with the transformation proposed by Papke

[14] For another example, women work more in the northern coastal region than in other areas because this area is economically poor. Then, it must be the case that the summary measures of income of this region (such as average income) are lower than those of other regions.

and Wooldridge (1996).[15] Regional effects (*RegionD* in Eq.(4)) 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 "other area" (the rest of Japan) as the base group.

In order to examine the role of supply and demand factors, variables representing these factors are included as explanatory variables. They include the nursery school availability index and the demand index. For the sample of married women with children, husband's education, husband's labor income, and the proportion of three-generation households are also included. The summary statistics of the covariates are shown in Table 2. Among the covariates, the definitions of the nursery school availability index and the demand index warrant special mention.

As a supply-related factor, the nursery school resource index at prefecture level is used.[16] Specifically, I use the ratio of nursery school enrollment divided by the female population aged 25–34 years in the prefecture. This index is introduced by Unayama (2009a, b) and has the advantage that it effectively

[15] The quasi-maximum likelihood is used because the dependent variable takes a value of 1 for many cells in the male sample (Table 3, column (2)) and some other samples, which makes it impossible to make a logit transformation. Running the weighted least squares for the logit transformation of $\overline{y_j}$ for the samples that do not have this problem yields similar estimates for marginal effects.

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

measures regional variations regarding the ease of obtaining childcare.[17]

The aim of the demand index is to capture the strength of labor demand based on the industry structure in the region. In the spirit of Katz and Murphy (1992), similar indices are widely used in the literature (e.g., Blau, Kahn, and Waldfogel 2000, 2004; Bound and Holzer 2000). Specifically, the demand index for gender-education group *g* in prefecture *p* is defined as follows:

$$D_{gp} = \sum_{j} s_{kg} \cdot \frac{E_{kp}}{E_{p}},$$

where *k* is the index for industry, s_{kg} is the share of group *g* employment in nationwide employment in industry *k*, E_{kp} is employment in industry *k* in prefecture *p*, and E_{p} is total employment in prefecture *p*. In deriving E_{p} and E_{kp}, a part-time worker is counted as equal to 0.75 of a regular full-time worker to account for differences in the number of hours worked. Since this measure is derived for each education group, it is used for regressions by educational subgroups. The natural logarithm of D_{gp} is used in the regression analysis.

These supply and demand variables are potentially endogenous. For example, firms may choose to locate in the northern coastal region, anticipating

[17] The number of children waiting for a vacancy in a nursery school is high in metropolitan areas, while the number is zero for most of the northern coastal region. Unayama (2009a, b) argues that division by the female population aged 25–34 year is more suitable for capturing the true availability.

that they will be able to hire female labor there. In that case, the industry composition is the *result* of high participation by women, and is not its cause. Likewise, the existing norm for women's high participation leads to a high demand for childcare services, which results in high availability of childcare resources in the high-participation region. The historical evidence shown in Section 6 is indeed consistent with the endogeneity of the industry structure or supply of childcare resources: the high participation in the northern coastal region existed as early as 1955; industry structure and childcare resources were determined after this time and, therefore, may have been endogenous.[18] Nonetheless, how these variables are related to cross-sectional variations in participation behavior is of interest, and that interpretation is given for the effects of covariates. Furthermore, previous studies use these measures in estimating cross-sectional labor force participation or fertility equations (Sasaki 2002; Nawata and Ii 2004; Unayama 2009a, b).

B. Results

All education groups

In this section, I report results for various measures of participation for different samples without including the covariates in order to gauge general patterns in regional differences in participation. As a starting point, I estimate and

[18] Although not included in the present analysis, the number of beds in long-term care facilities has regional variations. The number of beds (adjusted by the size of the elderly population) is high in the northern coastal region (Mitchell, Piggot, and Shimizutani 2007).

compare the regional effects for men and women pooling all education groups. Column (1) of Table 3 reports estimates of the women's E-P ratio, and column (2) reports estimates of the 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 8 percent higher than that of the base group, and the E-P ratio of women in the Kansai area is 7 percent lower than that of the base group (non-metropolitan area other than the northern coastal region); for men, the absolute values of the regional effects are less than 2 percent. It is also noteworthy that women living in metropolitan areas are less likely to participate in the labor market, especially in suburban Tokyo and Kansai. The coefficients of education indicate that junior high school graduate women are much less likely to work, while university graduates are 2 percent more likely to work than the base group of senior high school or junior college graduate women.

Next, the regional effects of women's regular employment are examined by taking RER as the dependent variable (column (3)). The effect of the northern coastal area is of similar size to that of the E-P ratio (column (1)), but the effects for Chubu is different from that in the E-P ratio. Women residing in the Chubu area are 3 percent less likely to work in regular employment than the base group. The effects of education show that university graduate women are 12 percent more likely to work in regular employment than senior high school or junior college graduates.

Column (4) reports the results for PTER, for which the regional patterns are very different from those of regular employment. Part-time employment is clearly lower in Tokyo and is high in Chubu and suburban Tokyo. The coefficients of education show that university graduate women are 16 percent less likely to work in part-time employment, which is consistent with previous research (e.g., Abe 2011a). Taken together, women's high participation in the northern coastal area is the result of high participation in regular employment, and 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 specification in column (6) includes the interaction terms of a northern-coastal-area dummy and an age-over-40 dummy plus the interaction of a Tokyo dummy and an age-over-40 dummy to allow for the possibility that regional effects differ depending on age. The positive effects for the northern coastal region are evident in both specifications. While the RER for married women younger than 40 is higher than for the base group, the coefficient of the interaction term of a northern-coastal-area dummy and an age-over-40 dummy is 0.05, which suggests that the positive effect of this region is more pronounced for the older group. It is also notable that the effect Tokyo is statistically insignificant for the younger group but negative and significant for the older group.

Column (7) reports results for regular employment for the sample of

single women aged 44 or younger.[19] The magnitude of regional effects is generally small for single women, in that single women residing in metropolitan areas are no less likely to work in regular employment than women in the "other" area. It is still the case that single women in the northern coastal region are 6 percent more likely to work in regular employment.

Finally, columns (8) and (9) report results for the sample of married women with children. The pattern of regional effects is close to that of married women (columns (5) and (6)), with the following two exceptions. First, the effect of Tokyo is significantly negative for the younger group. Second, the coefficient of the interaction of a northern-coastal dummy and an age-over-40 dummy is insignificant. Overall, the high E-P ratio in the northern coastal area is the outcome of married women with children working as regular employees.

Educational subgroups

The raw tabulations in Section 4 suggest that regional effects differ depending on education. In this subsection, I report regression estimates separately for two education groups: (1) senior high school or junior college graduates, and (2) university graduates.[20] Supply-demand characteristics are also

[19] Since there are prefecture-education-age group cells that have no observations for single women, the sample size of column (7) is slightly less than all possible combinations of prefecture, education, and age groups ($47 \times 3 \times 4 = 564$).

[20] Junior high school graduates, who finished compulsory schooling of 9 years, constitute another group and are included in the regressions reported in Table 3. I do not report the results for this group in this section because its proportion was relatively low for women.

included as covariates. For the sample of university graduate married women with children, the age 25–29 group is omitted because the cell sizes of this age group are much smaller than that of the other age groups.[21] The childcare availability index is included in some specifications, but this variable may be more relevant for younger women. Therefore, I run regressions that limit the sample for ages younger than 40 years (for senior high school or junior college graduates) or 45 years (for university graduates).

Table 4 presents regression estimates separately for the two education subgroups for all women, regardless of marital status. The northern coastal region still has a high RER for both subgroups, although for university graduates, the high participation is more pronounced for the older group.

Columns (1)–(3) list results from the subsample of the senior high or junior college group. Controlling for childcare availability and the demand index (column (2)) slightly decreases the coefficients of the northern coastal region (from 0.083 to 0.068), but it is still the case that women residing in this region are more likely to work in regular full-time employment. Limiting the sample to ages younger than 40 years (column (3)) does not change the estimates much. The coefficient of the demand index is positive, which suggests that the demand factor

[21] The average cell size is 15, whereas the average cell size for other age groups of university graduates is over 37. This is because the number of women who are university graduates, married, and have children at age 25–29 years is small due to the decline in marriage rates and fertility. Furthermore, when I estimate the model including this age group, the estimates are affected by the cells that represent small numbers of observations, which suggests that data for this age group are outliers.

plays a role for the less-educated group.

Columns (4) to (6) in Table 4 report results from the sample of university graduate women. 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 3a, in which the regular employment ratio is at similar levels in Tokyo and the northern coastal area for ages younger than 40, but there is a divergence over age 40.[22] The coefficient of childcare availability is greater for university graduates than for the less educated. The coefficient of the demand index is negative (wrong sign) and is statistically insignificant for the highly educated group. The inclusion of childcare availability diminishes the effect of the northern coastal area to zero for the younger group.

Married women with children

Table 5 presents results for married women with children, separately for the two education groups. The regional effects for married women with children tend to be greater in magnitude for university graduates than for the less-educated group. In particular, the negative coefficients of metropolitan areas are greater in absolute value.

Columns (2) and (5) of Table 5 show estimates that include covariates but not regional variables to see how the coefficients of covariates are affected by the

[22] It is also notable that the negative effect of Tokyo is unobserved for the less-educated group.

inclusion of regional variables. The coefficients of covariates diminish due to the inclusion of region dummies: for example, the coefficient of the proportion of three-generation households changes from 0.34 to 0.19 for the less educated.

Controlling for supply and demand factors and the region-level average of covariates (columns (3) and (6)) decreases the coefficient of the northern-coastal dummy (from columns (1) and (5)). For the senior high school or junior college group, the decline is about 30 percent. For university graduates, the coefficient of the northern coastal area becomes close to zero for the younger group; the coefficient of the interaction term of a northern-coastal dummy and an age-40-and-over dummy is 0.07 after the inclusion of the covariates. As in Table 4, the childcare resource index affects university graduates to a greater extent than it affects the less educated. The higher proportion of highly educated husbands tends to reduce the likelihood that wives work in regular full-time employment for the less-educated group but not for the highly educated group. After controlling for the distribution of the husband's education, the across-cell variations in husband's mean log earnings do not affect the RER of married women with children.

As for the case for all women regardless of marital status, the coefficient of the demand index is positive and statistically significant for the senior high school or junior college group. Likewise, the coefficient of the demand index is negative (wrong sign) and statistically insignificant for university graduates, which suggests that demand factors are less relevant for the highly educated

group.[23]

7. Historical evidence

The results so far have established that the high E-P ratio in the northern coastal area is because married women with children are more likely to work as regular employees in that region. This pattern is present for both highly educated and less-educated groups in various specifications and is quite robust. The magnitude of regional effects diminishes after controlling for supply and demand factors, but the effects remain sizable and statistically significant for the less-educated group and university graduates aged 40 years and over.

This observation is somewhat surprising for the following reasons. In general, it is believed that balancing work and family is not easy for women in Japan. Even though women's participation has risen over time, the increase has been attributed to an increase in (1) part-time employment among older women and (2) regular employment of young women (aged younger than 40 years); regular employment for married women has not increased much over time (Abe 2011a).[24] Nonetheless, in a region with a relatively small population, women's

[23] These facts are consistent with patterns in occupational distributions reported in the working paper version of this article. Specifically, women with a senior high school or junior college education work disproportionately more in manual occupations in the northern coastal region than elsewhere. In contrast, the occupational distribution of university graduates does not differ much across regions.

[24] In contrast, the increase in participation by married women with children is the major cause for the time-series increase in women's participation in the United States (Blau and Kahn 2007; Attanasio, Low, and Sanchez-Marcos 2008).

regular employment is high, particularly for married women with children.

The aggregate data from earlier censuses allow me to measure the E-P ratio in the past, although disaggregation by education, marital status, and employment status is impossible. The E-P ratios in 1955, 1965, and 1975 are plotted against age in Figure 5a. For all three years, women's participation is clearly higher in the northern coastal region than in other areas, which indicates that high participation in this region is a long-standing phenomenon.[25] These facts suggest that the "fundamental" causes for high participation in the northern coastal region may not be found in "modern" factors such as childcare availability or industry structure.

Indeed, employment in the agricultural and manufacturing sectors suggests that high participation in the northern coastal region was sustained during the period in which agricultural employment decreased significantly. Figure 5b shows the ratio of the number of female workers in the agricultural sector to the female population, and Figure 5c shows the ratio of female workers in the manufacturing sector to the female population, from the censuses of 1955, 1965, and 1975. Figure 5b clearly shows that the ratio in the agricultural sector decreased in all regions.[26] This decline was accompanied by a decline in female

[25] The relative levels of participation in other areas are different: participation was lowest in Tokyo in 1955, but surpassed that in other metropolitan areas in 1975. Note that the census figures are aggregated over education groups and do not correspond to the ESS figures in Figures 2a and B1.

[26] The similar figure for men (not shown here) also indicates that agricultural employment declined during the same period.

participation in suburban Tokyo, Chubu, and "other" areas. The remarkable fact about the northern coastal region is that, although the decline in agriculture was the same as for other regions, female participation remained at a high level in 1955, mainly because of the increase in manufacturing. Figure 5c shows that, while the proportion of those working in the manufacturing sector was around the middle among the six regions in 1955, it rose gradually over time and in 1975 it surpassed the proportion in the Chubu region for ages younger than 40 years. The likely reason is that the northern coastal region attracted manufacturing establishments that intensively hire women.[27]

The long-standing cause of women's high participation may be termed as a "work norm." The norm interpretation is similar to "cultural factors" in explaining ethnic differences in women's participation (Antecol 2000; Fernández and Fogli 2009; Alesina and Giuliano 2010). The evidence presented in this paper adds several insights to the cultural interpretation. First, a region-based work norm might have affected location decisions by firms (i.e., a high participation area attracts manufacturing establishments) or allocation of resources that facilitates women's participation (e.g., childcare). Second, whereas cultural factors are defined at the country level in the papers above, the evidence in this paper suggests that such factors can differ within a country like Japan, where inter-regional migration is less costly than international migration. Finally, the

[27] Similarly, but to a lesser extent than manufacturing, women's employment in the service sector increased in the northern coastal region between 1955 and 1975 (results not shown).

catch-up in young women's participation rates for by Tokyo implies that cultural factors may change over time, possibly due to labor market institutions (e.g., the Equal Employment Opportunity Law) or changes in the industry composition of labor demand (e.g., fall in labor demand for manufacturing due to increasing globalization).

8. Conclusions

This study uses cross-sectional data to investigate regional differences in women's participation in the labor market. Women's participation is high in the northern coastal region of Japan. Specifically, 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 variation differs depending on marital status and presence of children, supply-side factors are likely to play an important role. In fact, supply-side factors (the proportion of three-generation households in the region, the mean husband's earnings, and childcare availability) explain part of the regional differences. Demand-side factors play a role for women with a senior high school or junior college education. Nevertheless, controlling for supply and demand factors does not eliminate regional differences. The 1955 data show that

high participation in the northern coastal region was evident at that time. Historical evidence from old census data suggests that a high participation norm attracted manufacturing industries that intensively hire women to the northern coastal region.

Appendix A: Selection of prefectures included in the northern coastal region

In Tables A1 and A2, the prefectures with the highest E-P ratio in 2002 and 2007 (from ESS) and in 1990 and 2000 (from Census) are reported. As seen in the tables, seven prefectures classified into the northern coastal region consistently had high E-P ratios. The Akita prefecture also had high E-P ratios in the 2007 ESS and in the 2000 Census but not in other years. These patterns confirm that the selection of regions explained in Section 2 is reasonable.

Appendix B: E-P ratios in 1982

Figure B1 shows the E-P ratios from the 1982 ESS.

Data Appendix

(1) Data for the nursery school index

Data on nursery school enrollment are obtained from the Statistics of Social Welfare Facilities (Shakai Fukushi Shisetsu Chosa) in 2005. Data on the

female population aged 25–34 years for each prefecture are obtained from the 2005 Census.

(2) Coding of the presence of children in the 2007 ESS data

The ESS data have a variable that classifies household type into five categories: (1) a couple only; (2) a couple and their parent(s); (3) a couple with child(ren); (4) a couple, the couple's child(ren), and the couple's parent(s); and (5) other. In this terminology, "couple" means the youngest couple in the household, and "children" are the children of the youngest couple. "Married women with children" are identified as married women living in type (3) households or the wife of the youngest couple in type (4) households. Husband's income is earnings from the main job, and they are surveyed as selecting from income ranges. I assign the midpoint of the range in calculating the average income.

References

Abe, Yukiko. 2011a. "The Equal Employment Opportunity Law and Labor Force Behavior of Women in Japan." *Journal of the Japanese and International Economies*, 25, pp. 39-55.

____. 2011b. "Family Labor Supply, Commuting Time, and Residential Decisions: The Case of the Tokyo Metropolitan Area." *Journal of Housing Economics*, 20, pp. 49-63.

Abe, Yukiko; Shiori Kondo and Kunie Mori. 2008. "On Regional Differences of Women's Labor Supply: An Analysis of the Regular Employment Ratios Using Aggregate Data (in Japanese)." *Japanese Journal of Research on Household Economics*, 80, pp. 64-74.

Abe, Yukiko and Akiko Sato Oishi. 2007. "The Role of Married Women's Labor

Supply on Family Earnings Distribution in Japan." *Journal of Income Distribution*, 16, pp. 110-27.

Acemoglu, Daron; David H. Autor and David Lyle. 2004. "Women, War, and Wages: The Effect of Female Labor Supply on the Wage Structure at Midcentury." *Journal of Political Economy*, 112(3), pp. 497-551.

Alesina, Alberto and Paola Giuliano. 2010. "The Power of the Family." *Journal of Economic Growth*, 15(2), pp. 93-125.

Antecol, Heather. 2000. "An Examination of Cross-Country Differences in the Gender Gap in Labor Force Participation Rates." *Labour Economics*, 7(4), pp. 409-26.

____. 2001. "Why Is There Interethnic Variation in the Gender Wage Gap? The Role of Cultural Factors." *Journal of Human Resources*, 36(1), pp. 119-43.

Attanasio, Orazio; Hamish Low and Virginia Sanchez-Marcos. 2008. "Explaining Changes in Female Labor Supply in a Life-Cycle Model." *American Economic Review*, 98(4), pp. 1517-52.

Black, Dan A. ; Natalia Kolesnikova and Lowell J. Taylor. 2010. "Why Do So Few Women Work in New York (and So Many in Minneapolis)? Labor Supply of Married Women across U.S. Cities," In *Working Paper*. St. Louis, MO: Federal Reserve Bank of St. Louis, Research Division Working Paper 2007-043F.

Blau, Francine D.; Marianne A. Ferber and Anne E. Winkler. 2010. *The Economics of Women, Men, and Work (6th Ed.)*. Pearson, Prentice Hall.

Blau, Francine D. and Lawrence M. Kahn. 2007. "Changes in the Labor Supply Behavior of Married Women: 1980-2000." *Journal of Labor Economics*, 25(3), pp. 393-438.

Blau, Francine D.; Lawrence M. Kahn and Jane Waldfogel. 2004. "The Impact of Welfare Benefits on Single Motherhood and Headship of Young Women: Evidence from the Census." *Journal of Human Resources*, 39(2), pp. 382-404.

____. 2000. "Understanding Young Women's Marriage Decisions: The Role of Labor and Marriage Market Conditions." *Industrial and Labor Relations Review*, 53(4), pp. 624-47.

Booth, Alison L. and Jan C. van Ours. 2008. "Job Satisfaction and Family

Happiness: The Part-Time Work Puzzle." *Economic Journal*, 118(526), pp. F77-99.

Booth, Alison L. and Margi Wood. 2008. "Back-to-Front Down Under? Part-Time/Full-Time Wage Differentials in Australia." *Industrial Relations*, 47(1), pp. 114-35.

Bound, John and Harry J. Holzer. 2000. "Demand Shifts, Population Adjustments, and Labor Market Outcomes During the 1980s." *Journal of Labor Economics*, 18(1), pp. 20-54.

Compton, Janice and Robert A. Pollak. 2007. "Why Are Power Couples Increasingly Concentrated in Large Metropolitan Areas?" *Journal of Labor Economics*, 25(3), pp. 475-512.

Costa, Dora L. and Matthew E. Kahn. 2000. "Power Couples: Changes in the Locational Choice of the College Educated, 1940-1990." *Quarterly Journal of Economics*, 115(4), pp. 1287-315.

Donald, Stephen G. and Kevin Lang. 2007. "Inference with Difference-in-Differences and Other Panel Data." *Review of Economics and Statistics*, 89(2), pp. 221-33.

Fernandez, Raquel and Alessandra Fogli. 2009. "Culture: An Empirical Investigation of Beliefs, Work, and Fertility." *American Economic Journal: Macroeconomics*, 1(1), pp. 146-77.

Fogli, Alessandra and Laura Veldkamp. 2011. "Nature or Nurture? Learning and the Geography of Female Labor Force Participation." *Econometrica*, 79(4), pp. 1103-38.

Gaston, Noel and Tomoko Kishi. 2007. "Part-Time Workers Doing Full-Time Work in Japan." *Journal of the Japanese International Economies*, 21(4), pp. 435-54.

Hashimoto, Yuki and Masako Miyagawa. 2008. "Why Is Labor Force Participation Low in the Metropolitan Areas? A Re-Examination of Facts and Issues " In *RIETI discussion paper 08-J-043 (in Japanese)*. RIETI discussion paper 08-J-043 (in Japanese).

Houseman, Susan and Machiko Osawa. 2003. "The Growth of Nonstandard Employment in Japan and the United States: Comparison of Causes and

Consequences," In *Nonstandard Work in Developed Economies*, ed. S. Houseman and M. Osawa, 175-214. Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research.

Hunt, Jennifer. 2002. "The Transition in East Germany: When Is a Ten-Point Fall in the Gender Wage Gap Bad News?" *Journal of Labor Economics*, 20(1), pp. 148-69.

Katz, Lawrence F. and Kevin M. Murphy. 1992. "Changes in Relative Wages, 1963-1987: Supply and Demand Factors." *Quarterly Journal of Economics*, 107(1), pp. 35-78.

Manning, Alan and Barbara Petrongolo. 2008. "The Part-Time Pay Penalty for Women in Britain." *Economic Journal*, 118(526), pp. F28-51.

Mitchell, Olivia S.; John Piggot and Satoshi Shimizutani. 2007. "Developments in Long-Term Care Insurance in Japan," In. Australian Institute for Population Aging Research, University of New South Wales.

Nawata, Kazumitsu and Masako Ii. 2004. "Estimation of the Labor Participation and Wage Equation Model of Japanese Married Women by the Simultaneous Maximum Likelihood Method." *Journal of the Japanese and International Economies*, 18(3), pp. 301-15.

Ogawa, Naohiro and John F. Ermisch. 1996. "Family Structure, Home Time Demands, and the Employment Patterns of Japanese Married Women." *Journal of Labor Economics*, 14(4), pp. 677-702.

Olivetti, Claudia and Barbara Petrongolo. 2008. "Unequal Pay or Unequal Employment? A Cross-Country Analysis of Gender Gaps." *Journal of Labor Economics*, 26(4), pp. 621-54.

Papke, Leslie E. and Jeffrey M. Wooldridge. 1996. "Econometric Methods for Fractional Response Variables with an Application to 401 (K) Plan Participation Rates." *Journal of Applied Econometrics*, 11(6), pp. 619-32.

Sasaki, Masaru. 2002. "The Causal Effect of Family Structure on Labor Force Participation among Japanese Married Women." *Journal of Human Resources*, 37(2), pp. 429-40.

Unayama, Takashi. 2009a. "Increasing Supply of Childcare Resources for Promoting Marriage," In. Research Report, Japan Center for Economic Research

(in Japanese).

____. 2009b. "Policies toward Aging and Low Fertility and Labor Force Participation of Women: Evidence from Prefecture-Level Data," In *RIETI Discussion Paper Series 10-J004 (in Japanese)*. RIETI Discussion Paper Series 10-J004 (in Japanese).

Table 1a
Population share and population growth of each region

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
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 yen)	Welfare Participation (in ‰)
Suburban Tokyo	0.183	0.005	0.186	0.319	3109	2076	6.36
Tokyo	0.111	0.050	0.192	0.420	4540	2550	10.38
Northern Coast	0.058	-0.092	-0.002	0.203	2736	1703	3.65
Chubu	0.090	0.001	0.179	0.266	3377	2017	3.71
Kansai	0.133	-0.074	0.118	0.293	2996	2088	13.99
Other	0.424	-0.067	0.021	0.214	2707	1792	8.52
Populaton growth for all regions	---	-0.039	0.094				

Notes: Population share in 2007 is based on those aged 25-54.
Population growth is calculated between year 1992 and 2007.
Income per capita and Male FT hourly wage are 2007 figures. The welfare participation rate is for those aged 30-59 in year 2005.
Source: Employment Status Survey (published version), Prefecture Income Statistics, Basic Survey of Wage Structure, Survey of Public Assistance

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: Summary statistics of covariates (the sample of married women with children)

A. The proportion of residing in three-generation households by education and region

Education	Suburban Tokyo	Tokyo	Northern Coast	Chubu	Kansai	Other
Senior High or Junior College graduates	0.133	0.085	0.406	0.245	0.121	0.232
University graduates	0.080	0.036	0.261	0.175	0.076	0.155

B. Summary statistics of other covariates

	Senior High or Junior College graduates		University graduates	
	Mean	S.D.	Mean	S.D.
husband's education= university	0.288	0.084	0.803	0.085
ln(husband's earnings)	6.674	0.218	7.002	0.227
Childcare resource index	0.230	0.106	0.211	0.106
Demand index (ln(Dgp))	-1.071	0.027	-2.705	0.061

Note: In calculating the summary statistics, each cell-level observation is weighted by the number of sample in the cell.
Source: Author's calculation from ESS 2007 (microdata).

Table 3
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	-0.058***	0.004	-0.074***	0.026**	-0.080***	-0.080***	-0.033	-0.097***	-0.097***
	(0.011)	(0.005)	(0.011)	(0.009)	(0.011)	(0.010)	(0.018)	(0.011)	(0.011)
Tokyo	-0.052**	0.007	-0.055*	-0.020	-0.063**	-0.024	0.001	-0.091***	-0.066**
	(0.017)	(0.005)	(0.022)	(0.016)	(0.021)	(0.023)	(0.023)	(0.019)	(0.024)
Northern Coast	0.084***	0.013**	0.073***	-0.010	0.073***	0.048***	0.059*	0.076***	0.065***
	(0.011)	(0.004)	(0.008)	(0.009)	(0.008)	(0.012)	(0.027)	(0.009)	(0.015)
Chubu	0.013	0.014*	-0.034***	0.037***	-0.043***	-0.043***	0.018	-0.046***	-0.046***
	(0.010)	(0.006)	(0.009)	(0.010)	(0.009)	(0.009)	(0.022)	(0.010)	(0.010)
Kansai	-0.067***	0.003	-0.083***	0.008	-0.096***	-0.096***	-0.034	-0.103***	-0.103***
	(0.012)	(0.005)	(0.013)	(0.011)	(0.012)	(0.012)	(0.023)	(0.014)	(0.014)
Junior High Grads	-0.131***	-0.054***	-0.178***	0.018**	-0.127***	-0.127***	-0.417***	-0.117***	-0.117***
	(0.008)	(0.003)	(0.009)	(0.007)	(0.009)	(0.009)	(0.027)	(0.009)	(0.009)
University Grads	0.021***	0.020***	0.122***	-0.163***	0.118***	0.118***	0.078***	0.112***	0.112***
	(0.006)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.012)	(0.006)	(0.006)
Tokyo×(Age>40)						-0.074*			-0.045
						(0.034)			(0.035)
(Northern Coast)×(Age>40)						0.047**			0.021
						(0.015)			(0.018)
Observations	846	846	846	846	846	846	547	846	846

Notes:
The entries are marginal effects from logit. Standard errors in parentheses.
Age dummies and a constant are included in all regressions.
* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests); ***at the 0.1% level (two-tailed tests)

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

Table 4: Regression results for all women
Dependent variable: Regular Employment Ratio

	Senior high or Junior College			University		
	(1)	(2)	(3)	(4)	(5)	(6)
Age range of the sample	25-54	25-54	25-39	25-54	25-54	25-44
Suburban Tokyo	-0.073***	-0.042***	-0.030**	-0.089***	-0.028	-0.008
	(0.008)	(0.009)	(0.009)	(0.019)	(0.022)	(0.025)
Tokyo	-0.027*	-0.012	-0.014	0.006	0.049	0.012
	(0.014)	(0.014)	(0.014)	(0.035)	(0.036)	(0.045)
Northern Coast	**0.083*** **	**0.068*** **	**0.073*** **	**0.045** **	**-0.010**	**0.019**
	(0.009)	**(0.012)**	**(0.012)**	**(0.015)**	**(0.018)**	**(0.020)**
Chubu	-0.037***	-0.029***	-0.035**	-0.042*	-0.058***	-0.050*
	(0.008)	(0.008)	(0.011)	(0.017)	(0.017)	(0.021)
Kansai	-0.083***	-0.064***	-0.053***	-0.117***	-0.064**	-0.043
	(0.009)	(0.010)	(0.010)	(0.019)	(0.021)	(0.026)
Tokyo×(Age>40)	-0.028	-0.028		-0.150***	-0.149***	
	(0.015)	(0.015)		(0.036)	(0.036)	
(Northern Coast)×(Age>40)	**0.037** **	**0.037** **		**0.070** **	**0.070** **	
	(0.011)	**(0.012)**		**(0.022)**	**(0.022)**	
Childcare resource index		**0.141*** **	**0.121** **		**0.395*** **	**0.371*** **
		(0.030)	**(0.038)**		**(0.066)**	**(0.080)**
Demand index		0.264*	0.156		-0.109	-0.061
		(0.106)	(0.133)		(0.101)	(0.120)
Observations	282	282	141	282	282	188

Notes:
The entries are marginal effects from logit. Standard errors in parentheses.
Age dummies and a constant are included in all regressions.
* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests); ***at the 0.1% level (two-tailed tests)

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

Table 5: Regression results for married women with children
Dependent variable: Regular Employment Ratio

	Senior high or Junior College				University			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age range	25-54	25-54	25-54	25-39	30-54	30-54	30-54	30-44
Suburban Tokyo	-0.096***		-0.022*	-0.027*	-0.156***		-0.068*	-0.068*
	(0.006)		(0.010)	(0.012)	(0.024)		(0.027)	(0.031)
Tokyo	-0.066***		-0.002	-0.000	-0.118***		-0.052	-0.068
	(0.007)		(0.011)	(0.013)	(0.019)		(0.028)	(0.036)
Northern Coast	**0.088*** **		**0.065*** **	**0.054*** **	**0.043***		**-0.032**	**-0.032**
	(0.011)		**(0.012)**	**(0.013)**	**(0.019)**		**(0.025)**	**(0.028)**
Chubu	-0.050***		-0.017	-0.027	-0.082***		-0.101***	-0.132***
	(0.010)		(0.012)	(0.019)	(0.023)		(0.022)	(0.022)
Kansai	-0.097***		-0.054***	-0.055***	-0.167***		-0.091***	-0.085***
	(0.010)		(0.010)	(0.013)	(0.018)		(0.021)	(0.025)
Tokyo × (Age>40)	0.010		0.029**		-0.054*		-0.047	
	(0.010)		(0.009)		(0.023)		(0.025)	
(Northern Coast) × (Age>40)	0.025		0.012		**0.073***		**0.065***	
	(0.013)		(0.014)		**(0.029)**		**(0.028)**	
three-generation household		0.340***	0.189***	0.236***		0.202*	0.172*	0.519***
		(0.032)	(0.032)	(0.046)		(0.078)	(0.078)	(0.109)
husband educ=university		-0.051	-0.147*	-0.106		-0.052	-0.082	0.241*
		(0.058)	(0.059)	(0.074)		(0.103)	(0.096)	(0.119)
mean of log(husband's earnings)		-0.022	-0.011	-0.024		-0.042	-0.007	-0.055
		(0.020)	(0.018)	(0.027)		(0.032)	(0.028)	(0.071)
Childcare resource index		0.159***	0.033	-0.011		**0.562*** **	**0.454*** **	**0.339** **
		(0.036)	(0.037)	(0.054)		**(0.070)**	**(0.094)**	**(0.127)**
Demand index		**0.736*** **	**0.704*** **	**0.686*** **		-0.020	-0.035	0.086
		(0.140)	**(0.131)**	**(0.170)**		(0.119)	(0.139)	(0.180)
Observations	282	282	282	141	235	235	235	141

Notes:
The entries are marginal effects from logit. Standard errors in parentheses.
Age dummies and a constant are included in all regressions.
The base group for husband's education is junior high school, senior high school, or junior college.
* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests); ***at the 0.1% level (two-tailed tests)

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

Table A1: Top 12 prefectures in the E-P ratio of women aged 25-54

ESS	2007		2007		ESS	2002		2002	
	All women		Married women with kids			All women		Married women with kids	
rank					rank				
1	**Toyama**	0.801	**Toyama**	0.787	1	**Fukui**	0.784	**Fukui**	0.775
2	**Yamagata**	0.795	**Yamagata**	0.785	2	**Yamagata**	0.767	**Yamagata**	0.762
3	**Shimane**	0.791	**Fukui**	0.782	3	**Ishikawa**	0.761	**Shimane**	0.748
4	**Fukui**	0.790	**Shimane**	0.777	4	**Shimane**	0.760	**Ishikawa**	0.742
5	**Ishikawa**	0.785	**Niigata**	0.772	5	**Toyama**	0.755	**Toyama**	0.738
6	**Niigata**	0.781	**Tottori**	0.770	6	Kochi	0.750	**Niigata**	0.729
7	**Tottori**	0.779	**Ishikawa**	0.769	7	**Niigata**	0.743	Kochi	0.727
8	Akita	0.759	Kochi	0.743	8	**Tottori**	0.735	**Tottori**	0.719
9	Kochi	0.755	Akita	0.740	9	Nagano	0.728	Saga	0.717
10	Nagano	0.751	Iwate	0.728	10	Saga	0.726	Nagano	0.708
11	Iwate	0.748	Nagano	0.717	11	Kumamoto	0.711	Kumamoto	0.701
12	Kumamoto	0.735	Saga	0.711	12	Fukushima	0.707	Iwate	0.695

Census	2000		1990	
	All women		All women	
rank				
1	**Yamagata**	0.775	**Yamagata**	0.781
2	**Fukui**	0.758	**Fukui**	0.761
3	**Shimane**	0.755	**Toyama**	0.751
4	**Toyama**	0.753	**Shimane**	0.747
5	**Tottori**	0.747	**Tottori**	0.747
6	**Niigata**	0.739	**Niigata**	0.740
7	**Ishikawa**	0.735	**Ishikawa**	0.739
8	Akita	0.725	Nagano	0.724
9	Iwate	0.721	Iwate	0.717
10	Nagano	0.718	Fukushima	0.714
11	Kochi	0.710	Akita	0.708
12	Saga	0.707	Saga	0.700

Note: The entries with boldface are the prefectures included in the northern coastal region.
Source: Author's calculation from ESS (microdata) and Census (aggregate data).

Figure 1: Northern coastal region
(the shaded area)

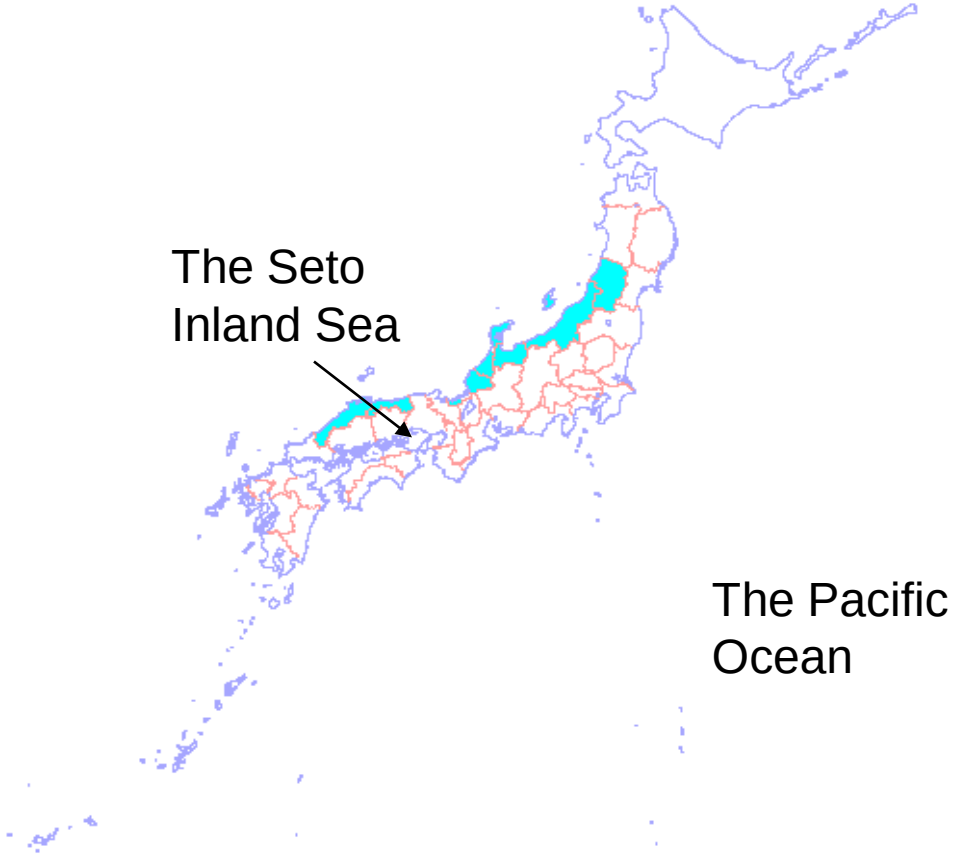


Figure 2a
Female participation in 2007

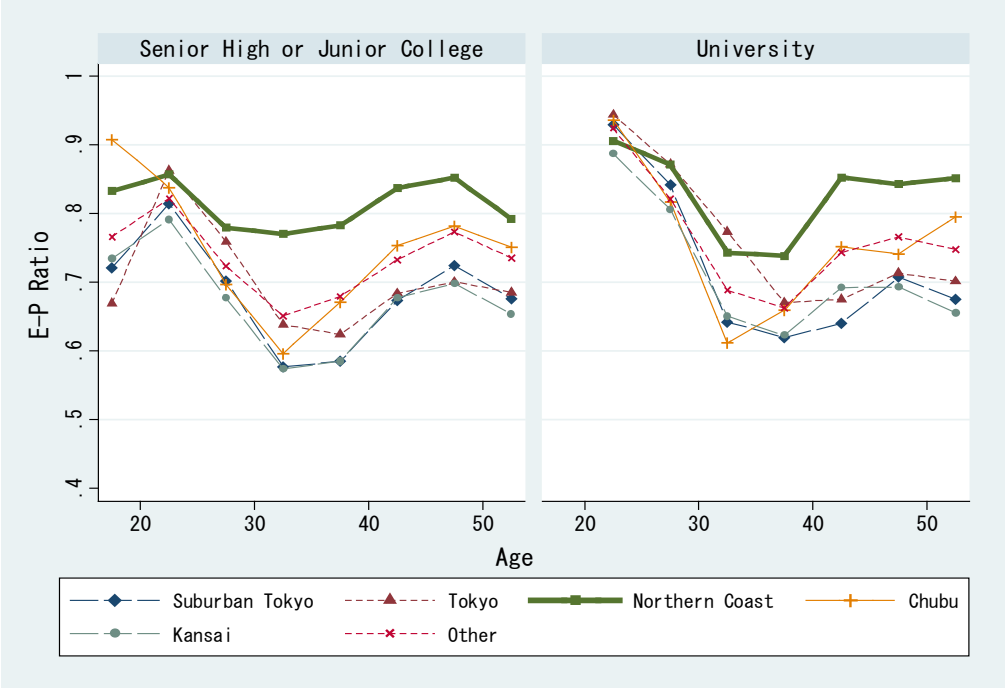
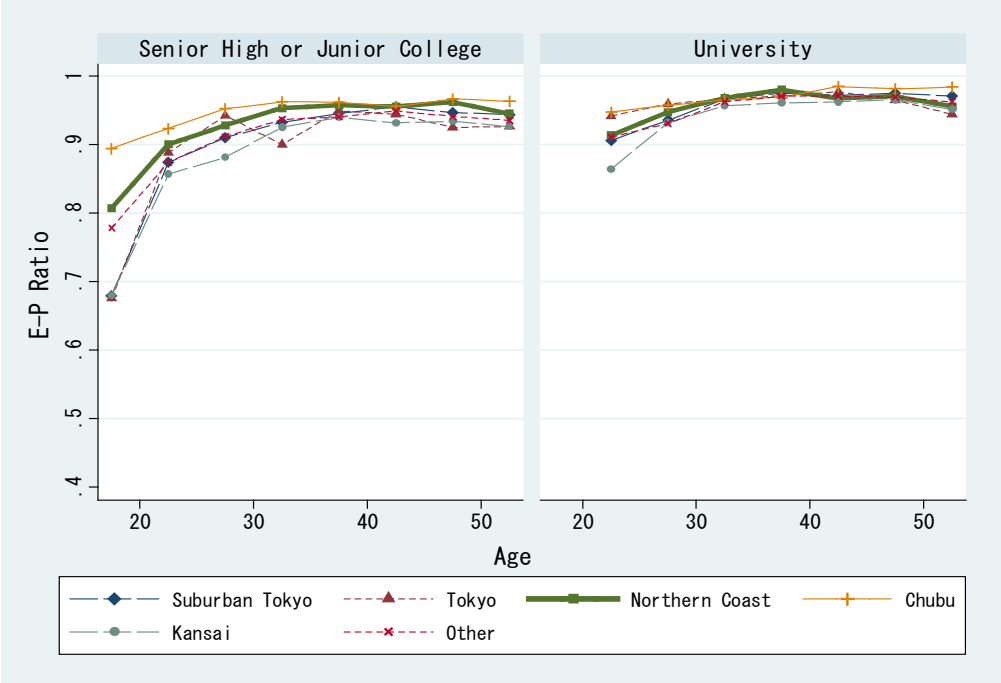


Figure 2b
Male participation in 2007



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

Fig 3a
Female regular employment ratio in 2007

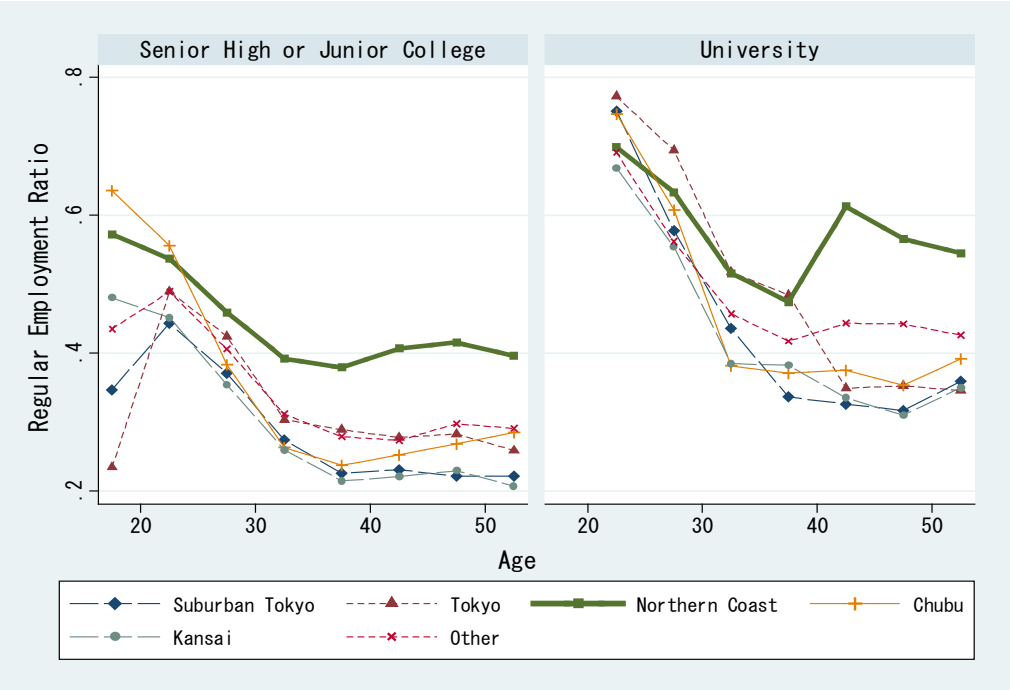
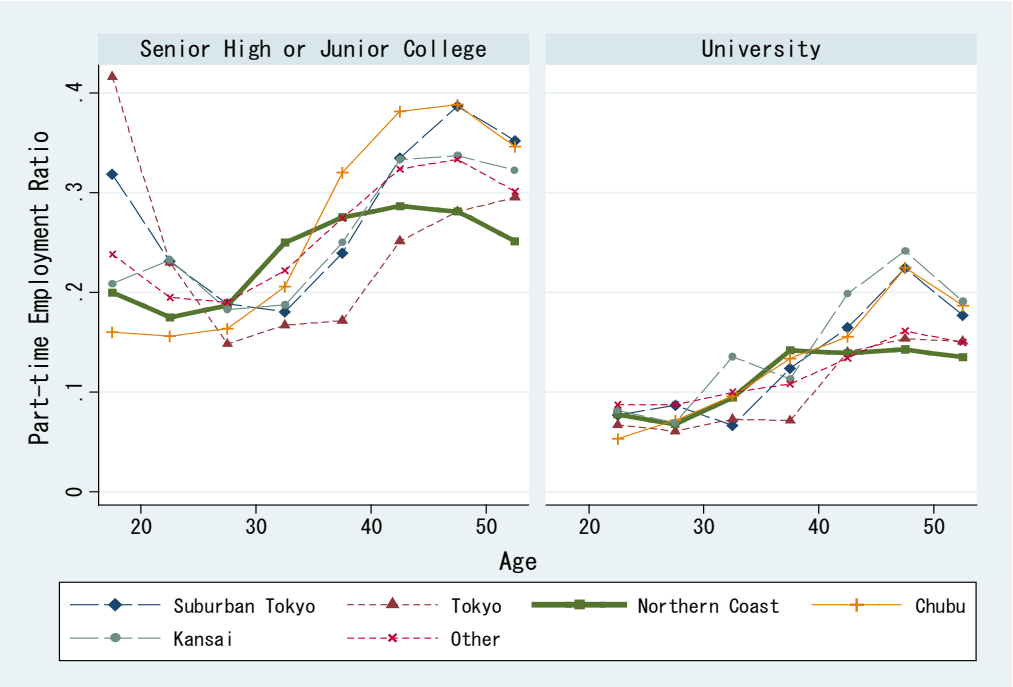


Fig 3b
Female part-time employment ratio in 2007



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

Fig 4a
Employment-Population ratio of married women with children

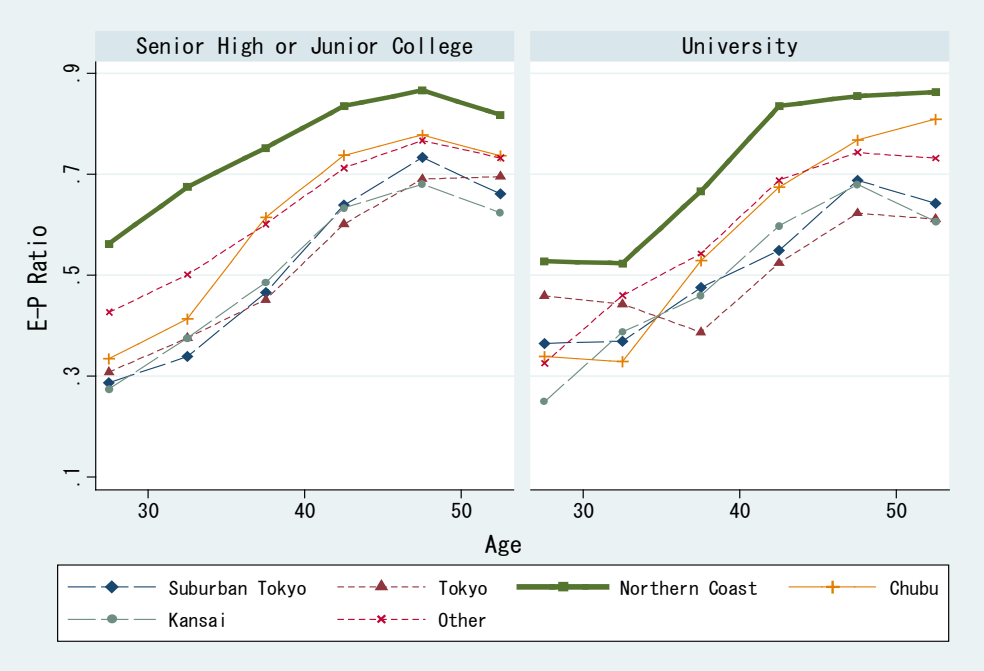


Fig 4b
Regular employment ratio of married women with children

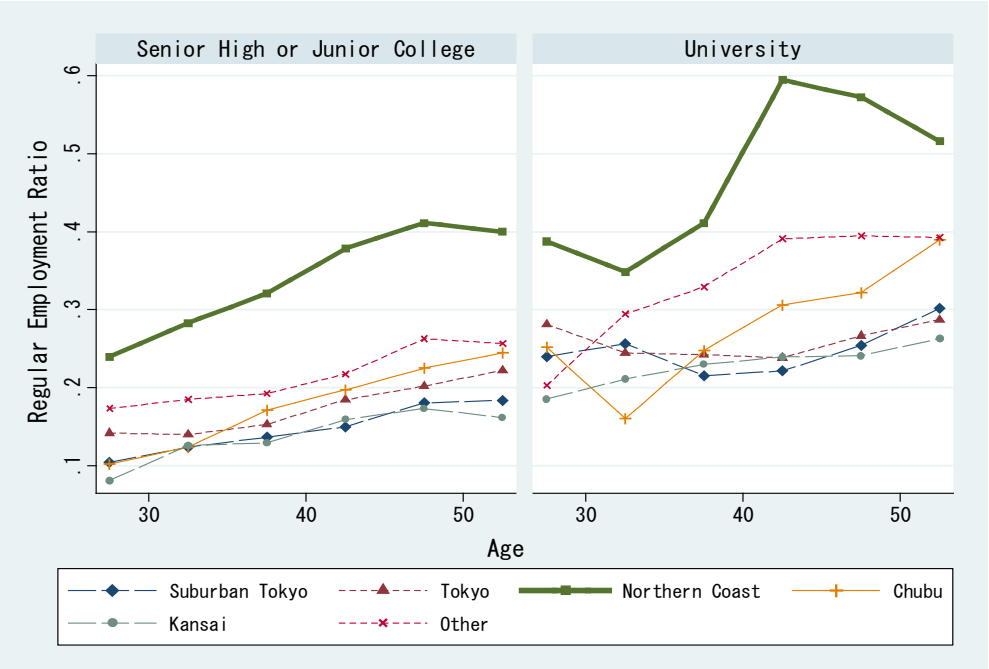
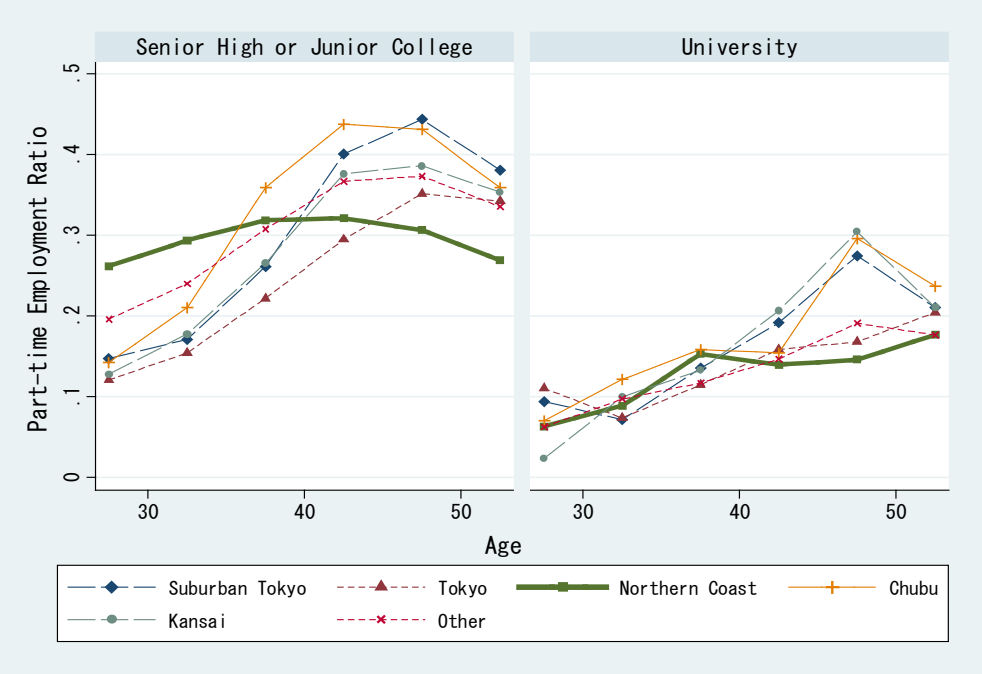


Fig 4c
Part-time employment ratio of married women with children



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

Figure 5a. Women's E-P ratio in 1955, 1965 and 1975

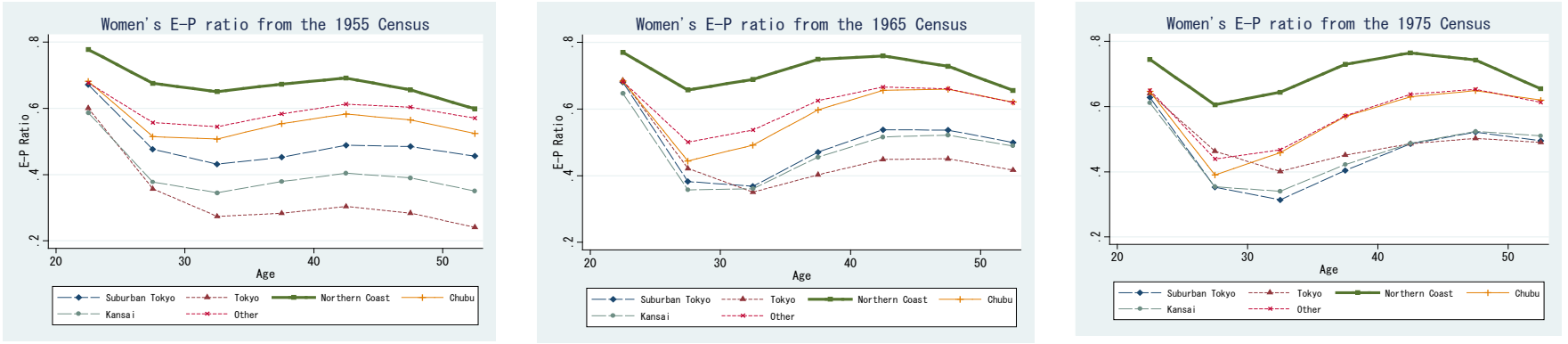


Figure 5b. Share of female agricultural employment in female popoulation in 1955, 1965 and 1975

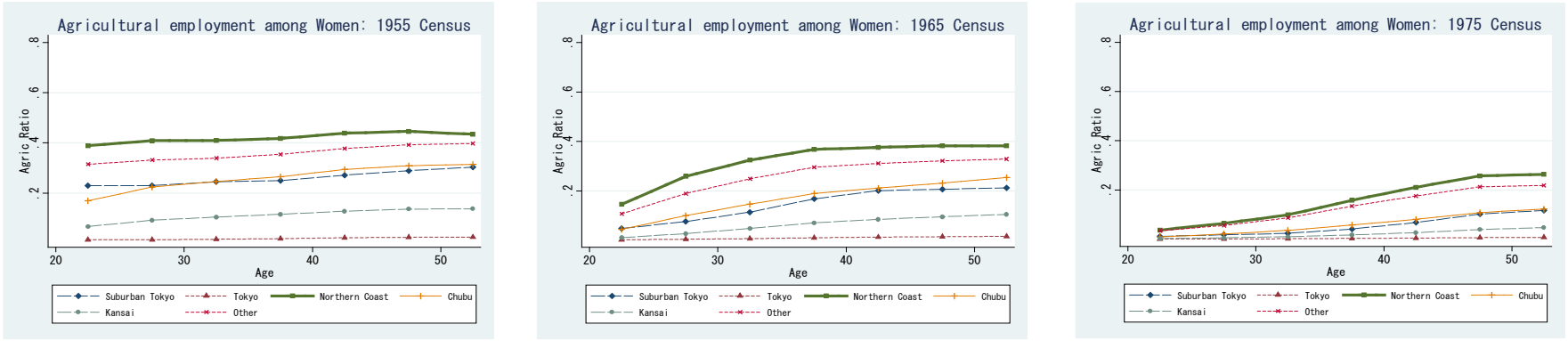
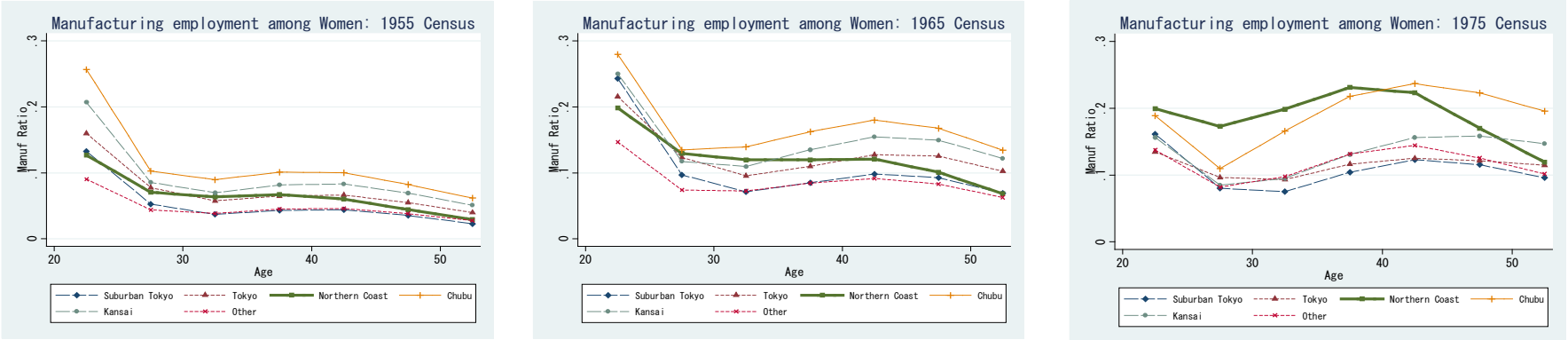
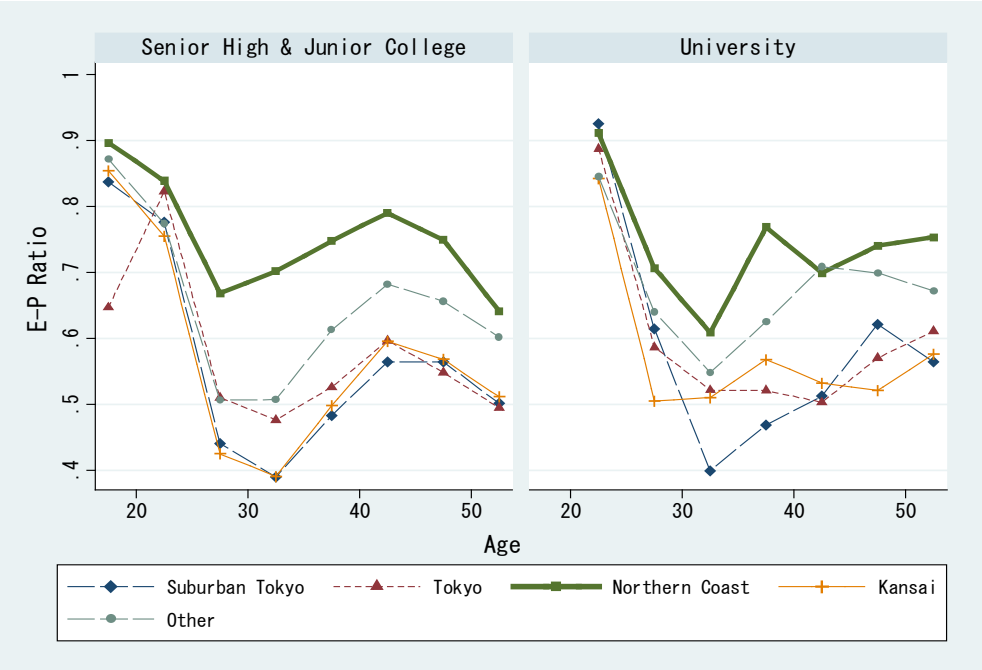


Figure 5c. Share of female manufacturing employment in female popoulation in 1955, 1965 and 1975



Source: Author's calculation from the Census (aggregate data).

Figure B1
Female participation in 1982



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