Table 8 *(continued)*

×experience 10–12 years	−0.035	−0.027
	(0.019)	(0.017)
Observations	38,281	33,778
R^2	0.26	0.35

Note: Standard errors in parenthesis are calculated by bootstrapping (reps = 200) with clustering by region. Other controls included are the unemployment rate in survey year, potential experience, education dummies, graduation year dummies, region dummies, survey-year dummies, and region-specific linear trends.

ative effect on earnings is the effect through the lower likelihood of regular, stable employment. In contrast, the negative impact of graduating from high school during a recession on earnings is temporary in the United States. We find a modestly persistent negative effect of graduating from colleges, similar to the existing studies that focus on college graduates.

Existing studies have mainly focused on college graduates and found persistent but fading negative effect of a recession at entry. Their models implicitly or explicitly ignore the effect through employment stability, which may be negligible for more-educated workers but not ignorable for less-educated workers. If dismissals are considered, less skilled workers are more likely to be laid off and lose the advantage of obtaining a good first job. We confirm that the effect of the labor market condition at graduation quickly fades away for less-educated American men. On the other hand, legally or institutionally enforced employment protection may place excessive burdens on those left outside of the protection. Our empirical results provide suggestive evidence that the stronger effect for less-educated Japanese men comes from chronic nonregular, unstable employment among those stranded out of the school-based hiring system, which does not exist in the United States.

That the cost of a recession at entry is borne disproportionately by relatively disadvantaged people raises a serious concern: The cohorts that suffer from the loss of earnings on average also experience greater earnings inequality between less- and more-educated people, since the effect of a recession at entry is weaker for the more-educated group. Furthermore, poverty concentrated to particular cohorts might severely weigh down the social security system and cause social unrest. Although coming up with specific policy recommendation is beyond the scope of this paper, it is worth bearing in mind that institutions that were meant to protect inexperienced workers could weigh down those who dropped out of the system.

Appendix 1

Earnings Data

The Japanese Labour Force Survey asks "Earnings from employed work (including not incorporated self-employment)." The respondent chooses one of the following categories: 0, < 50, 50–99, 100–149, 150–199, 200–299, 300–399, 400–499, 500–699, 700–999, 1000–1499, 1500- for 1996–2005; 0, < 100, 100–199, 200–299, 300–399, 400–499, 500–699, 700–999, 1000–1499, 1500– for 1986–1995 (in 10,000 yen). We define the nominal earnings as the middle value of each earnings category. For the top category, we set 2,100 following the convention of dealing with the CPS top coding (in any case, very few observations are in this category). Then, we divide the nominal earnings with the regional Consumer Price Index normalized so that the national average takes one in 2000.

For the March CPS, we use "PEARNVAL—total persons earnings" as the nominal annual earnings. This is the sum of wage and salary income and income from self-employment (including farm). Although this is in principle a continuous variable, 62 percent of the observations with positive earnings are bunched at every $1,000 and about 23 percent are even bunched at every $5,000. Thus it is more or less similar to the category data in the Japanese survey. Negative earnings are replaced with zero. We divide the nominal earnings by the national Consumer Price Index normalized to take one in 2000.

Table A1 summarizes the fraction with zero or missing earnings. Table A2 reports the effect of the unemployment rate at entry on the likelihood of reporting zero earnings or missing earnings. The unemployment rate at entry slightly raises the probability of lacking valid earnings data for the less-educated groups, probably due to nonemployment. Assuming that those with lower potential wages are more likely to lack valid earnings due to nonemployment, the potential bias will, if it is not negligible, work against our argument for Japanese men.

Table A1
Fraction with Zero or Missing Earnings

	Japan, High School or Less	Japan, Junior College or More	United States, Schooling ≤ 12	United States, Schooling > 12
Experience = 1–3	19.1%	5.5%	13.8%	6.2%
Experience = 4–6	8.1%	3.7%	7.9%	5.4%
Experience = 7–9	6.9%	3.4%	7.2%	5.4%
Experience = 10–12	7.2%	2.7%	6.8%	6.6%

Table A2
The Effect of the Unemployment rates on the Likelihood of Zero or Missing Earnings

Probit coefficients

	Japan		United States	
	High school	College	Schooling ≤ 12	Schooling > 12
Unemployment rate at entry to the market				
× experience 1–3 years	0.068	0.027	0.036	0.023
	(0.055)	(0.037)	(0.014)	(0.016)
× experience 4–6 years	0.060	0.123	0.024	0.005
	(0.054)	(0.043)	(0.013)	(0.013)
× experience 7–9 years	0.036	0.035	0.015	−0.008
	(0.040)	(0.041)	(0.011)	(0.013)
× experience 10–12 years	0.033	0.010	0.021	0.001
	(0.047)	(0.064)	(0.014)	(0.011)
Contemporaneous unemployment rate				
× experience 1–3 years	0.052	0.020	0.052	−0.015
	(0.045)	(0.043)	(0.014)	(0.015)
× experience 4–6 years	0.059	−0.013	0.032	0.003
	(0.034)	(0.036)	(0.019)	(0.018)
× experience 7–9 years	0.036	0.001	0.046	−0.002
	(0.033)	(0.036)	(0.016)	(0.018)
× experience 10–12 years	0.017	0.041	0.027	−0.005
	(0.045)	(0.041)	(0.019)	(0.016)
Observations	52,342	39,000	63,611	76,699
Pseudo R^2	0.186	0.180	0.077	0.026

Note: Standard errors in parenthesis are estimated by bootstrapping (reps = 200) with clustering by region/state. Other controls included are potential experience, education (dummies for the Japanese sample, years of schooling for the American sample), graduation year dummies, region dummies, survey-year dummies, and region-specific linear trends.

Appendix 2

Measurement Errors Caused by Migration across Regions and Skipped/Repeated Grades

Since we use the region of current residence as a proxy for the region of residence at entry, measurement errors due to migration across regions attenuate the estimated effect of the unemployment rate at entry. The five-year migration rate across regions of Japanese men of relevant ages is about 10 percent or less, while the five-year migration rate across states of American men is 15–20 percent.[26] Thus, attenuation bias due to measurement errors will be greater for Americans. However, the relative gap in migration rates between college-educated and not college-educated is fairly similar in Japan and the United States. Although the five-year migration rate across regions in Japan by age and education is unavailable, the migration rate across prefectures by age and education is available. Under an ad hoc assumption that the share of the migration across prefectures within a region in the total across-prefecture migration is the same across groups with different educational background, the five-year migration rate across region for 25–34-year-old Japanese men without a college education would be about 6 percent, and that for 25–34-year-olds with a college education would be about 14 percent. The across-state five-year migration rate of 25–39-year-old Americans with a college education is 26.0 percent and that of those without a college education is 13.5 percent, according to the cross-tabulation from Census 2000 by Franklin (2003).[27]

Another source of attenuation bias is errors in the year of graduation. Errors in the graduation year for Japanese high school graduates are negligible, and those for college graduates are mostly within one or two years. Admittedly, our definition of the year of graduation is noisier for American men: About 2 percent of 20-year-old white men in the CPS are still enrolled in high school, and 16 percent of 24-year-old white men are enrolled in college.[28]

Appendix 3

Business Cycles and Schooling Choice

First, let us check the effect on the completed education. Panel A of Table A3 shows the effect of unemployment rates around high school completion on the likelihood of college education among adult men. The dependent variable is an indicator of

26. The five-year migration rate across regions in Japan is 13.3 percent for 20–24-year-old men, 10.0 percent for 25–29-year-old men, and 8.2 percent for 30–34-year-old men. The migration rate across states is 18.5 percent for 20–24-year-old American men (including blacks), 19.7 percent for 25–29 year-olds, and 15.3 percent for 30–34 year-olds. Calculated from the Population Census in 2000 of each country.
27. This tabulation includes nonwhites and women.
28. Because many Americans graduate school one year later than the predicted entry, we have tried an alternative definition: the birth year + 7 + schooling. It does not change the results much.

Table A3
The Effect of the Local Unemployment Rate on the Enrollment Rates

(A) Unemployment rate around completion of high school on Pr(schooling > 12 years)

	Japan		United States	
Unemployment rate at	Age 18	Age 19	Age 18	Age 19
Marginal effect	0.2%	−1.1%	0.5%	0.3%
Coefficient	0.004	−0.027	0.013	0.007
Standard errors	(0.004)	(0.021)	(0.005)	(0.005)

(B) Contemporaneous unemployment rate on high school enrollment rates

	Japan		United States	
Age	Current	Last	Current	Last
16	−0.004 (0.011) * age 16–18 pooled	0.008 (0.010) * age 16–18 pooled	0.001 (0.002)	0.000 (0.002)
17			0.000 (0.002)	0.003 (0.002)
18			0.009 (0.004)	0.008 (0.004)
19	0.002 (0.018)	−0.004 (0.018)	0.000 (0.003)	−0.002 (0.003)
20	N/A	N/A	−0.001 (0.002)	0.000 (0.002)

(C) Contemporaneous unemployment rate on college enrollment rates

	Japan		United States	
Age	Current	Last	Current	Last
18	0.005	0.004	−0.001	0.002
	(0.007)	(0.007)	(0.004)	(0.003)
19	0.018	0.020	0.012	0.013
	(0.038)	(0.038)	(0.005)	(0.005)
20	0.000	−0.011	0.003	0.006
	(0.036)	(0.036)	(0.005)	(0.005)

(continued)

Table A3 *(continued)*

21	0.062	0.086	0.004	0.010
	(0.039)	(0.039)	(0.005)	(0.004)
22	−0.029	0.040	−0.002	−0.002
	(0.038)	(0.039)	(0.004)	(0.004)
23	0.068	0.062	0.001	0.008
	(0.029)	(0.029)	(0.004)	(0.004)
24	0.027	0.029	0.000	0.003
	(0.023)	(0.022)	(0.003)	(0.003)

Note: Coefficients from probit regressions, with birth-year dummies and region/state dummies as covariates. Standard errors are clustered for birth-year and region/state. See the text for details.

college education, and the control variables are dummies for year of birth and region of residence. The sample consists of men aged 25 or older born after 1966, and the standard errors are clustered for region-birth year groups. The estimated effect for Japanese men is not statistically significant and varies in sign. Although the effect of unemployment rate at age 19 looks substantial, the standard error is huge and also contradicts the result of no effect on college enrollment in Panel C. On the other hand, a recession at high school completion slightly increases the likelihood of having college education among American men.

Next, Panels B and C of Table A3 show the effect of the contemporaneous local unemployment rate on enrollment for a subsample of a specific age, following Card and Lemieux (2000). The sample contains all men in the relevant ages, and the table shows coefficients from probit model with year and region/state dummies in the right-hand side. High school enrollment in Japan is not correlated with business cycles.[29] Also, the correlation between the college enrollment rate and the unemployment rate suggests that a recession may make some people stay in college for another year but does not affect the decision upon high school graduation in Japan.[30] Note that the deferred graduation is not captured in the Japanese Labor Force Survey because it asks the diploma/degree obtained by the respondent, instead of years of

29. The number of 16–18 year-olds not enrolled is too small to run separate regression by single age, and the number enrolled in high school and older than 20 is too small to run regressions.

30. This result might sound contradicting to the existing studies in Japan that show that worse labor market opportunities for high school graduates are associated with higher college enrollment rates. In fact, according to the School Census, the ratio of high school graduates proceeding to college started to rise around 1992, coinciding with the upturn of the unemployment rate. However, as Ariga (2005) emphasizes, this rise is largely attributed to the expansion of college capacity relative to the number of high school graduates. On one side, the number of colleges started to increase in the end of 1980s thanks to deregulation; on the other side, the number of high school graduates started to decrease around in the early 1990s after the second baby boomers (born in 1971–74) finished high school. Since the most of the existing studies that find significant correlation between business cycle and college enrollment rate employ linear or quadratic trend and do not control for more flexible year fixed effects, chances are that they are picking up the spurious correlation in the early 1990s. Incidentally, the ratio of high school graduates proceeding to college stopped rising as the decrease of 18-year-old population slowed down around 2000, while the unemployment rate kept rising until 2002.

schooling. On the other hand, a recession increases high school enrollment of 18-year-old American men, consistent with Card and Lemieux (2000), and it also increases college enrollment of 19- and 21- year-old American men slightly. However, the effect on college enrollment is small, and there is no significant effect of unemployment rate in the previous year on 20- and 22-year old men suggesting that a substantial part of the increased college entrants quit in a year.[31] Overall, the effect of the business cycle on schooling choice is small.

Further, to assess whether people who proceed to college during a recession are differently selected from those who proceed to colleges during a boom, we estimate the correlation between the unemployment rate at age 18 and future wages for college graduates. The unemployment rate at age 18 is unlikely to have any direct effect on earnings after graduation from college. Thus, if there is a significant correlation, it is likely to be due to sorting on unobserved ability. Table A4 reports the result. Although the unemployment rate at age 18 is slightly positively correlated with earnings after graduating from college, the four coefficients are jointly insignificant and most of the individual coefficients are also insignificant in both countries. At least, there is no evidence that selection of students proceeding to college during a recession goes in an opposite direction in Japan than in the United States.

Table A4
The Effect of Unemployment Rates at Age 18 on Future Wages for College Graduates

	Japan		United States	
	Four-Year College Graduates Only	Include Junior/Tech College	Schooling ≥ 16 yrs	Schooling ≥ 13 yrs
Unemployment rate at age18				
× experience 1–3 years	0.018	0.034	0.012	0.005
	(0.033)	(0.018)	(0.009)	(0.005)
× experience 4–6 years	−0.005	0.014	0.009	0.011
	(0.027)	(0.015)	(0.007)	(0.004)
× experience 7–9 years	−0.003	0.026	0.009	0.004
	(0.024)	(0.016)	(0.005)	(0.003)
× experience 10–12 years	0.000	0.017	0.000	−0.001
	(0.023)	(0.019)	(0.005)	(0.003)

(continued)

31. Card and Lemieux (2000) also conclude the effect of local labor market condition on college enrollment is weak. Their result suggests the effect of cohort size on the college enrollment rate is substantial in the United States, too.

Table A4 *(continued)*

Contemporaneous unemployment rate				
×experience 1–3 years	−0.064	−0.064	−0.014	−0.011
	(0.021)	(0.018)	(0.016)	(0.010)
×experience 4–6 years	−0.034	−0.040	−0.031	−0.024
	(0.020)	(0.017)	(0.013)	(0.008)
×experience 7–9 years	−0.023	−0.024	−0.024	−0.018
	(0.021)	(0.017)	(0.018)	(0.010)
×experience 10–12 years	−0.019	−0.014	−0.016	−0.010
	(0.021)	(0.018)	(0.015)	(0.010)
Observations	18,053	27,577	38,769	72,226
R^2	0.22	0.25	0.14	0.16

Note: Cohort-clustered robust standard errors in parenthesis. Other controls included are potential experience, education (dummies for the Japanese sample, years of schooling for the American sample), birth year dummies, region dummies, survey-year dummies, and region-specific linear trends.

Appendix 4

Sensitivity Check

Provided that more-educated workers are more geographically mobile, they may be less sensitive to labor market shocks specific to the region. Thus, the deviations of the regional unemployment rate from the national unemployment rate may not affect more-educated workers as much as the level of the unemployment rate does. Also, since we approximate the region of entry by the region of current residence, the potential attenuation biases due to measurement errors also affect college graduates more than high school graduates. Thus, it is worth estimating the effect of the national unemployment rate at entry, although we cannot control for year fixed effects.

Panel 1 of Table A5 shows the effect of the national unemployment at entry estimated with controls for the contemporaneous unemployment. Note that the effect of the contemporaneous unemployment rate is not allowed to vary with experience because of the concern about multicollinearity. Therefore, although the effect for more-educated Japanese seems to be growing over time, we don't think this result is reliable. In any case, the overall result looks very noisy. Panel 2 uses the regional unemployment rates and allows the effect of the contemporaneous unemployment rate vary with experience, while the year dummies are not included. The estimated coefficients for Japanese men look reasonably similar to those in Table 3. Also, the coefficients for Americans are statistically insignificant both in Table 3 and Table A5.

Table A5
Sensitivity Check—The Effect of the Unemployment Rate at Entry on Employment, Estimated without Year-Fixed Effects

Coefficients from the probit model

(1) National unemployment rate

	Japan		United States	
	High school	College	Schooling ≤12	Schooling >12
Unemployment rate at entry to the market				
×experience 1–3 years	−0.014	−0.006	0.052	0.001
	(0.029)	(0.049)	(0.007)	(0.009)
×experience 4–6 years	−0.119	0.020	0.048	0.030
	(0.055)	(0.077)	(0.008)	(0.009)
×experience 7–9 years	−0.043	−0.200	0.013	0.031
	(0.079)	(0.120)	(0.011)	(0.012)
×experience 10–12 years	−0.219	−0.624	0.007	0.005
	(0.171)	(0.284)	(0.013)	(0.013)
Observations	49,336	36,668	63,611	76,699
Pseudo R^2	0.09	0.03	0.04	0.02

(2) Pooled regional unemployment rate

	Japan		United States	
	High school	College	Schooling ≤12	Schooling >12
Unemployment rate at entry to the market				
×experience 1–3 years	−0.129	−0.073	0.028	0.003
	(0.027)	(0.022)	(0.008)	(0.007)
×experience 4–6 years	−0.098	−0.032	0.033	0.016
	(0.023)	(0.033)	(0.007)	(0.011)
×experience 7–9 years	−0.120	−0.003	0.017	0.006
	(0.019)	(0.027)	(0.008)	(0.0070
×experience 10–12 years	−0.141	−0.032	−0.004	−0.012
	(0.028)	(0.049)	(0.009)	(0.009)

(continued)

Table A5 *(continued)*

Observations	49,336	36,668	63,611	76,699
Pseudo R^2	0.09	0.04	0.05	0.02

Note: Standard errors in parenthesis are calculated by White's heteroskedasticity robust method, and clustered by region/state for Panel B. Other controls included are the unemployment rate in survey year (for Panel A, without interactions with potential exp. for fear of multicollinearity; for Panel B, interacted with the four potential exp categories), potential experience, and education (dummies for the Japanese sample, years of schooling for the American sample). Panel B also includes region/state dummies. Note that no control for time trend is included.

Similarly, Panel 1 of Table A6 shows the effect of the national unemployment at entry estimated with controls for the contemporaneous unemployment. As expected, the effects for the more-educated group become larger; however, the relative pattern across the more and the less-educated group remain the same. Further, Panel 2 confirms the same patterns for the effect of regional unemployment rates at entry estimated without year effects. Although the effect for less-educated Japanese men looks less persistent, we suspect that it is spurious because cohorts who graduated during the boom around 1990 happened to face the deep recession in the end of 1990s and the early 2000s.

Table A6

Sensitivity Check—the Effect of the Unemployment Rate at Entry on Earnings, Estimated without Year-fixed Effects

(1) National unemployment rate

	Japan		United States	
	High school	College	Schooling ≤ 12	Schooling > 12
Unemployment rate at entry to the market				
×experience 1–3 years	−0.062	−0.056	−0.018	−0.017
	(0.010)	(0.009)	(0.006)	(0.006)
×experience 4–6 years	−0.063	−0.059	0.025	−0.006
	(0.013)	(0.010)	(0.006)	(0.004)
×experience 7–9 years	−0.040	−0.020	−0.004	−0.019
	(0.019)	(0.016)	(0.008)	(0.007)
×experience 10–12 years	0.046	0.024	−0.019	−0.031
	(0.028)	(0.027)	(0.009)	(0.007)

(continued)

Table A6 *(continued)*

Observations	43,574	35,190	57,635	72,226
R^2	0.21	0.26	0.16	0.15

(2) Pooled regional unemployment rate

	Japan		United States	
	High school	College	Schooling ≤ 12	Schooling > 12
Unemployment rate at entry to the market				
× experience 1–3 years	−0.079	−0.072	−0.028	−0.017
	(0.014)	(0.014)	(0.006)	(0.006)
× experience 4–6 years	−0.068	−0.051	0.008	−0.014
	(0.014)	(0.011)	(0.005)	(0.005)
× experience 7–9 years	−0.030	−0.025	−0.001	−0.015
	(0.011)	(0.012)	(0.005)	(0.006)
× experience 10–12 years	−0.022	−0.013	−0.002	−0.021
	(0.011)	(0.008)	(0.009)	(0.005)
Observations	43,574	35,190	57,635	72,226
R^2	0.22	0.27	0.16	0.15

Note: Standard errors in parenthesis are calculated by White's heteroskedasticity robust method, and clustered by region/state for Panel b. Other controls included are the unemployment rate in survey year (for Panel A, without interactions with potential exp. for fear of multicollinearity; for Panel B, interacted with the four potential exp categories), potential experience, and education (dummies for the Japanese sample, years of schooling for the American sample). Panel B also includes region/state dummies. Note that no control for time trend is included.

Appendix 5

Controlling for Industries

Table A7 shows estimated effects from regressions with dummies for ten industries. Adding controls for industry makes the estimated effect slightly weaker, but not much enough to alter the basic observations from Table 6.

Table A7
The Effect of the Unemployment Rate at Entry on Earnings, with Controls for Dummies for Industry

	Japan		United States	
	High school	College	Schooling ≤ 12	Schooling > 12
Unemployment rate at entry to the market				
× experience 1–3 years	−0.048	−0.036	−0.028	−0.015
	(0.041)	(0.013)	(0.009)	(0.008)
× experience 4–6 years	−0.051	−0.039	0.005	−0.011
	(0.036)	(0.015)	(0.005)	(0.005)
× experience 7–9 years	−0.041	−0.034	−0.002	−0.008
	(0.029)	(0.014)	(0.005)	(0.005)
× experience 10–12 years	−0.046	−0.017	0.008	−0.004
	(0.030)	(0.017)	(0.008)	(0.005)
Contemporaneous unemployment rate				
× experience 1–3 years	−0.038	−0.048	−0.032	−0.017
	(0.017)	(0.026)	(0.011)	(0.012)
× experience 4–6 years	−0.010	−0.038	−0.033	−0.023
	(0.014)	(0.025)	(0.011)	(0.008)
× experience 7–9 years	−0.001	−0.032	−0.025	−0.022
	(0.017)	(0.018)	(0.011)	(0.010)
× experience 10–12 years	0.022	−0.030	−0.029	−0.013
	(0.016)	(0.016)	(0.014)	(0.011)
Observations	45,687	45,687	45,687	37,386
R^2	0.26	0.26	0.26	0.30

Note: The same regressions as in Table 6, except for industry dummies (agriculture, mining, construction, manufacture, utility, transportation, wholesale and retail trade, finance, service, public sector) are added.

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Do Work-Life Balance Measures and Workplace Flexibility Matter?
An Empirical Analysis for Female Reinstatement Choice after the First Childbirth

Haruko Noguchi

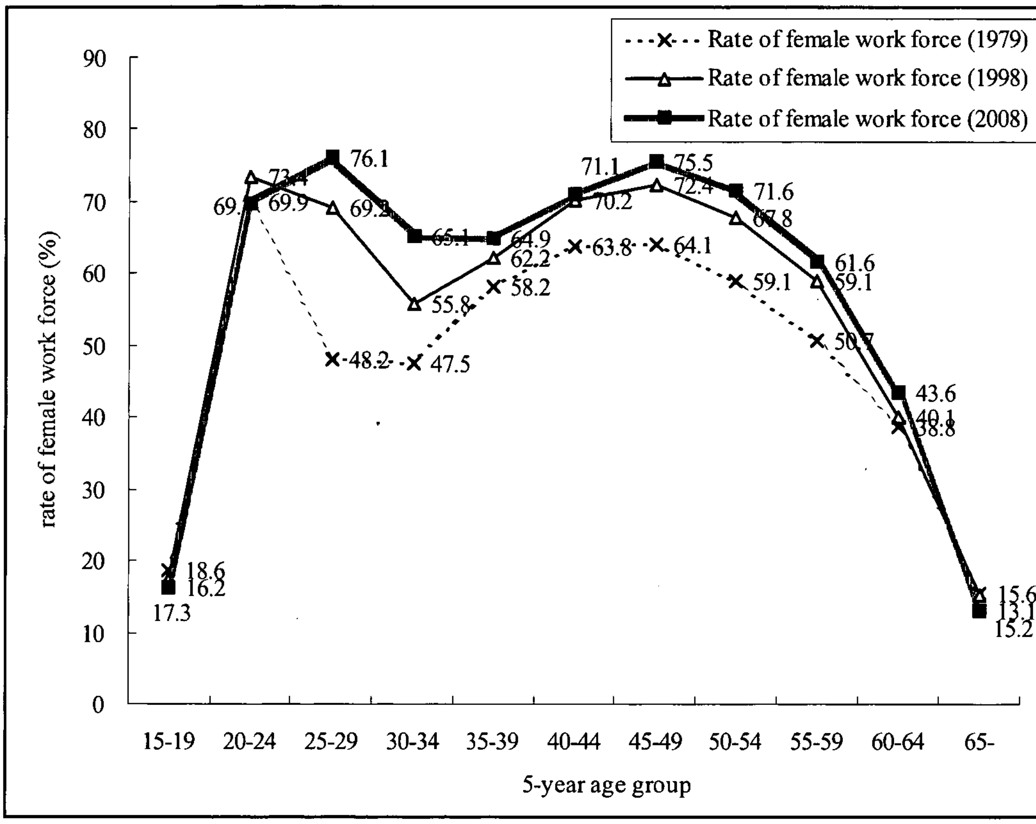
Abstract
The main purpose of this study is to evaluate the effects of work-life balance measures and workplace flexibility on a female worker's choice and timing of being reinstated into the labor market after the first childbirth. The results show that: (1) female workers who have not come back to work within one year after the first childbirth face a high risk of never being reinstated into the labor market; (2) a decrease in child care costs due to the presence of informal care and an increase in opportunity costs such as profession/skilled or clerical work with high annual income would motivate a female worker to be reinstated into the labor market within a short time period after the first childbirth; and (3) adjusting for the opportunity costs, the accessibility of work-life balance measures still remains a significant positive impact on the probability of a stable female employee to come back to work and thus shortens the length of being on leave.
Keywords: female reinstatement after first childbirth, accessibility of work-life balance systems, flexibility of working environment, duration analysis

1. Introduction
The female workforce in Japan has been gradually increasing in the background of an underlying change in industrial and family structures in society since the 1970s. The 2008 "Labour Force Survey" (Statistics Bureau, 2008) shows that the number of the female labor force became approximately 27.6 million, which is 48.4% out of the female population 15 years and older. Most significantly, the M-shaped distribution of female workers according to the 5-year age group, which has characterized the female workforce in Japanese society with the 20s and late 40s age groups forming the two peaks of the letter "M," has been getting much smoother in 2008 compared to the distributions in 1979 and 1998 (Figure 1). In 2008, the bottom of this M-shaped curve has shifted to the right from age groups 30-34 and 35-39, probably because of late marriages following late child bearing, incidentally while the labor participation rate at the bottom increased significantly from 47.5% in 1979 to 64.9% in 2008, by 17.4 percentage points. "The Actual Status of Working Women" concludes that a continuous increase in the percentage of female workers who choose to continue working even after having children, associated with the growing rates of the highly educated and late- or never married female population, would accelerate to smooth out the bottom of the M-shaped curve (Ministry of Health, Labour and Welfare (called "MHLW"), 2008).

However, the Japanese labor market has not yet completely dissolved the M-shaped curve like Sweden and France. A number of female workers still exit from the labor market due to either marriage or child bearing (Osawa, 1994). The distribution of the female workforce reflects that women remain confronting the difficulty to balance working and family lives especially when they have children in preschool age. Besides, the ratio of non-regular employees such as part-time and/or temporary dispatched workers to regular or full-time employees has been increasing for female workers especially in younger age groups (Note 1), which would raise the discrepancy of life-time income across different cohorts (MHLW, 2008). Suppose that full-time or regular status and high life-time income imply high opportunity costs for female workers, which may motivate them to continue to work after marriage and/or childbirth. The growth of the ratio of non-regular to regular workers causing low life-time income in the younger generation would be reducing the bottom of the M-shaped distribution of female workforce all over again in the next decade.

On the other hand, since a low fertility ratio apparently became one of the most serious socio-economic and political issues in late 1980s, the Japanese government has been adopting various work-life balance measures (Note 2) and taking legal actions to support female workers with children, countermeasures against a rapid change in the structure of population due to aging and an extreme low birthrate. For example, the Family Care Leave Act was activated in 1991 (Note 3). Because the law strongly suggests that all employers should make efforts to establish concrete systems for supporting employees for balancing work and family lives, the accessibility of child care and sick/injured child care leave improving through the 1990s (Ministry of Labour, 1971-1985; and MHLW, 1986-2005). Also, the government had been targeting to reduce the numbers of waiting-list children for day care centers, which is called "zero-waiting list for nursery schools (that is day care centers) strategy", but the excess demand for child care in urban areas has not been dissolved yet.

Figure 1: Change in rate of female work force by five-year age group(1979, 1998, and 2008)



Source: Ministry of Internal Affairs and Communications, Statistics Bureau, Director-General for Policy Planning (Statistical Standards) & Statistical Research and Training Institute, "Labour Force Survey (1979, 1998, and 2008)"

Although the government has been promoting municipal governments and firms to adopt various measures for balancing working and family lives, the accessibility of child care resources and workplace flexibility are still different across local areas and employers. Therefore, applying the discrepancy in macro- and micro-based characteristics of different local governments and employers, this study will evaluate the effects of public child care resources, work-life balance measures, and workplace flexibility on a female worker's choice and timing of being reinstated into the labor market after the first childbirth. In order to test the validity of work-life balance measures and child care resources comparatively, I adjust for opportunity costs for being on child care leave which individual female workers face in the labor market. Even after controlling for a female worker's opportunity costs, if we observe robust and significant impacts of these policy variables on a female worker's choice, the government policies in the last couple of decades could be justified to increase female labor supply after childbirth as countermeasures against the shortage of the labor force in the future, which will be contributing to overcome the M-shaped curve of female workforce in Japan.

The paper proceeds as follows. Section 2 provides a brief overview of previous studies in Japan. Section 3 explains an empirical strategy. Section 4 describes the data set used in this study. Section 5 presents empirical results. The final section concludes.

2. Previous studies

A number of studies evaluate the effects of the accessibility of day care centers and work-life balance measures on the female labor supply after childbirth. In regards to child care provided by nursery schools, almost all studies concluded that an increase in the rate of children entering day care centers in a municipal area would raise the probability of females to work in the labor market, regardless of the type of data to be analyzed (for either prefecture-level or municipal-level aggregated data, Yamada, Yamada, and Chaloupka, 1987; Komamura, 1996; Institute for Health Economics and Policy, 1996; Nagase, 1999 and 2003; and Maeda, 2002; for micro-based data, Nakamura and Ueda, 1999; Shigeno and Okusa, 1999 and 2001; Morita, 2002; Shigeno, 2003; Oishi, 2003 and 2005; Shimizutani and Noguchi, 2004).

Out of studies using aggregated data, Nagase (1999, 2003) and Maeda (2002) find that the rate of entering nursery school for children who are less than 3 years old has a positive impact on the labor supply of mothers, but the effects are statistically insignificant for children in the 3-5 age group. Probably due to multicollenearity, the multiplicity of child care provided by day care centers does not seem to be significant to the female labor supply (Shigeno and Okusa, 1999 and 2001; Shimizutani and Noguchi, 2004). The simulation analysis conducted by Shigeno and Okusa (1999 and 2001) shows that an increase by twice in the quota of children in day care centers would raise the female labor supply by 10 percentage points. On the other hand, Oishi (2003 and 2005) finds that an increase by 10 percentage points in quota or no charge in child care by nursery schools would increase the female labor supply by 2.7% and 14% respectively, while a uniform charge of 60,000 yen for child-care regardless of parents' income level might decrease the female labor supply by 14 percentage points.

For work-life balance measures, most studies focus solely on how the system of child care leave influences female workers to continue to work after childbirth (Higuchi and Abe, 1992; Higuchi, 1994 and 1996; Morita and Kaneko, 1998; Shigeno and Okusa, 1998; Waldfogel, J., Y. Higuchi and M. Abe, 1999; Suruga and Cho, 2003), while some examine the effects of multiple measures simultaneously within a single regression analysis (Tomita, 1994; Shigeno and Okusa, 2001; Shimizutani and Noguchi, 2004; and Kawaguchi, 2008). These studies find a consistent result such that the presence of a child care leave system has a significant positive impact on the continuous labor supply of female workers even after the childbirth, except for Kawaguchi (2008). Interestingly, Kawaguchi concludes that the presence of the system is not correlated with the length of female workers' service to the same employer, but a significant effect of child care leave could be observed either when some surrounding employees have the experience of utilizing the system or when employees are well informed about the policy. Also, Shigeno and Okusa (2001) find that the effect of child care leave policy becomes statistically insignificant when they focus on married couples, probably because of a strong commitment to be required by the employer. Tomita (1994) points out that the length of a female worker's service tends to be longer with employers adopting child care leave policy earlier than other firms.

In regards to other work-life balance measures than the child care system, the results seem to be inconsistent. Tomita (1994), Shigeno and Okusa (2001), and Shimizutani and Noguchi (2004) observe a significant positive effect of the shortening of working hours on continuous female labor supply. Also, annual paid leave by half a day, day care centers in the workplace, and flexible times of starting and ending work would motivate female workers to continue to work in the labor market (Tomita, 1994 and Shimizutani and Noguchi, 2004). In addition to work-life balance measures, Tomita (1994) and Kawaguchi (2008) find that equal opportunity between males and females in the workplace would have a significant positive effect on the length of service among female workers in the same employer, in particular for those in their 40s-50s who might have already finished child rearing.

3. Econometric specifications

Most parents might be inexperienced in child care until they have their first babies. Thus, for inexperienced parents, and in particular mothers, the first childbirth must have more significant impact on their working and family lives than the second or following ones. Focusing on these inexperienced mothers, this study applies a duration analysis scheme for evaluating empirically the effects of various characteristics of households, regions, and employers on the timing of mothers to be reinstated into the labor market.

Duration models have frequently been used in the context of medical science, e.g., the multiple-causes of death in patients who had heart surgery (prosthetic replacement of the mitral valve) (Litwak et al., 1969); the influence of smoking on the timing of death from vascular disease, cancer, and other causes (Holt, 1978); the timing of death of breast cancer (Chiang, 1968) and lung cancer patients (Lubin, 1985); and the mortality risks of the elderly (Yashin, Manton, and Stallard, 1986). After Lancaster (1979, 1990) used duration analysis in the study of unemployment, it became common in economics, especially, labor economics, e.g., Heckman and Singer (1984, 1986); and Kiefer (1988). In Japan, some studies applied the duration analysis to estimate the timing of female workers to exit from the labor market (e.g., Yamaguchi, 1998; and Higuchi and Abe, 1999), however, as far as I know, no empirical studies have used this model to evaluate the timing of re-entry into the labor market after the first childbirth. In this study, I take three analytical strategies: (1) plots of the Kaplan-Meier survival estimates and the Nelson-Aalen cumulative hazard estimates; (2) the semi-parametric (the Cox proportional hazards) model; and (3) parametric approaches with weibull, exponential, and weibull-gamma distributions.

First, I introduce simple plots of the Kaplan-Meier survival estimates (Kaplan and Meier, 1958) and the Nelson-Aalen cumulative hazard estimates (Nelson, 1972; Aalen, 1978), which measure the length of months mothers remain on child care leave after the first childbirth. Suppose $S(t)$ to be the probability of a mother remaining on child care leave at or exceeding the time t. Let t_i ($i=1,...,T$ and $t_1 \le t_2 \le ... \le t_T$, where T denotes the time when all respondents are failed) be the times at which failure occurs. Here, "failure" means that a mother is reinstated into the labor market or she comes back to work after the first childbirth. Assuming that n_i is the number of respondents at risk of failure just before time t_i and d_i is the number of failures at time t_i , the Kaplan-Meier survival estimates ($\hat{S}(t)$) and the Nelson-Aalen cumulative hazard estimates ($\hat{\Lambda}(t)$) are respectively shown as (StataCorp LP, 2007):

$$\hat{S}(t)=\prod_{t_i \le t}\left(\frac{n_i-d_i}{n_i}\right),\quad \hat{\Lambda}(t)=\sum_{t_i \le t}\frac{d_i}{n_i} \qquad \text{(Eq. 1)}$$

In particular, I will focus on the behavior of mothers for six years (72 months) after the first childbirth, while the child is preschool in age.

Next, I estimate the Cox-proportional hazards model. In this model, the j th individual hazard ($\lambda_j(t)$) is specified as:

$$\lambda_j(t)=\bar{\lambda}(t)\exp[\bar{X}_j{}'\beta]$$

$$\text{for } j=1,...,N \qquad \text{(Eq. 2)}$$

where $\bar{\lambda}(t)\ge 0$ is the baseline hazard at time t, which is arbitrary and a nuisance function. Here, $\bar{X}_j$ is assumed to be a row vector of explanatory variables for the j th couple which would affect the timing of mothers to come back to work. $\bar{X}_j$ includes household characteristics, the status of mothers in the labor market, macro-based characteristics of local areas, the accessibility of work-life balance measures and workplace flexibility, and timing of childbirth. I will describe the explanatory variables further in the next data section. β is a vector of unknown parameters to be estimated. In order to obtain parameter estimates ($\hat{\beta}$), the partial log-likelihood function to be maximized is shown as:

$$\ln L=\sum_{i=1}^{T}\left[\sum_{k\in D_i}\bar{X}_k{}'\beta-d_i\ln\left\{\sum_{j\in R(t_i)}\exp(X_j{}'\beta)\right\}\right] \qquad \text{(Eq. 3)}$$

where i indicates the ordered failure times t_i ($i=1,...,T$ and $t_1 \le t_2 \le ... \le t_T$); D_i is the set of d_i which is the number of failures at time t_i; and $R(t_i)$ is the risk set of k observations that are at risk of failure just before or at time t_i (Kalbfleisch and Prentice, 2002; StataCorp LP, 2007). The arbitrary assumption of the baseline hazard in the Cox-proportional hazards model permits us to analyze transition data without specifying an exact distribution of people's taste (Lancaster 1990). Thus, this model will lead to measure (but not correct) the misspecification caused by heterogeneity among respondents.

Finally, for verifying the robustness of results from the Cox-proportional hazards model, I estimate the duration model for three possible underlying distributions, weibull, exponential, and weibull-gamma distributions. Unlike a semi-parametric approach, a parametric approach assumes an investigator to have full information on the distribution of tastes over the population of interest and thus, it requires us to specify the distribution of baseline hazard ($\bar{\lambda}(t)$), given the explanatory vector, $\bar{X}_j$. The baseline hazards, $\bar{\lambda}(t)=\alpha t^{\alpha-1}$ (some describe $\sigma=1/\alpha$ instead of α) and $\bar{\lambda}(t)=1$ (meaning $\alpha=1$ in the setting of weibull distribution), are assumed for weibull and exponential distributions, respectively. However, the assumption of the homogeneous baseline hazard across individuals has two possible effects: (1) parameter estimates will be inconsistent and/or (2) disturbances will be based on inappropriate standard errors (Greene, 1990). In order to modify an unobservable heterogeneity effect, Greene (1990) suggested using a parametric model which assumes that the baseline hazard is distributed as weibull-gamma. Let ϑ be an unobservable multiplicative effect on the hazard function as:

$$\lambda_j(t \mid \vartheta) = \vartheta\lambda_j(t)$$

$$\text{where } \vartheta \sim \Gamma(k,\theta),\ k,\theta>0 \qquad \text{(Eq. 4)}$$

Here, ϑ is assumed to be a random positive and to have mean k and finite variance θ with the gamma distribution. The probability density function is specified as:

$$g(\vartheta \mid k,\theta) = \frac{\vartheta^{k-1}\exp(-\vartheta/\theta)}{\theta^k\Gamma(k)} \qquad \text{(Eq. 5)}$$

In this study, $\theta = 1/k$ is defined and $\theta = 0$ correspondents to the weibull distribution. Therefore, the further θ deviates from 0, the greater the effect of heterogeneity is. I will test whether a zero hypothesis test such that $H_0 : \theta = 0$ is statistically rejected.

In order to re-examine the results from the previous studies shown in the last section, this study assesses the effects of work-life balance measures, and the flexibility of the working environment on a female worker's choice and timing of being reinstated into the labor market after the first childbirth, adjusting for a female worker's opportunity costs. Since the child care costs are not identified for the first child in individual household, I rather control for the rate of waiting-lists to the quota of children for day care centers in a female worker's residential municipal area. In regards to work-life balance measures and workplace flexibility, I use principal component scores calculated by principal component analysis in order to avoid multicolleenearity. Here, I have to note a critical limitation of this study such that I cannot specify these variables (the rate of waiting-lists, work-life balance measures, and workplace flexibility) exactly at the timing of the first childbirth. Rather, I use the status at the survey period in 2007. Due to the restrictions, I should interpret the results very carefully.

4. Data and basic statistics

4.1 Data

The data used in this study is the micro-level data from the "Survey for Working Environment and Fertility" conducted by Central Research Service Inc ("Chuo Chosa Sha" in Japanese) in November, 2007 (National Institute of Population and Social Security Research, 2009). The survey was carried out on married members of two labor unions and their spouses, the Japan Federation of Service and Distributive Workers Unions (JSD) and the Japanese Federation of Textile, Chemical, Food, Commercial, Service and General Workers' Unions (UIZ) (Note 4). Out of 2,810 married couples (Note 5), the number of respondents was 1,441 (a response rate of 51.3%) for the questionnaire on union members and 1,312 (a response rate of 46.7%) for their spouses (Note 6).

Out of 1,312 couples of which data are available for both subjects and spouses, first, I extract 548 couples who have at least one child and female respondents who were working one-year before the first childbirth (Note 7). Out of the 548, I exclude couples whose data necessary for the analyses are missing, such as the timing of a mother's reinstatement into the labor market after the first childbirth, household characteristics, a mother's status in the labor market before the first childbirth, timing of childbirth, and macro-based characteristics of local areas. Most importantly, this study focuses on the effects of various measures for balancing work and family lives on the mothers' timing of coming back to work. Since the survey asked these questions related to only respondents' current employers at the survey period, I have to clarify those who worked in the same firm as now when they first had a baby. Therefore, the data has to be limited to stable employees who continue to be hired by the same employers after school graduation. Consequently, the sample size becomes downsized to 140.

I have to note that the policy implications in this study would be quite restricted due to the three major data limitations as follows. First, since the sampling of the subjects is left in charge of each local labor union, the results would statistically suffer from a severe sampling-bias due to the non-random scheme of the data collection. Second, the survey was conducted on labor union members and their spouses so that, by definition, at least one person of each couple belongs to the labor union. Thus, they might be working in a better environment than non-labor union couples, e.g., being easier to use child care leave (Suruga (1999); and Nishimoto and Suruga (2002)). The exclusion of non-labor union couples will lead to a "selection-bias problem." Third, this study includes very limited labor union couples, such as female respondents who were employed one-year before the first childbirth, and even further, stable female employees who continue to be hired by the same employers after school graduation, for examination of the effects of work-life balance measures on the labor supply. Therefore, the restrictions of samples to be analyzed must cause another "selection-bias problem." I will come back to discuss the limitations of this study in the last section.

4.2 Basic statistics

Table 1 shows basic statistics. The first column of Table 1 shows the censoring and duration variables, and explanatory variables used for the duration analyses. The second column shows the means and standard deviations of these variables for 140 couples and the third and fourth columns indicate the basic statistics by female respondents' reinstatement status, "Not being reinstated after 1st childbirth (right-censored samples)" and "Being reinstated after 1st childbirth (failure)." Out of 140 couples, 45 female workers (32.1%) did not come back to work (right-censored) and 95 (67.9%) were reinstated into the labor market (failure). Thus, in this model, the number of failures is 95. The mean lengths of female respondents' reinstatements after the first childbirth are 35 months for total samples, 84.5 months for right-censored samples, and 11.5 months for failed samples, respectively. The mean difference between right-censored and failed samples is statistically significant at a 1% level.

In regards to explanatory variables indicating household characteristics, I adjust for age at the first childbirth and educational attainment of parents, a dummy for having informal child care, a dummy for the first child's birth weight being less than 2,500g, and a dummy variable of having the second child before a mother comes back to work after the first childbirth. The basic statistics show that the presence of informal support for child care (48.9% versus 67.4%), the first child birth weight (22.2% versus 7.4%), and the timing of the second childbirth (62.2% versus 3.2%) differ significantly between the right-censored and failure groups. So, compared to right-censored mothers, those who were reinstated into the labor market after the first childbirth are more likely to have informal support for child care, less likely to have a low-weight baby, and also less likely to have the second child before they come back to work.

The status of mothers in the labor market one-year before the first childbirth seems to influence significantly the female labor supply after the first childbirth (Note 8). Compared to right-censored respondents, failed samples are more likely to be full-time workers (8.9% versus 46.3%) and to be profession or skilled (nobody versus 18.9%); or clerical workers (8.9% versus 23.2%). The mean annual income is approximately 3.01 million yen for the censored group compared to 3.65 million yen for those who were reinstated into the labor market after the first childbirth. Mothers' employment status, type of job, and annual income in the labor market imply opportunity costs for being on child care leave. The above results show that high opportunity costs will motivate mothers to exit the labor market than those who face low opportunity costs.

Some studies show that the demand and supply for child care provided by day care centers are significantly mismatched, in particular for infants who are less than 3 years old in urban areas of Japan (e.g., Zhou and Oishi, 2003 and Shimizutani and Noguchi, 2003). So, I assume that the rate of waiting-list children for day care centers in local areas affects the labor supply of mothers (Note 9). The mean rates of waiting-list children between right-censored and failed female respondents are different as 1.4% versus 0.7%. The result implies that the excess demand for facility-based child care would give a negative impact on the probability of a mother's reinstatement. However, as stated at the end of Section 3, I use the rate at the survey period as a proxy variable, and so the results cannot clearly indicate the effects of excess demand. Further, in the regression analyses, I put year dummies indicating the timing of first childbirth to control for fixed effects of macro status of the labor market.

4.3 Measurements for the working environment

In this section, I will discuss how to measure the accessibility of various work-life balance measures and workplace flexibility in the mother's current employer. The survey asked about the presence and accessibility of 12 types of systems (annual paid leave by half a day; shortening of working hours; limitation on late-night work; limitation on overtime work; child care leave system and nursing care leave system more generous than the legal definition; flexible time of starting and ending work; financial support for day care center; telecommuting; area-specific working system; reemployment; and sick/injured child care leave); and the flexibility of 7 factors related to the working environment (workloads; tasks; deadline or time of delivery; schedule for meeting and conference; time of starting work on weekdays; time of ending work on weekdays; annual paid leave). With regard to the presence, the survey asked whether each of 12 systems is available for employees. For the accessibility, the respondents are questioned about how easy it is to use it when a system is available, according to five-grade system such as "very easy," "easy," "cannot be said either," "not very easy," and "very