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Effects of demographic compositional changes on the convergence of female participation rates☆

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ABSTRACT

Female participation rates differ significantly within Japan, but their regional dispersion decreased from 1982 to 2012. The participation rates have been low in urban areas and high in non-urban areas, and they increased more rapidly in urban than in non-urban areas. In this paper, I quantify effects of composition in education, marital status, and presence of children on convergence in participation of women aged 25–39 years. The composition accounted for 80% of the convergence from 1982 to 2012. The convergence was rapid from 1982 to 1997, when the fall in marriage and fertility accounts for all of the convergence. The convergence was slower after 1997 compared with the earlier period, and the effects of compositional changes were more limited—from 1997 to 2012, they accounted for 38% of the convergence.

1. Introduction

Labor force measures, such as hours of work and participation rates, vary greatly across countries and even across regions within a single country. This difference has attracted the attention of researchers for a long time. For example, Alesina et al. (2006) report that, on average, Americans work 25.1 hours per week whereas Germans work 18.7 hours per week. Significant within-country, across-region differences exist in labor market participation by women (Fogli and Veldkamp 2011; Black et al., 2014; Abe 2013).[1] Little is known about the long-term development and causes of these regional differences, however. In Japan, regional dispersion in female labor market participation decreased from 1940 until the present. In this paper, I show that compositional changes in demographics account for 80% of the convergence from 1982 to 2012. In the 1980s and 1990s, the compositional changes in demographics fully explain the convergence; after 1997, the composition accounts for 38%, and the participation behavioral changes account for 49%.

The gender gap in Japanese society is considered one of the largest among developed countries: for instance, Japan ranked 111th among 144 countries, according to the gender gap index of the World Economic Forum in 2016, where it scored particularly badly in terms of "economic participation and opportunity" and "political empowerment."[2] Therefore, the gender gap in Japan in terms of "economic participation" is considered large according to the international standards.

Regional differences in female participation rates within Japan have received little recognition so far. For example, in the Northern Coastal region of Honshu Island (Yamagata, Niigata, Toyama, Ishikawa, Fukui, Tottori, and Shimane prefectures, which together are designated as the "non-urban high participation region" in this paper), the female participation rate is high. In 2010, the employment-to-population ratio (EPR) of women aged 25–39 years was 76% in this region, which was higher than the EPR in Tokyo, where it was 70%. In 2010, the EPR of women of the same age group was 79% in Sweden, 75% in France, 73%

☆ 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 under the terms of usage of the data. Part of the analysis using Census data is based on the data provided by the Center for Spatial Information Science, University of Tokyo. I thank Shin-ichi Fukuda (Editor), anonymous referees, Giorgio Brunello, Joyce Burnette, Ann Carlos, Janet Hunter, Susumu Imai, Frederic Jouneau-Sion, Bipasha Maity, Shiko Maruyama, Chiaki Moriguchi, Maria Pagenelli, Shingo Takagi, participants of the 7th Cliometrics World Congress (2013), the Economic History Association's Annual Conference in Washington D.C. (2013), Asian Meeting in Econometric Society in Kyoto (2016), ERSA conference in Vienna (2016), NARSC in Minneapolis (2016), IAAE conference in Sapporo (2017), and seminar participants at Aarhus University, GATE-Lyon St. Etienne, Hitotsubashi University, Hokkaido University, University of Helsinki, Kobe University, University of Padova, and University of Tokyo (Housing Policy Research Seminar) for helpful comments and suggestions. Remaining errors are my own. This research is supported by the Joint Usage and Research Center, Institute of Economic Research, Hitotsubashi University, and the JSPS KAKENHI (Grant Numbers JP23530261, JP26590045, and JP15H03358).

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[1] In important recent studies, researchers have attempted to explain regional differences in participation using exogenous factors, including (1) availability of outsourcing household services (Cortes and Tessada 2011) or (2) peer effects operating through the sex composition of the children in the neighborhood (Maurin and Moschion 2009). Johnson (2014) examines the link between female participation and housing markets in US cities.

[2] http://reports.weforum.org/global-gender-gap-report-2016/rankings/ (accessed March 3, 2017).

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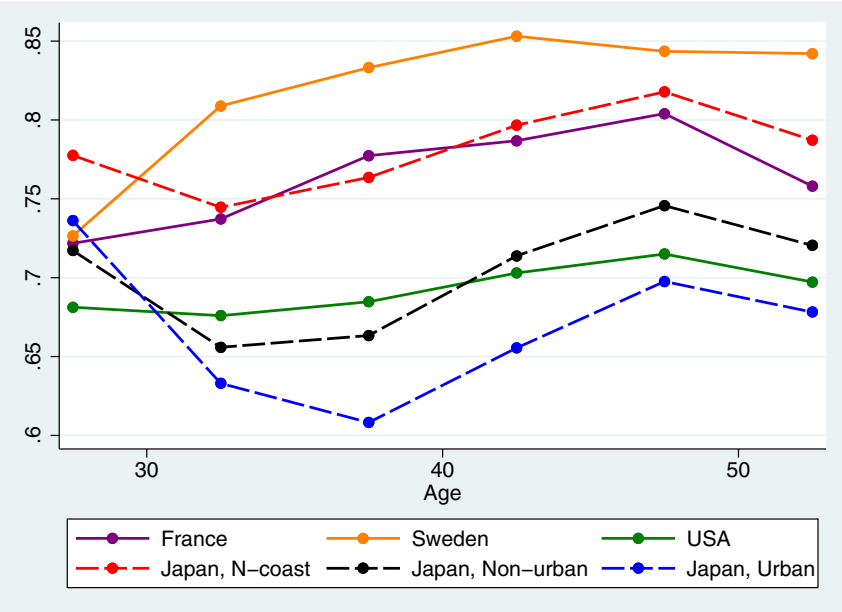

Fig. 1. Age profiles of EPR in selected countries and sub-regions of Japan.
Note: Dotted lines are regions in Japan (Northern Coast, Non-urban, Urban).
Source: OECD (for countries other than Japan), and Census of Japan.

in Germany, 72% in the United Kingdom, and 68% in the USA. Therefore, the participation rate in the Northern Coastal region is comparable to, or even higher than, the rate in countries with high female participation.[3]

To get a sense of the extent of regional differences within Japan, the age profiles of the female EPR for three countries and three sub-regions of Japan are plotted in Fig. 1. The three sub-regions of Japan are: (1) the urban area, (2) the Northern Coastal region (non-urban, high participation region), and (3) the rest of Japan.[4] The countries included are Sweden, France, and the USA.[5] The female participation rate in the Northern Coastal region is higher than in any other regions in Japan, as high as the rate in France, and much higher than the rate in the USA. In contrast, the rates in the urban areas of Japan are lower than elsewhere and are lower than those in the USA for most age ranges. According to Fig. 1, regional differences within Japan are as large as the international differences, and low participation is mainly an urban phenomenon.

This paper examines the causes of the long-term development of these regional differences in Japan. Female participation rates have been low in Japan's urban areas and high in non-urban areas. The participation rate has risen steadily in urban areas and to a lesser extent in non-urban areas. In 1982, the average female EPR in the ten highest participation prefectures was 65.1%, whereas the average in the ten lowest prefectures was 40.2% (a difference of 25 percentage-points). In 2012, the average of the ten highest prefectures was 79.2%, whereas the average of the ten lowest prefectures was 66.8% (a difference of 12 percentage-points). The standard deviation of female EPR among the 47 prefectures fell from 0.086 in 1982 to 0.041 in 2012.[6] I quantify the extent to which the compositional changes in education, marital status and fertility account for the convergence. The main conclusions are as follows: (1) Demographic compositional changes explain 80% of convergence from 1982 to 2012; (2) The convergence was faster from 1982 to 1997 (the first half: the standard deviation decreased by 0.03) than from 1997 to 2012 (the second half: the standard deviation decreased by 0.016); (3) The demographic composition accounts for all of the convergence from 1982 to 1997, whereas it accounts for 38% from 1997 to 2012; and (4) The remaining part of the convergence after 1997 is explained by changes in the EPR by married women and mothers, notably by the relative increase in participation by college-graduate mothers in urban areas.

A number of recent studies have considered the regional variations in female participation. Fogli and Veldkamp (2011) examine the spatial correlation of participation behavior in the USA and consider the effects of information transmission among women; Black et al. (2014) analyze the role of differential commuting costs across major U.S. cities; Acemoglu et al. (2004) and Goldin and Olivetti (2013) examine women's labor supply across U.S. states during the World War II era and thereafter. Olivetti and Petrongolo (2008) study the effects of different participation levels on the gender wage gap across European countries. Of these, Fogli and Veldkamp (2011) and Black et al. (2014) focus on regional differences in labor-supply factors (i.e., information flow among mothers and commuting costs). Acemoglu et al. (2004) and Goldin and Olivetti (2013) consider the role of the one-time demand shock of the war, but their primary focus is not the extent of regional dispersion. None of these studies examine the causes of the long-term convergence in female participation. This paper contributes to the literature by identifying the determinants of convergence in female EPR.

Much of the recent literature on female participation in Japan focuses on effects of the availability of childcare, either formal or informal, on participation. For example, Sasaki (2002) examines the effect of co-residence with grandparents on female labor force participation, considering the endogeneity of co-residence, while Nawata and Ii (2004) examine the determinants of female labor force participation. These two studies are based on the Japan Panel Survey of Consumers in 1993. From a regional perspective, the high participation rate in non-urban areas is certainly related to the ease of securing childcare (Unayama 2012; Asai et al. 2015; Abe 2013). Unayama (2012) examines the withdrawal from the labor market around marriage or childbirth using data from 1980 to 2005 and concludes that, the rate of withdrawal from employment at marriage or childbirth has been stable over time, but differed greatly across regions. Asai et al. (2015) investigate the effect of local childcare availability on participation and find that formal childcare replaced informal childcare

[3] Data for country-level participation rates are from statistics published by the OECD.
[4] The three regions are illustrated in Fig. 2.
[5] The countries are chosen for the following reasons. Sweden is one of the northern European countries that is famous for high female participation. France is chosen because it is a country in Europe that has a relatively large population. The USA is a country where the falling participation rate in recent years is conspicuous. Of course, the participation rates are not uniform across regions within these three countries. But the point I wish to show is that the within-Japan differences are as large as cross-county differences that are often considered significant.
[6] These are calculated for women aged 25-39 years from the ESS.

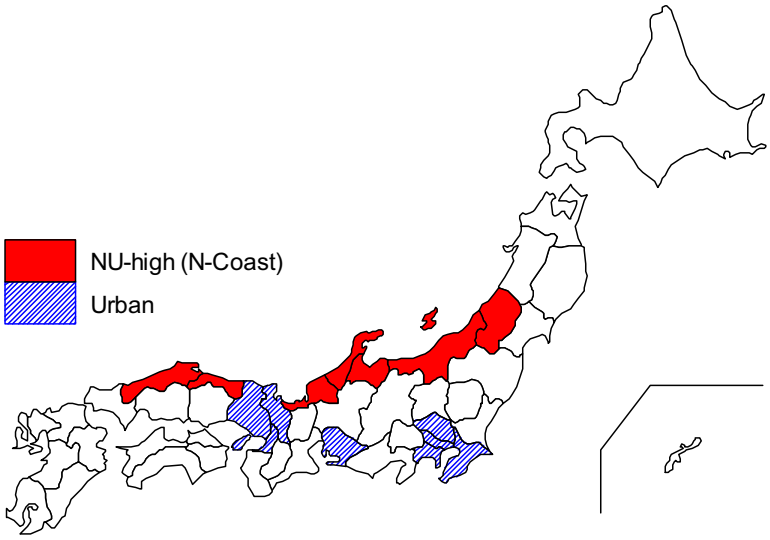

Fig. 2. Three sub-regions.

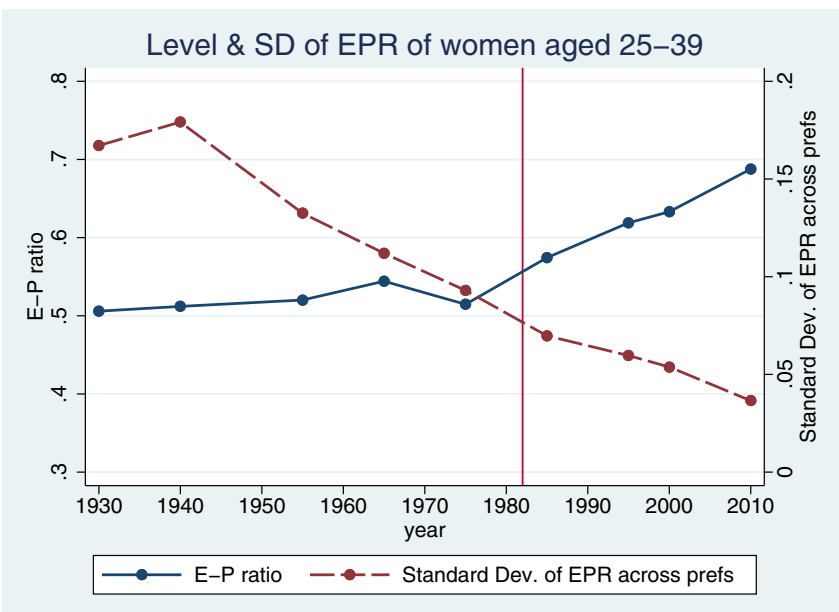

Fig. 3. Level and the standard deviation of the E-P ratio of women aged 25–39.
Note: The red vertical line corresponds to year 1982, the earliest year of the ESS data.
Source: Authors' calculation from Census (1930–2010).

provided by grandparents living together. Asai (2015) examines the impact of child-care benefit levels on continued employment by new mothers and finds that changes in benefits had little impact. Unayama (2012) provides a comprehensive review of female participation and its relation to co-residence and childcare.

2. EPR by education, marital status and children: 1982—2012

Female EPR has been slowly rising since the early 1930s in Japan. Fig. 3 plots the average EPR and its standard deviation among 47 prefectures from 1930 to 2010. As illustrated in Fig. 3, the increasing trend of EPR was interrupted in the 1970s, but it resumed subsequently at a faster pace. The increase in the average participation rates has been accompanied by a steady decline in its dispersion, as shown by the decreasing standard deviation of the EPR. However, the EPR's dispersion in 2010 was still much larger for women than for men: the standard deviation was 0.036 for women and 0.016 for men.

In the rest of this paper, microdata of the Employment Status Survey (ESS) from 1982 to 2012 are used to examine the convergence in participation rates across 47 prefectures of Japan. To begin, detailed convergence patterns by demographic groups are reported. The six demographic groups are defined by the combination of two education groups (less-than-college education and college graduates) and the three groups for marital status and children. The three statuses for marital status and children are: (1) single women, (2) married women without children, and (3) women with children (referred to as "mothers" in the rest of the paper).[7] Here, attention is confined to women aged 25–39 years because the experiences of the older prime-age groups (aged over 40) are different from those aged 25–39, thereby requiring separate examination. Disaggregation by demographics reveals that regional dispersion is large only for married women and mothers.[8]

To illustrate the convergence pattern, I have divided the 47 prefectures of Japan into five groups: (1) Tokyo; (2) metropolitan areas

[7] Single mothers are included in singles, since their EPR is close to that of single women. The proportion of mothers in single-mother households in the analysis sample is about 2–3%.

[8] The EPR is the number of people working divided by the population. The numerator of the EPR includes all types of workers, including wage earners, as well as the self-employed and those who work in family businesses or in family farms.

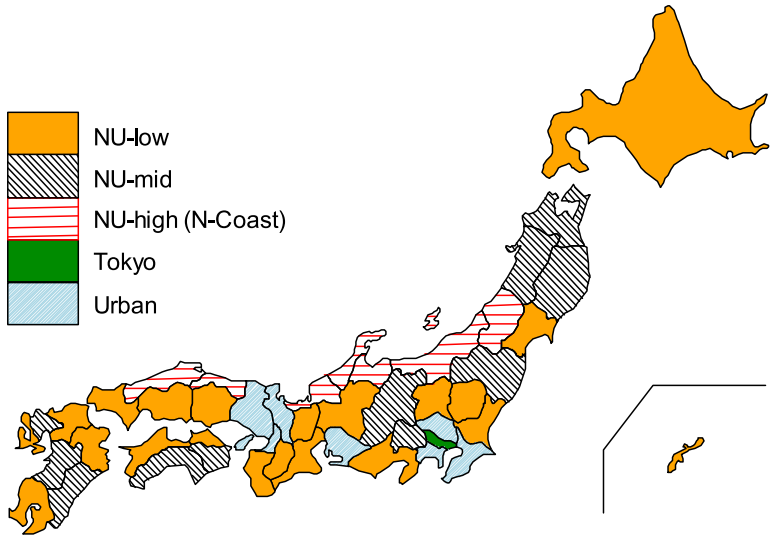

Fig. 4. Five macro regions.
Notes: The prefectures included in each macro region. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Red: Non-urban-high (Northern Coast) <NU-High (N-Coast)>	Yamagata, Niigata, Toyama, Ishikawa, Fukui, Tottori, Shimane
Green: Tokyo	Tokyo
Blue: Urban	Kanagawa, Saitama, Chiba, Aichi, Kyoto, Osaka, Hyogo
Black: non-urban-middle <NU-mid>	Aomoti, Iwate, Akita, Fukushima, Yamanashi, Nagano, Tokushima, Kochi, Saga, Kumamoto, Miyazaki
Orange: non-urban-low <NU-low>	Hokkaido, Miyagi, Ibaraki, Tochigi, Gumma, Gifu, Shizuoka, Mie, Shiga, Nara, Wakayama, Okayama, Hiroshima, Yamaguchi, Kagawa, Ehime, Fukuoka, Nagasaki, Oita, Kagoshima, Okinawa

other than Tokyo; (3) non-urban areas with a high EPR in 1975 (also referred to as the Northern Coastal region); (4) non-urban areas with an intermediate-level EPR in 1975 (11 prefectures); and (5) non-urban areas where the EPR was low in 1975 (21 prefectures). The five regions are illustrated in the map in Fig. 4.

In Fig. 5A, the EPRs of the two education groups, in five macro regions, are plotted against year. In Fig. 5B, the standard deviations of EPRs among the 47 prefectures by education and demographic groups are plotted, along with their 95% confidence intervals.[9] Table 1 reports means and standard deviations of the EPR over time, by education. Five notable patterns are evident.

First, the regional differences in the EPR are much greater for married women and mothers than for single women (Fig. 5A). Therefore, the large regional disparities in the EPR are driven by differences for married women and mothers.[10]

Second, the regional EPR ranking is similar for married women and mothers, both for the less-educated and college graduates. In most cases, the EPR is highest in the non-urban high area (the Northern Coastal region), lowest in Tokyo and other urban regions, and at the intermediate level in the two non-urban regions. After 2002, the EPR of mothers in Tokyo

Table 1
Means and dispersions of female EPR, 1982–2012.

Less than college education

year	Mean	Standard Deviation
1982	0.468	0.088
1987	0.497	0.083
1992	0.591	0.071
1997	0.598	0.062
2002	0.615	0.052
2007	0.658	0.051
2012	0.686	0.049

College or over

year	Mean	Standard Deviation
1982	0.504	0.080
1987	0.542	0.063
1992	0.653	0.055
1997	0.677	0.049
2002	0.700	0.045
2007	0.733	0.042
2012	0.765	0.040

Source: Author's calculation from the Employment Status Survey (1982–2012).

[9] The standard errors of the standard deviation are calculated by using the jackknife procedure.

[10] Abe (2013) reports a similar pattern using the cross-sectional data in year 2007.

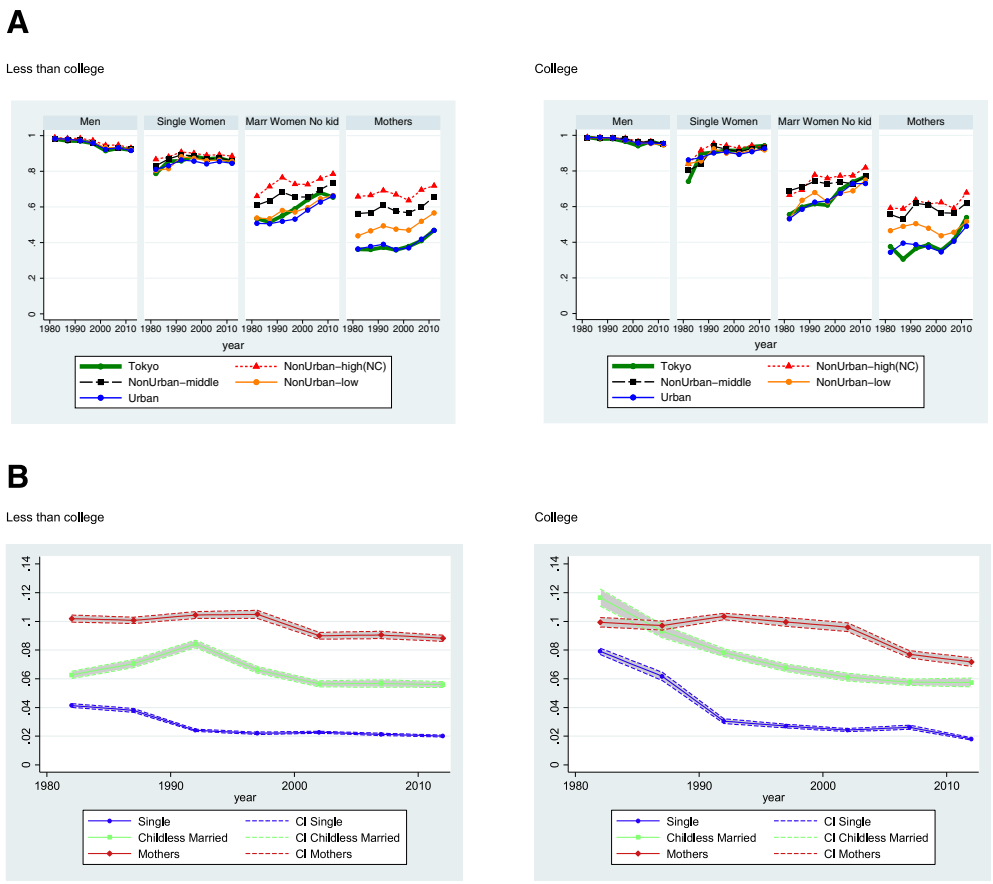

Fig. 5. (A) EPR by education, demographics, and region. (B) Standard Deviation of female EPR by education and demographics.
Source: Author's calculation from the ESS, 1982–2012 (microdata).

increased more rapidly than that of mothers elsewhere, while patterns before 1997 were similar across the two education groups.

Third, the convergence pattern differed depending on education. For the less educated, the dispersion has been stable when participation measures are disaggregated by demographics. For college graduates, convergence occurred for single women in the 1980 s, started after 1992 for childless married women and after 2002 for mothers. In Section 3, I quantify the contributions by (1) demographic composition and (2) changes in EPR, for the two sub-periods (1982–1997 and 1997–2012). The results show that the contribution to convergence from the changes in EPR is absent in 1982–1997, whereas it comprises 49% of the convergence in 1997–2012. The convergence in EPR for childless married women and mothers with a college degree is reflected in the latter.

Fourth, the small EPR differences across the two education groups before 2002 are notable. Among mothers, those with a college education were not more likely to work than those with less education. OECD (2002) points out that one of the anomalies of female participation in Japan is the low participation by the highly educated. Fig. 5A shows that this low participation by the highly educated is evident for married women and mothers residing in urban areas. Since female college graduates are more likely than other groups to live in urban areas, the low participation in urban areas decreases the overall EPR of female college graduates.

Finally, Fig. 5B indicates that the dispersion in EPR by each of the demographic groups has been relatively stable for the less educated. After 2002, there has been no convergence in EPR for any of the three demographic groups of women with a less-than-college education. In contrast, there has been convergence for college graduates. The convergence for single college graduates occurred before 1992, but the proportion of this group among the female population was small at that time (Fig. 6); thus, its impact on the overall convergence was small. In contrast, the convergence in the EPR by married women and mothers contributed to the overall convergence after 1997 (see Section 3).

3. Sources of convergence: effects of compositional changes

3.1. Compositional changes and convergence of participation

Regional dispersion in female EPR has compressed over time (Fig. 3). When data are disaggregated by education, marital status, and presence of children, the dispersion has been stable for women with a less-than-college education, whereas it has converged for mothers with a college education since 2002 (Fig 5B). Dispersion of the EPR conditional on demographics was stable, but the overall EPR converged. This pattern can be explained by the compositional changes in demographics.

The composition of demographics changed significantly, as shown in Fig. 6 in which the proportion of each of the six demographic groups (defined by education, marital status and presence of children) among the female population of all regions is plotted from 1982 to 2012. The proportion of single people increased, the proportion of mothers decreased, and those movements were most rapid between 1987 and 1992. After 1992, the changes in the same direction continued, but the size of the changes was smaller.

To see why compositional changes lead to convergence, consider a decline in the fertility rate. A fertility decline results in the EPR convergence across regions as follows. For simplicity, consider a shift between the two demographic groups, single women and mothers.[11] The EPR difference between single women and mothers is greater in urban than in non-urban areas (Fig. 5A). Let θ_{dp} represent the proportion of the demographic status d ($d = m,n,s$: m for mothers, n for childless

[11] As an actual transition in the demographic status of an individual, moving from being single to being a mother may not be as likely. However, in terms of the accounting, an increase in the proportion of singles and a decrease in the proportion of mothers is the most obvious development in the data considered here (Fig. 6), therefore I am making this assumption.

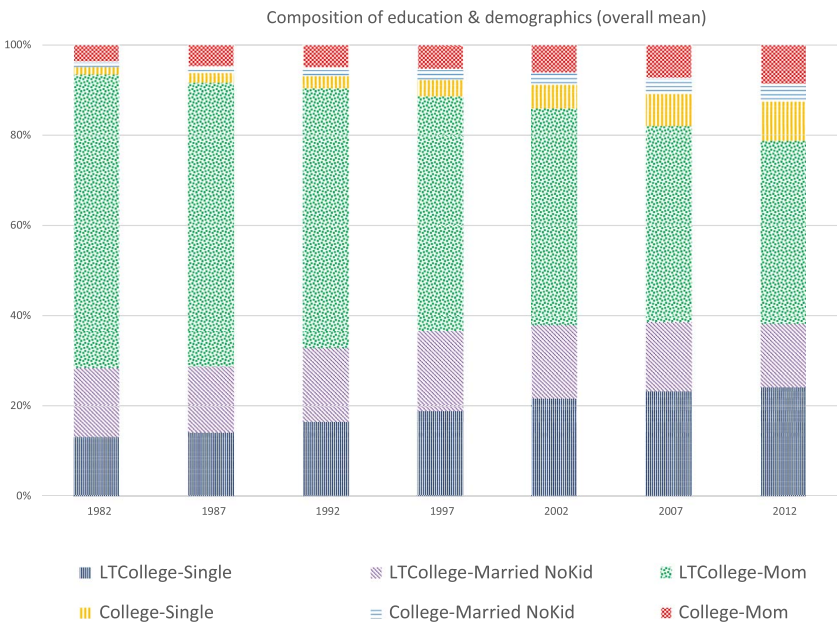

Fig. 6. Mean composition of the education and demographics over time.
Source: Author's calculation from the ESS, 1982–2012 (microdata).

married women, and s for singles) in prefecture p, and let EPR_{dp} represent the EPR for demographic status d in prefecture p. Then, the overall EPR in prefecture p is:

$$EPR_p = \theta_{mp} \cdot EPR_{mp} + \theta_{np} \cdot EPR_{np} + (1 - \theta_{np} - \theta_{mp}) \cdot EPR_{sp}. \quad (1)$$

Differentiating Eq. (1) by θ_{mp} gives $\partial EPR_p / \partial \theta_{mp} = EPR_{mp} - EPR_{sp}$, which is negative and its absolute value is greater for urban than non-urban areas. Therefore, given the same decline in the proportion of mothers, the overall EPR would increase more in urban than in non-urban areas. Since the overall EPR is lower in urban than in non-urban areas, the decline in θ_{mp} reduces regional EPR disparities, even though the EPR conditional on demographic status (EPR_{mp} and EPR_{sp}) remains constant.

3.2. Educational and demographic compositional changes: 1982–2012

To quantify the effects of compositional changes in demographics, I compare the standard deviations of the actual EPR with those of counterfactual measures. The first counterfactual is the EPR that keeps the composition constant at its distribution in 1982. Specifically, for each prefecture, I use the EPR for each of the six demographic groups in 1982 and then weight them with the demographic status share of women in 2012, as follows:

$$\widehat{EPR_{cf,p}} = \sum_j \theta_{jp,2012} EPR_{jp,1982}, \quad (2)$$

where $EPR_{cf,\,p}$ denotes the counterfactual EPR in prefecture p, and θ_{jpy} is the population share of the demographic group j in prefecture p in year y. The standard deviations of the actual EPRs in 1982 and 2012, as well as that of $\widehat{EPR_{cf,p}}$ among the 47 prefectures, are reported in Table 2.[12]

Changes in the demographic composition had significant effects in reducing regional dispersion in EPR. The standard deviation of the EPR decreased from 0.086 in 1982 to 0.041 in 2012. According to the dispersion in $\widehat{EPR_{cf,p}}$, the composition explains 80% ((0.086 − 0.050)/(0.086 − 0.041) = 0.80). The reason composition has such a large effect is evident from Fig. 6, which shows the dramatic shift in demographic composition during the sample period. The proportion of mothers decreased, that of single people increased, and the educational attainment of women improved. As shown in Fig. 6, while the proportion of college graduates was less than 10% of the female population in the 1980 s, it has increased over time, exceeding 20% in 2012. The dispersion of EPR of college graduate women has decreased more than that of women with a less-than-college education (Fig. 5B), yet its impact on the overall dispersion is limited, because the proportion of college graduates among all women was small (Fig. 6).

The strong effect of compositional changes on convergence in female participation is consistent with the findings of previous studies, which report that a decline in marriage and fertility was an immediate change in behavior among young women after the enactment of the Equal Employment Opportunity Act in 1986 (Edwards et al. 2015; Abe 2011). The increase in the proportion of single women and the decrease in the proportion of mothers is a reflection of this phenomenon.

3.3. Convergence in participation

As shown in Fig. 5B, the dispersion in EPR is large for childless married women and mothers, and the dispersion decreased after 2002 for those with a college education. In order to explore the additional causes of convergence, I introduce another counterfactual, as follows:

$$\widehat{EPR_{cf2,p}} = \theta_{sp,2012} EPR_{sp,1982} + \sum_{j=n,m} \theta_{jp,2012} EPR_{jp,2012}. \quad (3)$$

Eq. (3) differs from Eq. (2) in the values of EPR of childless married women and that of mothers: in Eq. (2), they are set to the 1982 values, while in Eq. (3), they are set to the 2012 values. After deriving $\widehat{EPR_{cf2,p}}$ for each prefecture, its standard deviation among 47 prefectures is calculated. The idea here is to gauge the impact of convergence in participation rates of childless married women and mothers on the overall convergence. The standard deviations of $\widehat{EPR_{cf2,p}}$ are reported in row (5) of Table 2.

Is the remaining part of the convergence, other than the composition, explained by the sources posited in Eq. (3)? The answer is affirmative. Setting the EPR for the non-singles to the 2012 value as in Eq. (3) brings the standard deviation of $\widehat{EPR_{cf2,p}}$ to 0.042, close to the 2012 value of 0.041. Therefore, the changes in the EPR of childless married

[12] In calculating the standard deviations of the actual and counterfactual EPR, it is appropriate that the prefecture-level observation is weighted by the population weight. In doing so, the population in 1982 is used throughout: that is, in calculating the standard deviation of actual and counterfactual EPR in 1997 and 2012, the population of each prefecture in 1982 is used as a weight. Therefore, the standard deviation of actual EPR in 1997 is not equal to the actual standard deviation in that year, for example, though the difference between the two is very small. Using the same weight throughout is more appropriate for across-time comparisons, therefore the 1982 population is used as a weight throughout.

Table 2
Standard deviations of E-P ratio and counterfactual measures (Sample of women aged 25–39).

	30-year period		Sub-periods			
	1982–2012		1982–1997		1997–2012	
		Fraction explained by		Fraction explained by		Fraction explained by
(1) Actual SD in 1982	0.086		0.086			
(2) Actual SD in 1997			0.057		0.057	
(3) Actual SD in 2012	0.041				0.041	
(4) SD of $\widehat{EPR_{cf,p}}$	0.050	<composition>	0.056	<composition>	0.051	<composition>
(Eq. (2) in the text)		0.801		1.031		0.383
(5) SD of $\widehat{EPR_{cf2,p}}$	0.042	<EPR of married women & mothers>	0.057	<EPR of married women & mothers>	0.043	<EPR of married women & mothers>
(Eq. (3) in the text)		0.191		−0.031		0.494

Note: In calculating the SD, each prefecture-level observation is weighted by the population of women aged 25–39 in 1982. The value of the SDs differ littile when a different weight is used.
Source: Author's calculation from the ESS, 1982–2012 (microdata).

women and mothers explain the remaining 19% of the convergence.

In summary, the compositional changes in demographics (education, marital status, and the presence of children) account for 80% of the convergence in female EPR from 1982 to 2012. To the extent that the convergence is explained by compositional changes at stable EPRs, women's participation in the labor market has not become similar across regions; rather, changes in marriage and fertility are the major causes of convergence.

3.4. Convergence by sub-periods

As shown in Fig. 6, the increase in the proportion of single women and decrease in that of mothers is largest between 1987 and 1992. While the role of composition for the entire period is 80%, the extent of the compositional changes may differ across time, which is indeed the case.

I apply the same decomposition as in the previous subsection separately for the earlier period (from 1982 to 1997) and later period (from 1997 to 2012). The results are shown in the right columns of Table 2. The convergence was more rapid during the earlier years than the later years: the standard deviation decreased from 0.086 in 1982 to 0.056 in 1997 (a decrease of 0.020), and from 0.056 in 1997 to 0.041 in 2012 (a decrease of 0.015). From 1982 to 1997, the compositional changes in education and demographics account for 103% of the convergence (the dispersion would have compressed more if it were only due to compositional changes). The changes in the EPR of childless married women and mothers offset the effect of compositional changes.

For the convergence from 1997 to 2012, the compositional changes account for 38%, while the changes in the EPRs of childless married women and mothers account for 49%. These results agree with Fig. 5, which shows that after 2002, the EPR of college-graduate mothers converged because the rates in urban areas increased faster than those in non-urban areas.[13]

4. Conclusions

It is known that female participation is higher in Japan's rural areas than in urban areas (Unayama 2012; Asai et al. 2015; Abe et al. 2008; Abe 2013). The regional disparity in the EPR within Japan is as large as cross-country differences. Yet, to my knowledge, little has been known about whether the dispersion widened or compressed over time. In this paper, I examine the causes of the convergence in participation by women aged 25–39 years from 1982 to 2012. The paper establishes that regional differences compressed over time: this pattern is found from both census and ESS data and seems quite robust. Moreover, female participation is low in urban areas and high in non-urban areas, and its regional disparity is large for married women and mothers but small for single women. Then, I quantify the role of a major source of convergence, the compositional changes in education and marital status, and show that all of the convergence from 1982 to 1997, and 38% of it from 1997 to 2012, are due to compositional changes. For the less educated, conditional on marital status and fertility, regional differences in participation have been stable. For college graduates, the EPR converged for married women and mothers after 2002, because the participation rate in urban areas increased more than it did in non-urban areas.

The paper points out the importance of urban-rural differences in participation. The female participation rate in urban areas caught up with that in rural areas. However, a large part of this increased female participation in urban areas is due to the declining marriage and fertility rates (i.e., compositional changes in demographics). It has not become easier for married women or mothers to pursue careers. In promoting women's participation in the labor market in Japan, easing the constraints for participation of urban mothers is of high priority.

Data Appendix

ESS data

The ESS is a large scale cross-sectional survey conducted every 5 years; I use data from 1982 to 2012 for the analysis. Because the ESS does not collect information about region of employment, the region variable used is the region of residence, not that of employment. The ESS data include 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. According to this terminology, “couple” refers to the youngest couple in the household, and “children” are the children of the youngest couple. People whose completed education is junior high school are excluded from the sample, since their labor force behavior is different from those with a senior high school degree or more (Abe 2011).

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[13] The different sub-periods (1982-1992 and 1992-2012, or 1982-2002 and 2002-2012) are also experimented. While the fraction explained by compositional changes varies somewhat, the conclusion that the composition explains much of the convergence during the earlier period whereas it explains less of it during the later period does not change.

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