A cohort analysis of male labor supply in Japan*

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Abstract

This study uses repeated cross-sectional data from 1982 to 2007 to understand labor force behavior of Japanese men, focusing on the increase in non-regular employment. I find that regular employment fell significantly for recent cohorts of less-educated men. Regular employment of single men and less-educated married men responded more to the business cycle than did regular employment of highly educated married men. Cohorts who finished their schooling in the late 1990s and early 2000s experienced a severe decline in regular employment at young ages, although this phenomenon was mainly observed among single men and not among married men.

Keywords: cohort, Japan, non-regular employment, regular employment

JEL Classification: J12, J21

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1. Introduction

Long-term trends in labor market participation among prime-aged men in Japan have not attracted much attention in previous studies. Trends in male participation are mostly examined for the young population (up to 34 years of age) or for the old population (aged 55 years and over).[1] In particular, decreasing regular full-time employment among young men and women has attracted attention as the "freeter" or the "NEET" (not in education, employment, or training) problem.[2] However, the employment-population ratio (E-P ratio) of less-educated men has been decreasing continuously: among junior high school graduate males aged 20–54 years, the E-P ratio was 0.94 in 1992, was 0.85 in 2002, and reached 0.82 in 2007.[3]

Declining participation by less-educated men has been reported in other industrialized countries as well. Juhn et al. (2002) show that nonparticipation by less-skilled men in the USA increased from 1967 to 2000.[4] Del Boca and Pasqua (2003) report that the employment rate of married men fell in Italy in the 1990s, and Fitzenberger et al. (2004) report that the employment rate of less-skilled men decreased

[1] See, for example, Sakai and Higuchi (2005), Kondo (2007), and Genda et al. (2010) for the former and Clark and Ogawa (1997) and Shimizutani and Oshio (2010) for the latter.
[2] An important exception is Genda (2006), who shows that nonparticipation has become common for less-educated men aged 35–49.
[3] The figures are from the ESS. Abe and Tamada (2010) examine regional variations of this phenomenon.
[4] Juhn et al. (1991) and Juhn (1992) also report a decrease in participation during earlier periods.

in West Germany. In this paper, I document trends in employment of prime-aged men (aged 20–54 years) in Japan by tracing cohort experiences in order to understand recent changes in male participation behavior. The key focus of the analysis is the increase in non-regular employment among men.

Three major contributions of this paper are as follows. First, I present a cohort analysis of male labor supply behavior, the pattern of which changed significantly from the 1980s to the mid-2000s. In Japan, male labor supply over the life cycle has not been analyzed as much as female labor supply; in fact, I am unaware of any previous study that examines cohort experiences of *regular* and *non-regular* employment of *prime-aged* males in Japan.[5] In analyzing non-regular employment, I pay close attention to changes in the different types of non-regular employment (traditional and non-traditional), as well as their industry compositions. Distinguishing between regular full-time work and non-regular work is quite important, especially in light of recent concerns regarding the part-time/full-time wage gap and increasing earnings inequality in Japan (Ohtake, 2005; Fukawa and Oshio, 2007). The data of the ESS are particularly suitable for this purpose because the survey questionnaire asks whether each

[5] The models used by Kuroda and Yamamoto (2008) and Abe and Tamada (2010) are based on cohorts, but they do not distinguish explicitly between regular full-time employment and non-regular employment. Genda et al. (2010) conduct a cohort-based analysis of young men, although their main focus is the relationship between the cohort effects and the unemployment rate at the time of labor market entry by each cohort. Cohort-based analyses of women's participation behavior in Japan include Abe (2001), Fukuda (2006), and Abe (2011).

individual's work is regular full-time employment or non-regular employment over an extended period of time.[6] Issues concerning non-regular employment have attracted attention in other East Asian countries as well. For instance, Cho and Keum (2004, 2009) present evidence that after the 1997 financial crises in Korea, job stability of non-regular and less-educated workers did not recover, whereas it did recover for other groups.

Second, repeated cross-sectional data from 1982 to 2007 are used to analyze the labor force experiences of men, focusing on (1) differences in participation by educational attainment and (2) differences by marital status. The analysis by marital status is important because patterns of employment differ significantly across marital status.[7] Furthermore, the disaggregation by marital status allows me to test whether falling regular employment of single people as a cohort ages is consistent with the hypothesis that more employable men are more likely to get married.

Third, the relationship between male participation and business cycle factors is closely examined using data from six points in time. In this assessment, differences in responsiveness to the business cycle across education and marital status are

[6] By contrast, the ESS is not suitable for studying labor force participation or unemployment since most of the questions are concerned with the usual status of employment instead of activities in the reference week.

[7] Abe (2011) also reports that women's employment differs significantly across marital status in Japan for a time period similar to the one analyzed in this paper.

considered.

I reach three main conclusions. First, since the mid-1990s, a decrease in regular employment and an increase in non-regular employment have occurred for less-educated men of all age groups. The increase in non-regular employment is accompanied by an increase in non-traditional, non-regular employment, most significantly in manufacturing. Second, the decrease in regular employment and the increase in non-regular employment have occurred mostly among unmarried men. I also find that the fall in regular employment for highly educated single men as they age can be understood as more employable men getting married and leaving the set of singles. Finally, regular employment of single men and less-educated married men is more affected by business cycle factors than that of highly educated married men.

The remainder of the paper is organized as follows. In the next section, I explain the data and introduce definitions. Section 3 reports raw tabulations and regression results. Section 4 presents an analysis disaggregated by marital status. Section 5 presents an analysis of the relationship between marriage and regular employment. Section 6 concludes.

2. Data and definitions

The data used in this paper are from the ESS, which is a large scale

cross-sectional survey.[8] I aggregate the microdata into cell-mean data for which cells are defined by the combination of age group and education; in addition, disaggregation by marital status is carried out for the data used in Section 4. Using the cell-mean data, it is possible to construct pseudo-panel data that follow cohorts defined by birth year and education. To focus on those who finished schooling and are below the mandatory retirement age, the analysis here uses a sample of men aged 20–54 years (25–54 years for university graduates).[9]

Two measures are used to gauge participation in the labor market: the regular employment ratio (RER) and the non-regular employment ratio (NRER). In Japan, employment as a regular full-time employee is quite different from employment as a non-regular employee (e.g., part-time workers, casual workers, workers employed by temporary staffing agencies, contract workers) in terms of wages, hours, fringe benefits, and degree of employment protection (Houseman and Osawa, 2003; Gaston and Kishi, 2007). Therefore, the RER and the NRER are examined separately.

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

[9] In the 1980s, the time period included in the present analysis, the mandatory retirement age in many firms was 55. For instance, in 1983, the mandatory retirement age was 55 for 31 percent of firms (Employment Management Survey, Ministry of Labor). Furthermore, a mandatory retirement age of 60 might affect the work behaviors of those several years younger than 60. For that reason, I restrict the sample up to age 54.

Employment status used in this paper corresponds to workplace definitions as surveyed in the ESS. The ESS asks respondents how they are labeled in the workplace (or what titles are designated for their job advertisements or how they are referred to in their employment contracts). Therefore, the definition of regular work or non-regular work is not based on working hours or contract length. Table A1 lists the titles of non-regular employment in the ESS for the years analyzed here:[10] part-time workers, casual workers ("arbeit workers"), entrusted workers, temporary staffers (haken shain), and contract workers. Of these, temporary staffers are not hired by the firm where they actually work but are hired by a temporary staffing agency and sent to the workplace in a different firm; workers in other categories are directly hired by the firm where they work. Part-time and casual workers perform similar tasks, but casual workers are generally younger than part-time workers. Students who work part time normally work under casual status. Working hours or number of days worked are longer for entrusted and contract workers than for part-time and casual workers.

This definition of non-regular workers in Japan is different from the ones used in other countries. For instance, in the United States, contingent workers are those who do not have a long-term employment contract; according to a narrow definition, the

[10] The titles for non-regular workers in the ESS differ across survey years, as shown in Table A1.

contract length is no more than 1 year (Polivka, 1996). In contrast, many of the non-regular employees examined in this paper work more than 1 year due to the ESS definition of non-regular employment. According to the 2007 ESS, the proportion of non-regular employees who worked for their current employer for less than 1 year was 23 percent, and the average number of years they had worked for their current employer was 6.1 years. In the Netherlands, part-time workers receive hourly wages comparable to what regular workers receive (Bosch et al., 2010), whereas in Japan part-time workers receive wages receive wages substantially below those of regular employees (Abe and Tanaka, 2007).

Non-regular work has been much more common for women than for men, but the fraction of men among non-regular workers has increased in recent years: according to the ESS, the proportion of men among non-regular workers aged 25–54 years was 18 percent in 1992 but increased to 25 percent in 2007. The proportion of non-regular workers among the population increased sharply for less-educated men: from 7 percent in 1982 to 16 percent in 2007 for junior high school graduates and from 3 percent in 1982 to 11 percent in 2007 for senior high school or junior college graduates.

The RER and NRER are defined as follows:

$$RER = \frac{Number\ of\ regular\ employees}{Population}, \tag{1}$$

$$NRER = \frac{Number\ of\ \ non-regular\ \ employees}{Population}, \tag{2}$$

where the number of regular employees (the sum of regular employees and executives, excluding the self-employed) and the population is that for each cell defined by a combination of birth year, education, and age group.[11] Corporate executives are included in the set of regular employees because many are promoted from a regular employee position to an executive position.[12] Non-regular employees in the numerator of Eq. (2) include wage and salary earners who are not regular employees, excluding the self-employed. Here, age and birth year are grouped by 5-year intervals. Note that the two measures above are calculated as proportions of the population in each cell, so the denominator includes non-workers.[13] These measures are derived for those who finished schooling; those who are in school are excluded from both the numerator and

[11] The self-employed are not included either in regular employment or in non-regular employment. I confine attention to those who are wage or salary earners. This is because the focus of this paper is to examine the differing patterns in regular and non-regular employment, which attracted significant attention in the Japanese labor market recently. To understand the overall employment, the appropriate measure would be the E-P ratio, in which the self-employed and those working in the family businesses are included in the set of the employed. A detailed analysis of the E-P ratio of men using the recent ESS data is found in Abe and Tamada (2010).

[12] The Data Appendix of Abe (2011) explains the issues concerning this treatment.

[13] I use the population in the denominator to create the measure of regular full-time employment and non-regular employment. Alternatively, one could use the number of employed as the denominator. I choose population because the number of employed is potentially endogenous; for example, Abe and Tamada (2010) provide such evidence for the same data. Using a more exogenous variable (population) to deflate the number of regular and non-regular employees would allow me to gauge their movement more consistently.

the denominator.[14]

The analyses below are performed separately for the three education groups: (1) junior high school graduates, (2) senior high school or junior college graduates, and (3) university graduates (this includes those who have graduate-level education).[15] It is important to note that the educational attainment of the population has improved for more recent cohorts. The pattern of this change is shown in Table 1; for comparison, data for women are also shown.[16] The proportion of junior high school graduates is 37.5 percent for men born from 1938 to 1942 and 6.5 percent for men born from 1973 to 1977. The proportion of university graduates increased over time, although it remained at similar levels (approximately 35 percent) for the three cohorts of men born between 1963 and 1977.

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[14] Because (potential) university graduates are still in school at ages 20–24 years, I have omitted observations for the 20–24-year age category from the university graduate sample.

[15] Until the ESS in 2002, respondents were asked to indicate the level of education they completed by choosing one of the following four categories: junior high school graduate (9 years of compulsory schooling), senior high school graduate (12 years of schooling), junior college graduate (usually 14 years of schooling, including some vocational and technical schools), and university graduate (16 years or more of schooling, including graduate-level education). The format of the question on vocational and technical schools changed in the 2007 survey. In this paper, I aggregate senior high school graduates, graduates from technical and vocational schools, and junior college graduates into one category called "senior high school or junior college graduates." This is a conservative way of creating an education category that is consistent over the survey years.

[16] The figures are derived from the ESS in 1997, 2002, and 2007. Data for other years show generally similar patterns of educational distribution for each cohort, although the proportion of junior high school graduates for cohorts born after 1953 is slightly higher before 2002 than in 2007. In the 2000 census, the proportion of junior high school graduates for cohorts born after 1953 is slightly higher than that in the 2007 ESS and is closer to the pre-2002 ESS data.

3. Cohort patterns of participation behavior

3.1. Raw tabulations

In this section, I report cohort patterns of labor force behavior by simple tabulations of cohort profiles, separately for each level of educational attainment. Separate tabulations are done for regular and non-regular employment. For non-regular employment, I further disaggregate the ratio into traditional and non-traditional types.

3.1.1. Regular employment ratio

In Figure 1, the RER for cohorts defined by education and birth year is plotted against age. The ratios are connected for each cohort as they age; therefore, for the 1953–1957 birth cohort for which data are available for six points in time (1982 to 2007), the leftmost point of the profile corresponds to the year 1982, the second from the left to the year 1987, and the rightmost to the year 2007.[17] The profiles show how the average labor force behavior for each cohort evolves over time. To clarify cohort differences, I include only a subset of older cohorts in the figures (all of the younger cohorts are shown); the regression analysis in the next section includes all cohorts (those born between 1933 and 1982) in the sample.

Two patterns stand out. First, the experience of junior high school graduate

[17] For the earliest and most recent cohorts analyzed here, data are not available for all 6 years. For example, for the 1978–1982 birth cohort, only the data for 2002 and 2007 are included because of the age restriction of the sample.

men is noteworthy. In general, RER values for this group are lower than for the others. In 2002, the RER for this group decreased more or less uniformly for all birth cohorts. Furthermore, from 2002 to 2007 when the Japanese economy recovered from the severe recession, the RER moved differently for young and old men. For the young (up to 34 years of age), the ratio increased slightly for the same birth cohorts, suggesting that economic recovery increased regular employment for the less-educated young. On the other hand, for those aged 35 and over, the RER decreased continuously from 1997 to 2007 in spite of the economic recovery.

Second, for all education groups, the RER values for those aged 20–29 years are much lower for the two cohorts born after 1973 than for earlier cohorts. Those born after 1973 lost regular employment in the early stages of the recession in the mid-1990s. It has been pointed out that during the recession in the late 1990s, young workers lost regular employment (Genda, 2003). Figure 1 suggests that such a phenomenon continued for the young into the early 2000s, although reversals of this trend are observed in the mid-2000s (from 2002 to 2007). The 1978–1982 birth cohort had a low RER in their early 20s, but the ratio increased when they were aged 25–29 years; on the other hand, the 1973–1977 birth cohort experienced a small increase in RER between ages 25–29 and ages 30–34.

3.1.2. Non-regular employment ratio

Figure 2 plots NRER by cohort and education. NRER values are less than 0.3 and are, thus, lower than RER values. Nonetheless, non-regular employment increased over time, especially between 1997 and 2007 (the years corresponding to the three rightmost points of each cohort profile).[18] For the young, the increase occurred as upward shifts of the cohort profiles, whereas for the old, it occurred as increases in the NRER with age for fixed cohorts. The upward shifts in cohort profiles for the young are much greater than the increase in the ratio for fixed cohorts. The increase in NRER from 1997 to 2007 for cohorts born between 1953 and 1972 was around 5 percent. By contrast, the NRER for senior high and junior college graduates of the 1978–1982 cohort at ages 25–29 (in 2007) was 13 percentage points higher than the NRER of the 1968–1972 cohort at the same age (in 1997). The increase in male non-regular employment from 1997 to 2007 is disproportionately concentrated in the less-educated young.

It is worth emphasizing the details of the increases in non-regular employment for the two youngest cohorts (those born between 1973 and 1982) that were adversely affected in the recession periods from the late 1990s to the early 2000s. When

[18] Kambayashi and Kato (2011) report that non-regular employment among men increased after 1997.

non-regular employment is disaggregated into two groups, a different picture emerges. The disaggregation made here is (1) part-time and casual employees (hereafter termed part-arbeit workers) and (2) other types of non-regular employees, including entrusted [shokutaku] workers, temporary staffers, contract workers, and others (hereafter referred to as non-traditional non-regular employees); Table A1 shows the classifications applied here. The former group comprises the traditional forms of non-regular employment, whereas the latter group includes contract workers and temporary staffers, which are relatively new employment arrangements.

Figures 3a and 3b show the tabulations disaggregated by these two non-regular status groups. The proportion of part-arbeit workers decreased between 2002 and 2007 (Figure 3a). Conversely, non-traditional non-regular employment increased continuously across cohort and across time within each cohort (Figure 3b). The proportion of non-traditional non-regular workers increased for older cohorts as well. Therefore, the overall decrease in non-regular employment for the young from 2002 to 2007 was driven by a significant decrease in part-arbeit employment accompanied by a steady increase in non-traditional non-regular employment.[19]

Figure 3b also shows that the proportion of non-traditional non-regular

[19] Hara (2010) points out that the changes in regulations for occupations and/or industries for temporary staffers might have been related to the increase in non-traditional non-regular employment over time.

employees to population increased from 1997 to 2007, especially for those who are not university graduates. To understand the forces behind this increase, the number of non-regular employees by industry is shown in Table 2 for workers other than university graduates, disaggregated by age group (aged 20–34 and aged 35–54).

It is clear from Table 2 that the rise in the proportion of non-regular employees was driven by several industries. For the part-arbeit category, the increase in number took place at an earlier time, between 1992 and 1997, most significantly in the wholesale and retail sector and to a lesser extent in the service sector. In addition, the number declined from 2002 to 2007, which coincides with the decline in the traditional non-regular employment ratio for the young group shown in Figure 3a.

For those aged 20–34, a significant increase took place for non-traditional non-regular employment in the manufacturing, transportation, wholesale and retail, and service sectors. These increases were pronounced between 1997 and 2007; the numbers for manufacturing and transportation almost doubled from 2002 to 2007. On the other hand, a decline is observed for the construction sector.

The numbers for the older group (aged 35–54) are shown for comparison purposes. For this group, the construction industry hired many non-traditional non-regular employees in the past, but employment in this sector decreased over time.

The timing of the remarkable increase in non-traditional non-regular employees in the manufacturing and service sectors is similar for the younger group.

3.2. Regression results

In this subsection, I report results from regressions that parsimoniously summarize the profiles shown in Figures 1 and 2. The regressions are estimated by a two-step procedure: the first step is to calculate participation measures for cells defined by cohort, age, and education, (and marital status in Section 4), and the second step is to relate the cell-level data to explanatory variables.[20] Estimation is performed by weighted least squares by using the inverse sampling variance of the participation measures as a weight.[21]

Separate regressions are estimated for the different education groups because Figures 1 and 2 clearly indicate that patterns in employment ratios differ for different levels of education. The explanatory variables are cohort, age, and time. Restrictions must be applied to fit the data because the cohort, age, and time effects are linearly

[20] This type of two-step estimation procedure is used in Card and Krueger (1992) and Card and Lemieux (2001). The grouped-data estimation is used widely in analyzing labor supply behavior (e.g., Angrist, 1991; Blundell et al., 1998; Pencavel, 1998, 2002; Devereux, 2004; Blau and Kahn, 2007). Furthermore, recent studies suggest that the two-step estimation has an additional advantage in that it is robust to intra-cell correlations of error term (Donald and Lang 2007; Angrist and Pischke 2009).

[21] The regression sample is restricted to cohorts for which at least two observations per cohort are available. As a result, the 1978–1982 birth cohort is not included for the university sample.

dependent. Following the previous literature (e.g., Deaton and Paxson, 1994; Attanasio, 1998), I normalize the time effects sum to zero, and they are orthogonal to a linear time trend. This restriction may not be an entirely sensible one in the present application because the number of time periods is only six.[22] Nonetheless, since some restriction has to be applied and the variations in data are reasonably well explained using it (the R^2 coefficients are mostly above 0.90), I impose the restriction above.[23] A full set of cohort dummies (5-year intervals) is included to test whether discernible differences exist between cohorts. Spline functions are used to control for age: linear age and age spline up to age 30 years are included.[24] This is because below age 30, the ratio increases with age, whereas it remains constant or decreases thereafter.

Table 3 contains regression results using the RER as the dependent variable. The coefficients of the cohort dummies indicate that cohorts born after 1973 experienced a significant decrease in RER for all education groups, but this decrease

[22] With a small number of time periods, this normalization may not be a sensible restriction to impose. Deaton (1997) explains this problem as follows: "This procedure is dangerous when there are few surveys, where it is difficult to separate trends from transitory shocks…Only when there are sufficient years for trend and cycle to be separated can we make the decomposition with any confidence" (p. 126).

[23] This does not preclude the possibility that variations in data may be well explained with different restrictions.

[24] The age spline function takes a value that equals the Age - 30 for age less than 30 and zero for ages 30 and over. For the cell data of 5-year intervals, the midpoint of the age interval is assigned as the age for the cell-level observations. The reasons for using linear age and spline are (1) to understand the effects with a few parameters and (2) to allow for the possibility that the age effect changes the slope around age 30. Of course, it is possible to use age dummies corresponding to the age groups of 5-year intervals, instead of a spline. I estimated such models and found that the estimates on year dummies and cohort dummies are very close to the ones reported in the paper.

was particularly large for the less educated. The coefficient of age indicates that the RER decreases with age after age 30.

Regression results for the NRER are shown in columns (4)–(6) of Table 3. In line with Figure 2, the NRER increases for recent cohorts. This is particularly true for less-educated men. Coefficients of age and its spline function show that the NRER decreases with age over the age range considered here.

4. Disaggregation by marital status

In this section, I report results disaggregated by marital status, in addition to education and age. Disaggregation by marital status reveals that substantial differences exist in participation behavior between married and unmarried men.

4.1. Raw tabulations

Figures 4a-c show participation patterns by marital status for men's regular employment. First, the patterns of cohort differences are quite different from those for which married and single men are aggregated (Figure 1). The decrease in regular employment observed for junior high school graduates is mostly a phenomenon for unmarried men: for married junior high school graduates, the decrease in regular employment is much smaller than for their unmarried counterparts. It is also striking

that the decrease in regular employment for those born after 1973 occurred among unmarried men only: for married men of all education groups, there is no significant decrease for this cohort, except for junior high school graduates.

Second, the cohort profiles fall quickly with age for single men, whereas they fall gradually for married men. These patterns are observed for all education groups, including the highly educated. The differing age patterns across marital status can be a result of endogenous selection into marriage: more employable men getting married and leaving the set of singles.

Figures 5a–c show the NRER by marital status. As in Figure 2, NRER values are lower than RER values. The NRER increased for recent cohorts of single men and increased slightly for married men of less-educated groups. The increase in the NRER for less-educated single men is more or less uniform for all cohorts, rather than restricted to cohorts born after 1973.

4.2. Regression results by marital status

In this section, I turn to regression analysis using the data disaggregated by marital status. Table 4 contains results from separate regressions by marital status and education for the RER. As with raw tabulations, the pattern of cohort effects is

noteworthy. The decrease in regular employment for those born after 1973 is a phenomenon for single men. For married men, the coefficient of this variable is close to zero (for senior high school or junior college graduates) or negative but much smaller in magnitude than for single men (for junior high school graduates). In other words, the deterioration of the RER for cohorts born after 1973 did not occur for married men, as married men of these cohorts did as well as their previous counterparts.[25]

The coefficient of age (Age-30) differs across marital status. For all education groups, it is about -0.003 for the married and -0.01 for singles; the magnitude (in absolute value) is much greater for singles.[26] My interpretation of this pattern is that it is not behavioral but is a compositional effect. In other words, the large negative age coefficient does not mean that the same set of single men loses regular employment as the group ages; instead, this set of single men increasingly consists of less employable men as their age increases, because more employable men get married and leave the set of singles.[27] I call this latter hypothesis a compositional change hypothesis and test

[25] Of course, the marriage rate has been falling over cohorts, which would certainly make the "selectivity" of married people different across cohorts.
[26] This is true when I restrict the sample to those younger than age 40.
[27] If one is to estimate behavioral response of employment to age, splitting the sample by an endogenous variable that is related to the dependent variable (marital status) is inappropriate. However, the purpose in this section is not to estimate such a behavioral parameter but, rather, to understand the patterns that exist in the data.

it formally in Section 5.

Table 5 reports regression results for the NRER. In line with Figures 5a–c, significant cohort effects exist for single men who are not university graduates. For junior high school graduate single men, the coefficient of the 1943–1947 birth cohort is -0.039, while that of the 1973–1977 birth cohort is 0.100, implying that the NRER is higher for the latter cohort by 14 percentage points. The same difference is 12 percentage points for single men with a senior high school or junior college education. For married men of all education groups, the cohort differences are either small in magnitude or statistically insignificant.

4.3. Business cycle effects in regular and non-regular employment

The regression results shown in Tables 4 and 5 identify year effects under the restriction explained in Section 3.2. The movement of year effects across groups is of independent interest because it is related to the issue of employment stability across skill and demographic groups. Previous studies using data from the USA find that employment and/or the occupations of the less educated are more likely to be affected by business cycles than those of the highly educated (e.g., Devereux, 2000, 2002). Figures 6a–d plot the estimated year effects reported in Tables 4 and 5, along with the male unemployment rate for the corresponding years (the unemployment rate is for

men of all education and age groups).

Four patterns stand out in Figures 6a–d. First, the year effects for regular employment are pro-cyclical (i.e., the unemployment rate and the year effects move in opposite directions), whereas those for non-regular employment are counter-cyclical. The likely reason for this differing pattern is that, when labor demand is strong, a higher proportion of men engage in regular full-time work; therefore, the proportion of non-regular employment decreases. During recessions, those who cannot find regular employment engage in non-regular employment, making non-regular employment counter-cyclical. Second, the absolute values of year effects for regular employment are much greater for single men than for married men. Thus, single men's employment is more likely to be affected by business cycles. Third, among married men, the magnitude of year effects differs significantly across education. Regular employment of junior high school graduates is more responsive to the unemployment rate than that of university graduates, with that of senior high school or junior college graduates showing intermediate responsiveness. Conversely, the differences across educational groups are not as large for single men as they are for married men. Finally, the year effects for the NRER are much smaller in magnitude than those for the RER.

5. Considerations for endogeneity of marriage

One of the significant patterns in raw tabulations and RER regressions by marital status in Table 4 is the decline in the RER for single men as they age; such patterns are weak or nonexistent for married men. If more employable men get married as they age, the population of singles is more likely to consist of less employable men, which could make the RER fall as a cohort ages. In other words, the composition of the single population changes as a cohort ages because employable men leave it. Therefore, declining regular employment does not mean that the same set of individuals leaves regular employment; rather, the composition of the single population changes over time for a fixed cohort. In this section, I develop a simple framework to test whether the pattern of a falling RER for single men may be understood as an outcome of selection into marriage.[28]

For each education group, let θ_a represent the proportion of married people in age group *a*, and let y_{ja} represent the RER of age *a* and marital status j, where j takes M (married), S (single), CM (continuously married), NM (newly married), and CS (continuously single).

The following assumptions are made to form a test procedure:

[28] The analysis in this section does not address the question of cohort differences in marriage and regular employment. Rather, it is concerned with the relationship of marriage and regular employment for those who belong to the same cohort. An analysis within cohort is a suitable choice for addressing the role of individual heterogeneity in employability.

Assumption 1 (No divorce): Those who got married before age *a* remain married at age *a*+5.

Assumption 2 (Stable regular employment for the fixed marital statuses): Those who are either continuously married or continuously single between age *a* and age $a+5$ do not change regular employment status between these ages. Therefore, $y_{a+5,CM} = y_{a,CM}$ and $y_{a+5,CS} = y_{a,CS}$ hold.

Assumption 1 says that movement between the single and married groups is in one direction: single to married. Because of this assumption, the married group, M, at age *a*+5 is the sum of the continuously married (CM) group and the newly married group (i.e., those who got married between ages *a* and *a*+5). Assumption 1 means that those who are continuously married at age $a+5$ are married at age a. Together with $y_{a+5,CM} = y_{a,CM}$ from Assumption 2, this implies that $y_{a+5,CM} = y_{a,M}$.

5.1. Accounting relationships

As "accounting" relationships of the RER of married and single people of age *a*+5, the following two equations hold for each age and education group:

$$y_{a+5,M} = \frac{\theta_a}{\theta_{a+5}} \cdot y_{a+5,CM} + (1 - \frac{\theta_a}{\theta_{a+5}}) \cdot y_{a+5,NM,M} = \frac{\theta_a}{\theta_{a+5}} \cdot y_{a,M} + (1 - \frac{\theta_a}{\theta_{a+5}}) \cdot y_{a+5,NM,M}, \qquad (3)$$

$$y_{a+5,S} = \frac{1-\theta_a}{1-\theta_{a+5}} \cdot y_{a,S} - (\frac{\theta_{a+5}-\theta_a}{1-\theta_{a+5}}) \cdot y_{a,NM,S}, \quad (4)$$

where the subscript at the end of $y_{a+5,NM,X}$ (the RER of the newly married), X=M or S, distinguishes whether the $y_{a+5,NM}$ comes from the "equation for the married" (Eq. (3)), or the "equation for singles" (Eq. (4)).

Eq. (3) says that the RER of married people at age *a*+5 is the weighted average of the RER of the continuously married and of the newly married. The weights are derived from the proportion of married people for each education and birth year group, given Assumption 1. The second equality of Eq. (3) comes from Assumptions 1 and 2: because I assume away divorce (Assumption 1), the CM group at age *a*+5 consists of people who were married at age *a* and, since the continuously married do not change employment status (Assumption 2), $y_{a+5,CM} = y_{a,M}$. Eq. (4) says that the RER for singles at age *a*+5 is the RER for those who were single at age *a* minus the RER of the "leavers" (the newly married who leave the single population between age *a* and *a*+5), with appropriate weights attached.

Eqs. (3) and (4) mean that the changes in the RER from age *a* to *a*+5 partly reflect that newly married people move from the single group to the married group. Assuming the RERs of the continuously married and the continuously single groups do not change, the RERs of newly married individuals can be inferred from the two

equations.[29]

For the expressions in Eq. (3) and Eq. (4), values of y and θ are observable in repeated cross-sectional data, except for $y_{a+5,NM,M}$ and $y_{a,NM,S}$. These are the RERs of newly married individuals imputed from two different accounting equations: one from the equation for the married and the other from the equation for singles. From the "married equation," the RER of those who newly joined the married population is derived ($y_{a+5,NM,M}$), while from the "singles' equation," that of "leavers" (i.e., those who leave the population of singles) is derived ($y_{a,NM,S}$).

If Assumptions 1 and 2 hold and newly married individuals do not change labor force behavior upon marriage, then the two RERs for the newly married that are imputed from the two equations should be close, leading to the following hypothesis.

Hypothesis 1 (*Compositional Change*): $y_{a+5,NM,M} = y_{a,NM,S}$.

To form a test statistic for the joint test of Hypothesis 1, it is necessary to account for the sampling errors of the ys and θs. The delta method is used to calculate the standard errors of the test statistics.

[29] Assumption 2 may not be valid because employment status is determined as an endogenous choice and could change over time. If it were possible to derive the RER at age a+5 separately depending on marital status of 5 years earlier (at age a), it would be possible to account for the impact of changing labor force behavior of the population of fixed marital status (i.e., relax Assumption 2). However, such information is usually unavailable in cross-sectional data, as is the case for the ESS data used in this paper.

5.2. Test results of the compositional change hypothesis

Hypothesis 1 is tested using the ESS data from 1982 to 2007, separately for the groups defined by education and age. I confine attention to the sample in which a+5 is between 25 and 39 (a 5-year interval) because selection into marriage is most applicable for this age group.[30] Another concern for the empirical analysis is that the data may not support the theoretical restrictions that $0 \le y_{a+5,NM,M} \le 1$ and $0 \le y_{a,NM,S} \le 1$. In such cases, some of the assumptions are likely to be false, or the sampling errors may be large. I confine attention to the cases in which these restrictions are satisfied. Table 6 reports results for the cases in which these restrictions are met. The table lists estimates for $y_{a+5,NM,M}$, $y_{a,NM,S}$, their difference, the test statistic for Hypothesis 1, and the probability value (p-value) of the test, for each combination of education, birth year, and age.

For university graduates, Hypothesis 1 is not rejected statistically for most cases under the conventional significance level; furthermore, the magnitude of the difference between $y_{a+5,NM,M}$ and $y_{a,NM,S}$ is less than 0.1 except for one case. These results indicate that Hypothesis 1 is mostly consistent with data for university graduate men.

In many of the cases, Hypothesis 1 is rejected for the less-educated groups

[30] The 35–39 age group is used only for university graduates, because the percentage of married people in the population does not change much for this age range for other education groups.

(junior high school and senior high or junior college groups). However, for the senior high school or junior college group, although the equality is rejected statistically, the magnitude of the difference ($y_{a+5,NM,M} - y_{a,NM,S}$) is small: in all cases but two, the absolute value of the difference is less than 0.1. Even though the hypothesis is rejected statistically, the fact that the RERs imputed in two ways are close means that, those leaving the single group and joining the married group have similar RER levels. For junior high school graduates, the hypothesis is rejected statistically, and the difference is large in magnitude.[31] Taken as a whole, Hypothesis 1 is mostly consistent with the data for highly educated men. In other words, a fall in the RER for highly educated single men as they age can be understood as more employable men getting married and leaving the set of singles.

The mechanism wherein less employable young men are less likely to get married has been pointed out (e.g., Wood (1995) and Brien (1997) for the USA, and Sakai and Higuchi (2005) and Kondo (2007) for Japan), and the analysis of this section confirms such a hypothesis for narrowly-defined education and birth cohort groups. In general, it is natural to expect that employability and marriage are related, but the deterioration of employment for men in Japan (Figures 1 and 2) might have made this

[31] As shown in Table 1, the proportion of junior high school graduates for the cohorts analyzed here is less than 7 percent.

more relevant for recent cohorts of young men.

6. Conclusions

In this paper, I use repeated cross-sectional data to examine recent trends in male labor supply in Japan. The results show that regular employment decreased for less-educated men during the recession period in the late 1990s. In addition, non-regular employment increased for young cohorts of less-educated men. This increase in non-regular employment was accompanied by an increase in non-traditional non-regular employment, most significantly in manufacturing. The cohorts who finished schooling during the late 1990s and early 2000s experienced a decrease in regular employment and an increase in non-regular employment at young ages, but this phenomenon was more prevalent among single men than married men. I find that the fall in the RER for highly educated single men as they age can be understood as more employable men getting married and leaving the set of singles. The business cycle effects for regular employment are pro-cyclical, whereas those for non-regular employment are counter-cyclical. Regular employment of single men and less-educated married men is more affected by business cycle factors than that of highly educated married men.

In the past, non-regular employment was more common for female workers

than for male workers. However, as shown in Section 3, non-regular employment has become more common among less-educated men in the 2000s. This paper also shows that the increase in non-regular employment is concentrated in several industries. A detailed analysis of how the changing industry composition affected the increase in non-regular employment is left for future research.

Appendix

Classification of the titles for non-regular workers in the ESS from 1982 to 2007 is summarized in Table A1.

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Table 1: Educational distribution by birth year groups

Men

Birth years	Junior High	Senior High or Junior College	University
1933–1937	0.424	0.423	0.153
1938–1942	0.348	0.484	0.167
1943–1947	0.297	0.488	0.215
1948–1952	0.211	0.528	0.261
1953–1957	0.114	0.529	0.352
1958–1962	0.062	0.541	0.394
1963–1967	0.062	0.570	0.364
1968–1972	0.066	0.582	0.347
1973–1977	0.065	0.570	0.361
1978–1982	0.062	0.527	0.405

Women

Birth years	Junior High	Senior High or Junior College	University
1933–1937	0.482	0.495	0.023
1938–1942	0.395	0.576	0.028
1943–1947	0.311	0.639	0.049
1948–1952	0.198	0.736	0.066
1953–1957	0.086	0.795	0.114
1958–1962	0.041	0.817	0.136
1963–1967	0.035	0.819	0.140
1968–1972	0.041	0.802	0.153
1973–1977	0.040	0.751	0.205
1978–1982	0.040	0.677	0.278

Note: The figures are the share of population of each educational group for the birth year group. The figures are calculated for those who are aged from 25 to 54. The figures are calculated from the 2007 ESS for cohorts born after 1953, from the 2002 ESS for cohorts born between 1943 and 1952, and from the 1997 ESS for cohorts born between 1933 and 1942.

Source: Employment Status Survey, 1997, 2002, and 2007

Table 2: Industry composition of non-regular employment

A. Age 20-34, education=Not university

The number of part-arbeit non-regular employees (in thousands)

	1992	1997	2002	2007
Construction	54	72	81	63
Manufacturing	48	73	81	54
Transportation	36	47	59	48
Wholesale & Retail	84	155	253	230
Service	64	100	155	133

The number of non-traditional, non-regular employees (in thousands)

	1992	1997	2002	2007
Construction	38	40	57	44
Manufacturing	32	23	120	232
Transportation	9	11	36	70
Wholesale & Retail	7	11	42	67
Service	35	44	88	108

B. Age 35-54, education=Not university

The number of part-arbeit non-regular employees (in thousands)

	1992	1997	2002	2007
Construction	53	54	66	48
Manufacturing	31	38	63	48
Transportation	17	19	36	39
Wholesale & Retail	20	29	59	70
Service	23	30	53	76

The number of non-traditional, non-regular employees (in thousands)

	1992	1997	2002	2007
Construction	145	113	122	84
Manufacturing	57	31	73	163
Transportation	15	13	37	67
Wholesale & Retail	17	19	41	51
Service	35	35	77	102

Source: Author's calculation from ESS 1992-2007 (microdata).

Table 3
Regression results for regular employment and non-regular employment ratios

	(1)	(2)	(3)	(4)	(5)	(6)
	regular employment ratio			non-regular employment ratio		
	Junior High	Senior High or Junior College	University	Junior High	Senior High or Junior College	University
Year 1982	-0.023**	-0.013**	-0.007*	0.010**	0.007**	0.004**
	(0.004)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Year 1987	-0.007	-0.004	-0.002	0.004*	0.003**	0.001
	(0.004)	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)
Year 1992	0.032**	0.020**	0.010**	-0.012**	-0.007**	-0.004**
	(0.005)	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)
Year 1997	0.035**	0.021**	0.010**	-0.019**	-0.013**	-0.006**
	(0.006)	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)
Year 2002	-0.020**	-0.017**	-0.010**	0.008*	0.001	0.002
	(0.007)	(0.004)	(0.003)	(0.003)	(0.002)	(0.001)
Year 2007	-0.016*	-0.006	-0.002	0.009**	0.009**	0.003*
	(0.006)	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)
Dummy for born	0.037*	-0.009	0.009	-0.051**	-0.042**	-0.023**
1933–1937	(0.014)	(0.013)	(0.009)	(0.006)	(0.003)	(0.003)
Dummy for born	0.061**	0.008	0.023**	-0.052**	-0.038**	-0.022**
1938–1942	(0.013)	(0.010)	(0.007)	(0.005)	(0.003)	(0.002)
Dummy for born	0.082**	0.008	0.000	-0.048**	-0.028**	-0.017**
1943–1947	(0.012)	(0.008)	(0.005)	(0.005)	(0.002)	(0.002)
Dummy for born	0.054**	-0.008	-0.009*	-0.028**	-0.019**	-0.012**
1948–1952	(0.011)	(0.007)	(0.004)	(0.005)	(0.002)	(0.002)
Dummy for born	0.038**	-0.002	-0.011*	-0.011*	-0.008**	-0.005*
1958–1962	(0.012)	(0.007)	(0.004)	(0.005)	(0.002)	(0.002)
Dummy for born	-0.027	-0.006	-0.002	0.007	0.015**	0.007**
1963–1967	(0.015)	(0.007)	(0.004)	(0.006)	(0.002)	(0.002)
Dummy for born	-0.058**	-0.027**	-0.024**	0.032**	0.035**	0.022**
1968–1972	(0.015)	(0.008)	(0.005)	(0.007)	(0.003)	(0.003)
Dummy for born	-0.116**	-0.067**	-0.063**	0.080**	0.069**	0.052**
1973–1977	(0.017)	(0.009)	(0.007)	(0.009)	(0.004)	(0.005)
Dummy for born	-0.193**	-0.161**		0.128**	0.152**	
1978–1982	(0.023)	(0.013)		(0.013)	(0.007)	
Age–30	-0.005**	-0.004**	-0.003**	0.002**	0.002**	0.001**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age spline up to 30	0.002	0.006**	0.006**	-0.005**	-0.004**	-0.005**
	(0.002)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)
Constant	0.660**	0.839**	0.926**	0.081**	0.027**	0.016**
	(0.011)	(0.006)	(0.004)	(0.004)	(0.002)	(0.002)
Observations	40	40	34	40	40	34
R-squared	0.95	0.95	0.95	0.97	0.99	0.97

Notes:
Standard errors are in parentheses.
Regressions are estimated by weighted least squares, using the inverse sampling variance of the dependent variable as a weight.
The base group for cohort dummies is the cohort born in 1953–1957.
Age spline up to age 30 is defined as (age–30) for age less than 30 and equal to zero for ages 30 or over.

* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests).

Source: ESS (microdata), 1982-2007.

Table 4
Regression results for regular employment ratio: by marital status

Education	Junior High		Senior High or Junior College		University	
marital status	married	single	married	single	married	single
	(1)	(2)	(3)	(4)	(5)	(6)
Year 1982	-0.020 **	-0.021 **	-0.012 **	-0.016 **	-0.004	-0.012 **
	(0.003)	(0.006)	(0.002)	(0.004)	(0.002)	(0.004)
Year 1987	-0.006	-0.011	-0.001	-0.010	-0.001	-0.006
	(0.003)	(0.007)	(0.002)	(0.005)	(0.002)	(0.005)
Year 1992	0.027 **	0.033 **	0.014 **	0.031 **	0.005 *	0.021 **
	(0.004)	(0.008)	(0.002)	(0.005)	(0.002)	(0.005)
Year 1997	0.028 **	0.039 **	0.016 **	0.028 **	0.006 **	0.023 **
	(0.005)	(0.008)	(0.002)	(0.005)	(0.002)	(0.004)
Year 2002	-0.014 *	-0.027 **	-0.008 **	-0.028 **	-0.004 *	-0.022 **
	(0.005)	(0.008)	(0.002)	(0.005)	(0.002)	(0.004)
Year 2007	-0.015 **	-0.013	-0.008 **	-0.004	-0.002	-0.004
	(0.005)	(0.007)	(0.002)	(0.004)	(0.002)	(0.004)
Dummy for born	-0.050 **	0.099 **	-0.055 **	0.047	-0.020 **	0.010
1933–1937	(0.011)	(0.025)	(0.007)	(0.038)	(0.006)	(0.044)
Dummy for born	-0.013	0.090 **	-0.029 **	0.043	-0.002	0.016
1938–1942	(0.010)	(0.020)	(0.005)	(0.025)	(0.005)	(0.029)
Dummy for born	0.022 *	0.101 **	-0.020 **	0.028	-0.020 **	-0.003
1943–1947	(0.010)	(0.017)	(0.005)	(0.017)	(0.004)	(0.018)
Dummy for born	0.008	0.082 **	-0.027 **	0.008	-0.023 **	-0.014
1948–1952	(0.009)	(0.014)	(0.004)	(0.011)	(0.003)	(0.010)
Dummy for born	0.008	0.060 **	-0.009 *	0.004	-0.018 **	-0.006
1958–1962	(0.010)	(0.014)	(0.004)	(0.009)	(0.003)	(0.007)
Dummy for born	0.003	-0.050 **	0.013 **	-0.019 *	0.004	-0.008
1963–1967	(0.013)	(0.016)	(0.004)	(0.008)	(0.003)	(0.006)
Dummy for born	-0.016	-0.087 **	0.011 *	-0.049 **	0.002	-0.042 **
1968–1972	(0.013)	(0.016)	(0.005)	(0.008)	(0.004)	(0.007)
Dummy for born	-0.026	-0.168 **	0.016 *	-0.103 **	-0.001	-0.086 **
1973–1977	(0.016)	(0.017)	(0.006)	(0.008)	(0.005)	(0.008)
Dummy for born	-0.064 *	-0.247 **	-0.006	-0.199 **		
1978–1982	(0.025)	(0.021)	(0.011)	(0.010)		
Age–30	-0.003 **	-0.010 **	-0.003 **	-0.011 **	-0.002 **	-0.010 **
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Age spline up to 30	-0.010 **	0.001	0.000	0.008 **	0.003	0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Constant	0.711 **	0.602 **	0.859 **	0.805 **	0.950 **	0.888 **
	(0.009)	(0.012)	(0.003)	(0.007)	(0.003)	(0.006)
	40	40	40	40	34	34
R-squared	0.97	0.96	0.98	0.98	0.97	0.98

Notes:
Standard errors are in parentheses.
Regressions are estimated by weighted least squares, using the inverse sampling variance of the dependent variable as a weight.
The base group for cohort dummies is the cohort born in 1953–1957.
Age spline up to age 30 is defined as (age–30) for age less than 30 and equal to zero for ages 30 or over.

* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests).

Source: ESS (microdata), 1982-2007.

Table 5
Regression results for non-regular employment ratio: by marital status

Education	Junior High		Senior High or Junior College		University	
marital status	married	single	married	single	married	single
	(1)	(2)	(3)	(4)	(5)	(6)
Year 1982	0.012 **	0.006 *	0.006 **	0.009 **	0.003 **	0.009 **
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)
Year 1987	0.004	0.004	0.002 *	0.007 **	0.000	0.004 *
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Year 1992	-0.013 **	-0.006	-0.006 **	-0.011 **	-0.003 **	-0.010 **
	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)
Year 1997	-0.019 **	-0.019 **	-0.010 **	-0.020 **	-0.003 **	-0.016 **
	(0.002)	(0.005)	(0.001)	(0.002)	(0.001)	(0.002)
Year 2002	0.006	0.010	0.001	0.002	0.002	0.002
	(0.003)	(0.005)	(0.001)	(0.002)	(0.001)	(0.003)
Year 2007	0.012 **	0.005	0.007 **	0.014 **	0.001	0.011 **
	(0.003)	(0.005)	(0.001)	(0.002)	(0.001)	(0.003)
Dummy for born	-0.031 **	-0.030 *	-0.025 **	-0.054 **	-0.013 **	-0.029 *
1933–1937	(0.007)	(0.014)	(0.004)	(0.006)	(0.002)	(0.013)
Dummy for born	-0.034 **	-0.038 **	-0.023 **	-0.057 **	-0.013 **	-0.035 **
1938–1942	(0.006)	(0.011)	(0.002)	(0.004)	(0.002)	(0.005)
Dummy for born	-0.033 **	-0.039 **	-0.018 **	-0.030 **	-0.009 **	-0.036 **
1943–1947	(0.006)	(0.007)	(0.002)	(0.006)	(0.001)	(0.005)
Dummy for born	-0.017 **	-0.025 **	-0.010 **	-0.029 **	-0.006 **	-0.020 **
1948–1952	(0.005)	(0.005)	(0.001)	(0.004)	(0.001)	(0.004)
Dummy for born	-0.004	-0.014	-0.004 **	-0.015 **	-0.003 **	-0.008 **
1958–1962	(0.005)	(0.007)	(0.001)	(0.003)	(0.001)	(0.003)
Dummy for born	0.007	0.003	0.006 **	0.023 **	0.004	0.012 **
1963–1967	(0.009)	(0.007)	(0.002)	(0.002)	(0.002)	(0.002)
Dummy for born	0.020 **	0.037 **	0.014 **	0.049 **	0.008 **	0.035 **
1968–1972	(0.007)	(0.010)	(0.002)	(0.002)	(0.002)	(0.002)
Dummy for born	0.045 **	0.100 **	0.023 **	0.091 **	0.015 **	0.070 **
1973–1977	(0.009)	(0.008)	(0.002)	(0.002)	(0.002)	(0.006)
Dummy for born	0.069 *	0.152 **	0.054 **	0.177 **		
1978–1982	(0.027)	(0.005)	(0.008)	(0.010)		
Age–30	0.001 **	0.003 **	0.001 **	0.004 **	0.001 **	0.002 **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age spline up to 30	-0.003 *	-0.004 **	-0.003 **	-0.003 **	-0.002 **	-0.001
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
Constant	0.062 **	0.103 **	0.017 **	0.045 **	0.009 **	0.033 **
	(0.005)	(0.004)	(0.001)	(0.002)	(0.001)	(0.002)
Observations	40	40	40	40	34	34
R-squared	0.89	0.94	0.95	0.99	0.91	0.97

Notes:
Standard errors are in parentheses.
Regressions are estimated by weighted least squares, using the inverse sampling variance of the dependent variable as a weight.
The base group for cohort dummies is the cohort born in 1953–1957.
Age spline up to age 30 is defined as (age–30) for age less than 30 and equal to zero for ages 30 or over.

* Statistically significant at the 5% level; ** at the 1% level (two-tailed tests).

Source: ESS (microdata), 1982-2007.

Table 6: Imputed regular employment ratios for the newly married and the test of the Compositional Change Hypothesis

Education	Birth year	Age (a+5)	$y_{a, NM,S}$	$y_{a+5, NM,M}$	Diff	t-statistic for Diff=0	p-value	Actual $y_{a, S}$	Actual $y_{a+5, M}$
Junior High	1958-1962	25-29	0.825	0.681	-0.144	-1.633	0.102	0.664	0.744
Junior High	1963-1967	25-29	0.567	0.787	0.220	2.476	0.013	0.605	0.786
Junior High	1968-1972	25-29	0.767	0.701	-0.065	-0.814	0.416	0.618	0.759
Junior High	1973-1977	25-29	0.978	0.487	-0.491	-5.524	0.000	0.545	0.671
Junior High	1978-1982	25-29	0.185	0.719	0.534	5.405	0.000	0.366	0.700
Senior High or Junior College	1958-1962	25-29	0.825	0.876	0.050	2.456	0.014	0.815	0.874
Senior High or Junior College	1963-1967	25-29	0.757	0.898	0.141	6.462	0.000	0.807	0.894
Senior High or Junior College	1968-1972	25-29	0.861	0.886	0.025	1.243	0.214	0.814	0.887
Senior High or Junior College	1973-1977	25-29	0.909	0.867	-0.042	-1.687	0.092	0.748	0.877
Senior High or Junior College	1978-1982	25-29	0.461	0.878	0.417	12.047	0.000	0.590	0.860
Senior High or Junior College	1953-1957	30-34	0.871	0.813	-0.059	-2.056	0.040	0.813	0.845
Senior High or Junior College	1958-1962	30-34	0.826	0.852	0.027	0.939	0.348	0.809	0.866
Senior High or Junior College	1963-1967	30-34	0.929	0.861	-0.067	-2.370	0.018	0.830	0.882
Senior High or Junior College	1973-1977	30-34	0.736	0.828	0.093	2.462	0.014	0.690	0.860
University	1953-1957	30-34	0.927	0.931	0.004	0.167	0.867	0.894	0.931
University	1958-1962	30-34	0.919	0.940	0.021	0.774	0.439	0.903	0.945
University	1963-1967	30-34	0.969	0.943	-0.027	-1.092	0.275	0.921	0.950
University	1973-1977	30-34	0.809	0.946	0.137	4.328	0.000	0.794	0.943
University	1953-1957	35-39	0.900	0.828	-0.072	-1.020	0.308	0.847	0.918
University	1958-1962	35-39	0.978	0.919	-0.060	-1.028	0.304	0.887	0.940
University	1968-1972	35-39	0.910	0.870	-0.040	-0.561	0.575	0.802	0.931

Note: Diff=$y_{a+5, NM, M}$-$y_{a, NM, S}$.

Source: Author's calculation from ESS 1982-2007 (microdata).

Table A1
Employment status of non-regular workers in the ESS

	Survey year						Definition in Figure 3
Non-regular employment status category	1982	1987	1992	1997	2002	2007	
part-time	}						} part-arbeit
casual (arbeit)							
entrusted [shokutaku]					}		} other
contract worker [keiyaku shain]	X	X	X	X			
temporary staffer	X						
other wage and salary earners							

Note:The entry "X" means that the category did not exist for that survey year.
The curley brace in year 1982 means that two categories are pooled into one category.

Figure 1. Regular employment ratio of men, by education

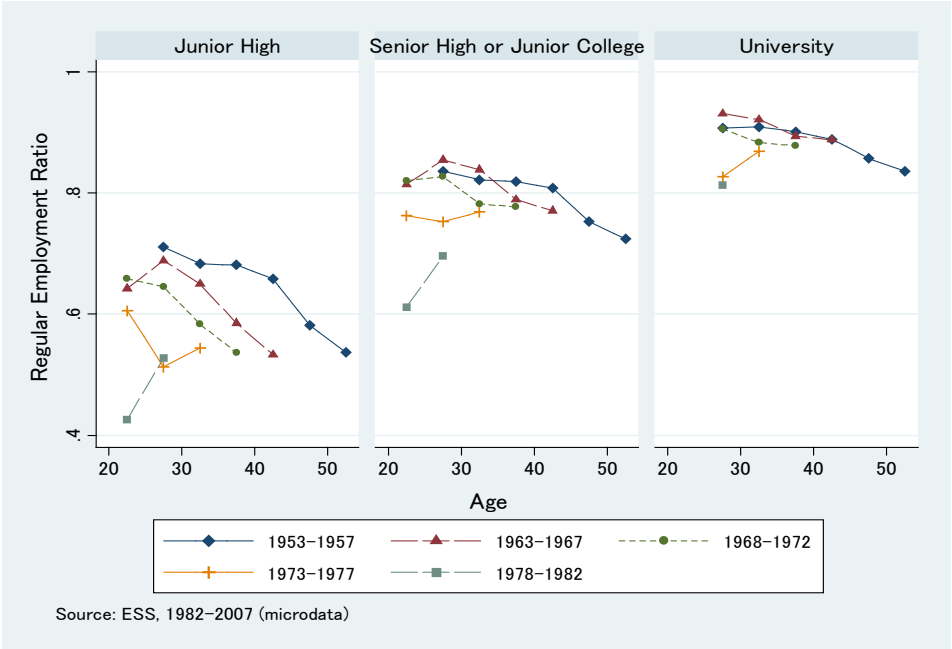


Figure 2. Non-regular employment ratio of men, by education

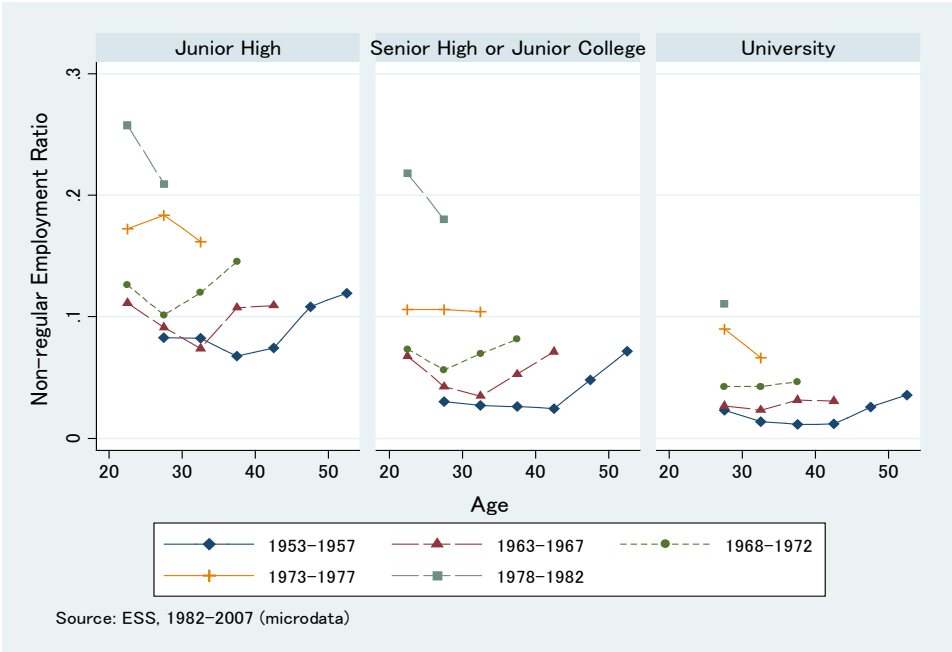
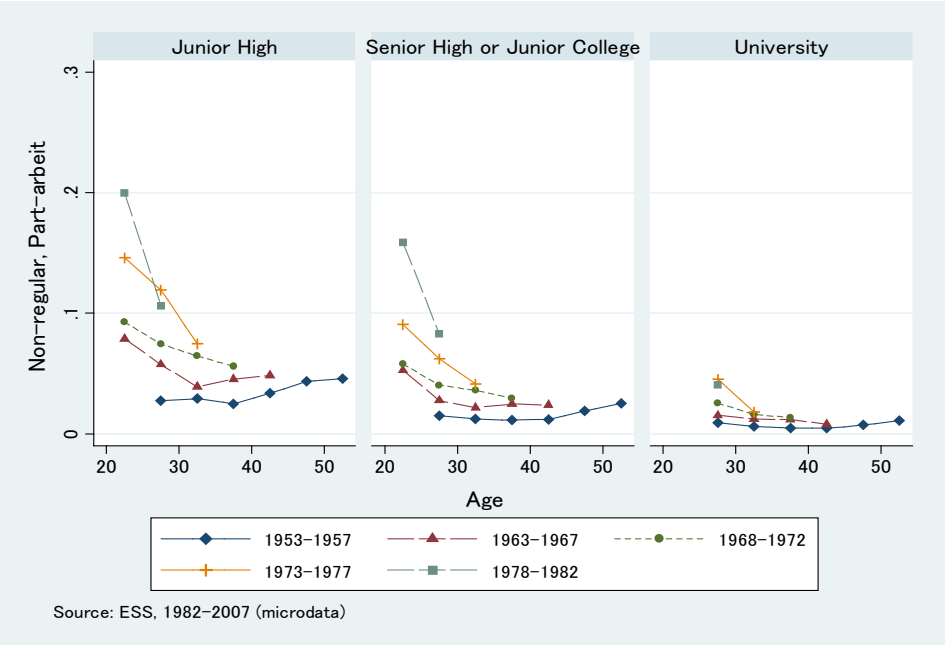
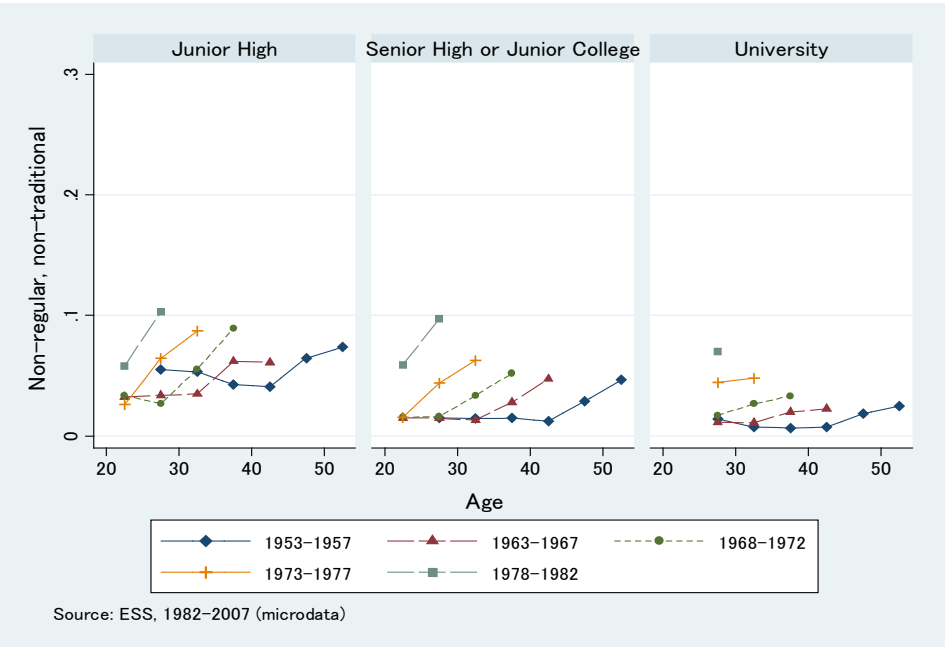


Figure 3. Disaggregation of non-regular employment
Figure 3a. Proportion of part-arbeit employment of men, by education



Note: The proportion is calculated as the number of part-time and casual workers to population.

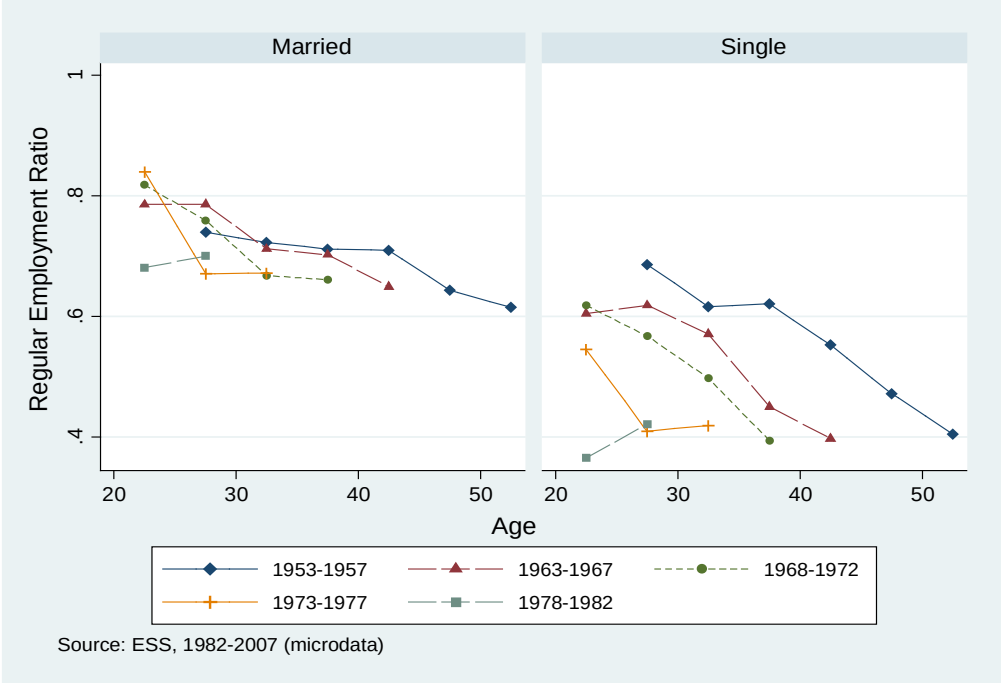
Figure 3b. Proportion of non-traditinoal non-regular employment of men, by education



Note: The proportion is calculated as the number of non-regular employees other than part-arbeit workers to population.

Figure 4. Regular employment ratio by education and marital status

4a. Junior high school graduates



4b. Senior high school or junior college graduates

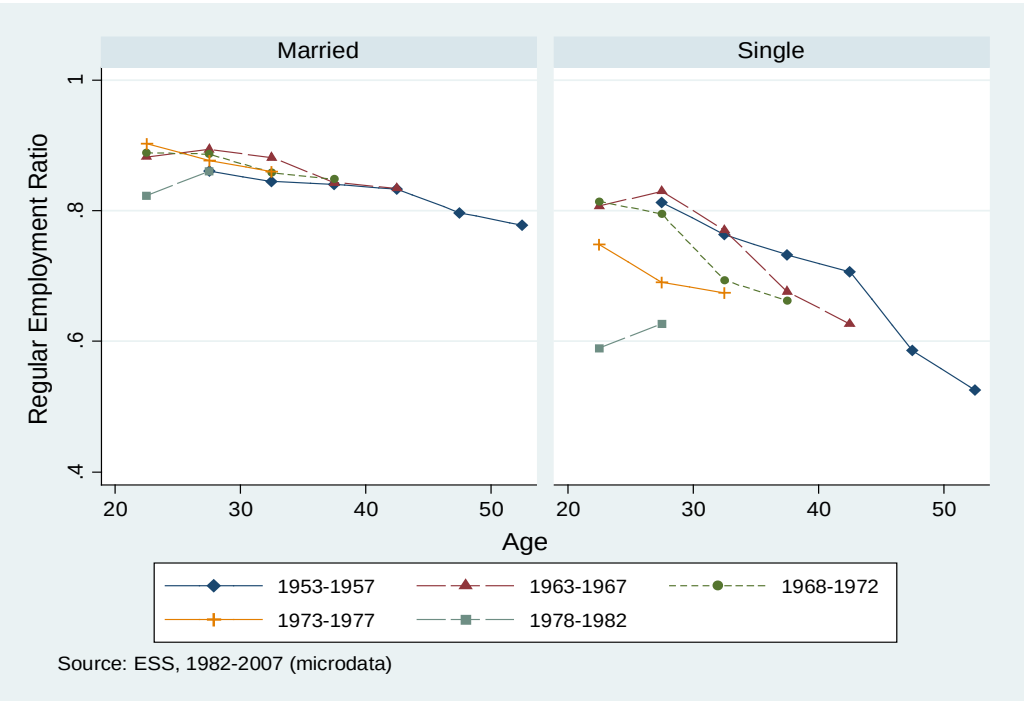


Figure 4 (continued)
4c. University graduates

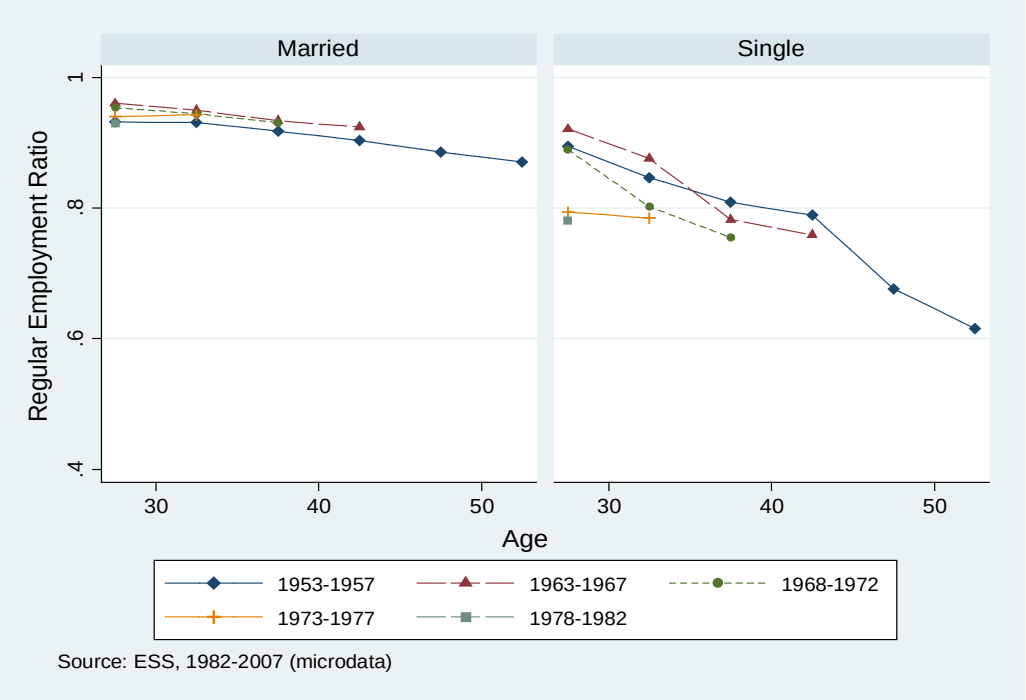
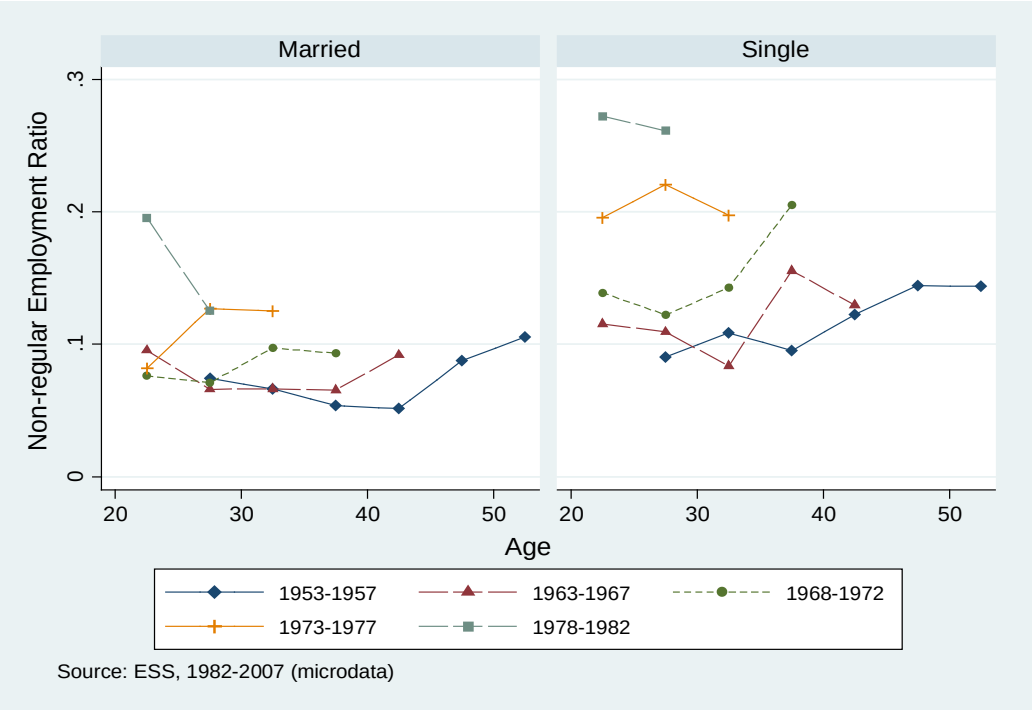


Figure 5. Non-regular employment ratio by education and marital status

5a. Junior high school graduates



5b. Senior high school or junior college graduates

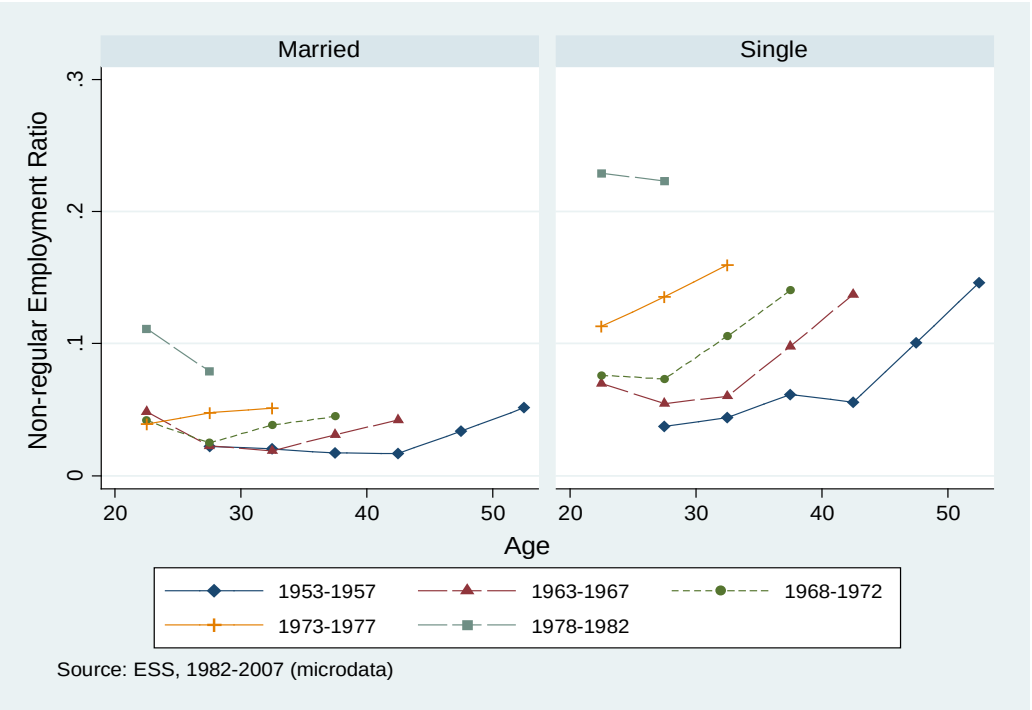


Figure 5 (continued)

5c. University graduates

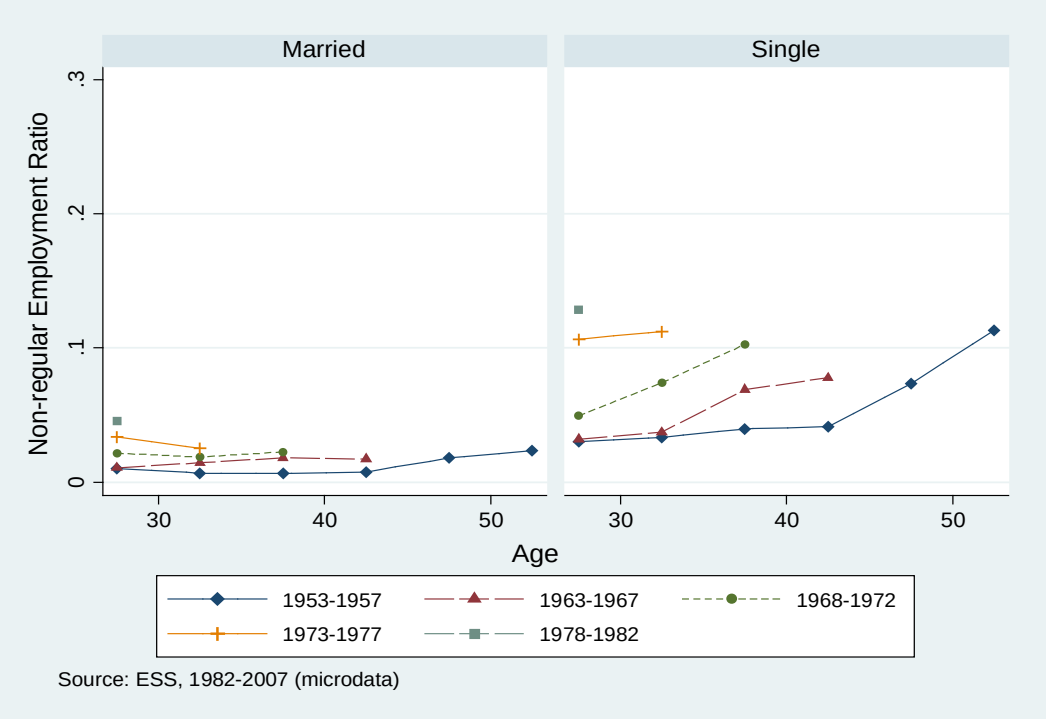
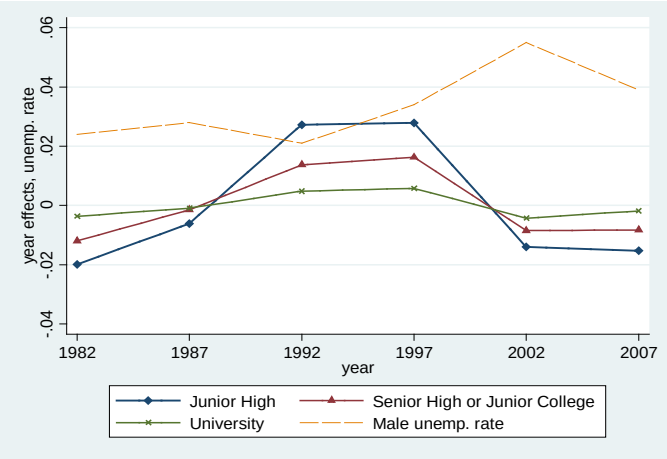
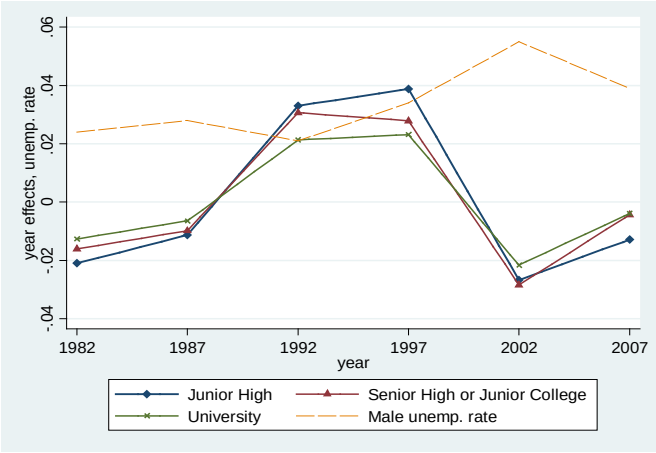


Figure 6. Year effects by education and year

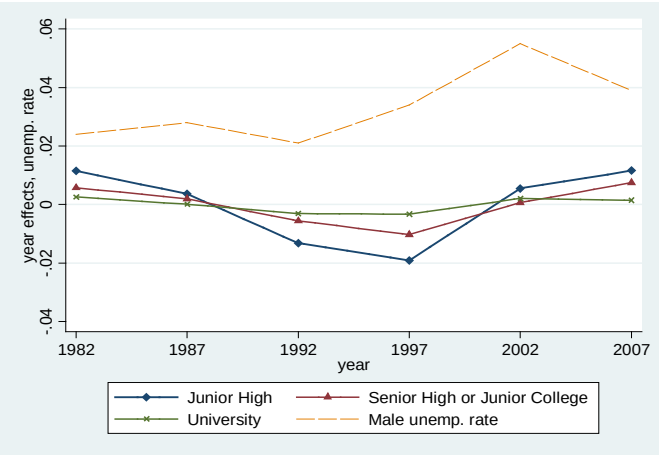
6a. Year effects of regular employment ratio: married men



6b. Year effects of regular employment ratio: single men



6c. Year effects of non-regular employment ratio: married men



6d. Year effects of non-regular employment ratio: single men