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Long-term Employment and Job Security over the Last Twenty-Five Years: A Comparative Study of Japan and the U.S.*

Ryo Kambayashi and Takao Kato**
January 27, 2016

Abstract

Taking advantage of a recent relaxation of Japanese government's data release policy, we conduct the first cross-national analysis of micro data from Japan's Employment Status Survey and its U.S. counterpart, Current Population Survey. Our focus is to document and contrast changes (or lack thereof) in long-term employment and job security over the last twenty five years between the two largest advanced market economies. On the one hand, we find that in spite of the prolonged economic stagnation, prime-age male workers with at least 5 years of tenure in Japan continued to enjoy much higher job stability than their U.S. counterparts consistently over the last twenty-five years. Most remarkably Japan's "Lost Decade" is found to have little discernible adverse effect on job stability of this group of Japanese employees. On the other hand, we find that job stability for mid-career hires and youth workers did deteriorate in Japan over the last twenty-five years. Our cross-national regression analysis of the odds of job loss confirms the consistently more important role that seniority plays in protecting workers from job loss in Japan than in the U.S., and uncovers that such Japan-U.S. gap in seniority's influence in job stability widened over the last twenty five years. It is the U.S. economy with the longest economic expansion not the Japanese economy with the longest economic stagnation in which employment stability and job security deteriorated. As such, contrary to the conventional wisdom, our findings point to the absence of convergence of the Japanese and U.S. systems. However, our job retention analysis, combined with our regression analysis of the odds of job separation in Japan over 1982-2007, shows that mid-career hires, young new job market entrants, and college-educated women in Japan were less fortunate, with their job stability deteriorating significantly. (JEL: J63, J64, J41, P52)

Key words: Long-term employment, job security, convergence theory, Great Recession, Lost Decade, and Japan and the U.S.

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Long-term Employment and Job Security over the Last Twenty-Five Years: A Comparative Study of Japan and the U.S.

1. Introduction

Taking advantage of a recent relaxation of Japanese government's data release policy, we conduct the first cross-national analysis of micro data from Japan's Employment Status Survey and its U.S. counterpart, Current Population Survey. Specifically we document and contrast changes (or lack thereof) in long-term employment and job security over the last twenty five years between the two largest mature market economies.

Contrasting Japan's experience to the U.S. experience over the last twenty five years is of significant interest. First, the U.S. and Japan have been considered representing two contrasting employment systems. The U.S. employment system is often characterized as a real-world example of a textbook neo-classical labor market with highly mobile labor force and relatively unregulated firms responding freely and quickly to market forces (see, for instance, Freeman, 2007). In contrast, Japan was traditionally known for an alternative labor market model characterized by the practice of "lifetime employment" (or implicit long-term employment guarantees for the regular workforce) [1]; various mechanisms to enhance employee involvement and voice; elaborate pay systems including employee ownership and profit sharing; extensive training and multiskilling (including job rotation and various training programs); and corporate welfare programs (see, for instance, Kato, 2003 and Kambayashi and Kato, 2011).

Such an alternative labor market model was celebrated as a major source of the Japanese

[1] The term "lifetime" is somewhat of a misnomer since except for executives, Japanese workers have been typically subject to mandatory retirement that occurs around age 60. A precise definition of the practice of lifetime employment is therefore implicit long-term employment contract that ends at mandatory retirement for the regular workforce. In addition, the practice of "lifetime employment" does not necessarily mean that layoffs never happen in large Japanese firms. It has been documented that Japanese firms, even large ones, did lay off some of their regular employees, following the first oil crisis (see, for example, Koike, 2005, Suruga, 1998, Nakata and Takehiro, 2003, Chuma, 2002).

economic success (e.g., high productivity growth, global competitiveness, and low unemployment) in the postwar growth era (Aoki, 1990, Koike, 2005, Morita, 2005). Meanwhile, many U.S. firms responded by benchmarking some of those successful Japanese firms and adopting their employment practices (see, for example, Ichniowski and Shaw, 2009).[2]

However following the burst of the financial bubble at the end of the 1980s, the Japanese economy fell into prolonged stagnation (Japan's Great Recession or Lost Decade), while the U.S. economy started its longest economic expansion in history. The popular rhetoric about the relative strength of the Japanese employment system to the U.S. system swung rather wildly. The inability of the Japanese employment system to respond to rapidly changing market conditions during Japan's Great Recession was often accused of a structural impediment to the swift and robust recovery of the Japanese economy (Ono and Rebick, 2003). Influential associations of Japanese business leaders, such as Keizai Doyukai (Japan Association of Corporate Executives) and Nippon Keidanren (Japan Business Federation) called for a replacement of the Japanese system with the U.S. system. It was truly a remarkable reversal of the fortune of the Japanese employment system visa vie the U.S. system.

Taking at face value, it appears as if the Japanese employment system and the U.S. employment system are converging over the last twenty five years – initially the U.S. system moved toward the Japanese system and then following the burst of Japan's financial bubble, the Japanese system moved toward the U.S. system.[3] However, data limitation has been preventing researchers from providing much rigorous comparative evidence on exactly what happened to the Japanese employment system and the U.S. employment system over the last twenty five

[2] There is some evidence that the afore-mentioned Japanese employment system indeed helped Japanese firms enhance their productivity (See, for instance, Jones and Kato, 1995, Ohkusa and Ohtake, 1997, and Kato and Morishima, 2002).

[3] For the convergence theory and the related debate, see for instance Katz and Darbishire (2000), Boyer (2001), Jacoby, Nason and Saguchi (2005), and Sako (2005).

years. This paper is aimed at providing such evidence and contributing to the debate over the convergence theory.

Second, the Japanese economic system has attracted much attention as a potentially viable alternative to the Anglo-American model from a variety of economists who conduct comparative analysis of institutions (see, for example, Aoki, 1990, Milgrom and Roberts, 1994, Williamson, 1996, Koike, 2005, and Morita, 2005). In their theories the Japanese employment system is almost always considered a key element of the Japanese economics system. Moreover, understanding its potentially complementary relationship to the corporate governance system is often at the core of their theories.

During Japan's Great Recession, various institutions that are considered complementary to the Japanese employment system (such as the Keiretsu system which ensures stable supply of capital, parts and materials) were allegedly weakening.[4] By providing rigorous evidence on how the Japanese employment system responded to such evolving institutional environments, we hope to be able to provide insights on such comparative institutional theories and more generally the economic theory of institutional change and institutional complementarities (see, for instance, Aoki, 2001, and Roland, 2008).

Third, to understand better how the Japanese employment system responded to her Great Recession will be also of significant topical interest and relevance to policy makers around the world. About ten years after Japan's Great Recession, the U.S. and other major European economies started to experience their own Great Recessions, following the financial meltdown in the fall of 2008.[5] By providing rigorous and comparative evidence on how Japan's long-term

[4] For evidence on complementarity between the employment system and corporate governance, see, for instance, Abe (2002), Abe and Hoshi (2007), and Abe and Shimizutani (2007)

[5] Notwithstanding some important differences between Japan's Great Recession and the recent global Great Recession, there are some intriguing similarities (Koo, 2009). A number of serious attempts

employment and job security changed during her own Great Recession as compared to the U.S., we hope to be able to help policy makers in the U.S. and many advanced economies assess the long-term employment effects of the financial meltdown in the fall of 2008 and subsequent global Great Recession accurately, and develop well-informed policy responses.

In the next section, we present our key findings concerning changes (or lack thereof) in long-term employment in Japan and the U.S. over the last twenty five years, computing and contrasting various job retention rates between the two nations. In Section 3 we take advantage of the availability of comparable job loss data for Japan and the U.S. in recent years and conduct a cross-national regression analysis of the odds of job loss and their determinants. As such, the section presents new comparative evidence on changes in job security of Japanese and U.S. employees. Section 4 explores the nature and causes of changes in job stability (or lack thereof) of Japanese workers over the last twenty five years by estimating a linear probability model of job separation including both voluntary and involuntary turnover. The concluding section interprets the findings, emphasizing the importance of institutional complementarity.

2. Job retention rates of Japanese and U.S. workers over the Last Twenty-five Years

There is a long and fruitful tradition of comparing the prevalence of long-term employment between Japan and the U.S. in the fields of industrial relations and labor economics. Hashimoto and Rasian (1985) provide the first rigorous cross-national evidence on the practice of "lifetime employment" during Japan's high growth period (1962-77) by using aggregate data from the Employment Status Survey (ESS). The ESS is a large representative survey of Japanese

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have been made to contrast the Great Recession to Japan's Great Recession in the 1990s, in search for historical lessons with regard to the causes and consequences of such severe and prolonged recession as well as appropriate policy responses (see, for instance, Hamada, Kashyap, and Weinstein, 2011 and Hoshi and Kashyap, 2010).

households, conducted by Japan Statistics Bureau once every five year since 1982. The sample includes all household members (15 years old or higher) of over 400,000 randomly-selected households, representing about 1 percent of the population in Japan.[6] Their study was updated by Kato (2001) to include the first half of Japan's Lost Decade with a specific objective to examine the transformation (or lack thereof) of the contrasting prevalence of long-term employment between the two nations. Recently Farber (2007b) uses aggregate tables from the ESS from 2002 and earlier years for Japan and CPS Tenure Supplements for the U.S., and conducts an intriguing cross-national comparison of the evolution of long-term employment between Japan and the U.S. with particular focus on the role of unique institutions in labor adjustments to globalization in recent years. Our study extends Farber (2007b) in three significant ways. First, we take advantage of our access to micro data from the ESS, and conduct a cross-national econometric study of the determinants of the incidence of job loss for both nations. Second, we extend the period of analysis to 2007 so that we can consider the long-term implications of Japan's Lost Decade. Third, we extend and refine the job retention rate methodology of Hashimoto and Rasian (1985) and apply the refined methodology to more recent and comprehensive comparative data.[7]

We begin by calculating the ten-year job retention rates of Japanese employees in the

[6] Interest in studies of the importance of long-term employment in the U.S. was rekindled in late 1990s in light of the rising popular perception of disappearing long-term jobs in the U.S. In response, a number of researchers in the U.S. have been using CPS tenure supplements to address this popular perception (see, for example, Farber, 1998, and Neumark, et. al., 2000).

[7] There is, however, an alternative dataset available for Japan, i.e., the Basic Survey of Wage Structure (often called the Wage Census data). Though the Wage Census data are obtained from an establishment-level survey and hence not comparable to CPS tenure supplements, they provide information necessary to calculate job retention rates. A few scholars use this alternative establishment-level dataset and draw conclusions that are broadly consistent with those of recent studies using the ESS (Chuma, 1998, Shimizutani and Yokoyama, 2009, and Hamaaki, et. al., 2012). However, Kawaguchi and Ueno (2013) recently conduct a careful study of the two datasets and suggest that the Basic Survey of Wage Structure data may be subject to a nonrandom selection of employees by each responding establishment and thereby lead to an overly optimistic conclusion on the resilience of Japan's long-term employment system.

private sector, including both standard and non-standard employees (such as subcontract temporary workers, part-timers and other contingent workers). Specifically, for each of the following four groups: (i) college-educated men (men with 4-year degrees or higher); (ii) less-educated men (men without 4-year degree); (iii) college-educated women (women with 4-year degrees or higher); and (iv) less-educated women (women without 4-year degree), we calculate the ten-year job retention rate as follows:

1. Use the ESS in year Z and calculate the proportion of civilian noninstitutional population who are employees and X years old with Y years of tenure in year Z, P(Age=X, Tenure=Y, Year=Z)
2. Use the ESS in year Z+10 and calculate the proportion of civilian noninstitutional population who are employees and X+10 years old with Y+10 years of tenure in year Z+10, P(Age=X+10, Tenure=Y+10, Year=Z+10)
3. Calculate the ten-year job retention rate for employees with Age=X and Tenure Y in Year Z by dividing P(Age=X+10, Tenure=Y+10, Year=Z+10) by P(Age=X, Tenure=Y, Year=Z).

The ESS data are available for 1982, 1987, 1992, 1997, 2002, and 2007, and thereby we can calculate such ten-year job retention rates for the four time periods, 1982-1992, 1987-1997, 1992-2002 and 1997-2007, or Z=1982, 1987, 1992, and 1997. For age, we consider the following six age groups: (i) age 15-19; (ii) age 20-24; (iii) age 25-29; (iv) age 30-34; (v) age 35-39; and (vi) age 40-44. The first age group (age 15-19) is considered only for less-educated employees. Due to the prevailing practice of mandatory retirement in Japan which was originally set at 55 and then raised to 60 in the 1990s and 65 in the 2000s, we focus on those who are below age 45. The ten-year job retention rates of those who are over age 45 will be subjected to Japan's

prevailing mandatory retirement practice. For tenure, following prior job retention rate estimates (such as Hashimoto and Rasian, 1992) we use two tenure groups: (i) 0-4 years of tenure; and (ii) 5+ years of tenure.[8] Comparable retention rates for U.S. workers are then calculated by using CPS tenure supplements and calculate.[9]

The top half of Figure 1 labelled "College-educated Men" shows the ten-year job retention rates for college-educated men of prime age over 1982-2007 for each of the six tenure-age categories (age 30-34/tenure 0-4; age 35-39/tenure 0-4; age 40-44/tenure 0-4; age 30-34/tenure 5+; age 35-39/tenure 5+; and age 40-44/tenure 5+). The red dotted lines are for Japan and the blue dotted lines for the U.S. For each retention rate we calculate the 95% confidence interval (see appendix for the derivation of the confidence interval). As such, each retention rate series has an accompanying 95% confidence interval series (indicated by a pair of solid lines).

First, the figure confirms that job retention rates are indeed higher for Japanese workers with college degrees than for their U.S. counterparts throughout the period under study. Second and most important, the ten-year job retention rates for college-educated Japanese workers with 5+ years of tenure were remarkably stable around at 80% over the last two and half decades regardless of age, pointing to the enduring nature of Japan's long-term employment for college-educated men of prime age with at least 5 years of tenure.

The resilience of Japan's long-term employment practice for college-educated men of

[8] To see if our results are sensitive to the use of alternative tenure thresholds, we also consider four additional tenure groups: (iii) 10+ years of tenure; (iv) 15+years of tenure; (v) 20+years of tenure; and (vi) 25+years of tenure. Reassuringly we find our results are generally not sensitive to the threshold. These and other unreported results are available upon request from the corresponding author.

[9] Specifically, we use the following: 1981 Jan. Occupational Mobility and Job Tenure (ICPSR_08115); 1987 Jan. Occupational Mobility and Job Tenure (ICPSR_08913); 1991 Jan. Job Training (ICPSR_09716); 1996 Feb Displaced Workers (ICPSR_06879); 1997 Feb. Contingent Work (ICPSR_02408); 2001 Feb. Contingent Work (ICPSR_03302); and 2006 Feb. Displaced Workers, Employee Tenure, and Occupational Mobility Supplement (ICPSR_04568). The relatively small sample size of CPS makes further disaggregated analysis (such as job retention rates of male employees with university degrees) somewhat unreliable.

prime age with 5+ years of tenure is particularly impressive when compared to their U.S. counterparts who did not experience a "Lost Decade" instead enjoyed the longest economic expansion in the postwar period. It appears to be the U.S. with the longest economic expansion not Japan with a "Lost Decade" that showed more pronounced weakening of job stability for this group of workers. For instance, the ten-year job retention rates for college-educated men of age 30-34 with 5+ years of tenure in the U.S. fell from close to 60 percent in the 1980s to around 40 percent till late 1990s, resulting in a widening gap in job stability for this group of workers between the two nations. For the older age groups (35-39 and 40-44) with 5+ years of tenure, job stability did improve somewhat in the 2000s in the U.S. However, in late 2000s the job stability gap of college-educated men of prime age with 5+ years of tenure between the two nations remains considerable.

When we focus on employees with less than 5 years of tenure, however, we realize a different pattern. First, in Japan, the job retention rates for Japanese college-educated men of prime age with less than 5 years of tenure were substantially lower than those with 5+ years of tenure. Second and perhaps more important, there is some evidence that jobs for such short-tenure workers became more unstable over time although evidence is somewhat less definitive for those age 30-34 who experienced an initial rise in the retention rates. Since such workers are likely to be mid-career hires, our finding can be interpreted as an example of deepening labor market segmentation—the resilience of the long-term employment system for "core employees" who quickly settle into "jobs for life" after graduating, while further deterioration of job security for other employees who are mdi-career hires. Again, the observed deterioration of job stability of Japanese workers with less than 5 years of tenure is rather striking when contrasted with their U.S. counterparts who show no apparent deterioration of job stability over the last twenty five

years.

The ten-year job retention rate for less-educated men are shown in the bottom half of Figure 1 labelled "Less-educated Men." Although the stability of Japanese job retention rates over time is somewhat less striking, as compared to the U.S., the job retention rates for less-educated men with 5+ years of tenure in Japan appear to be more stable over the last twenty five years than their U.S. counterparts which experienced a more obvious weakening of job stability. Job stability for those with less than 5 years of tenure (or mid-career hires) was found to have deteriorated in Japan while no such downward trend in job stability was apparent for their U.S. counterparts, resulting in narrowing gaps in job stability between the two nations for less-educated men with less than five years of tenure.

Figure 2 presents the results from the same analysis for women of prime age. As shown in the bottom half of the figure, less-educated women show similar patterns to their male counterparts—the job retention rates are relatively more stable in Japan than in the U.S., while such relative stability of the ten-year job retention rates over the last twenty five years for Japanese workers as compared to their U.S. counterparts is found not to apply to mid-career hires with less than 5 years of tenure, for whom the job retention rates appear to have weakened similarly between the two nations.

Turning to college-educated women, as shown in the top half of Figure 2, the 95% confidence intervals are rather wide due to the relatively small cell size, and hence the results ought to be interpreted with caution. That being said, the ten-year job retention rate series appears to suggest a gender difference in long-term trends in job stability. Specifically Japanese female university graduates with 5+ year of tenure for age 35-39 and age 40-44 experienced an increase in their job retention rates initially. However, all of such gains in job stability for female

university graduates were lost during Japan's Lost Decade (1992-2002), and there was no sign of regaining thereafter. This is in contrast to the remarkable stability of job retention rates for their male counterparts over the last twenty five years (the top half of Figure 1).

A number of scholars stress the demise of youth employment as a major victim of Japan's "Lost Decade" (see, for instance, Genda, 2003). To this end, we produce similar figures for youth by focusing on younger age groups rather than prime age groups. Figures 3 and 4 confirm that job stability of such youth employees with 4-year degrees indeed deteriorated over the last twenty-five years in Japan, while no such weakening job stability is found for their U.S. counterparts (there does not appear to be any comparable contrast between the two nations for less-educated youth, however).

In sum, on the one hand, prime-age male workers with 5+ years of tenure in Japan continued to enjoy much higher job stability than the U.S. counterparts consistently over the last twenty-five years. Most remarkably Japan's "Lost Decade" did not have any discernible adverse effect on job stability of this group of Japanese employees. On the other hand, job stability for mid-career hires and youth workers did deteriorate in Japan over the last twenty-five years. Since there was no comparable decline in job stability for the U.S. counterparts, job stability gap between Japan and the U.S. did shrink over the last twenty-five years for these group of workers.

We have shown that in Japan jobs for workers with at least five years of tenure have been remarkably stables over the last twenty five years, and that the celebrated "lifetime employment" system appears to be still well and alive. It is, however, possible that the proportion of such "lifetime employment" workers has been falling and thereby that the "lifetime employment" system has become less relevant to the Japanese labor market. To see if this is the case, we use the ESS and calculate the proportions of Japanese workers with at least five years of tenure at

different age categories for the four groups of workers over 1982-2007. The results are summarized in Table 1. Note that for college-educated workers, we begin with age 30-34 since we are reasonably confident that most college-educated workers age 30-34 had an opportunity to accumulate five years of tenure with the firm, while that is not the case for age 25-29.

Overall Table 1 shows no downward trend in the proportion of workers with 5+ years of tenure, pointing to the continuing importance and relevance of the "lifetime employment" system in Japan---workers under the "lifetime employment" system have continued to enjoy strong job stability AND the proportion of workers who enjoy such resilient job stability has not fallen.[10]

There is, however, one important exception, entry-level male youth (college-educated men of age 30-34 and less-educated men of age 25-29). In 1982 63 percent of college-educated men of age 30-34 had already accumulated at least five years of tenure with the firm. The proportion of such workers continued to grow and reached almost 70 percent by 1997. Nonetheless the second half of Japan's Lost Decade (1997-2003) proved to be highly destabilizing for such entry-level college-educated men, and the proportion of college-educated men of age 30-34 with at least five years of tenure declined significantly and fell below 60 percent in 2002. In spite of the subsequent steady economic recovery, the proportion of entry-level college-educated men with at least five years of tenure remained low.

Likewise, entry-level less-educated men of age 25-29 show a similar pattern of falling share of workers with stable jobs. In 1982, the majority of entry-level less educated men of age 25-29 had at least five years of tenure. In 2007, only 40 percent of such workers had at least five

[10] It is possible that with demographic changes and increased labor force participation of women, the relative size of "lifetime employment" workers could have shrunk even if the share of prime age men with 5 or more years of job tenure has not declined. To this end, we also calculated the proportion of all workers including all different age groups from age 20 to age 60 who have at least five years of tenure. The proportion of all workers with 5+ years of tenure was quite stable over the last twenty-five years--32.6, 34.3, 35.7, 38.1, 35.6, and 37.5 percent in 1982, 1987, 1992, 1997, 2002, and 2007 respectively.

years of tenure.

Stability of entry-level male youth employment has been declining. The question then arises as to whether such declining stability of entry-level male youth employment is of short-term nature or has a lasting impact on their future job stability. To this end, it is informative to study the same cohort of workers over time. Specifically we study the cohort of college-educated men who were age 30-34 in 2002 (the post-bubble cohort), as compared to the previous cohorts of college-educated men---age 30-34 in 1982 (the 1982 cohort); age 30-34 in 1987 (the 1987 cohort); age 30-34 in 1992 (the 1992 cohort); and age 30-34 in 1997 (the 1997 cohort). As discussed above, it is the post-bubble cohort who experienced a sharp drop in the proportion of workers with 5+ years of tenure. Thus, 59.5 percent of college-educated workers of the post-bubble cohort had at least five years of tenure at age 30-34. In contrast, 63 percent of the 1982 cohort, 63.2 percent of the 1987 cohort, 64.8 percent of the 1992 cohort, and 67.8 percent of the 1997 cohort had at least five years of tenure. The post-bubble cohort had a harder time settling into stable jobs at age 30-34 than the previous cohorts at the same age.

Nevertheless, as the post-bubble cohort spent another five years and became age 35-39, the proportion of workers with 5+ years of tenure rose considerably to 63.4 percent, which is close to the level of the previous cohorts at the same age (except for the 1997 cohort who experienced a sharp increase in the proportion of workers with 5+ years of tenure). In sum, as compared to the previous cohorts, the post-bubble cohort indeed had a more difficult time settling into stable jobs initially yet in five additional years on the labor market the post-bubble cohort recovered reasonably well from the initial struggle, and achieved the level of job stability that the previous cohorts (except for the 1997 cohort) enjoyed. An analysis of less-educated men yields a similar pattern.

In sum, to answer the question of whether the declining job stability of youth employment has a lasting impact will require a more rigorous analysis of longitudinal data. That being said, our cohort analysis of repeated cross-section data from the ESS appears to suggest that the falling job stability of entry-level male youth employment during Japan's Lost Decade might not have had a long-lasting adverse impact.

Since the job retention rates for prime-age male workers with 5+ years of tenure remained high over the last twenty five years and there was no apparent downward trend in the share of such workers in Japan, the overall tenure distribution of Japanese workers is expected to remain intact overall. To this end, we produce Table 2 in which median, 25^{th} percentile and 75^{th} percentile of the distribution of current tenure are presented for the four groups of workers in Japan. Note that the distribution of current tenure can differ considerably from the distribution of eventual completed tenure, especially for younger workers---some young workers with short current tenure may well end up spending many more years in the same firm and having long eventual completed tenure with the firm. As such, we feel most confident in inferring long-term patterns in job stability from the distribution of current tenure of workers of age 50-54, for they are nearing mandatory retirement, and their current tenure is likely to be close to their eventual completed tenure. As shown in the table, their tenure distribution has been stable over the last twenty five years. For younger workers, the potentially large discrepancy between current tenure and completed tenure notwithstanding, the table also points to similar stability of the tenure distribution with a moderate exception of college-educated women age 45-49, whose tenure distribution has been shifting to the left somewhat over time.

Lastly both academic and popular writings about the Japanese employment system tend to highlight a notable distinction between standard employees who are termed as "sei shain" in

the workplace and all other employees (e.g., subcontract temporary workers, part-timers and other contingent workers) in Japan, and attribute the rising importance of such non-standard employment to the declining influence of the "lifetime employment" practice in Japan (Rebick, 2005, and Ono, 2010). To see if our key findings on trends in job stability of Japanese employees over the last twenty-five years remain valid even when we focus only on standard employees, we repeat the same analysis, excluding all non-standard employees and find no discernible change in the results.[11]

3. Regression Analysis of the Odds of Job loss of Japanese and U.S. Employees

A closer examination of Japan's ESS and America's CPS reveals that reasonably comparable data on job loss are available. Specifically we use the 1997 and 2007 ESS and create a dummy variable, **job loss=**1 if an employee lost a job as a result of the employer's decision unrelated to his/her individual performance (such as downsizing and "recommended" early retirement; bankruptcy and plant closing; and poor business performance) during the previous year, 0 otherwise. The 1996 and 2006 Displace Worker Surveys (CPS Supplements) allow us to create a reasonably comparable dummy variable for the U.S., although specific reasons for job loss are worded differently (company and plant closing and moving; insufficient work; and

[11] As discussed in detail in Kambayashi and Kato (2013), there is an alternative way to capture the dual labor market in Japan-- regular employees who are defined as those on indefinite contracts and non-regular employees as those on fixed-term contacts (less than one year). Kambayashi and Kato (2013) discover that being on an indefinite contract yet termed as a non-standard employee (regular yet non-standard employment) is not entirely uncommon. An example of such regular yet non-standard employment is those workers who are termed in the workplace as "part-timers" yet are on indefinite contracts. Such "part timers" are expected to work for the firm for an extended length of time yet receive lower wage with limited benefits, enjoy less job security, and often do not qualify for a variety of HRM programs (e.g., training and development programs) that are open only to standard employees. A regression analysis by Kambayashi and Kato (2013) shows that the distinction based on standard vis-à-vis non-standard employment results in sharper differences in labor market outcomes than the distinction based on "regular" vis-à-vis "non-regular" employment.

position or shift abolished in the U.S.) As such, as in the case of most cross-national studies, the results ought to be interpreted with caution.[12]

We focus on employees age 20-54 in the private sector so that we can avoid further complications caused by an important institutional difference between the two nations regarding mandatory retirement as well as legal and regulatory differences between the two countries surrounding public sector employment.[13]

Specifically for each year (1997 and 2007 for Japan and 1996 and 2006 for the U.S.) we estimate the following linear probability model:[14]

$$\text{(1) job loss}_i = \alpha + \beta_1 \text{ten5to9}_i + \beta_2 \text{ten10to14}_i + \beta_3 \text{ten15over}_i + \beta_4 \text{age}_i + \beta_5 (\text{age}_i^2/100) + \beta_6 \text{female}_i + \beta_7 \text{juniorcollege}_i + \beta_8 \text{university}_i + (\text{controls}) + \varepsilon_i$$

where ten5to9_i =1 if employee i's tenure with the current employer is equal to or greater than 5 but less than 10 years, zero otherwise; ten10to14_i =1 if employee i's tenure with the current employer is equal to or greater than 10 but less than 15 years, zero otherwise; ten15plus_i =1 if employee i's tenure with the current employer is equal to or greater than 15 years, zero otherwise (omitted reference category is ten0to4_i =1 if employee i's tenure with the current employer is equal to or greater than 0 but less than 5 years, zero otherwise); age_i=age of employee i; junior college_i=1 if employee i's highest education level is 2-year junior college, zero otherwise; and

[12] As shown in the next section, unlike the U.S. data, the Japanese data also provide data on total separation including both job loss and voluntary quit which we will exploit in the next section.

[13] We use age 20 as the lower threshold, following the convention of prior empirical studies on job loss probability (such as Farber, 2009). We experimented with different age threshold levels and found no discernible difference in the results. In addition, we considered three-year odds of job loss instead of one-year odds of job loss as done in Farber (2009). Again reassuringly we found little change in our key findings.

[14] We also repeat the same analysis, using probit, and reassuringly we find no discernible change in the results. We present the results from the linear probability model estimations, for the interpretation of the estimated coefficients is more straightforward in the linear probability model than the probit model.

university$_i$=1 if employee i's highest education level is 4-year university or higher, zero otherwise (the omitted reference category is high school$_i$=1 if employee i's highest education level is high school or less, zero otherwise;); and female$_i$=1 if employee i is female, zero otherwise. In addition, we control for regional unemployment rates, firm size, industry, occupation, and location. For regional unemployment rates in Japan, we use the unemployment rate of the region where employee i resides (there are nine regions) which we obtain from the Labor Force Survey conducted by Statistics Bureau of the Ministry of Internal Affairs and Communications. For regional unemployment rates in the U.S., we use BLS's state-level unemployment rates.[15]

Table 3 presents summary statistics. The odds of annual job loss for employees age 20-54 in the private sector in Japan in 1997 (the midst of her "Lost Decade") were 4 percent. The comparable U.S. job loss odds in 1996 were 6 percent. The Table further reveals that annual job loss odds in Japan were still 4 percent in 2007 and that the U.S. job loss odds came down to the 3 percent level by 2006. Not surprisingly there were relatively more employees with short tenure in the U.S. than in Japan in spite that average age was comparable between the two nations (37 to 38). Educational attainment of employees age 20-54 was higher in the U.S. than in Japan.

The estimates of linear probability model of Eq. (1) are presented in Table 4. Generally the coefficients are estimated more precisely for Japan than for the U.S. largely due to the substantially larger size of the Japanese sample. The estimated coefficients on all tenure variables are negative and statistically significant at the 1 percent levels for both Japan and the U.S., pointing to the positive role of seniority in protecting workers from job loss for both nations.

[15] A common narrative for Japan is that measured unemployment may be low but many workers, especially women and older workers, drop out of the labor force when labor markets are weak. We are less concerned about this measurement error for the time period we are studying in this section (1996/7-2006/7), for Ohta, Genda, and Teruyama (2008) finds no evidence for a significant rise in the number of discouraged workers during the time period we are studying.

The estimated coefficients on junior college and university are negative for both nations, suggesting that more educated workers are more likely to be protected from job loss (although the estimated coefficients are statistically significant only for Japan).

The estimates reveal two noteworthy contrasts between Japan and the U.S. First, for Japan, the estimated coefficients on female are positive and statistically significant at the 1 percent level, indicating that women are less protected from job loss. There is no such evidence for the U.S. (the estimated coefficients on female are far from significant and the sign of the coefficients actually flips from 1996 to 2006). Another intriguing contrast between the two nations is the relationship between job loss probability and age. Job loss probability will increase significantly with age in Japan, whereas the reverse is true for the U.S. though not very significant. The observed contrast in the age-job loss link between the two nations is consistent with the "two-tier" employment system in Japan consisting of "home-grown (haenuki)" employees (hired immediately upon graduation and climbing up internal promotion ladders) and mid-career hires "chutosaiyou" (hired after some work experience at other firms). Home-grown employees enjoy well-known Japanese employment practices characterized by "lifetime employment" (strong job security); various mechanisms to enhance employee involvement and voice; elaborate pay systems including employee ownership and profit sharing; extensive training; and corporate welfare programs. Mid-career hires have only limited access to such practices, including "lifetime employment" (see, for instance, Kato, 2003 and Kambayashi and Kato, 2011). Once tenure is controlled for, older workers are more likely than younger workers to be mid-career hires, and thereby face weaker job security in Japan.

To shed light on structural changes in the odds of job loss over time, for each nation we pool two years of data (1997 and 2007 for Japan and 1996 and 2006 for the U.S.) and re-estimate

the linear probability model of job loss with a year dummy variable (year2=1 if the observation comes from the second year, 2007 for Japan and 2006 for the U.S., zero otherwise) and interaction terms involving the year dummy variable and each covariate. For each of the eight tenure*year combinations (ten0to4=1&year2=0; ten5to9=1&year2=0; ten10to14=1&year2=0; ten15plus=1&year2=0; ten0to4=1&year2=1; ten5to9=1&year2=1; ten10to14=1&year2=1; and ten15plus=1&year2=1), we calculate the conditional odds of job loss by using mean values for all covariates across all years (except for the year dummy variable, the tenure dummy variables, and the gender dummy variable). As such, changes in the conditional odds of job loss over the decade capture changes in the odds of job loss that are due to changes in the structure of job loss process (changes in the parameters in the linear probability model over the decade) as opposed to changes in the odds due to changes in covariates over the decade. Figure 5 depicts such conditional odds of job loss for 1997(6) and 2007(6) (all rates are normalized to ten0to4). Note that the odds are calculated, assuming that all regional unemployment rates along with all other covariates stayed the same over the decade. In other words, the figure shows predicted changes in the odds of job loss over the decade that are independent of any changes in economic conditions (measured by unemployment rate) along with any other demographic changes.

In 1997 in Japan, as compared to short-tenure workers with 0-4 years of tenure, the predicted odds of job loss were 5.3 percentage points lower for workers with 5-9 years of tenure; 6.9 percentage points lower for workers with 10-14 years of tenure; and 8.4 percentage points lower for workers with 15 and more years of tenure. In contrast, the tenure-job loss profiles for the U.S. workers are much shallower—the predicted odds of job loss for workers with 5-9 years of tenure, and 10-14 years of tenure were 3.7 percentage points lower, and 4.7 percentage points lower than short-tenure workers with 0-4 years of tenure (workers with 15 and more years tenure

appear to be no more protected from job loss than workers with 10-14 years of tenure). It follows that in the U.S. seniority did not protect workers from job loss as much as in Japan in mid-1990s.

In ten years later, it is still the case that seniority protects workers from job loss for both nations. However, the extent to which seniority protects workers from job loss has diminished for both nations over the decade. Such weakening of seniority's ability to protect workers from job loss is considerably more pronounced in the U.S. than in Japan. Thus, the conditional odds of job loss for workers with 5-9 years of tenure relative to workers with 0-4 years of tenure in Japan rose from about -5.3 in 1997 to -3.8 percentage points in 2007 (amounting to less than 30 percent increase). In contrast the relative odds of job loss for their U.S. counterparts rose more sharply than in Japan (-3.7 percentage points in 1996 to -1.8 percentage points in 2006, amounting to over 50 percent jump). Likewise, the conditional odds of job loss for Japanese workers with 10-14 years of tenure relative to workers with 0-4 years of tenure increased from -6.9 to -4.9 percentage points over 1997-2007 (amounting to less than 30 percent increase), while the comparable odds of job loss increased more sharply in the U.S. over 1996-2006---from -4.7 in 1996 to -2.6 (amounting to 45 percent jump). All those changes over the decade are statistically significant at the 5 percent level.

In short, the gap in the job protecting power of seniority between the two nations appears to have widened over the decade, which is consistent with our key finding in the last section---job retention rates for workers with longer tenure have been high and remarkably stable in Japan over time while their U.S. counterparts experienced downward trends in job stability. It is beyond the scope of this paper to further explore why the gap in the role of seniority in protecting workers from job loss between the two nations have widened over time. It is, however, less likely that the job-protecting power of seniority declines as a result of a prolonged

economic stagnation, for the job-protecting power of seniority fell more noticeably in the U.S. with longest prosperity than in Japan with Lost Decade.

4. Regression Analysis of the Odds of Job separation of Japanese Workers over 1982-2007

The above regression analysis has at least two drawbacks. First, the time span of the analysis is a decade. Any longer-term trends and changes are beyond the scope of the analysis. Second, in order to shed full light on job stability and job retention, we will need to include voluntary quit in the scope of analysis. There are both good news and bad news. Good news is that the labor turnover module of the ESS provides data on whether an employee experienced a job separation during the previous year over 1982-2007, and that job separation includes both voluntary separation (quit) and involuntary separation (job loss) from their firms. We were given a permission to access micro data from the labor turnover module of the ESS for 1982, 1987, 1997, 2002, and 2007.[16] Bad news is that the U.S. counterparts to the ESS provide data only on job loss (not on voluntary quit), and therefore our analysis of job separation rates is limited to Japan.

Specifically we estimate a linear probability model of job separation (=1 if employee i separated voluntarily or involuntarily from her firm during the previous year, zero otherwise) as a linear function of gender (dummy variable), education (dummy variables), age (dummy variables), tenure, whether or not the employee is on a fixed-term contract,[17] regional unemployment, industry (dummy variables), occupation (dummy variables), and location

[16] We were unable to retrieve micro data on separation reliably from the 1992 ESS, and therefore 1992 data were not included in our analysis. We focus on employees, and hence self-employed individuals are excluded from the data. Our key results change little even if we include self-employed individuals.

[17] Unfortunately the turnover module of the ESS does not provide data on whether the employee is a standard employee or a non-standard employee (such as part-timers).

(dummy variables). Note that the educational attainment dummy variables are slightly more refined than in the previous section since comparability between the two nations is irrelevant to this section's analysis which is limited only to Japan. Thus, there are four educational attainment dummy variables: senior high$_i$=1 if employee i's highest education level is senior high school, zero otherwise; junior college$_i$=1 if employee i's highest education level is 2-year junior college, zero otherwise; and university$_i$=1 if employee i's highest education level is 4-year university or higher, zero otherwise (the omitted reference group is those whose highest educational level is junior high school). As discussed earlier, due to the prevailing practice of mandatory retirement in Japan which was originally set at 55 (and then raised to 60 in the 1990s and 65 in the 2000s), we focus on those age 18 to 54.

Though we can use the estimated linear probability model and shed light on diverse aspects of the structure of job separation process, we focus on two issues surrounding job stability: (i) job stability of youth as compared to prime-age workers; and (ii) job stability of women over their life cycle. First, as discussed earlier, unemployment and job mismatch for youth as well as advancement of women in the labor market are of great topical interest among Japanese policy makers. Second, our retention rate analysis suggests that it is youth and women which the popular narrative of weakening job stability may apply to. To this end, we produce Figures 6 and 7. For men and women separately, we calculate the conditional odds of job separation for all age*year combinations by using mean values for all covariates across all years (except for age, year and gender). For instance, by substituting zero for female; one for year1987; one for the age dummy variable for age 25; and mean values for all other covariates, we calculate the conditional odds of job separation for male age 25 in 1987. Changes in the conditional odds of job separation captures only changes in the odds of job separation caused by

the structural changes (or parameter changes) over time separate from changes in the odds caused by changes in the covariates over time (such as changes in the proportion of college-educated workers). Since eliminating year to year changes in tenure as a source of changes in the odds of job separation may lead to misleading results, we present the results without conditioning on tenure by substituting mean values for tenure for each year separately (rather than using mean for tenure across all years).[18]

Figure 6 demonstrates that young male workers in their 20's have been experiencing a disproportionately greater decline in their job stability over the last twenty five years. Note that the observed disproportionately large fall in job stability among young male workers in Japan represents a structural change in the Japanese labor market as opposed to a compositional change such as changes in educational attainments of young workers over the last twenty five years. The increase in the conditional odds of separation over time is more pronounced for younger workers than for older workers, which suggests that job stability has fallen for entry-level jobs but some of them ended up settling down to stable jobs as they age, which is consistent with our earlier cohort analysis.[19]

A spike toward the upper limit of age (55) in 1982 and 1987 is consistent with the mandatory retirement age of 55 in those years. As the mandatory retirement age was being extended beyond 55 in 1990s, such a spike disappeared (it seems to have reappeared in 2002 yet we believe that this was due to the fact that 2002 was at the trough of Japan's prolonged

[18] We reproduce Figures 6 and 7 by conditioning on tenure as well as all covariates and find no discernible change in the key conclusions.

[19] The earlier assertion that job stability for prime age men has not eroded appears at odds with data presented in Figure 6. Note that the assertion of enduring job stability for prime age workers was based on stable job retention rates for prime age workers with 5+ years of tenure over time. Figure 6 is based on our regression analysis of a sample of workers including both workers with 5+ years of tenure and workers with less than 5 years of tenure. When we reproduce the figure by limiting our analysis to workers with 5+ years of tenure, we find a much less pronounced increase in the conditional odds of separation over time.

stagnation and that many firms used "voluntary" retirement programs and induced separation of older employees (according to a survey conducted by Tokyo Shoko Research, the number of firms listed in Japan's Stock Exchanges that used "voluntary" retirement programs peaked in 2002).

Figure 7 points to a rather remarkable change in the relationship between the conditional odds of job separation and age for Japanese female workers over the last twenty five years. In 1982, there was an inverse U-shape relationship between the odds of job separation and age for Japanese female workers with the peak around age 25. Over time, the inverse U-shape has become less pronounced and the peak age has increased. Eventually in 2007 the inverse U-shape curve disappeared. While Japanese women in their mid to late 20's experienced declining odds of separation over time, Japanese women in their early 20's experienced rising odds of separation over the same time period. As a result, in 2007, the age-separation curve for Japanese women was much closer to that for Japanese men than in previous years. Much of public policy efforts to facilitate advancement of women in the labor market in Japan tend to center around the career interruption of women due to childrearing and pervasive rat race promotion tournament with long working hours and the lack of flexible work arrangements (see, for instance, Asai, 2015 and Kato, Kawaguchi, and Owan, 2013). Our finding suggests that in addition to women of childrearing ages, policy makers may need to pay attention to young entry-level women whose job stability weakened the most over the last twenty five years.[20]

[20] We repeat the same analysis by separating total job separation into quit (voluntary separation) and job loss (involuntary separation). The conditional odds of job loss are considerably lower than the conditional odds of quit in Japan, in particular for youth, and the reported falling job stability of youth employment is mostly due to the rising conditional odds of quit, which is consistent with the recent literature on youth employment (see, for instance, Genda, 2003 who argues that the rising scarcity of "good jobs" for youth has been a main culprit for growing job turnover of youth).

6. Conclusions

Recently Japanese government relaxed its micro data release policy. By taking advantage of the policy change, we have conducted the first cross-national analysis of micro data from Japan's Employment Status Survey and its U.S. counterpart, Current Population Survey, with particular focus on changes in long-term employment and job security over the last twenty five years. On the one hand, we have found that in spite of the prolonged economic stagnation, prime-age male workers with at least 5 years of tenure in Japan continued to enjoy much higher job stability than their U.S. counterparts consistently over the last twenty-five years. Most remarkably Japan's "Lost Decade" has been found to have little discernible adverse effect on job stability of this group of Japanese employees. On the other hand, we have found that job stability for mid-career hires and youth employees did deteriorate in Japan over the last twenty-five years.

Our cross-national regression analysis of the odds of job loss has also pointed to the consistently more important role that seniority plays in protecting workers from job loss in Japan than in the U.S. Furthermore, such Japan-U.S. gap in seniority's influence in job stability has been found to widen over the last twenty five years. In short, it is the U.S. economy with the longest economic expansion not the Japanese economy with the longest economic stagnation in which employment stability and job security deteriorated.

Our findings cast serious doubt on the conventional wisdom that since the burst of the bubble at the end of the 1980s, the Japanese employment system has been shifting away from its celebrated practice of "lifetime employment", and moving closer to the Anglo-American system that is often characterized as a real-world example of a textbook neo-classical labor market with highly mobile labor force and relatively unregulated firms responding freely and quickly to market forces. As such, our findings point to the absence of convergence of the Japanese and

U.S. systems.

Though prime-age male employees in Japan weathered their Great Recession rather well, however, we have found that mid-career hires as opposed to new graduate hires as well as young new entrants experienced weakening employment stability and declining job security over the last twenty five years. In addition, college-educated women gained job stability during Japan's high growth era yet such gains appear to have been lost in the subsequent economic stagnation.

The job retention analysis and the regression analysis of job loss have pointed to youth and women as the segments of the labor force that experienced rising job instability. To further shed light on this, we have carried out a regression analysis of the odds of job separation of Japanese employees over the last twenty five years. For men, the age-separation curve with the conditional odds of separation on the vertical axis and age on the horizontal axis rotated clockwise sharply over the last twenty five years, making youth employment relatively more unstable and older employees relatively more stable. For women, the age-separation curve was initially an inverse U-shape with a peak at age 25. Over time it flattened and eventually the inverse U-shape age-separation curve disappeared. In the meantime, the conditional odds of separation rose considerably for younger women in their early 20's. In the end, the distinct gender difference in the age-separation curve dissipated over the last twenty five years, making youth employment for both men and women relatively less stable.

The historical deterioration of long-term employment and job security in the U.S. has been reported by Farber (2007a). Farber (2007a), however, concludes that the reasons for such a historical decline in long-term employment and job security in the U.S. have not been fully understood. Intensified global competition and rising uncertainty in product markets might have been necessitating U.S. employers to enhance flexibility by replacing long-term jobs with

temporary jobs (Farber, 2007b).

The observed resilience of Japan's long-term employment for prime-age employees with at least five years of tenure during her Great Recession supports economic theorists in new institutional economics and transaction cost economics who stress the importance of institutional complementarities. Specifically, the Japanese employment system consists of clusters of practices that are often distinct from the traditional Anglo-American model of flexible labor market and hierarchical labor-management relations that are apt to be adversarial. A variety of specific employment practices have been considered key elements of the Japanese employment system. The following practices are often said to constitute a coherent set of elements of the Japanese employment system.

1. the practice of "lifetime employment" (or implicit long-term employment guarantees for the regular workforce) and the reward system which fosters lifetime employment (e.g., seniority wage system in which wage is detached from specific job and seniority plays a significant role in wage determination).
2. Employee involvement and problem solving activities at the grass roots level intended to provide workers with opportunities to exert discretionary effort, acquire useful local knowledge, and share it with their co-workers, and higher-level engineers and managers. They include Shopfloor Committees (SFCs); and various Small Group Activities, such as QC circles; Zero Defect; Kaizen; JK activities; and cross-functional problem solving teams.
3. Incentive schemes, such as employee ownership and profit sharing, which align the interest between workers and the firm, and hence reward them for their wholehearted participation in such employee involvement programs.

4. Extensive information sharing mechanisms (often called Joint Labor-Management Committees, JLMCs) involving cooperative enterprise unions to minimize information asymmetry and facilitate the alignment of interest between labor and management.
5. Careful screening and extensive training aimed at increasing worker ability to effectively participate in employee involvement/problem solving activities and information sharing meetings.[21]

The Japanese employment system developed over time during the postwar era and was well-established and deep-rooted in the Japanese society by the end of the high growth period. It probably contributed significantly to the rise of the Japanese economy, and is often considered a significant example of a system with powerful institutional complementarities (Aoki, 1990, Milgrom and Roberts, 1994, Williamson, 1996, Koike, 2005, and Morita, 2005).

An important consequence of such institutional complementarity is its resilience. Instinctive and hasty changes even in one element of the Japanese employment system may cause the whole system to halt due to the intricate complementary interplay between the changing element and the remaining elements of the system. For example, a rushed decision to break implicit long-term employment contracts and terminate some of their employees who are on implicit long-term contracts will undermine incentive for the remaining employees on such implicit contracts to continue to invest in firm-specific human capital, and produce and share with their coworkers and supervisors valuable firm-specific local knowledge. In addition, once the firm reneges on their implicit long-term employment contracts, its labor market reputation may be damaged permanently, resulting in a higher cost of future recruitment of high-ability workers.

[21] Scholars somewhat differ in the relative importance of each practice (see for example, Koike, 2005, Aoki, 2000, Itoh, 1994, Morita, 2001; 2005, Moriguchi and Ono, 2004 and Rebick, 2005).

How did the Japanese economy weather the prolonged economic stagnation without breaking down its implicit long-term employment contract system? First and perhaps most importantly, the Japanese employment system has a built-in shock absorber, or a group of Japanese workers who are not covered by the aforementioned practices of the Japanese employment system and hence do not enjoy long-term employment, employee participation (both financial and non-financial), and extensive on-the-job training. Such workers constitute the secondary segment of the Japanese labor market, and often function as a shock absorber in economic downturns by being the first to be let go Such secondary segment workers are said to be paid lower wages, enjoy less generous benefit, less control over their work, and weaker job security than those primary workers covered by the Japanese employment system (see for instance Koike, 2005, Rebick, 2005, Kambayashi and Kato, 2013).

In addition to the aforementioned two-tier structure as a built-in shock absorber, the following two factors might have helped Japanese firms preserve its implicit long-term employment contracts for the most part during her Great Recession. First, according to OECD data, the average number of hours worked declined considerably during Japan's Great Recession from over 2100 hours per year to below 1800 hours per year. In fact, by 1999, the average number of hours worked for U.S. workers became greater than for Japanese workers. Currently it is U.S. workers not Japanese workers who probably deserve the "workaholic" label. Japan's public policy has been also strongly supportive of hours adjustment (e.g., Japan's short-time work take up rate is one of the highest among OECD countries according to a recent study by Hijzen and Venn, 2011). Second, the real hourly earnings of Japanese workers significant decelerated when Japan's Great Recession began and by 1998, the level of real hourly earnings actually started to fall, and has been falling since then. While the Japanese real hourly earnings

have been falling, the real hourly earnings of U.S. workers have been rising.

Following the financial meltdown in the fall of 2008, the U.S. economy and many other major advanced market economies have been experiencing their own Great Recessions and it is plausible that the current global Great Recession may turn out to be almost as long-lasting as Japan's Great Recession of the 1990s. On the one hand, our finding of the resilience of the Japanese employment system during her Great Recession of the 1990s points to the importance of institutional complementarities and the significant cost of drastic and rapid changes in labor market institutions. On the other hand, the presence of the two-tier structure of the Japanese employment system as a built-in shock absorber suggests that the long-term employment effect of Japan's Great Recession of the 1990s was the further polarization of the labor market. The core segment of the labor market weathered the Great Recession rather well, continuing to enjoy strong job security, while the secondary segment of the labor market experienced significant loss in job security (mid-career hires and youth).

In sum, for policy makers around the world grappling with the challenging task of designing and implementing effective public policy responses to their Great Recessions, this paper's findings point to the importance of recognizing institutional complementarities and potentially high cost of drastic changes as well as the possibility of heterogeneous long-term employment effects of the Great Recession for different segments of the labor force.

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Table 1 Proportion of Workers with 5+ Years of Tenure

	age 25-29	age 30-34	age 35-39	age 40-44	age 45-49	age 50-54
college-educated men						
1982		0.630	0.650	0.668	0.585	0.527
1987		0.632	0.649	0.639	0.635	0.553
1992		0.648	0.640	0.608	0.599	0.593
1997		0.678	0.699	0.649	0.617	0.579
2002		0.595	0.665	0.656	0.607	0.530
2007		0.550	0.634	0.664	0.640	0.559
less-educated men						
1982	0.524	0.572	0.587	0.563	0.517	0.488
1987	0.515	0.581	0.579	0.584	0.553	0.505
1992	0.483	0.565	0.582	0.581	0.576	0.550
1997	0.498	0.577	0.604	0.599	0.586	0.573
2002	0.439	0.530	0.565	0.557	0.545	0.511
2007	0.397	0.523	0.557	0.559	0.556	0.525
college-educated women						
1982		0.261	0.269	0.323	0.314	0.295
1987		0.279	0.287	0.297	0.328	0.298
1992		0.316	0.302	0.304	0.283	0.316
1997		0.330	0.297	0.336	0.359	0.356
2002		0.300	0.323	0.347	0.344	0.348
2007		0.294	0.319	0.348	0.382	0.412
less-educated men						
1982	0.193	0.145	0.163	0.219	0.251	0.235
1987	0.230	0.170	0.189	0.245	0.284	0.270
1992	0.246	0.191	0.215	0.265	0.312	0.316
1997	0.281	0.220	0.235	0.300	0.353	0.347
2002	0.253	0.218	0.235	0.288	0.343	0.338
2007	0.252	0.257	0.260	0.316	0.387	0.398

Source: the Employment Status Survey, 1982, 1987, 1992, 1997, 2002, and 2007.

Table 2 Changes in Tenure Distribution over 1982-2007

	men						women					
	College-educated			Less-educated			College-educated			Less-educated		
	25th	median	75th	25th	median	75th	25th	median	75th	25th	median	75th
age 50-54												
1982	18	26	30	13	25	32	10	25	30	7	15	28
1987	19	27	29	13	25	31	10	21	28	6	14	25
1992	19	27	30	15	26	32	8	19	28	5	13	23
1997	18	26	29	13	26	32	7	20	28	5	12	22
2002	17	27	29	13	27	33	7	19	28	5	12	23
2007	16	26	29	11	27	33	6	16	28	4	11	22
age 45-49												
1982	16	22	25	11	20	28	8	20	24	5	10	20
1987	16	22	25	12	22	27	8	20	24	4	10	20
1992	16	22	24	12	23	28	6	15	23	4	10	19
1997	15	22	25	11	23	28	5	13	23	4	9	19
2002	14	22	24	11	23	28	5	13	23	3	9	19
2007	15	22	24	9	21	27	4	12	22	3	8	17
age 40-44												
1982	13	18	20	10	18	23	6	16	20	3	8	16
1987	12	17	20	10	19	23	5	15	19	3	7	15
1992	12	18	20	10	20	23	4	11	18	3	7	15
1997	11	17	19	9	19	23	4	10	18	3	7	15
2002	12	17	19	8	17	22	4	12	18	2	6	14
2007	11	17	19	7	17	22	3	11	18	2	6	14
age 35-39												
1982	9	12	15	8	15	18	4	10	14	2	5	12
1987	9	13	15	7	15	18	4	10	14	2	5	12
1992	8	12	15	7	15	18	3	10	14	2	5	13
1997	9	13	15	6	13	18	3	10	14	2	5	12
2002	9	12	14	6	13	18	3	10	13	2	5	12
2007	7	12	14	5	13	17	2	8	13	2	5	12
age 30-34												
1982	6	8	10	6	10	14	3	7	10	2	5	10
1987	6	8	10	5	10	14	4	8	10	2	5	10
1992	5	8	10	4	10	13	3	7	10	2	4	10
1997	6	8	10	4	10	13	3	7	9	1	5	10
2002	5	7	9	4	9	12	2	6	9	1	5	10
2007	4	7	9	4	9	13	2	6	8	2	4	10

Source: the Employment Status Survey, 1982, 1987, 1992, 1997, 2002, and 2007.

Table 3 Summary Statistics for the Linear Probability Model Estimation of Job Loss in Japan and the U.S.

Data source	1997 ESS	2007 ESS	1996 DWS	2006 DWS
sample size	206034	149482	24270	31070
	mean	mean	mean	mean
jobloss	0.04	0.04	0.06	0.03
ten0to4	0.32	0.27	0.54	0.54
ten5to9	0.22	0.22	0.23	0.20
ten10to14	0.13	0.14	0.10	0.10
ten15plus	0.33	0.36	0.14	0.16
age	37.01	38.14	36.74	37.04
$Age^2/100$	14.80	15.54	14.32	14.68
female	0.38	0.39	0.47	0.49
highschool	0.67	0.68	0.65	0.58
juniorcollege	0.14	0.09	0.10	0.12
university	0.19	0.23	0.25	0.30

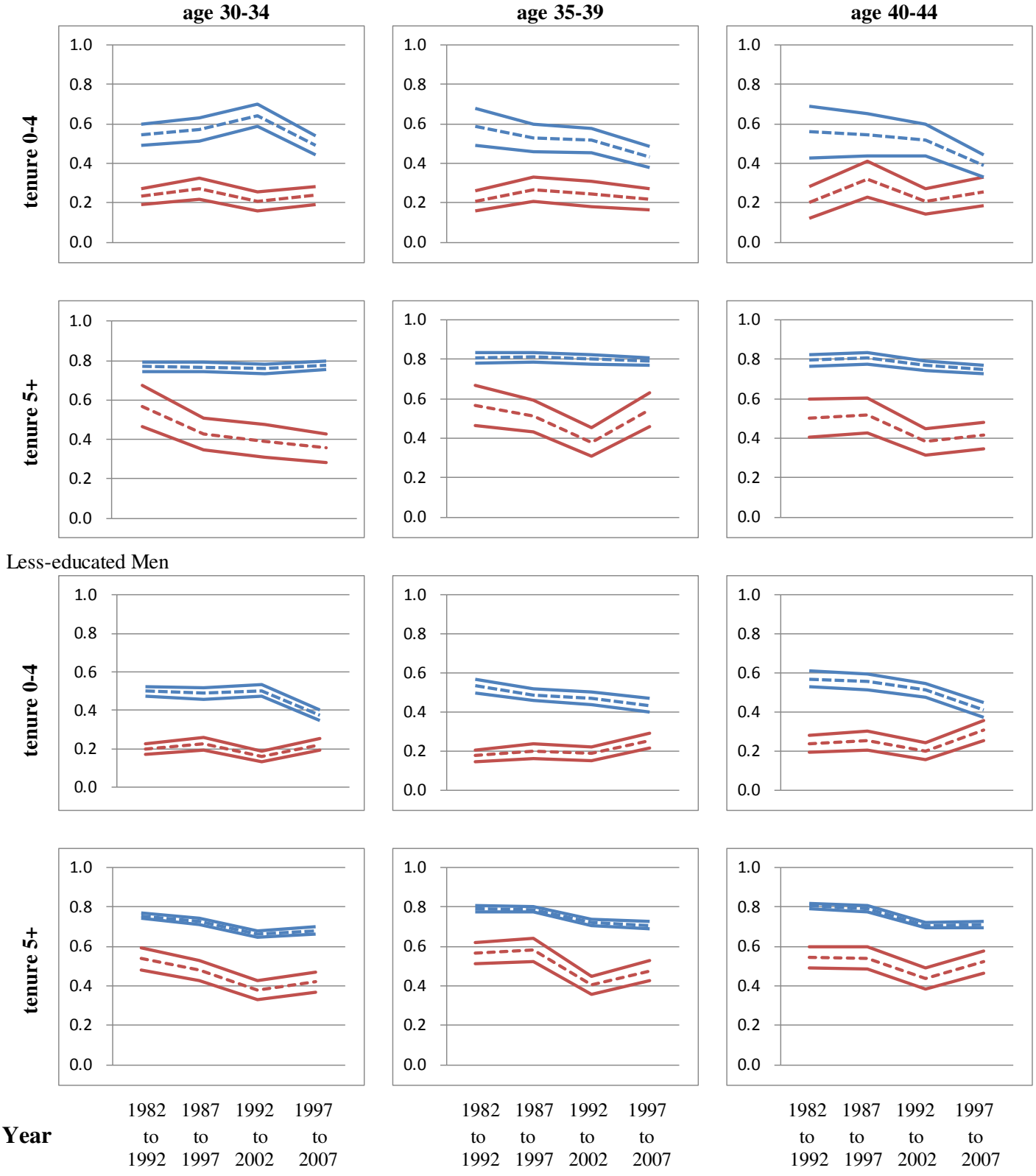
Sources: For Japan, we use micro data from the Employment Status Survey, 1997 and 2007. For the U.S., we use micro data from the Displace Worker Surveys (CPS Supplements), 1996 and 2006.
Note: For variable definitions, please see text.

Table 4 OLS (linear probability) Estimates of the Determinants of the Odds of Job loss in Japan and the U.S.
Dependent Variable: Jobloss=1 if the employee separated involuntarily from the firm during the previous year, 0 otherwise

	1997 ESS			2007 ESS			1996DWS			2006 DWS		
independent variable	coeff.	s.e.		coeff.	s.e.		coeff.	s.e.		coeff.	s.e.	
(base) ten0to4												
ten5to9	-0.053	0.001	***	-0.038	0.001	***	-0.037	0.004	***	-0.018	0.003	***
ten10to14	-0.069	0.002	***	-0.049	0.002	***	-0.047	0.005	***	-0.026	0.004	***
ten15plus	-0.084	0.001	***	-0.072	0.002	***	-0.045	0.005	***	-0.030	0.003	***
age	0.009	0.000	***	0.009	0.000	***	-0.003	0.001	***	-0.001	0.001	
$Age^2/100$	-0.011	0.001	***	-0.010	0.001	***	0.004	0.002	**	0.002	0.001	**
female	0.009	0.001	***	0.003	0.001	***	0.002	0.003		-0.003	0.002	
(base) highschool												
juniorcollege	-0.011	0.001	***	-0.003	0.002		-0.002	0.005		-0.002	0.003	
university	-0.020	0.001	***	-0.014	0.001	***	-0.006	0.004		-0.003	0.003	
Number of obs	206034			149482			24270			31070		
Adj. R-squared	0.032			0.020			0.024			0.011		

Sources: For Japan, we use micro data from the Employment Status Survey, 1997 and 2007. For the U.S., we use micro data from the Current Population Survey Supplements, 1996 and 2006.
Notes: For variable definitions, please see text. The omitted tenure category is 0-4 years of tenure (t0to4). The omitted educational attainment category is high school or less. Firm size, industry, occupation, location, and unemployment at the regional level (prefecture level for Japan and state-level for the U.S.) are also controlled for.
***significant at the 1 percent level; **significant at the 5 percent level; *significant at the 10 percent level.

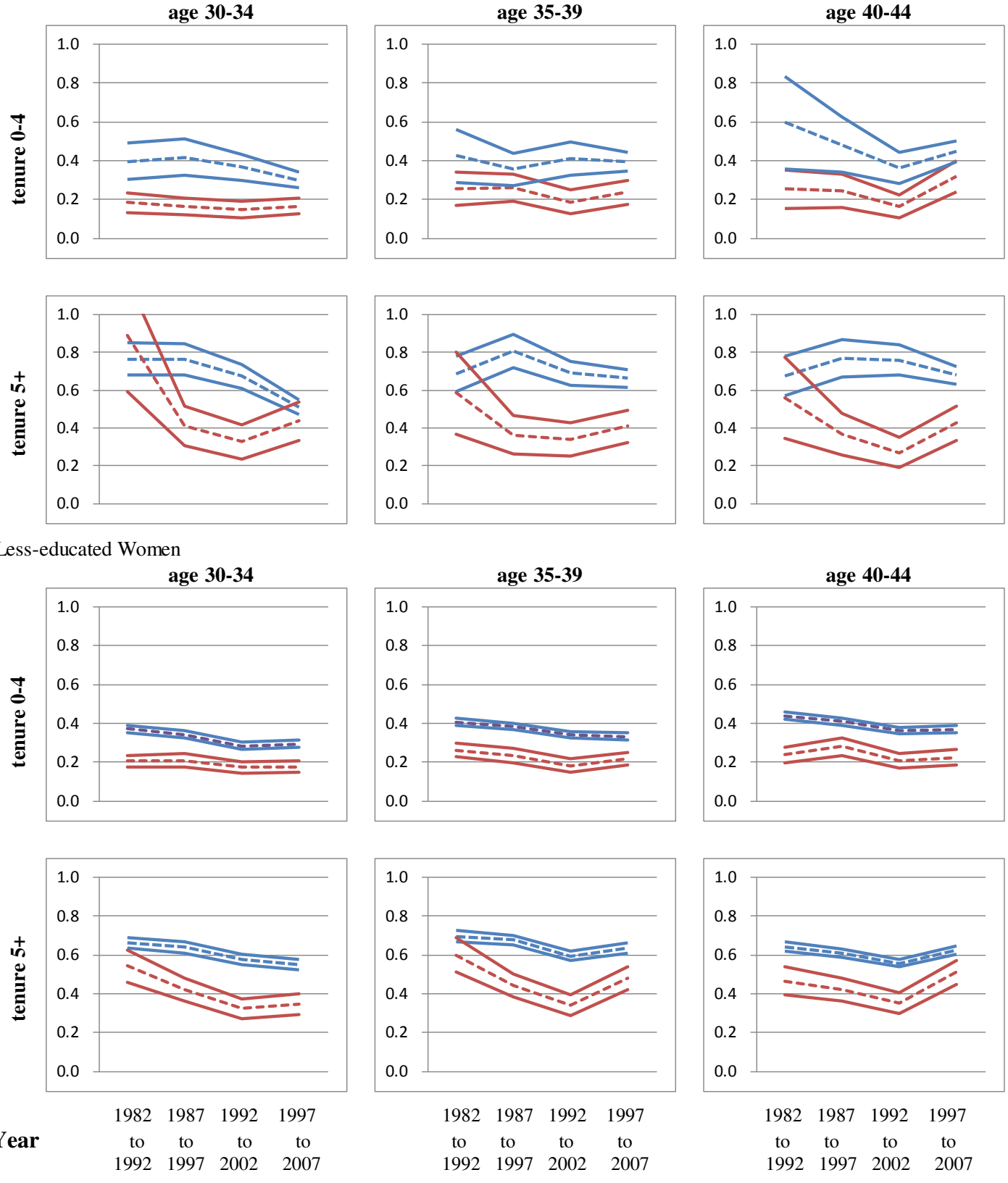
Figure 1 Ten-year Job Retention Rates over 1982-2007: Men of Prime Age



Note: Japan in blue and the U.S. in red. The dotted lines indicate the ten-year job retention rates of workers over 1982-2007 for each of the twelve education-tenure-age categories. For each retention rate we calculate the 95% confidence interval (see appendix for the derivation of the confidence interval). Each retention rate series has an accompanying 95% confidence interval series (indicated by a pair of solid lines).

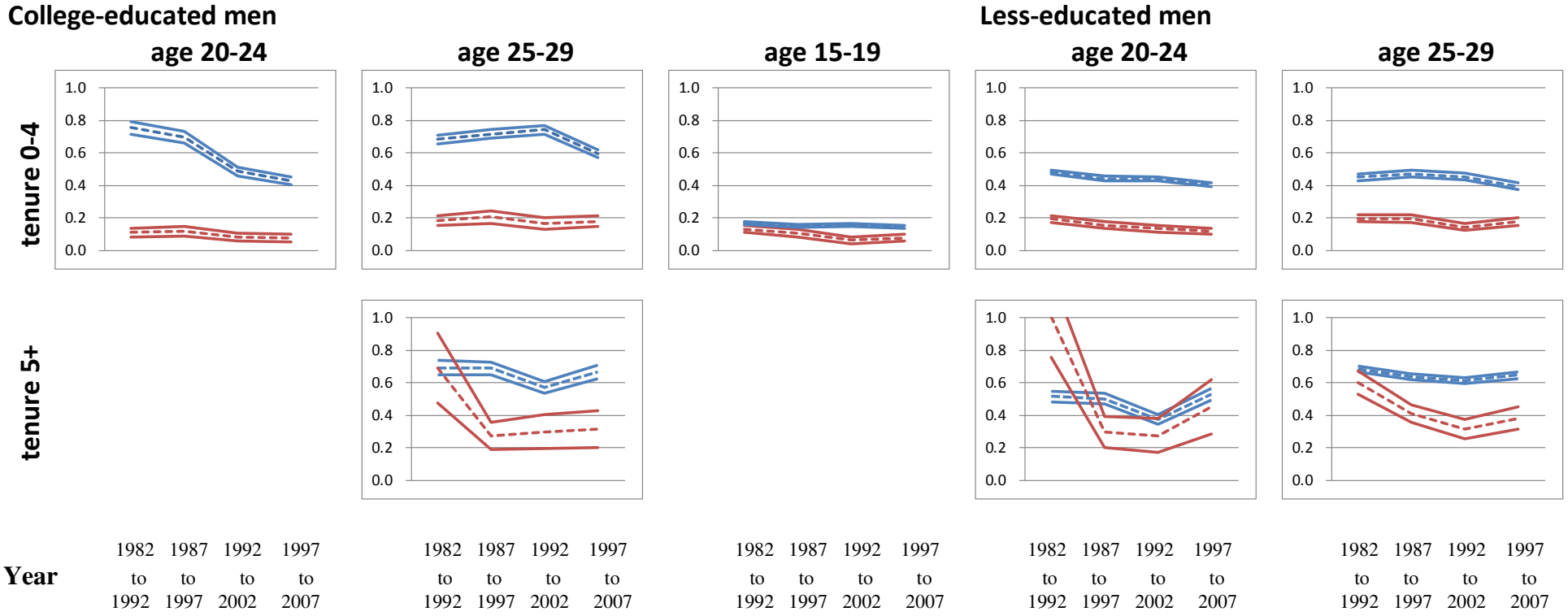
Figure 2 Ten-year Job Retention Rates over 1982-2007: Women of Prime Age

College-educated Women



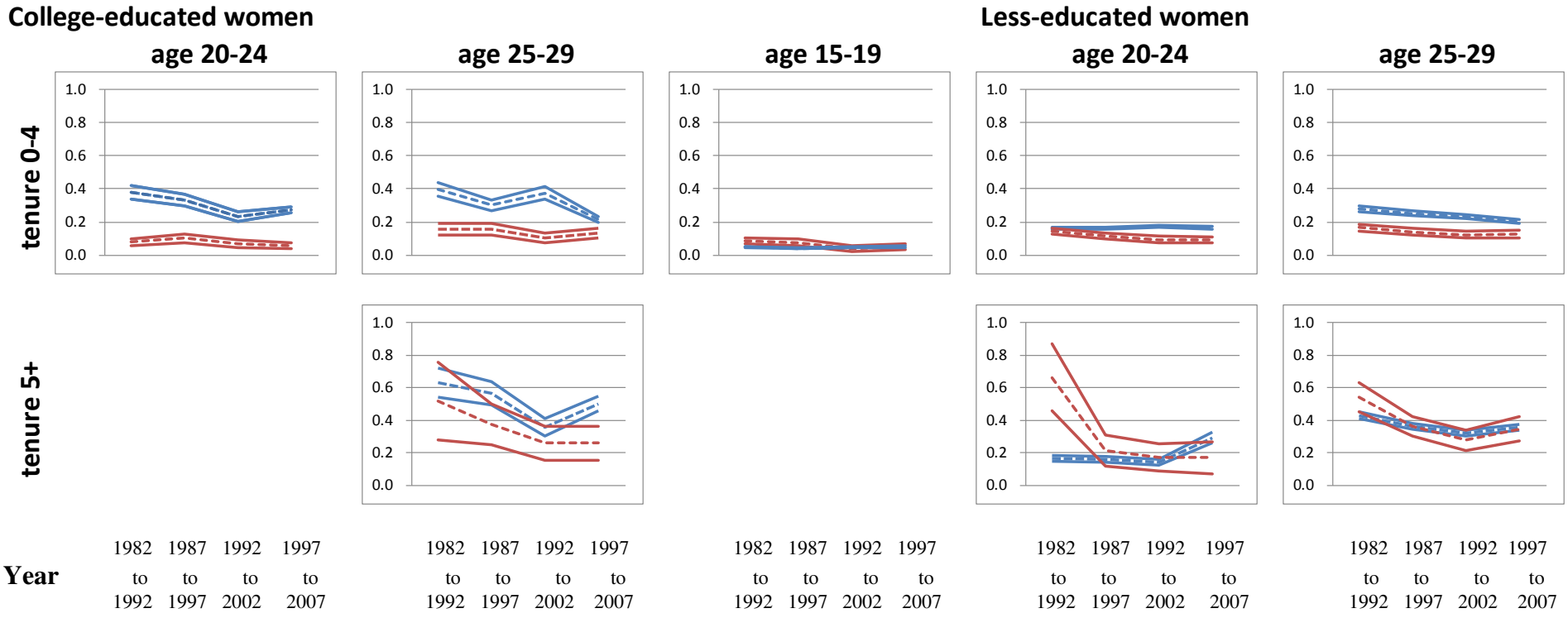
Note: Japan in blue and the U.S. in red. The dotted lines indicate the ten-year job retention rates of workers over 1982-2007 for each of the twelve education-tenure-age categories. For each retention rate we calculate the 95% confidence interval (see appendix for the derivation of the confidence interval). Each retention rate series has an accompanying 95% confidence interval series (indicated by a pair of solid lines).

Figure 3 Changes in Ten-year Job Retention Rates in Japan and the U.S. over the Last twenty-five years: Male Youth



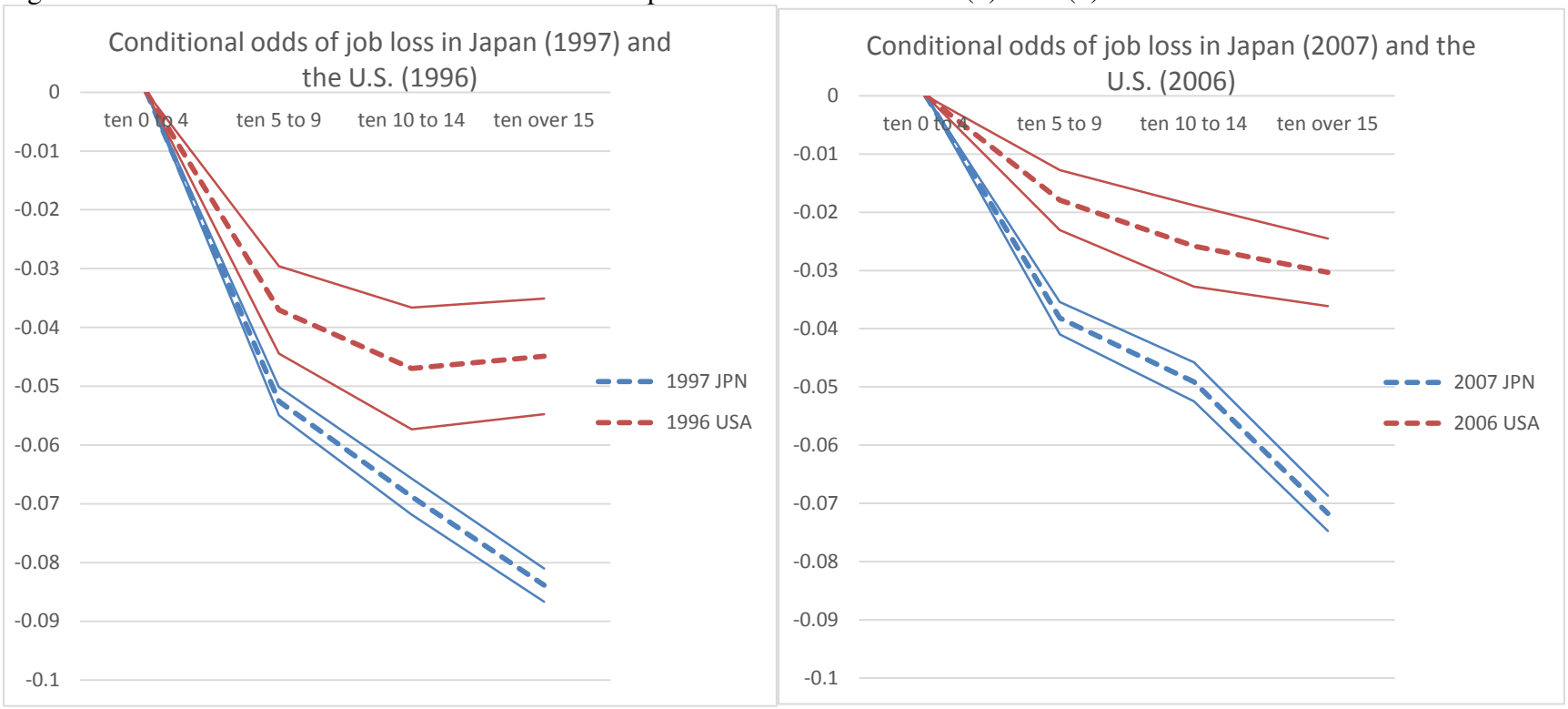
Note: Japan in blue and the U.S. in red. The dotted lines indicate the ten-year job retention rates of workers over 1982-2007 for each of the eight education-tenure-age categories. For each retention rate we calculate the 95% confidence interval (see appendix for the derivation of the confidence interval). Each retention rate series has an accompanying 95% confidence interval series (indicated by a pair of solid lines).

Figure 4 Changes in Ten-year Job Retention Rates in Japan and the U.S. over the Last twenty-five years: Female Youth



Note: Japan in blue and the U.S. in red. The dotted lines indicate the ten-year job retention rates of workers over 1982-2007 for each of the eight education-tenure-age categories. For each retention rate we calculate the 95% confidence interval (see appendix for the derivation of the confidence interval). Each retention rate series has an accompanying 95% confidence interval series (indicated by a pair of solid lines).

Figure 5 Conditional Odds of Job loss and Tenure in Japan and the U.S. over 1997(6)-2007(6)



Note: Japan in blue and the U.S. in red. The dotted lines indicate the conditional odds of job loss in 1997 and 2007 for Japan and 1996 and 2006 in the U.S. for the four tenure categories (ten 0 to 4=less than five years of tenure; ten 5 to 9=5 to 9 years of tenure; ten 10 to 14=10 to 14 years of tenure; and ten over 15=15 or more years of tenure). For each conditional odds of job loss we calculate the 95% confidence interval. Each tenure-job loss profile has an accompanying 95% confidence interval profile (indicated by a pair of solid lines).

Figure 6 Conditional Odds of Job separation and Age in Japan over the Last Twenty Five Years: Men

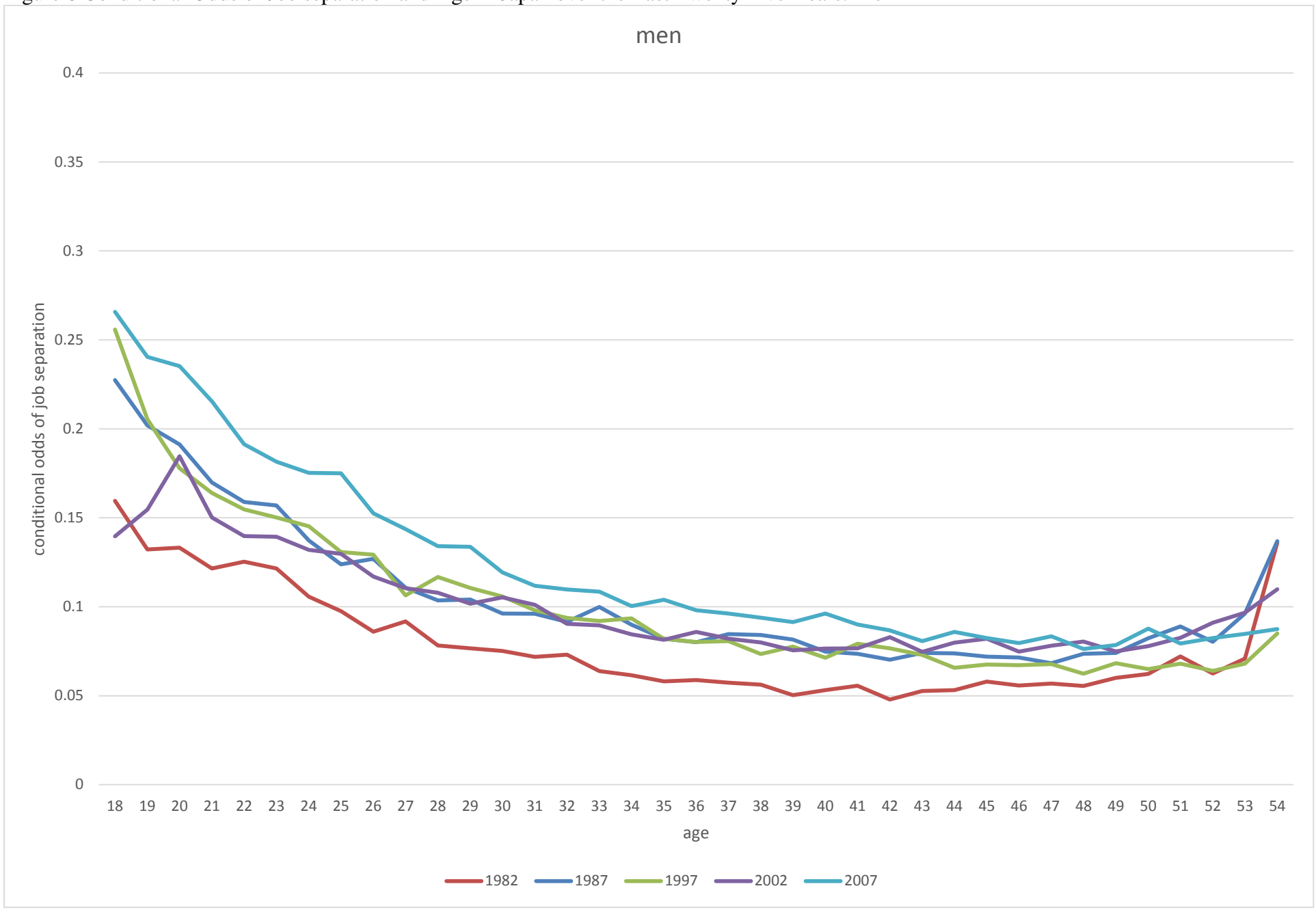
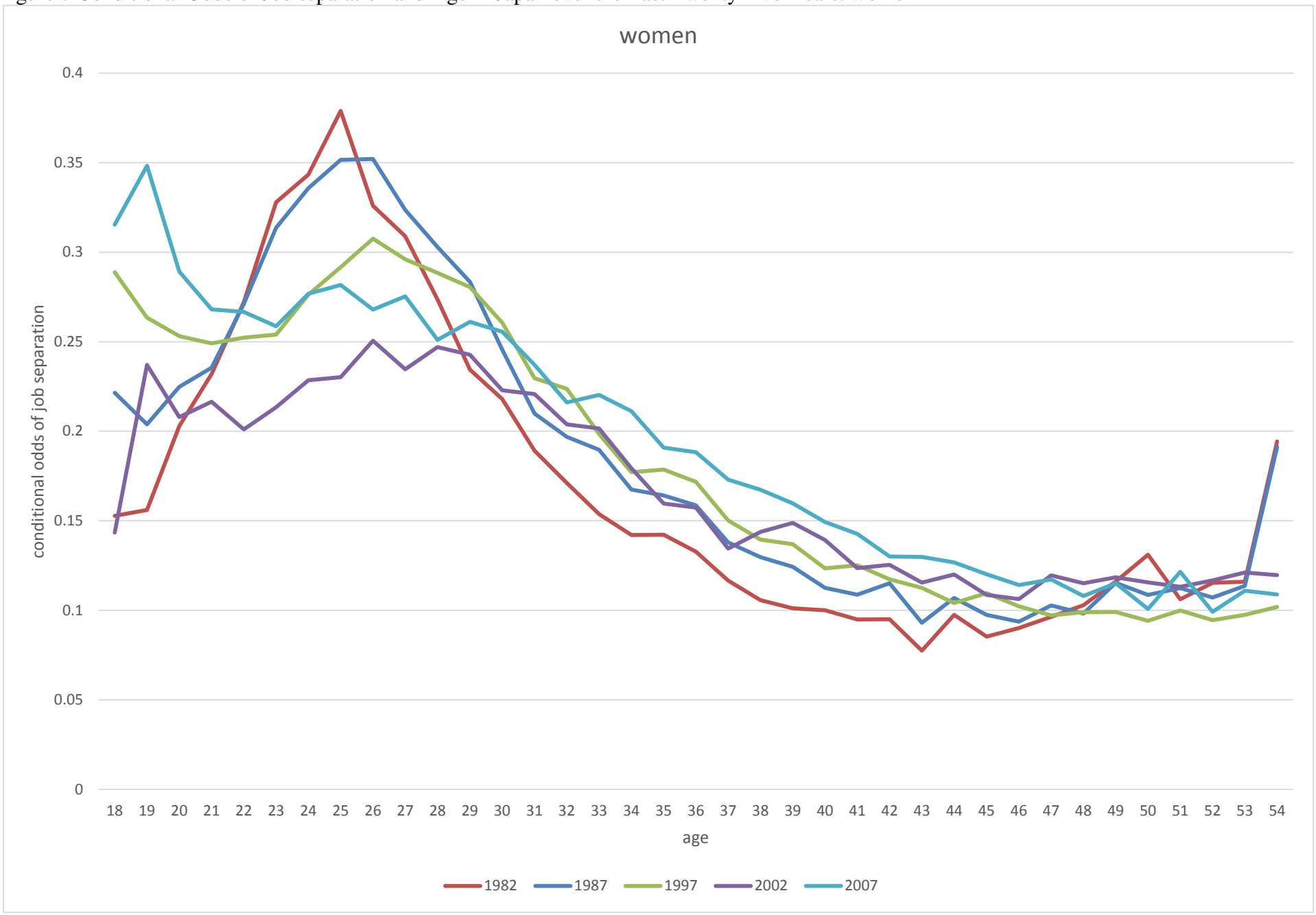


Figure 7 Conditional Odds of Job separation and Age in Japan over the Last Twenty Five Years: women



Appendix

Statistical inference of retention rates

To illustrate how we derive the 95% confidence interval for each job retention rate estimate, consider the job retention rate for employees with age 20-24 and tenure 0-4 in 1982.

Step 1: Use the 1982 ESS and the 1992 ESS, and create a sample of all workers who are between 20-24 years old in 1982 and all workers who are between 30-34 years old in 1992.

Step 2: Create a dummy variable, $Target_i = 1$ if worker i is from the 1982 ESS and her tenure is between 0 and 4 years, or worker i is from 1992 ESS and her tenure is between 10 and 14 years, 0 otherwise.

Step 3: Estimate the following regression equation:

$Target_i = \alpha ESS82_i + \beta ESS92_i + u_i$

where $ESS82_i = 1$ if worker i is from 1982 ESS, 0 otherwise; and $ESS92_i = 1$ if worker i is from the 1992 ESS.

Since the estimated coefficient on $ESS82_i$ (α) is the proportion of all workers age 20-24 in 1982 whose tenure is between 0 and 4 years, and the estimated coefficient on $ESS92_i$ (β) is the proportion of all workers age 30-34 in 1992 whose tenure is between 10 and 14 years, the 10-year job retention rate for this cohort (workers age 20-24 and tenure 0-4 in 1982) is β/α.

By using the estimated means and standard errors for these coefficients, we can generate the 95% confidence interval for each job retention rate estimate, provided that the estimated coefficients are normally distributed, which is a reasonable assumption considering the large sample of our data (over 100 thousand).

Table A1 Summary Statistics for Regression Analysis of Job separation in Japan over the Last Twenty-five Years

sample	1982-2007 ESS			
sample size	1388971			
	mean	s.d.	min.	max.
separation	0.12			
tenure	9.40	8.67	0	40
$Tenure^2$ /100	1.64	2.58	0	16
junior high	0.17			
Senior high	0.56			
junior college	0.12			
university	0.15			
female	0.44			
fixedterm	0.10			
unemployment	3.56	1.20	1.70	6.70
1982	0.18			
1987	0.19			
1997	0.23			
2002	0.20			
2007	0.20			

Sources: the Employment Status Survey, 1982, 1987, 1997, 2002, and 2007.
Notes: For variable definitions, please see text.

Table A2 OLS (linear probability) Estimates of the Odds of Job separation in Japan over 1982-2007: male

estimation method	OLS									
	MALE									
Sample	1982 ESS		1987 ESS		1997 ESS		2002 ESS		2007 ESS	
independent variable	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
fixed term contract	0.108	0.003	0.156	0.003	0.209	0.003	0.149	0.003	0.251	0.003
age 18	0.038	0.007	0.070	0.008	0.106	0.008	0.000	0.011	0.084	0.012
age 19	0.011	0.006	0.045	0.007	0.055	0.006	0.015	0.009	0.059	0.009
age 20	0.012	0.006	0.034	0.007	0.028	0.006	0.045	0.008	0.054	0.009
age 21	0.000	0.006	0.013	0.006	0.014	0.005	0.011	0.007	0.034	0.008
age 22	0.004	0.005	0.002	0.006	0.005	0.005	0.000	0.007	0.010	0.007
age 23	BASE		BASE		BASE		BASE		BASE	
age 24	-0.016	0.005	-0.020	0.006	-0.005	0.005	-0.007	0.006	-0.006	0.007
age 25	-0.024	0.005	-0.033	0.006	-0.019	0.005	-0.010	0.006	-0.007	0.007
age 26	-0.036	0.005	-0.030	0.006	-0.021	0.005	-0.022	0.006	-0.029	0.007
age 27	-0.030	0.005	-0.046	0.006	-0.044	0.005	-0.029	0.006	-0.038	0.007
age 28	-0.043	0.005	-0.053	0.006	-0.033	0.005	-0.031	0.006	-0.048	0.007
age 29	-0.045	0.005	-0.053	0.006	-0.040	0.005	-0.038	0.006	-0.048	0.007
age 30	-0.046	0.005	-0.061	0.006	-0.044	0.005	-0.034	0.006	-0.062	0.007
age 31	-0.050	0.005	-0.061	0.006	-0.052	0.005	-0.038	0.006	-0.070	0.006
age 32	-0.048	0.005	-0.065	0.006	-0.056	0.005	-0.049	0.006	-0.072	0.006
age 33	-0.058	0.005	-0.057	0.006	-0.058	0.005	-0.050	0.006	-0.073	0.006
age 34	-0.060	0.005	-0.067	0.006	-0.057	0.005	-0.055	0.006	-0.081	0.006
age 35	-0.063	0.005	-0.075	0.005	-0.068	0.005	-0.058	0.006	-0.078	0.006
age 36	-0.063	0.005	-0.077	0.005	-0.070	0.005	-0.053	0.006	-0.084	0.007
age 37	-0.064	0.005	-0.072	0.005	-0.069	0.005	-0.057	0.006	-0.085	0.007
age 38	-0.065	0.005	-0.073	0.005	-0.077	0.005	-0.059	0.006	-0.088	0.007
age 39	-0.071	0.005	-0.075	0.005	-0.073	0.005	-0.064	0.006	-0.090	0.007
age 40	-0.068	0.005	-0.082	0.006	-0.079	0.005	-0.063	0.006	-0.085	0.007
age 41	-0.066	0.005	-0.083	0.006	-0.071	0.005	-0.063	0.006	-0.091	0.007
age 42	-0.074	0.005	-0.087	0.006	-0.073	0.005	-0.056	0.006	-0.095	0.007
age 43	-0.069	0.005	-0.083	0.006	-0.077	0.005	-0.065	0.006	-0.101	0.007
age 44	-0.068	0.005	-0.083	0.006	-0.084	0.005	-0.060	0.006	-0.096	0.007
age 45	-0.064	0.005	-0.085	0.006	-0.083	0.005	-0.057	0.006	-0.099	0.007
age 46	-0.066	0.005	-0.085	0.006	-0.083	0.005	-0.065	0.006	-0.102	0.007
age 47	-0.065	0.005	-0.089	0.006	-0.082	0.005	-0.061	0.006	-0.098	0.007
age 48	-0.066	0.005	-0.083	0.006	-0.088	0.005	-0.059	0.006	-0.105	0.007
age 49	-0.061	0.006	-0.083	0.006	-0.082	0.005	-0.064	0.006	-0.103	0.007
age 50	-0.059	0.006	-0.075	0.006	-0.085	0.006	-0.062	0.006	-0.094	0.007
age 51	-0.049	0.006	-0.068	0.006	-0.082	0.005	-0.057	0.006	-0.102	0.007
age 52	-0.059	0.006	-0.077	0.006	-0.086	0.005	-0.048	0.006	-0.099	0.007
age 53	-0.051	0.006	-0.061	0.006	-0.082	0.005	-0.043	0.006	-0.097	0.007
age 54	0.015	0.006	-0.020	0.006	-0.065	0.005	-0.030	0.006	-0.094	0.007
(base) junior high school graduates										
high school graduates	0.001	0.002	-0.001	0.002	-0.004	0.002	-0.009	0.002	-0.014	0.003
junior college graduates	0.001	0.004	-0.007	0.004	-0.005	0.003	-0.013	0.003	-0.014	0.005
university graduates	0.004	0.002	-0.004	0.003	-0.005	0.002	-0.014	0.003	-0.012	0.003
Number of obs	152169		152711		181314		154369		143977	
R-squared	0.041		0.049		0.064		0.036		0.081	

Sources: the Employment Status Survey, 1982, 1987, 1997, 2002, and 2007.

Notes: For variable definitions, please see text. The omitted educational attainment category is junior high. Firm size, industry, occupation, location, and unemployment at the regional level are also controlled for.

***significant at the 1 percent level; **significant at the 5 percent level; *significant at the 10 percent level.

Table A3 OLS (linear probability) Estimates of the Odds of Job separation in Japan over 1982-2007: female

dependent variable	separation =1									
estimation method	OLS									
	FEMALE									
Sample	1982 ESS		1987 ESS		1997 ESS		2002 ESS		2007 ESS	
independent variable	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
fixed term contract	0.080	0.003	0.093	0.003	0.108	0.003	0.069	0.003	0.145	0.003
age 18	-0.175	0.011	-0.092	0.011	0.035	0.013	-0.070	0.017	0.057	0.016
age 19	-0.172	0.009	-0.110	0.009	0.009	0.010	0.024	0.013	0.090	0.013
age 20	-0.125	0.009	-0.089	0.009	-0.001	0.008	-0.005	0.011	0.031	0.011
age 21	-0.096	0.008	-0.078	0.008	-0.005	0.007	0.003	0.010	0.009	0.010
age 22	-0.056	0.008	-0.043	0.008	-0.002	0.007	-0.012	0.009	0.008	0.010
age 23	BASE		BASE		BASE		BASE		BASE	
age 24	0.016	0.008	0.022	0.008	0.022	0.007	0.015	0.009	0.018	0.009
age 25	0.051	0.009	0.038	0.009	0.038	0.007	0.017	0.008	0.023	0.009
age 26	-0.002	0.009	0.038	0.009	0.053	0.007	0.037	0.008	0.009	0.009
age 27	-0.019	0.009	0.010	0.009	0.042	0.008	0.021	0.009	0.017	0.009
age 28	-0.054	0.009	-0.011	0.010	0.034	0.008	0.034	0.009	-0.008	0.009
age 29	-0.093	0.010	-0.030	0.010	0.026	0.008	0.029	0.009	0.002	0.009
age 30	-0.110	0.009	-0.068	0.010	0.007	0.009	0.010	0.009	-0.003	0.009
age 31	-0.139	0.009	-0.104	0.010	-0.024	0.008	0.007	0.009	-0.021	0.009
age 32	-0.157	0.009	-0.117	0.010	-0.030	0.008	-0.010	0.009	-0.043	0.009
age 33	-0.174	0.009	-0.124	0.010	-0.056	0.008	-0.012	0.009	-0.038	0.009
age 34	-0.186	0.009	-0.146	0.009	-0.077	0.008	-0.034	0.009	-0.047	0.009
age 35	-0.186	0.010	-0.150	0.009	-0.075	0.008	-0.054	0.010	-0.068	0.009
age 36	-0.195	0.010	-0.155	0.009	-0.082	0.008	-0.056	0.009	-0.070	0.009
age 37	-0.211	0.009	-0.176	0.009	-0.104	0.008	-0.079	0.009	-0.086	0.009
age 38	-0.222	0.009	-0.184	0.009	-0.115	0.008	-0.070	0.009	-0.091	0.009
age 39	-0.227	0.009	-0.189	0.008	-0.117	0.008	-0.065	0.009	-0.099	0.009
age 40	-0.228	0.009	-0.201	0.010	-0.131	0.008	-0.074	0.009	-0.109	0.009
age 41	-0.233	0.009	-0.205	0.010	-0.129	0.008	-0.090	0.009	-0.116	0.009
age 42	-0.233	0.010	-0.199	0.009	-0.137	0.008	-0.088	0.009	-0.129	0.009
age 43	-0.250	0.009	-0.221	0.009	-0.141	0.008	-0.098	0.009	-0.129	0.009
age 44	-0.230	0.009	-0.207	0.009	-0.150	0.007	-0.093	0.009	-0.132	0.009
age 45	-0.243	0.009	-0.216	0.009	-0.145	0.007	-0.105	0.009	-0.139	0.009
age 46	-0.238	0.009	-0.220	0.009	-0.152	0.007	-0.107	0.009	-0.145	0.009
age 47	-0.231	0.010	-0.211	0.010	-0.157	0.007	-0.094	0.009	-0.141	0.009
age 48	-0.225	0.010	-0.216	0.010	-0.155	0.007	-0.098	0.009	-0.151	0.009
age 49	-0.212	0.010	-0.198	0.009	-0.155	0.007	-0.095	0.008	-0.144	0.009
age 50	-0.197	0.010	-0.205	0.010	-0.160	0.009	-0.098	0.008	-0.158	0.009
age 51	-0.222	0.010	-0.201	0.010	-0.154	0.008	-0.100	0.008	-0.137	0.009
age 52	-0.213	0.010	-0.207	0.010	-0.160	0.008	-0.097	0.008	-0.159	0.009
age 53	-0.212	0.011	-0.200	0.010	-0.157	0.008	-0.092	0.008	-0.148	0.009
age 54	-0.134	0.011	-0.122	0.010	-0.152	0.008	-0.094	0.009	-0.150	0.009
(base) junior high school graduates										
high school graduates	0.007	0.003	-0.002	0.003	-0.006	0.003	-0.024	0.004	-0.042	0.005
junior college graduates	-0.003	0.005	-0.011	0.005	-0.013	0.004	-0.031	0.004	-0.046	0.006
university graduates	0.025	0.008	0.000	0.007	-0.005	0.005	-0.023	0.005	-0.038	0.006
Number of obs	100443		108426		142328		124726		128508	
R-squared	0.064		0.054		0.056		0.042		0.061	

Sources: the Employment Status Survey, 1982, 1987, 1997, 2002, and 2007.
Notes: For variable definitions, please see text. The omitted educational attainment category is junior high. Firm size, industry, occupation, location, and unemployment at the regional level are also controlled for.
***significant at the 1 percent level; **significant at the 5 percent level; *significant at the 10 percent level.