Long-term effects of labor market conditions on family formation for Japanese youths

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Abstract

This study aims to examine how each cohort's family formation is affected by labor market conditions experienced in youth in Japan. Although the deteriorated youth employment opportunities have been blamed for the declining fertility and marriage rates, the effects of slack labor market conditions on marriage and fertility are theoretically unclear. On the one hand, a decline in household income could have a negative income effect, but on the other hand, lower earnings for women imply lower opportunity costs of marriage and child bearing and thus have a positive substitution effect. We estimate the effects of prefecture-level labor market conditions on the cohort level marriage rates, controlling for nation-wide year effects and prefecture fixed effects. We find that overall effect of a recession in experienced in youth on marriage rate is negative, and that the male unemployment rate experienced at age 18 lowers the affected cohort's marriage rate even at age 35. In contrast, the contemporaneous female unemployment rate increases marriage, suggesting simultaneous decision making on female labor supply and marriage.

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1. Introduction

In Japan, like in many other countries, the average age at first marriage has been rising, and the fertility rate has been falling for decades. At the same time, the rates of unemployment and non-regular employment are on the rising trend. Given this time series correlations, the deteriorated youth employment is often blamed for the declining marriage and fertility rate. Yet, there remains much to learn about this alleged link between labor market conditions and demographic changes. Do worse labor market conditions keep more people unmarried and childless throughout their lifetime, or simply delay the timing of marriage and childbearing? Do the labor market conditions experienced at a particular age have a critical, persistent effect, or are the contemporaneous conditions more important? This study aims to identify long-run effects of labor market conditions experienced in youth on the affected cohorts' marriage formation and fertility in Japan.

Theoretically, on the one hand, a decline in household earnings is expected to have a negative income effect. On the other hand, less employment opportunities for women lower the opportunity cost of marriage and childbearing, thus there may be a positive substitution effect. Like in many other countries, existing studies using the Census data (Ogura and Dekle 1992, Ohta 2007, Kitamura and Miyazaki 2009 etc) establish evidence that worse employment opportunities for men and better employment opportunities for women lower marriage and fertility rates in Japan. One thing peculiar to Japan is that labor market conditions for men seem to have a greater impact on demographic trends than those for women.[1]

[1] In contrast, labor market conditions for women tend to have a greater impact in the

However, these existing studies are limited to the link between contemporaneous labor market conditions and demographic trends. We do not know whether a shock experienced in youth changes the life-time marriage and fertility rates of the affected cohort or it simply changes the timing of marriage and childbearing. It is especially important to understand the long-run effect at the cohort level in Japan, given the strong, persistent effects of labor market conditions at entry on subsequent earnings and employment status (Genda, Kondo and Ohta, forthcoming). In order to follow each cohort over time, we construct an annual panel at the prefecture level from the Census and the Vital Statistics.[2]

We estimate the effects of contemporaneous labor market conditions and conditions at entry to the labor market simultaneously. Our estimates suggest that the overall effect of a recession experienced in youth on marriage rate is negative, and stronger than the effect of contemporaneous labor market conditions. Further, we find that the male unemployment rate experienced at age 18 lowers the affected cohort's marriage rate in the long run. This result suggests that a shock to the male labor market produces a persistent income effect on family formation for the cohort entering to the labor market. In contrast, the contemporaneous female unemployment rate increases marriage, suggesting the simultaneous decision making on female labor supply and marriage.

At this point, our analysis is limited to the effect on the marriage rate, or more

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United States (Kondo 2008 [need more references here]).

[2] Abe (1999) and Higuchi (2001) estimated the effect of unemployment rate at the year of graduation on marriage hazard using individual level panel data. However, their results are conflicting, probably because both of them use nation-wide labor market indices and control for time trend in different ways. We use prefecture or region level indices and control for nation-wide year effects non-parametrically.

precisely, the fraction of never-married women in each prefecture and birth-year cohort because of data availability. In future, however, we hope to get micro-data that allow us to examine fertility at the individual level.

The rest of this paper is organized as follows. The next section reviews the literature and explains why we think Japan may be different from the United States. Then, the third and fourth sections describe our empirical model and data. The fifth section reports the results and the final section provides with preliminary conclusion and proposes further analyses of fertility using microdata.

2. Japanese youth labor market and marriage behavior

Kondo (2008) shows that, although slack labor market conditions for women relative to men increase marriage incidence for young American women, this increase in marriage reflects an inter-temporal substitution and the long run marriage rate is unaffected. Yet, this result may rely on the high labor turnover rate in the United States. In fact, Adsera (2005) argue that, in countries with rigid labor market structure, the unemployment rate has a negative effect on the total fertility rates.

In contrast to the United States, the labor turnover rate is low and the first job right after graduation is very important in Japan. Thus, as shown by Genda, Kondo and Ohta (forthcoming), the unemployment rate at entry to the labor market has almost permanent effect on earnings and employment for male high school graduates, while such effects do not exist in the United States. Therefore, labor market conditions in youth might well have more persistent effects on marital status and fertility outcomes in Japan.

Furthermore, the persistence of the effect of male labor market conditions and that of female may be quite different. Since the pecuniary cost of a child is incurred for many years after the child is born, the decision to have a child depends on permanent income of the household. Given that labor market conditions at entry have a strong, persistent effect on male earnings, the effect of male labor market conditions experienced in youth can be also quite persistent. On the other hand, the opportunity cost of having a child depends more on the contemporaneous labor market conditions for women because the maternal time spent on a child falls rapidly as the child ages. Therefore, the effect of contemporaneous female labor market conditions may be stronger than that of female labor market conditions in youth.

Another important difference between Japan and the United States is that the average age at first marriage is much younger in the United States. Non-Hispanic white American women typically marry in the late teens and the early twenties. That is, the timing of marriage and labor market entry overlap. In contrast, the median age of marriage of Japanese women is in the mid to late twenties. Since Japanese women typically work for several years before getting married, we are able to estimate the effect of contemporaneous labor market conditions and the effect of labor market conditions in the late teens and early twenties simultaneously.

3. Empirical model

Our goal is to identify the long-run effects of labor market conditions experienced in youth on the affected cohort's family formation. Specifically, we regress the fraction of never-married women on the indices of labor market conditions in the previous year

and the year when the cohort was 18, 20 or 22 years old. We exploit regional variations in labor market conditions over time to control for nation-wide year effects and prefecture fixed effects. The never married ratios of men and women should move parallel in response to aggregate labor market shocks, thus we focus on the never-married ratio of women.

Thus, we estimate the following linear regression equation separately for each age:

$$NM_{apt} = \alpha_a + \beta_a' U_{p,t-1} + \gamma_a' U_{p,t-a+x} + \delta_a' X_{apt} + \eta_{ap} + \zeta_{at} + \varepsilon_{apt} \ldots (1)$$

Where NM_{apt} is the ratio of never-married women in the total female population of age a in prefecture p in year t, $U_{p,\,t-1}$ is a vector of indices in the previous year's labor market conditions, $U_{p,\,t-a+x}$ is a vector of the same set of indices in the year when this cohort was x years old, and X_{apt} represents all other covariates. η_{ap} is a prefecture fixed effect and ζ_{at} is nation-wide year effect. The remaining random errors are denoted as ε_{apt}, which may be correlated within prefecture (i.e. standard errors are clustered by prefecture). The subscript a attached to each coefficient implies that this equation is estimated separately for each age.

We estimate equation (1) by the linear OLS using data at the prefecture and birth-year level. We use the linear OLS because it is easier to interpret the estimated coefficients. The major disadvantage of the linear OLS is that predicted values can be greater than 1 or smaller than 0. Thus, we have checked that predicted values from the regressions reported in this paper are in the range from 0 to 1. We have also tried logit-transformation of NM and confirmed that the results are qualitatively similar.[3]

[3] Since we control for prefecture-fixed effects and nation-wide year effects, grouped logit/probit estimates do not seem to yield consistent estimates.

4. Data

Total and never-married population

Ideally, we would like to have an annual panel dataset of total and never married population by single age for each prefecture. However, the data for total and never married population by single age, sex and prefecture is available only from the quinquennial population Census (*kokusei chosa*). Thus, we have to impute the data for inter-Census years from the Census and the annual report of Vital Statistics (*jinko dotai tokei nenpo*).

For the total population, we assume that the population of each birth year cohort does not change much and take a weighted average of the last and the next Census data. In contrast, the number of never-married women fluctuates as the number of marriages reported in the annual Vital Statistics changes. What we identify is basically the link between this fluctuation from the Vital statistics and the labor market indices described in the next subsection.

Specifically, for each prefecture and sex, we define the population of each age in an inter-Census year as a weighted average of population of the same birth-year cohort in two Census years. For example, the population of age 28 in 1997 is defined as follows:

$$\begin{aligned} &Population\_age28\_in1997 \\ &= 0.6 * Population\_age26\_in1995 + 0.4 * Population\_age31\_in2000 \end{aligned}$$

Using seven waves, we construct a pseudo panel spanning from 1975 to 2005.

It is true that this definition does not take into account different migration rates for different ages. This omission may cause non-random measurement errors for the

teens and the early twenties because many of them move from rural areas to large cities to enter college or start a new job. Yet, we believe that such errors are negligible for the population of age 25 or older;[4] therefore, we focus on marital status at age 25 or older.

The number of marriages by age of the bride in each prefecture is published annually as a part of the Vital Statistics, and the never-married population by single age, sex and prefecture is available from the Census since 1980. Using these data, first, we subtract the number of marriages formed after the latest Census from the never married population reported in the Census. Let us call this "forward imputation." Second, we added the number of marriages to be formed by the next Census to the never married population reported in this next Census. Let us name this "backward imputation." Lastly, we take a weighted average of the forward and backward imputations. For example, the never-married population of age 28 in 1997 is calculated as follows:

1. Forward imputation: the never-married population of age 26 in 1995 - the number of marriages with 27-year-old brides in 1996 – the number of marriages with 28-year-old brides in 1997.
2. Backward imputation: never married at age 31 in 2000 + marriages with 31-year-old brides in 2000 + marriages with 30-year-old brides in 1999 + marriages with 29-year-old brides in 1998.

[4] For 1991-2005, we tried an alternative definition that uses the annual population estimates reported in *jinko suikei nenpo*. Since the annual estimated population is available only for five-year age categories, we decomposed each five-year age cell into five single-year age cells using the ratio obtained from nearest two Census waves. For example, the population of age 28 in 1997 is defined as follows: $Population\_age28\_in1997 = EstPopulation\_age25\sim29\_in1997 * \left(\frac{Population\_age26\_in1995}{Population\_age23\sim27\_in1995} + \frac{Population\_age31\_in1995}{Population\_age28\sim32\_in1995}\right)/2$
We confirmed that the difference between this alternative definition and the definition used in the main analysis is negligible for population older than 24.

3. Weighted average: 0.6*forward imputation + 0.4* backward imputation.

For years prior to 1980, only the "backward imputation" is available because Census 1975 does not provide with the never married population by single age. Thus, we regress the imputed never-married population on the backward imputation and interaction terms of age dummies and dummies for years since the last Census, using the data after 1980 and separately for each prefecture, to get the predicted never-married population for years prior to 1980 based on the backward imputation. The underlying assumption is that the difference between the forward and backward imputations depends only on the age and how far the last Census was.

Eventually, we have a pseudo panel dataset of total and never-married female population at the prefecture and birth-year level, spanning from 1976 to 2005.

Labor market indices and other covariates

As indices for labor market conditions, we use the effective vacancy-applicant ratio (*yuko kyujin bairitsu*) and unemployment rates by gender. The effective vacancy-applicant ratio is the ratio of the number of vacancies posted to the public Employment Service Agency (*shokugyo anteijo*) to the number of job applicants registered to the Agency. This statistics is published by the Ministry of Health, Labor and Welfare and available at the prefecture level. However, this index cannot be decomposed by gender because the Agency does not allow employers to target a specific gender explicitly in their vacancy ads. Thus, we also use unemployment rates by gender based on the Labour Force Survey, although they are available only at the

region level. Male and female unemployment rates are published for 10 regions[5] since 1974. Therefore, unemployment rates at age 18 are available for cohorts born after 1956.

Other explanatory variables include the population sex ratio and the fraction of men and women with high school or less education. The sex ratio is based on the estimated population described above. The fraction with high school or less educated is a fixed value for each prefecture and birth-year cohort based on Census 2000. Since the educational background is available only at the 5-year age categories, we assume that enrolment rate doesn't jump a lot and take the moving average to impute educational background by single-age. For example, the value for 23 years old in 2000 is 0.8*(average of age 20-24) + 0.2*(average of age 25-30). Thus this is available only for those who are already 22 years old in 2000, i.e. born by 1978.

Summary Statistics

Figure 1 plots the fractions of never married women at age 25, 30 and 35 over the year of birth. The ratio of never-married has been rising for all age categories. Among women born in 1956, for example, more than a half had married by age 25 while only about one-third of women born in 1975 had married by age 25.

The upper panel of Table 1 summarizes the cohort level covariates. Our dataset include 1081 cohorts (47 prefectures times 1956-78). 1956 is the oldest cohort for whom unemployment rates at age 18 are available, and 1978 is the youngest cohort whose educational background can be determined from Census 2000. We follow each

[5] Hokkaido, Tohoku, Southern-Kanto, Northern-Kanto and Koshin, Hokuriku, Tokai, Kinki, Chugoku, Shikoku and Kyushu.

cohort from age 25 to 35.

The lower panel of Table 1 presents summary statistics of the labor market indices. Since male and female unemployment rates are expected to be correlated with each other, we also report the correlation coefficient net of year- and prefecture- effects.[6]The correlation between male and female residual unemployment rates is 0.68, which is admittedly high. Yet, the problem caused by multi-colinearity between two explanatory variable is that estimates tend to have large standard errors and often unstable in sign. Thus, as long as the estimated coefficients are statistically significant and in consistent signs, the correlation between male and female unemployment rates is not a critical problem for this study.

5. Results

Table 2 presents the estimated effect of past and present effective vacancy-applicant ratio, which proxies for prefecture-level labor market conditions. Each column corresponds to a regression of equation (1) using the sample of a particular age. Slack labor market conditions experienced at age 18 and 22 have somewhat persistent negative effects on the affected cohort's marriage rate. In contrast, the contemporaneous vacancy-applicant ratio does not have a significant effect.

Table 3 reports the estimated effects of past and present unemployment rates by gender. The male unemployment rate experienced at age 18 has persistent positive effect on the fraction never-married. The male unemployment rate experienced at age 20 and

[6] Since we control for year- and prefecture- effects in the main regression, the identification of the effects of male and female unemployment rates depends on the variations net of these fixed effects.

22 have somewhat weaker but still significant and persistent effects. This result implies a negative income effect from a recession at entry to the labor market for men.[7]

In contrast, the female unemployment rate experienced in youth does not have a statistically significant effect on the rate of never-married later. On the other hand, the contemporaneous female unemployment rate has a significantly negative effect, while. the contemporaneous male unemployment rate is insignificant though consistently positive. This result may imply that substitution effect is inter-temporal and the income effect is more permanent.

The effects of the vacancy-applicant ratio at age 18 and 22 gradually fade away by the early thirties. The effect of the male unemployment rate at age 18 remains significant until age 35 although the effects of the male unemployment rate at age 20 and 22 fades away by the early thirties. In sum, a negative shock to the (male) labor market substantially delays the timing of marriage among women who were at entry to the labor market, while it does not significantly change the likelihood of having ever married by age 35. Yet, this delay might affect the total fertility rate, provided that the age specific fertility falls sharply after 35.

In both Tables 2 and 3, the estimated coefficients of the other covariates are in plausible signs. The negative coefficients of the male to female ratio imply that, if there are more men, it is easier for women to find a spouse. Also, more educated women tend to marry later, while more educated men are more attractive potential spouses for women.

[7] The stronger persistence of the unemployment rate at age 18 than that of the rate at age 22 is consistent with the finding by Genda et al (forthcoming) that a recession at entry has more negative and persistent effects for high school graduates than for college graduates in Japan.

6. Preliminary conclusion and further research agenda

Using panel data at the prefecture level, we have shown that a negative shock to the male labor market leads to fewer marriages among women in the cohort who were at entry to the labor market. This result seems to be consistent with the argument that the prevailed anxiety for future employment and financial situation discourages Japanese youths from setting up a family. If so, improving employment opportunities for young men might alleviate the population aging.

Yet, we would need further analysis using individual-level data to derive clearer policy implications. Individual-level data would allow us to specify the exact year of entry to the labor market for both men and women. Also, our current dataset does not allow us to analyze fertility, which has more important implication for social security policies and long-run macroeconomic growth than marriage. In fact, obtaining fertility history data would be much easier to obtain marriage history because the timing of child births could be retrieved from any household data which includes children's ages. We are planning to apply for microdata of the Employment Status Survey for further analyses.

References

Abe, Masahiro, 1999. "*Shoshikashakai ni okeru Rodoshijo – Josei no Kekkon to Rodoryoku Kyokyu no Shiten kara*" *Kikan Shakaihosho Kenkyu*, 34(4), 361-373.

Adsea, Alicia, 2005. "Vanishing Children: From High unemployment to Low Fertility in Developed Countries," American Economic Review, 95 (2) 189-193.

Higuchi, Yoshio, 2001. "Women's Employment in Japan and the Timing of Marriage and Childbirth" Japanese Economic Review, 52 (2).

Genda, Yuji, Ayako Kondo and Souichi Ohta, *forthcoming*. "Long-term Effects of a Recession at Labor Market Entry in Japan and the United States." Journal of Human Resources.

Kitamura, Yukinobu and Tsuyoshi Miyazaki, 2009. "*Kekkon no Chiiki Kakusa to Kekkon Sokushinsaku*" *Nihon Keizai Kenkyu*, 60 (1), 79-102.

Kondo, Ayako, 2008. "Female Labor Market Conditions and Family Formation." PER Discussion Paper 0809-08, Columbia University.

Ogura, Seiritsu and Robert Dekle, 1992. "*1970-nen iko no Shusseiritsu Teika to Sono Genin - Kenbetsu, Nenreikaisobetsu Data karano Approach*" *Nihon Keizai Kenkyu*, 22 (3), 46-76.

Ohta, Souichi, 2007. "*Life-event to Jakunen Rodoshijo – Kokusei Chosa karamita Shingaku Kekkon Shussei Kodo* (Life-event and youth labor market)." in Toshiaki Tachibanaki Eds., *Nihon Keizaino Jissho Bunseki*, Toyokeizai Shinposha, 217-238.

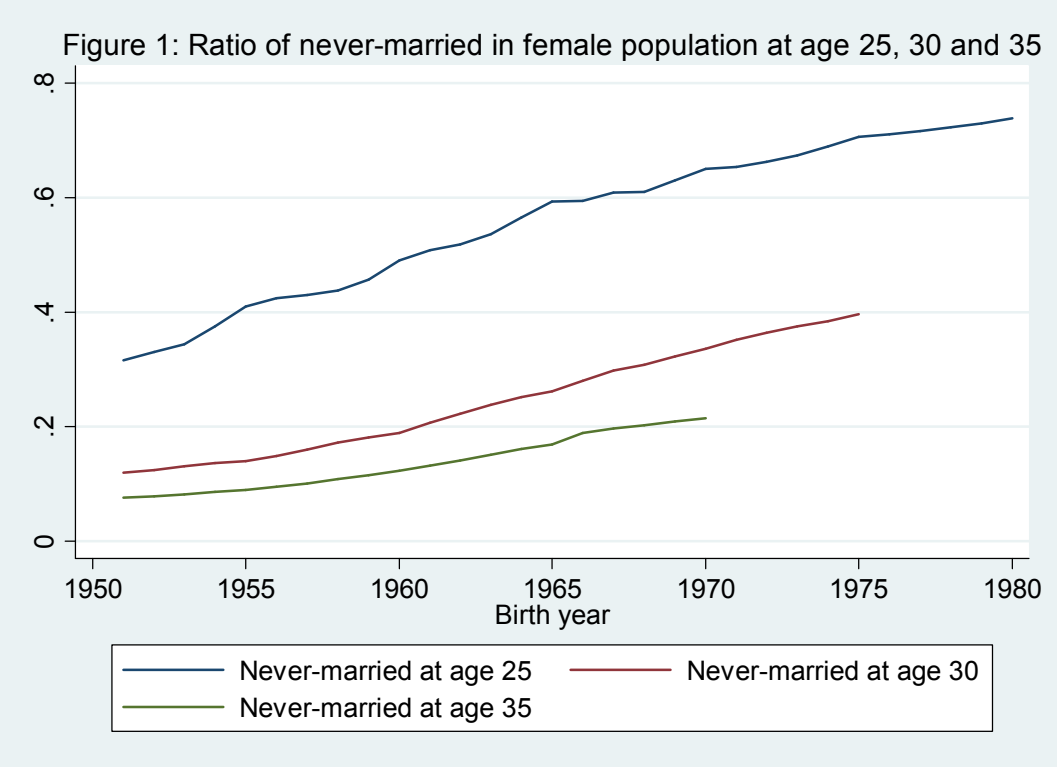

Table 1. Summary Statistics

Prefecture*birth-year cohorts, born 1956-1978	
Sample size	1081
Average male to female population ratio	1.03
Ratio of high school or less educated, men	51.7%
Ratio of high school or less educated, women	50.9%

Note: weighted by female population of each cohort at age 25.

Labor market indices, 1974-2005	
Effective vacancy-applicant ratio (yuko kyujin bairitsu)	0.822
Male unemployment rate (region level)	3.13%
Female unemployment rate (region level)	2.84%
Corr(male u, female u) net of year- and prefecture- effects	0.68

Note: unweighted average of 47prefectures over 32 years.

Table 2. Effects of effective vacancy-applicant ratio (*yuko kyujin bairitsu*) on the fraction of never-married women

a) Contemporaneous and at age 18

Age	25	26	27	28	29	30	31	32	33	34	35
Effective vacancy-applicant	-0.013**	-0.011**	-0.010***	-0.008**	-0.006**	-0.005	-0.004	-0.003	-0.002	-0.001	0.001
ratio in the year of age 18	[0.005]	[0.004]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]
Effective vacancy-applicants	-0.005	-0.005	-0.003	-0.003	-0.002	0.000	0.001	0.003	0.004	0.004*	0.000
ratio in the previous year	[0.009]	[0.008]	[0.006]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.004]
Male to female population ratio	-0.005	-0.054	-0.088*	-0.084**	-0.071**	-0.057***	-0.046***	-0.025	0.000	0.024	0.071
	[0.069]	[0.058]	[0.046]	[0.037]	[0.026]	[0.017]	[0.014]	[0.016]	[0.015]	[0.026]	[0.066]
Ratio of high school or less	-0.679***	-0.669***	-0.592***	-0.524***	-0.448***	-0.366***	-0.275***	-0.204***	-0.153**	-0.134*	-0.189
educated, women	[0.237]	[0.222]	[0.187]	[0.152]	[0.120]	[0.102]	[0.087]	[0.073]	[0.068]	[0.071]	[0.119]
Ratio of high school or less	0.419**	0.434**	0.396**	0.428***	0.423***	0.380***	0.306***	0.224***	0.153**	0.089	0.070
educated, men	[0.188]	[0.181]	[0.165]	[0.141]	[0.122]	[0.108]	[0.095]	[0.080]	[0.072]	[0.069]	[0.077]
Observations	1081	1081	1081	1034	987	940	893	846	799	752	705

Note: Weighted OLS. Each cohort is weighted by its female population. Standard errors in the brackets are robust to clustering at the prefecture level.

Table 2. Effects of effective vacancy-applicant ratio (*yuko kyujin bairitsu*) on the fraction of never-married women (continued)

b) Contemporaneous and at age 20

Age	25	26	27	28	29	30	31	32	33	34	35
Effective vacancy-applicant	-0.010	-0.010	-0.009*	-0.009*	-0.007*	-0.007	-0.006	-0.006	-0.006	-0.005	-0.002
ratio in the year of age 20	[0.007]	[0.007]	[0.005]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Effective vacancy-applicants	-0.005	-0.004	-0.002	-0.002	-0.002	-0.001	0.001	0.002	0.003	0.003	0.000
ratio in the previous year	[0.010]	[0.008]	[0.006]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]	[0.004]	[0.003]	[0.005]
Male to female population ratio	-0.007	-0.053	-0.084*	-0.075*	-0.060**	-0.046**	-0.036**	-0.015	0.008	0.027	0.071
	[0.075]	[0.063]	[0.048]	[0.038]	[0.028]	[0.020]	[0.017]	[0.018]	[0.016]	[0.026]	[0.065]
Ratio of high school or less	-0.682***	-0.672***	-0.595***	-0.526***	-0.446***	-0.364***	-0.279***	-0.215***	-0.169**	-0.145*	-0.185
educated, women	[0.239]	[0.224]	[0.190]	[0.155]	[0.122]	[0.103]	[0.088]	[0.076]	[0.073]	[0.075]	[0.118]
Ratio of high school or less	0.428**	0.445**	0.407**	0.440***	0.428***	0.381***	0.310***	0.234***	0.169**	0.105	0.071
educated, men	[0.191]	[0.183]	[0.167]	[0.143]	[0.123]	[0.108]	[0.094]	[0.081]	[0.074]	[0.070]	[0.080]
Observations	1081	1081	1081	1034	987	940	893	846	799	752	705

Note: Weighted OLS. Each cohort is weighted by its female population. Standard errors in the brackets are robust to clustering at the prefecture level.

Table 2. Effects of effective vacancy-applicant ratio (*yuko kyujin bairitsu*) on the fraction of never-married women (continued)

c) Contemporaneous and at age 22

Age	25	26	27	28	29	30	31	32	33	34	35
Effective vacancy-applicant	-0.011*	-0.009*	-0.009*	-0.008**	-0.007*	-0.007*	-0.006	-0.005	-0.004	-0.003	-0.001
ratio in the year of age 22	[0.006]	[0.005]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.003]	[0.003]	[0.004]
Effective vacancy-applicants	0.000	-0.001	0.000	0.000	0.000	0.000	0.001	0.003	0.004	0.003	0.000
ratio in the previous year	[0.009]	[0.008]	[0.006]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.004]
Male to female population ratio	-0.015	-0.058	-0.085*	-0.075*	-0.057*	-0.040*	-0.031*	-0.012	0.009	0.029	0.073
	[0.071]	[0.062]	[0.050]	[0.040]	[0.029]	[0.021]	[0.018]	[0.019]	[0.019]	[0.027]	[0.062]
Ratio of high school or less	-0.694***	-0.675***	-0.591***	-0.520***	-0.440***	-0.356***	-0.269***	-0.204***	-0.159**	-0.142*	-0.186
educated, women	[0.238]	[0.223]	[0.190]	[0.156]	[0.122]	[0.103]	[0.087]	[0.074]	[0.072]	[0.075]	[0.118]
Ratio of high school or less	0.437**	0.449**	0.406**	0.436***	0.425***	0.375***	0.300***	0.222***	0.155**	0.094	0.069
educated, men	[0.188]	[0.182]	[0.166]	[0.143]	[0.123]	[0.107]	[0.093]	[0.079]	[0.072]	[0.070]	[0.079]
Observations	1081	1081	1081	1034	987	940	893	846	799	752	705

Note: Weighted OLS. Each cohort is weighted by its female population. Standard errors in the brackets are robust to clustering at the prefecture level.

Table 3. Effects of unemployment rates by gender on the fraction of never-married women

a) Contemporaneous and at age 18

	25	26	27	28	29	30	31	32	33	34	35
Male unemployment rate in	0.008*	0.008**	0.009***	0.008***	0.006***	0.004*	0.003*	0.002	0.003**	0.004**	0.005**
the year of age 18 (%)	[0.004]	[0.004]	[0.003]	[0.003]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]
Female unemployment rate in	-0.004	-0.002	-0.003	-0.003	-0.002	-0.001	-0.002	-0.001	-0.001	-0.001	0.003
the year of age 18 (%)	[0.004]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.003]
Male unemployment rate in	0.005	0.006*	0.006*	0.006**	0.004*	0.004**	0.002	0.001	0.001	0.000	0.000
the previous year (%)	[0.004]	[0.004]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]
Female unemployment rate in	-0.001	-0.003	-0.005*	-0.007***	-0.007***	-0.008***	-0.006***	-0.005**	-0.001	0.001	0.001
the previous year (%)	[0.005]	[0.004]	[0.003]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]
Male to female population	-0.023	-0.065	-0.084*	-0.072*	-0.057*	-0.048**	-0.040**	-0.029*	-0.011	0.014	0.076
ratio (%)	[0.066]	[0.061]	[0.050]	[0.042]	[0.031]	[0.022]	[0.019]	[0.017]	[0.018]	[0.028]	[0.066]
Ratio of high school or less	-0.674***	-0.653***	-0.579***	-0.523***	-0.443***	-0.353***	-0.258***	-0.191**	-0.176**	-0.160**	-0.145
educated, women	[0.236]	[0.212]	[0.184]	[0.154]	[0.125]	[0.103]	[0.089]	[0.079]	[0.077]	[0.076]	[0.089]
Ratio of high school or less	0.415**	0.426**	0.393**	0.431***	0.429***	0.380***	0.301***	0.219**	0.175**	0.126	0.073
educated, men	[0.176]	[0.166]	[0.154]	[0.137]	[0.120]	[0.103]	[0.091]	[0.082]	[0.077]	[0.075]	[0.077]
Observations	1081	1081	1081	1034	987	940	893	846	799	752	705

Note: Weighted OLS. Each cohort is weighted by its female population. Standard errors in the brackets are robust to clustering at the prefecture level.

Table 3. Effects of unemployment rates by gender on the fraction of never-married women (continued)

b) Contemporaneous and at age 20

	25	26	27	28	29	30	31	32	33	34	35
Male unemployment rate in	0.007*	0.007**	0.006**	0.005*	0.004*	0.003	0.000	-0.002	-0.001	-0.001	0.003**
the year of age 20 (%)	[0.004]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
Female unemployment rate in	0.000	0.000	0.001	0.002	0.000	0.000	0.001	0.002	0.002	0.004	0.005*
the year of age 20 (%)	[0.003]	[0.004]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]
Male unemployment rate in	0.003	0.004	0.004	0.005	0.003	0.003*	0.002	0.001	0.000	-0.001	0.001
the previous year (%)	[0.004]	[0.004]	[0.003]	[0.003]	[0.002]	[0.002]	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]
Female unemployment rate in	-0.001	-0.004	-0.006**	-0.008***	-0.006***	-0.008***	-0.006***	-0.005**	0.000	0.001	0.000
the previous year (%)	[0.005]	[0.004]	[0.003]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]
Male to female population	-0.033	-0.072	-0.096**	-0.088**	-0.063**	-0.051**	-0.053***	-0.044**	-0.030*	-0.013	0.057
ratio	[0.062]	[0.056]	[0.047]	[0.040]	[0.030]	[0.023]	[0.018]	[0.018]	[0.018]	[0.019]	[0.054]
Ratio of high school or less	-0.649***	-0.635***	-0.555***	-0.489***	-0.424***	-0.344***	-0.243***	-0.182**	-0.168**	-0.149*	-0.154
educated, women	[0.225]	[0.202]	[0.176]	[0.148]	[0.123]	[0.103]	[0.087]	[0.078]	[0.077]	[0.077]	[0.093]
Ratio of high school or less	0.399**	0.413**	0.378**	0.407***	0.412***	0.366***	0.285***	0.206**	0.160**	0.105	0.063
educated, men	[0.175]	[0.166]	[0.155]	[0.137]	[0.119]	[0.101]	[0.088]	[0.080]	[0.077]	[0.075]	[0.074]
Observations	1081	1081	1081	1034	987	940	893	846	799	752	705

Note: Weighted OLS. Each cohort is weighted by its female population. Standard errors in the brackets are robust to clustering at the prefecture level.

Table 3. Effects of unemployment rates by gender on the fraction of never-married women (continued)

c) Contemporaneous and at age 22

	25	26	27	28	29	30	31	32	33	34	35
Male unemployment rate in	0.008**	0.008**	0.008**	0.007**	0.004*	0.002	0.001	-0.001	-0.002	-0.003	-0.001
the year of age 22 (%)	[0.004]	[0.004]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Female unemployment rate in	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.002	0.004*
the year of age 22 (%)	[0.004]	[0.004]	[0.004]	[0.003]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]	[0.002]
Male unemployment rate in	0.001	0.003	0.003	0.004	0.003	0.003	0.002	0.001	0.000	0.000	0.000
the previous year (%)	[0.004]	[0.004]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]
Female unemployment rate in	-0.002	-0.005	-0.006**	-0.008***	-0.007***	-0.008***	-0.006***	-0.005**	-0.001	0.001	0.002
the previous year (%)	[0.005]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]	[0.002]	[0.001]	[0.002]
Male to female population	-0.035	-0.072	-0.093**	-0.081**	-0.064**	-0.054**	-0.046***	-0.033**	-0.019	0.004	0.062
ratio	[0.058]	[0.053]	[0.045]	[0.038]	[0.028]	[0.020]	[0.017]	[0.016]	[0.017]	[0.024]	[0.061]
Ratio of high school or less	-0.655***	-0.645***	-0.562***	-0.499***	-0.424***	-0.345***	-0.252***	-0.194**	-0.178**	-0.163**	-0.178*
educated, women	[0.218]	[0.197]	[0.170]	[0.145]	[0.119]	[0.101]	[0.086]	[0.075]	[0.073]	[0.075]	[0.102]
Ratio of high school or less	0.396**	0.411**	0.375**	0.407***	0.405***	0.359***	0.288***	0.220***	0.171**	0.116	0.070
educated, men	[0.173]	[0.163]	[0.151]	[0.135]	[0.117]	[0.099]	[0.088]	[0.079]	[0.074]	[0.073]	[0.074]
Observations	1081	1081	1081	1034	987	940	893	846	799	752	705

Note: Weighted OLS. Each cohort is weighted by its female population. Standard errors in the brackets are robust to clustering at the prefecture level.