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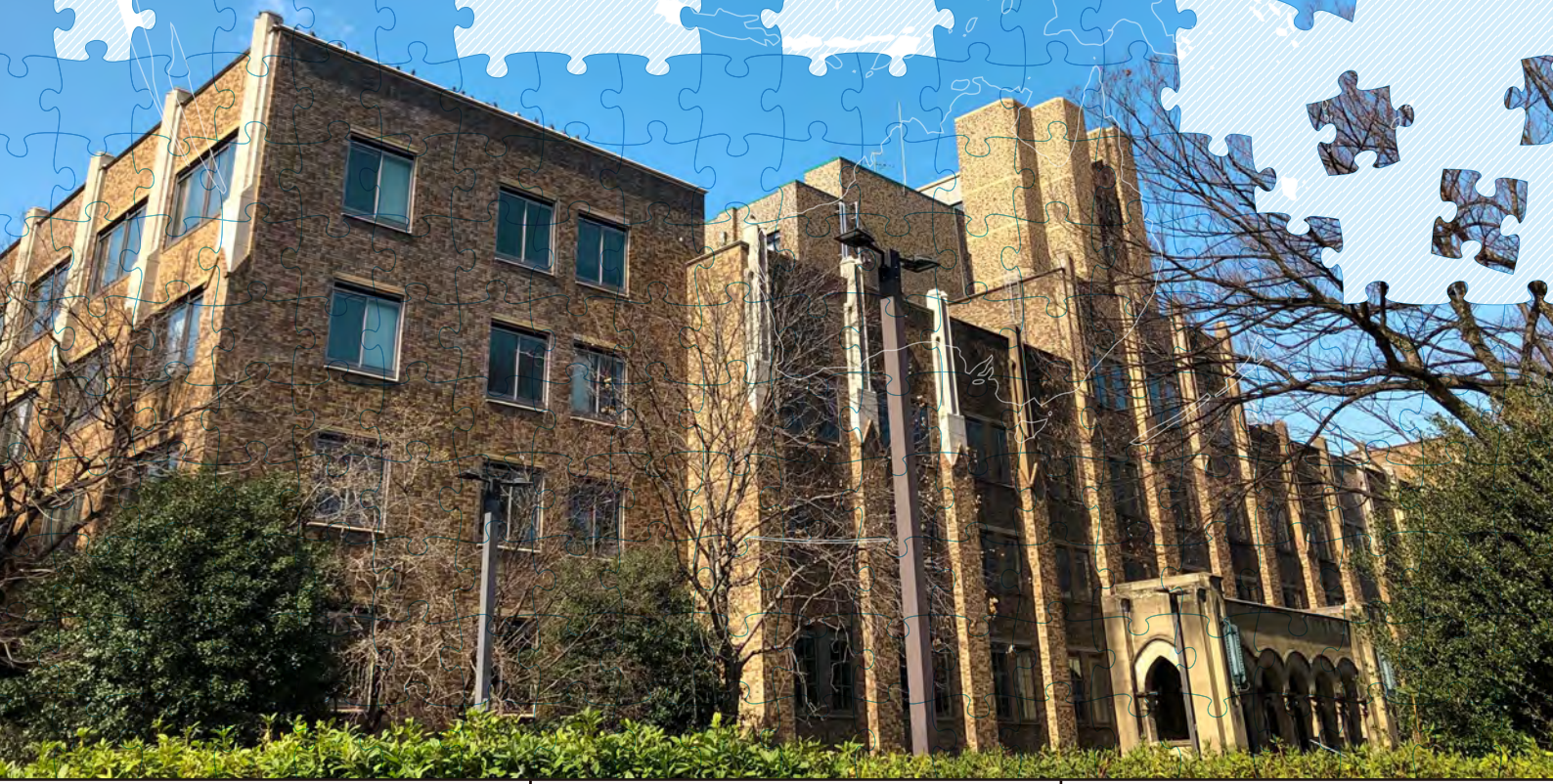
Long-term Consequences of Early Career Disadvantages on Fertility: Evidence from Japan



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Name
Manting Chen, Fumiya Uchikoshi

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Manting Chen

Southwest University of Finance and Economics

Fumiya Uchikoshi

Princeton University

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Corresponding Author: Fumiya Uchikoshi, Department of Sociology and Office of Population Research, Princeton University, Princeton, NJ 08540. 2626488750. uchikoshi@princeton.edu.

Abstract
While studies have observed the short-term impact of nonstandard employment on fertility in low-fertility countries, few have sought to examine its long-term consequences despite the abundant evidence regarding the 'scarring effects' exerted by early-career disadvantages on later career outcomes. Our study addresses this gap by examining how the employment disadvantages that men had experienced during their early-stage careers affect their later fertility outcomes in Japan, which is a country characterized by rising nonstandard employment and a strong gender-based division of labor. Analyses of retrospective occupational history data including work entry cohorts from between 1970 and 2015 with multistate life-table models indicate that early-career disadvantages negatively affect men's long-term fertility outcomes. Compared to men whose first jobs were in standard employment, men whose first job constituted nonstandard employment were approximately 30% less likely to have entered into marriage and approximately 35% less likely to have had a child by age 45. The scarring effect of nonstandard employment was particularly significant for the cohort who entered the labor market after the collapse of the bubble economy. Counterfactual estimates suggest that two-thirds of the cases of declining fertility due to nonstandard employment is explained by delayed marriage. We discuss the potential explanations of these results as well as the theoretical implications in other low fertility contexts.

Introduction

Since the mid-1970s, many developed countries have experienced a rise in both labor market polarization and labor market precarity (Houseman and Osawa 2003; Kalleberg 2000) and a decline in fertility levels to the so-called 'lowest-low' levels of fertility, which is a term used to designate situations in which total fertility has reached or fell below 1.3, a figure that is far below the replacement level (Goldstein et al. 2009). Research has consistently shown that employment uncertainty associated with such labor market changes during economic downturns has negative implications for fertility by delaying marriage and childbearing (Alderotti et al. 2021; Gutierrez-Domenech 2008; Karabchukl 2020; Sobotka et al. 2011). While these studies often operationalize employment uncertainty by applying measures of unemployment (Adsera 2011; Goldstein et al. 2013; Kreyenfeld 2010), more recent research has begun to examine the role of nonstandard employment in determining fertility outcomes (Alderotti et al. 2021; Golsch 2003; Raymo and Shibata 2017). These studies have revealed negative associations between nonstandard employment and fertility levels that highlight the features of nonstandard employment, such as the lack of job security and income stability (Gatta et al. 2021; Kreyenfeld et al. 2012).

Nevertheless, this work largely focuses on the immediate impact of nonstandard employment on fertility intention and behaviors and thus gives insufficient attention to the consequences of nonstandard employment on family formation over the long run. Abundant evidence has documented the existence of the 'scarring effects' of unemployment, in which early-career disadvantages exert enduring effects on the later career outcomes of individuals (Gangl 2004; Huckfeldt 2022; Yu 2012). Previous studies have found that individuals who have experienced contingent employment during the early stages of their careers tend to report lower

wages and occupational prestige in their later careers (DiPrete and Mcmanus 2000; Gangl 2006; Xu et al. 2022; Yu 2012).

However, we know little about the long-term fertility consequences caused by early-career uncertainty. In fact, the shape and strength of the long-term relationship between early career precarity and fertility outcomes, or even whether there is a long-term relationship at all, likely depends in part on the context in which the relationship is studied. In societies where institutional arrangements, such as social welfare policies or labor market practices, can mitigate the economic impact of early-career uncertainty, its effect on long-term fertility and other life outcomes may not be so pronounced. Conversely, in societies where such institutional provisions are weaker, it is possible that the impact of early-career uncertainty on life outcomes such as long-term fertility is greater. The tendency to overlook the long-term fertility consequences of employment precarity may obscure insights about how fertility in the short run is associated differently with nonstandard employment than fertility in the long run and how the long-term fertility consequences of nonstandard employment might be shaped by social context.

We aim to fill this void by examining whether, and if so then how, early-career disadvantage as measured by holding nonstandard first jobs is associated with later fertility outcomes in Japan, which is a country characterized by a prolonged fertility level that is below the replacement level (with a total fertility rate of 1.36 in 2019), later occurring and fewer marriages, and low nonmarital fertility rates due to a strong link between marriage and childbirth (Raymo et al. 2015). Japan's labor market is defined by a strong emphasis on the difference between standard and nonstandard employment in terms of job security, welfare benefits, and wages (Fukao 2012; Rosenbluth 2007), despite a sizeable increase in nonstandard employment over the past three decades (Houseman and Osawa 2003; Genda and Kurosawa 2001; Yu 2012).

In contrast to societies whose labor markets treat different types of employment relatively equally, Japan is a setting in which nonstandard employment may lead to stronger negative consequences over the long run (Yu 2012). Furthermore, Japan is also a country with a highly gendered division of labor where men are supposed to shoulder most of the economic and financial responsibilities of the family, while women are mainly responsible for housework and childcare (Brinton and Oh 2019). Finally, the order of life-course events is highly consistent across individuals in Japan. For example, marriage rates before school graduation are very low in Japan (Raymo 2003), and most school graduates start their careers immediately after graduation (Tsuya 2009; Kariya 2011). Additionally, the rate of nonmarital childbirth has always been almost negligible, and was only 2.4% in 2021 (National Institute of Population and Social Security Research 2022) because decisions to marry and have a child tend to be jointly determined in Japan (Shirahase 2000). As such, it is reasonable to expect early employment disadvantages to be particularly detrimental to men's fertility outcomes later in life by delaying the timing of marriage.

Therefore, we analyze retrospective occupational history data from Japan, which allows us to examine the relationships between the nonstandard employment experienced early in a career and later marriage and fertility outcomes. We provide distinctive insights into how the initial employment circumstances after graduation are associated with the probability of ever getting married and having a child by age 45. As our dataset covers the period of work entry cohort 1970-2015, we also study how the impact of early-career disadvantages on fertility has changed over time, particularly before and during Japan's long economic stagnation. In addition, our analyses reveal the mechanisms of fertility decline in Japan. In this study, we extend the work of previous studies by including a longer-term perspective and a richer account of labor

market characteristics that shed new light on the relationship between employment circumstances and fertility.

Theoretical Background

Employment Uncertainty and Fertility

Classical fertility theories hold that regular labor market participation increases the economic resources owned by individuals, which consequently contributes to fertility via stable income and financial certainty (De la Rica and Iza 2004; Gonzalez and Jurado-Guerro 2006; Kreyenfeld 2014). Economic uncertainty that arises from unstable employment situations is the primary driving force behind reduced fertility in contemporary societies (Del Bono et al. 2011; Gatta et al. 2021; Kreyenfeld et al. 2012; McDonald 2009; Modena and Sabatini 2012). Scholars hold that rational adults choose to have children only when they expect to be able to support a family over the long run because childrearing is costly in terms of both money and time. This means that an adult's expectations of his or her own future wealth and income levels matter as much as their current economic status in regard to fertility planning (Hofmann and Hohmeyer 2013). At similar socioeconomic levels, those who have nonstandard employment face more uncertain economic trajectories than those who are engaged in standard employment. This makes the former group far more likely to delay or avoid marriage and childbirth, as the relative lack of projected economic security creates the need to take time-costly precautionary measures such as accumulating savings before feeling ready to form families.

Empirical evidence has largely confirmed the negative relationship between nonstandard employment and fertility outcomes, primarily for men (e.g., Bumpass et al. 2009; Kaufman and Bernhardt 2012; Lim 2021; Raymo and Shibata 2017; Tragaki and Bagavos 2014). Research has

also discovered that men with high-paying jobs tend to have higher fertility intentions and more children (Kaufman and Bernhardt 2012; Lim 2021) than those who do not. This suggests that men's job security and stable income, which are indicators closely related to employment status, significantly contribute to fertility levels. The findings were disputed in regard to women: while some reported a negative relationship between employment precarity and fertility (e.g., Adsera 2011; De la Rica and Iza 2005), others found that relationship to be positive (e.g., Mills et al. 2005; Schmitt 2012) or largely unrelated (e.g., Andersson 2000; Kravdal 2002). Unlike in the case of men, where nonstandard employment reliably impacts fertility, the lack of a clear relationship between employment precarity and fertility in women indicates that these relationships are highly dependent on gender.

There is a good reason to believe that men's contingent employment, much more than women's, negatively affects their fertility outcomes in societies with strong expectations of a gendered division of labor. In such societies, men are supposed to be the primary provider of a household, whereas women's main duties are more centered around housekeeping and taking care of children. The labor market and workplace features of such societies also tend to disproportionately favor men, making it much harder for women to financially contribute to the family through working. As such, it is reasonable to expect that economic uncertainty associated with men's contingent employment may have a particularly strong impact on men's family-related decisions. Indeed, previous studies have found that the increasing job uncertainty faced by men in a labor market characterized by a growing share of short-term contracts and temporary employment is associated with delayed marriage and parenthood in Japan (Bumpass et al. 2009; Piotrowski et al. 2015; Raymo and Shibata 2017; Tsuya 2009). These findings suggest that men's employment status plays a key role in understanding the relationship between labor

market uncertainty and fertility decline. In terms of fertility outcomes, we expect to see that contingent jobs have a more negative effect than standard or regular jobs for men.

The Scarring Effects of Employment Disadvantages

The multifaceted long-term impact of early-career employment disadvantages on individuals is known as the 'scarring effect' (Gangl 2004; Huckfeldt 2022; Yu 2012). As a typical trigger event, failing to secure a regular job in the early-career stage can potentially disrupt the intragenerational mobility process (DiPrete and McManus 2000) and make individual life courses more vulnerable to broader labor markets and social changes (Gangl 2006). Although the main body of literature in this research focuses on unemployment, scholars have found scarring effects caused by contingent employment with the rise of the temporal work arrangement around the globe in recent years (e.g., Giesecke 2009; McGovern et al. 2004; Xu et al. 2022; Yu 2012).

There are several potential micro and macro explanations for the long-term negative effects of employment disadvantages. Micro mechanisms include, for example, the social stigma associated with employment (Genda et al. 2010; Gangl 2006; Yu 2012), the lack of firm-specific human capital (Oyer 2006), and constraints on job searches (Mouw 2003). Macro reasons, on the other hand, include the cohort effect of graduating during an economic recession (Hamaaki et al. 2013; Raymo and Shibata 2017) and general human capital depreciation that occurs during economic downturns (Gangl 2006). The existing empirical evidence suggests that the scarring effects of employment disadvantages can manifest in many aspects of individual life and social domains. Many studies have found that early-career employment uncertainty creates long-term

adversities in workers' subsequent careers and income levels across many industrialized countries (Choi et al. 2020; Gangl 2006; Hamaaki et al. 2013; Xu et al. 2022; Yu 2012).

Importantly, previous studies have highlighted the long-term negative effect of nonstandard employment on family-related decisions, such as delayed marriage (Maclean et al. 2016; Choi et al. 2020; Piotrowski et al. 2015) or the increased likelihood of divorce (Goñalons-Pons and Gangl 2018). However, we know relatively little about these scarring effects on individuals' fertility outcomes. Research analyzing the long-term relationship between employment uncertainty and family formation often attributes these negative effects to job insecurity and slow growth in economic capital associated with employment uncertainty, but these aspects also affect fertility outcomes over the long run. Based on data from OECD countries, Liu et al. (2022) found that unemployment rates suppress young people's fertility rates over the long run. However, this study used macrolevel analysis, providing little information concerning the scarring effects on fertility outcomes at the individual level. Vignoli et al. (2020) used data from Europe and found that employment precarity decreases the fertility intention of individuals through lowering subjective levels of well-being. However, knowledge about the impact of contingent employment on fertility outcomes is still scant.

The Japanese Labor Market and the Context of Gender

Distinction by Employment Status

Employment status is one of the key features of the Japanese labor market. Specifically, employees are treated differently based on their employment status, particularly between standard (*seiki*) and nonstandard (*hiseiki*) employment.[1] Unlike the situation in some European

[1] The term *hiseiki* includes a variety of work arrangements, such as part-time work, day labor, on-call work, dispatched work, and other work based on short-term contracts (Houseman and Osawa 2003; Osawa et al. 2013). Part-time work accounts for the

countries where labor laws are more complete and regulations enforce equal treatment regardless of employment status (Kalleberg 2000; Lim 2018), nonstandard work in Japan tends to be regarded as a "bad job" (Houseman and Osawa 2003; Lim 2018; Osawa et al. 2013; Raymo and Shibata 2017), which is characterized by not only lower pay but also lower levels of other socioeconomic rewards, including limited access to fringe benefits, weaker job security, and fewer career development opportunities compared with those of standard work (Arita et al. 2019).

The reward disparity between standard and nonstandard employment is rooted in the lifetime employment (*shushin koyo*) system, which remains the core aspect of the Japanese labor market despite the prolonged economic recession that occurred after the early 1990s (Fukao 2012; Rosenbluth 2007). Lifetime unemployment is a commitment made by employers, although largely unspoken, for permanent employment of their employees in Japan. Under this employment model, employers expect a long-term relationship with their employees, and thus they rarely fire them. Having internalized this expectation, employees, who typically enter the labor market immediately following school graduation (Tsuya 2009; Kariya 2011), implicitly assume that they will be staying with the firm and do not expect to change their job until retirement.[2] Access to benefits from lifetime employment is not equally distributed; however, it is limited to standard employees, who increase their wages with years of experience and receive bonuses or other subsidies, such as housing or the economic freedom to enter into marriage (Bumpass et al. 2009; Tsuya 2009). In contrast, nonstandard employees are often not eligible for these benefits, which results in a high turnover rate. Consequently, nonstandard employment is

dominant form of nonstandard employment in Japan.

[2] The lifetime commitment is supported by an age seniority-based (*nenko joretsu*) wage and promotion system. The age-seniority system states that the employees' salaries increase according to their years of service (*kinzoku nensu*). Junior employees receive wages below marginal productivity and will only earn wages above marginal productivity later when they become seniors with long tenures.

often taken by women who experience the type of career interruption that is associated with marriage or childbearing.

As such, it is not surprising that missing opportunities for standard employment in one's early stage of career constrains individuals' later labor market trajectories. Indeed, abundant studies have shown that nonstandard employment, especially as a first job, has enduring negative effects on a range of later outcomes (Diamond 2018; Genda et al. 2010; Hamaaki et al. 2013; Ishida 2005; Kondo 2007; Yu 2012). For instance, Yu (2012) has found that having a nonstandard job is associated with a lower chance of transitioning to standard employment, lower wages, and lower occupational prestige in later careers than those of *the unemployed*. In the Japanese labor market, which is characterized by lifetime employment, the way that individuals are employed in their first job is a critical moment that shapes their later occupational trajectories. Since the majority of standard employment opportunities for school graduates are concentrated in recruitment periods during their school year, one's chance of getting a standard employment job diminishes significantly if that job is not secured and started immediately after school graduation (Fong and Tsutsui 2015). When employment status of a first job is nonstandard, it is negatively associated with the likelihood of later finding a standard employment position. This relationship seems to be robust in regard to social origins or educational attainment (Ishida 2005), and one's initial employment status is causally linked to later occupational trajectories (Diamond 2018; Genda et al. 2010; Hamaaki et al. 2013; Kondo 2007).

Several studies have linked different labor market experiences by employment status to family outcomes. For instance, a nonstandard employment status is associated with delayed marriage (Piotrowski et al. 2015; Raymo and Shibata 2017; Sakai and Higuchi 2005). This is

especially the case for men (Piotrowski et al. 2015), which is likely a reflection of the gendered expectations regarding the economic roles in households as discussed below. Similarly, a few studies suggest that nonstandard employment is related to a lower chance of having a child (Sakai and Higuchi 2005). Although these studies provide important insights into how initial employment disadvantages shape family trajectories, we still have limited knowledge about their long-term consequences.

Increased Nonstandard Employment and Its Implications

The most drastic shift Japan has experienced over the last three decades after the collapse of the bubble economy is a rapid increase in nonstandard employment. As Japan experienced slow economic growth from the mid-1970s to the late 1980s and a prolonged economic recession beginning in the early 1990s, nonstandard employment expanded to cover a wide section of the population (Houseman and Osawa 2003; Genda and Kurosawa 2001). From the mid-1990s to 2010, the percentage of contingent male workers more than doubled (Yu 2012). In particular, recent school graduates increasingly start their first job as nonstandard workers (see Raymo and Shibata 2017 for a review). Based on publicly available data from the Employment Status Survey, one of the administrative surveys that collects information about individuals' labor market conditions, Figure 1 shows trends in nonstandard employment by sex. For the sake of our interest, we show the share of nonstandard employment as a factor of one's first job. Men's share of nonstandard employment (Panel A) was approximately 7% before 1990 but increased to close to 20% around the early 2010s. Although the size of nonstandard employment for men is smaller than that for women, the relative increase is both bigger and more remarkable for men, while the share of nonstandard employment has decreased for women in recent years, beginning to close

the gender gap in nonstandard employment. Panel B of Figure 1 clarifies how critical initial employment status might be for one's later occupational career. This figure shows the share of nonstandard employment for those men who started their first job as either standard or nonstandard. The sample is limited to those who worked for at least ten years. If an individual's first job is categorized as standard employment, then their current employment is very unlikely to be nonstandard (1-2%), while individuals are most likely to stay in nonstandard employment if they began their careers in this employment status (85-93%).

Previous studies have provided several explanations for the increase in nonstandard employment among school graduates. First, facing the collapse of the bubble economy that began in the early 1990s, the government has reduced restrictions on the hiring of nonstandard employees so that employers can hire more temporary or contract workers. Second, specifically for school graduates, institutional arrangements that helped students' smooth school-to-work transition have waned over the years (Kariya et al. 2000). As a result of these changes, a growing number of students graduate from their school without immediately starting a job (Ishida 2005). Perhaps reflecting this trend, Panel B of Figure 1 shows that the more recent male school graduates who started their careers in nonstandard employment are increasingly more likely to continue in that same employment status (93% in 2005) than those from previous cohorts (85% around the 1980s).

There are good reasons to believe that such a labor market transformation has placed recent nonstandard employees in a more disadvantaged position than they had previously been in. For instance, studies suggest that newly emerged employment arrangements, typically with contract and dispatched employees, are in a particularly vulnerable position in terms of renewing their contract and finding opportunities for transitioning to standard employee status within the

same workplace (Gash 2008; Yu 2012). As suggested by McDonald (2009), the larger employment uncertainty and the lack of prospects regarding career advancement allow us to hypothesize that the gap in the proportion of those who have ever been married and those who enter into parenthood by employment status has widened in recent cohorts.

[Figure 1 is here]

Gender-based Division of Labor

Scholars have argued that the characteristics of the Japanese labor market are based upon the family model of a male breadwinner and a female homemaker (Osawa 1993). Standard employees are expected to demonstrate their commitment to the firm as core members. As a result, in exchange for corporate welfare arrangements, their work hours tend to be comparatively long and exceptionally higher (Brinton and Lee 2001; Bumpass et al. 2009), which minimizes their potential contribution to unpaid labor at home. This is why dual-earner households with both parties being full-time workers are still difficult and rare in Japan (Brinton and Oh 2019), especially when the couple does not receive any help from the children's grandparents.[3] Additionally, the lifetime employment model penalizes those who experience career interruption and lose the accumulation of firm-specific skills and years of experience. The potential leaves that parents take for pregnancy and childcare thus decreases their earning potential and their opportunity cost of leaving the labor market.

With such employment arrangements and a lack of accessible childcare, such as public or private daycare centers (Qian and Sayer 2016; Raymo et al. 2015; Tsuya et al. 2005), women tend to withdraw from employment upon marriage or childbirth and only later restart working once the child is less dependent (Iwasawa 2004; Rosenbluth 2007). In light of such a highly

3 While outsourcing childcare is not common in Japan due to the limited availability of childcare facilities, grandparents' support is an important resource for childbearing in Japan (Thang et al. 2011).

asymmetric gendered domestic division of labor, it also makes sense to expect that men's employment uncertainty has a bigger impact on fertility outcomes in Japan.

Hypotheses

To evaluate the contributions of early-career disadvantages and changes to the declining fertility rates in Japan, we propose the following four hypotheses.

First, theories stressing the importance of economic uncertainty on fertility decisions suggest that nonstandard employment is negatively associated with men's earlier transition to marriage and parenthood. If delayed family formation is associated with a lower likelihood of ever marrying and having children, then we can expect to see that the proportion of those who are ever married, especially those with children, is lower among those who started their first job in nonstandard employment than it is among those in standard employment.

Hypothesis 1a: Compared with those in standard employment, men who started their first job in nonstandard employment are less likely to have been married by age 45.
Hypothesis 1b: Compared with those in standard employment, men who started their first job in nonstandard employment are less likely to have been married with children by age 45.

Second, we also expect that the labor market transformation in Japan over the past three decades has placed nonstandard employment in an even more precarious position than previously.

Hypothesis 2: The marriage gap and that of childbirth between those with standard employment and those with nonstandard employment has widened over time.

Third, we expect that the posited lower fertility among nonstandard employees in their first job is largely accounted for by their delay in and lower frequency of marriage. This hypothesis is built upon previous studies regarding socioeconomic gradients in family formation that have posited that finding a spouse is strongly associated with socioeconomic status in Japan (Bumpass et al. 2009; Piotrowski et al. 2015; Raymo and Shibata 2017), where one's decision to marry is often equivalent to one's decision to have a child (McDonald 2009; Shirahase 2000). In other words, marital fertility is relatively stable over time and less associated with socioeconomic position.

Hypothesis 3: Lower marital fertility among nonstandard employment workers is explained by their delay in and lower frequency of marriage compared with those enabled by standard employment.

Analytical Strategy

Data

This study used all available years covered by two nationally representative comparable cross-sectional surveys: the Japanese Social Stratification and Mobility Survey (SSM) and the Japanese General Social Survey (JGSS). Both surveys collected information about respondents' first jobs after graduation, their age at first marriage, and the demographic information regarding

their household members that is used to detect the year of first childbirth. We combined this data to boost the sample size.

The SSM and JGSS are highly comparable in both design and implementation. In terms of sampling strategy, they employed the same sampling technique (a standard stratified two-stage sampling where the first stage is based on census areas and the random sampling of approximately 10 individuals in each census area is the second stage). Importantly, the fieldwork for both surveys was conducted by the same agency, namely, Central Research Services (*Chuo Chosasya*). Moreover, the initial response rate was almost equal between these two surveys (see Appendix Table 1). Therefore, in this study, we pooled the two samples to form a single data file by extracting information on sex, year of marriage, respondent's employment status at their first job, and the year of their first childbirth.

The SSM has been conducted every ten years since 1955 to compile detailed information on respondents' complete retrospective work history with minimal changes to the type of questions asked or to the general structure of the survey. In addition to its original version, SSM 2015 also collected detailed marriage and fertility histories, including of those who were separated by the time of the survey. Similar to the SSM, the JGSS also collected respondents' information about the employment status of their first job as well as their ages at the times of first marriage and childbirth. We specifically used the SSM conducted in 2015 and the JGSS conducted in 2006, 2012, 2015, 2016, 2017, and 2018, in which the age at first marriage was asked. The other waves of the SSM and JGSS did not collect this information. By limiting the sample to men with at least one job experience and omitting cases with missing values, the same size became 5,916. Note that we excluded those who started their first job in self-employment.

Descriptive statistics are shown in Table 1. Similar to that in Figure 1, the share of nonstandard employment has increased from 5.4% to 14.3% in the two cohorts.

[Table 1 is here]

Variables

There are two outcomes, or transition stages, used in the life table. First, we estimate age-specific initial marriage rates from the two sets of survey data to detail the transition from unmarried to married. Second, we estimate age-specific fertility rates. We allow those who were never married to reach this state from two points: one is from married to first childbirth, and the other is from unmarried to first childbirth. The former occurs when marriage and childbirth happen at different ages, whereas the latter occurs when these two events happen in the same year. We expect to see an increase in the relative contribution of the latter group given that bridal pregnancy now accounts for about one-fourth of all the first births in recent marriage cohorts (Uchikoshi and Mogi 2018). Since the nonmarital childbearing rate is negligible in Japan, this life-table exercise does not assume instances where childbirth occurs outside of marriage.

Our primary explanatory variable is the employment status of a first job, which captures a critical dimension of the labor market condition. We focus on two types of employment status, that of standard employment and that of nonstandard employment, with the latter including both temporary work arrangements and part-time jobs. A focus on the first-job status partly solves potential endogeneity problems since students rarely enter marriage (and parenthood) before graduation (Raymo 2003). We also leverage respondents' year of labor market entry. Specifically, we separate the respondents into two entry cohorts: those who entered the labor market before 1990 and those who entered the labor market in 1990 or after.

Method

This study constructs a multistate life table estimating age-specific marriage and married fertility rates (Palloni 2001). Age is divided into seven 5-year intervals (15-19, 20-24, … 40-44). Our main point of interest is the proportion of those who are married with or without a child by age 45 (l_{45}^{m} or l_{45}^{c}) rather than the proportion of those who never married (i.e., radix or l_{15}). In this model, we assume that there is no nonmarital childbearing. We also do not distinguish between individuals who have been married on the basis of whether they are divorced or remarried. Rather, we suppose that there are three states, namely, 1. never-married, 2. a history of marriage without a child, and 3. a history of marriage with a child. The number of those having been married with a child, for instance, can be expressed as follows.

$$l_{x+5}^{3} = l_{x}^{3} + {}_{5}d_{x}^{13} + {}_{5}d_{x}^{23}$$

In this equation, l_{x}^{3} is the number of those who had married at age x, and ${}_{5}d_{x}^{13}$ and ${}_{5}d_{x}^{23}$ represent the number of childbirths either from unmarried (1) or married (2) from age x to age x+5. The number of events (marriage or childbirth) is calculated by the probability of these events (${}_{5}q_{x}^{13}$ or ${}_{5}q_{x}^{23}$) times the number of individuals remaining (l_{x}^{1} or l_{x}^{2}). ${}_{5}q_{x}^{13}$ o r ${}_{5}q_{x}^{23}$ is estimated as a function of age-specific rates (${}_{5}m_{x}^{13}$ or ${}_{5}m_{x}^{23}$) and ${}_{5}a_{x}$ (average years lived between age x and age x+5 for individuals who die in the interval. We use the conventional value, which is n/2).

We compared the proportion of those who had married with a child by age 45 among the never-married (l_{45}^{3}/l_{15}^{1}) by one's first-job employment status (standard or nonstandard) and work entry cohort (before 1990 and 1990 or after), each of which is expected to capture marriage and fertility differences by employment status and whether employment status may have changed

over time. We expect to see that the share of those who have had a child decreases over time for both standard and nonstandard employment, but that the magnitude is much larger for those who entered the labor market in nonstandard employment.

Based on these estimates, we also calculate the counterfactual fertility rates for those in the later work entry cohort as if they had followed the same marriage schedule as those in the former cohort. The main motivation of this exercise is to examine to what extent the changes in fertility outcomes for standard and nonstandard employment are due to delayed marriage and less marriage. We expect to see that the fertility decline, especially for nonstandard employment, is largely explained by changes in marriage schedules.

We calculate counterfactual estimates of the number of individuals who had been married with a child for the second work entry cohort ($l_{x+5}^{3\ \text{cohort}\ 2\ cf}$) as follows. First, we estimate the probability of marriage (without a child) among those who had never been married in the first cohort (${}_5q_x^{12\ \text{cohort}\ 1}$). Second, we use that probability to estimate the counterfactual number of marriages that occurred in the later cohort.

$$ {}_5d_x^{12\ \text{cohort}\ 2,\text{cf}} = l_x^{1\ \text{cohort}\ 2} \times\ {}_5q_x^{12\ \text{cohort}\ 1} $$

Third, we estimate the counterfactual number of individuals at age x who are married with a child.

$$ l_{x+5}^{2\ \text{cohort}\ 2,\text{cf}} = l_x^{2\ \text{cohort}\ 2} +\ {}_5d_x^{12\ \text{cohort}\ 2,\text{cf}} $$

$$ {}_5d_x^{23\ \text{cohort}\ 2,\text{cf}} =\ {}_5m_x^{23\ \text{cohort}\ 2} \times \frac{1}{2} \times (l_x^{2\ \text{cohort}\ 2,\text{cf}} + l_{x+5}^{2\ \text{cohort}\ 2,\text{cf}}) $$

$$ l_{x+5}^{3\ \text{cohort}\ 2,\text{cf}} = l_x^{3\ \text{cohort}\ 2,\text{cf}} +\ {}_5d_x^{13\ \text{cohort}\ 2} +\ {}_5d_x^{23\ \text{cohort}\ 2,\text{cf}} $$

Results

Descriptive Analysis

Age-specific marriage and fertility rates by employment status and work entry cohort

Figure 2 shows age-specific marriage and first fertility rates by employment status and work entry cohort. Looking first at age-specific marriage rates in the 1970s and 1980s, we see that age-specific marriage rates are lower for men who started their careers in nonstandard employment than for those who started their jobs in standard employment. For example, in the 1970s-80s, the marriage rate among men between the ages of 25 and 29 who were engaged in nonstandard employment was 0.067, whereas the marriage rate among men engaged in standard employment was 0.103. These results are consistent with Hypothesis 1a. Meanwhile, according to Figure 3, marital fertility rates for nonstandard and standard employment show similar patterns, especially at younger ages. There is some gap in the 30-34 and 35-39 age groups in the 1970-80s, but the difference is smaller than that of marriage rates.

Looking at change over time, the results remain consistent with Hypothesis 1. Although age-specific marriage rates show a decline in both standard and nonstandard employment, the relative difference remains. Similarly, the employment status gap does not change over time for age-specific marital fertility rates. These results suggest that lower and declining fertility among men engaged in nonstandard employment is primarily driven by their lower chance of marriage than that of those engaged in standard employment.

[Figure 2 is here]

[Figure 3 is here]

Multistate life tables

Based on these age-specific rates, we constructed multistate life tables. Figure 4 shows the proportion of ever married men by age 45 listed by employment status and work entry cohort.

Results in the 1970s and 1980s show that close to three-fourths (72.5%) of men whose first job was standard employment are married by age 45, and roughly three out of four of those (0.537/0.725 = 0.740) have at least one child. In contrast, the percentage of men whose first job was nonstandard employment who are married by age 45 is 55.8%, which is 17 percentage points lower than that of those in standard employment. The proportion of those who have a child accounts for a larger fraction of the married population with standard employment than it does for those with nonstandard employment (53.7% and 29.4%, respectively), while the share of those without a child is similar between the two groups (18.8% and 16.4%). The lower marriage and fertility rates of individuals engaged in nonstandard employment support Hypotheses 1a and 1b.

The difference in marriage and childbirth rates by employment status persists or even increases throughout the 1990s and 2000s. For those whose first job was in standard employment, a similar fraction of them (74.9%) were married by age 45, while only 47.8% of men who started their careers in nonstandard employment were married by 45. It should be noted that the percentage of those who are married has declined only in the nonstandard groups, thus indicating a much larger gap (from 17% to 27%) in a recent work cohort. We also see this divergent pattern more clearly for fertility outcomes. For example, those with nonstandard employment who opt to have children decreased (from 39.4% to 31.3%), while that in the standard employment group did not change (53.7% versus 51.9%). Since the fraction of those who had been married decreased under nonstandard employment, estimates suggest that approximately one out of three married men (34.5%) are expected to not have a child in the 1990s and 2000s if their first employment was nonstandard, which is five percentage points larger than that in the 1970s and 1980s (29.3%). The proportion of those without a child has

increased between the two cohorts under standard employment, but the size of that increase is relatively small (18.8% to 23.0%).

[Figure 4 is here]

Counterfactual analysis

Next, we estimate the counterfactual fertility rates for those who entered the labor market in the 1990s and 2000s. The descriptive results shown earlier suggest that declining fertility affects those who started their careers in nonstandard employment and that changes in marriage schedule play a role in explaining the decline. Figure 5 thus shows three sets of estimates for the nonstandard employment group. The first two (observed percentage of being married in 1970-1989 and 1990-2015) are identical to the estimates we presented in Figure 3. The last is a counterfactual estimate based on the assumption that the 1990-2015 cohort followed the same marriage schedule as those in the 1970-1989 cohort. Changing marriage schedules plays a significant role in explaining the declining fertility among nonstandard employment, as this explains two-thirds of the declining fertility (1- (0.367-0.394)/(0.313-0.394) = 0.666). Although this result is consistent with Hypothesis 3, the results also suggest that changes in marital fertility make a sizable contribution to declining fertility in this group.

[Figure 5 is here]

Supplementary analysis for women

Although our focus is on men's employment because of the gendered nature of the labor market in Japan, one may wonder if women's employment impacts long-term fertility outcomes. To answer this question, Appendix Figure 1 shows the cumulative proportion of women who have

been married or birthed their first child by initial employment status. As the figure shows, women who started their first job in nonstandard employment are slightly less likely to experience marriage and childbirth by age 45, and the difference from those estimates for those who started their first jobs in standard employment is smaller than that difference for men. It is also found that there is little change in the relationship between the two work entry cohorts. These results suggest that the long-term consequences of increasing labor market precarity, at least by the measure of one's initial employment status, are particularly relevant for men, but not for women.

Discussion

Research has identified that in the past half century, many developed countries have experienced a rise in contingent employment arrangements as well as a decline in fertility rates to below the replacement level. Against this backdrop, scholars are paying increasing attention to the relationship between nonstandard employment and fertility. However, we still know little about the long-term relationship between these two variables. By comparing the effect of early-career nonstandard employment on fertility in Japan, this study provides new evidence on the scarring effect that contingent employment has on individuals' fertility outcomes. The results from multistate life table analysis based on retrospective occupational and family history data from Japan reveal the following findings. First, men who started off their career in nonstandard employment are approximately 30% less likely to have experienced marriage and approximately 35% less likely to have had a child by the age of 45 than those whose first job was in standard employment. These results are consistent with predications derived from the theoretical emphasis

on the importance of economic condition and job security to fertility decisions (Hypotheses 1a and 1b).

Second, the scarring impact of early-career uncertainty on individuals' fertility outcomes is particularly strong for the cohort who entered the labor market after the collapse of the bubble economy in Japan. The gap between the percentages of men who had been married whose first job was nonstandard and their counterparts who began their employment in standard employment is larger by age 45 among the labor market entry cohort in or after 1990 compared with that among the labor market entry cohort prior to 1990. Furthermore, this widened gap between cohorts was uncovered when comparing the percentage of men who had ever been married *and had children* by age 45 between men in different first-job types. These findings are consistent with the expectation that the labor market transformation in Japan that began in 1990 has made nonstandard employment even more precarious (Hypothesis 2).

Third, the scarring effects of contingent employment on fertility are largely accounted for by the postponement of marriage. Counterfactual estimates suggest that a sizeable proportion (66.6%) of the lower fertility rate associated with nonstandard employment is explained by delaying marriage. In Japan, getting married comes with particularly high stakes since the decision to marry is closely equivalent to the decision to have children (McDonald 2009; Shirahase 2000). Facing growing economic uncertainty, relying on nonstandard employment makes this joint decision more difficult, especially for men who are still expected to be the breadwinner. As such, men's nonstandard employment is associated with lower fertility through a delayed joint decision to marry and have children. This finding is also consistent with the emphases on marital fertility being relatively stable over time seen in previous studies (Hypothesis 3).

The present paper has several limitations. First, the potential heterogeneity within nonstandard employment may lead to incomplete or inaccurate estimation of the causal links between employment and fertility outcomes. We use a simple definition of nonstandard employment that includes temporary work arrangement and part-time employment without considering, for example, the different skills involved in each job. Jobs with more transferrable and marketable skills, despite being nonstandard, may cause less harm to long-term career development than other jobs (Moriguchi and Ono 2005; Yu 2012). The analyses in this study could be meaningfully extended by leveraging more detailed aspects of nonstandard employment. Second, our results do not directly speak to potential individual-level mechanisms. For example, given the tight link between marriage and childbearing (McDonald 2009; Shirahase 2000), the larger contribution made by changes in marriage schedule to the declining number of those who marry and have children by age 45 may be impacted by a potentially increasing group of singles who do not intend to form families (Raymo et al. 2021). Although we are not aware of an increase in the intention to remain childless among Japanese singles (Raymo 2022), future studies may distinguish the sources behind the role played by delayed and lower rates of marriage on decreasing fertility. Third, the nature of the retrospective work history data used in this study introduces potential measurement errors that could complicate the estimated effects of employment uncertainty on fertility. It is more difficult to accurately recall employment histories than to recall marriage and fertility history. This is particularly the case with nonstandard employment, which tends to be complex and intermittent. Future research could examine the long-term impact of nonstandard employment more accurately on the basis of panel data, although these data also suffer from a potential lack of the representativeness of the sample.

Despite these limitations, our study provides an important first step toward understanding the mechanisms underlying the scarring effects of contingent employment on fertility outcomes. First, using the case of Japan, our study demonstrates the importance of the labor market context in shaping the persistent impact of nonstandard employment on the fertility outcomes of individuals. Japan's prolonged economic stagnation, together with the high cost of hiring regular workers under its prevalent welfare corporatist practices, has contributed to the increase in contingent employment that has occurred over the past three decades in Japan (Houseman and Osawa 2003; Genda and Kurosawa 2001; Yu 2012). As the labor market remains highly segmented and the labor pool for standard jobs becomes more exclusive, initial job status is considered critical for the occupational trajectories and economic prospectus of individuals (Hamaaki et al. 2013). In this context, starting a career in nonstandard employment means being an organizational outsider with a high risk of being permanently blocked from entering the insider labor pool with its associated job security and economic stability. The difficulty of transitioning to standard employment and the lack of economic prospectus are bound to have long-term negative consequences on individuals' family-related decisions.

Second, by accounting for the gender-based division of labor in Japan, our study sheds light on the ways in which the long-term consequences of contingent employment on fertility outcomes may differ by sex. We argue that men's employment type is the key indicator of long-term economic conditions and stability in Japan, thus affecting men's fertility outcomes later in life, as men are assumed to be the breadwinner of families in Japan. The persistent gendered division of labor in Japan demands that women are primarily responsible for caring activities. For similar reasons, women tend to be sorted into the secondary labor pool; thus, they find it difficult to be committed workers and make substantial economic contributions to families. As a

result, having a first job in nonstandard employment makes relatively little difference to women's marriage and fertility decisions, as our supplementary analysis shows. Rather, we find that the experiences of early-career nonstandard employment have persistent negative consequences on men's fertility outcomes. Our study also adds to the scant evidence on the relationship between changing employment circumstances and low fertility, especially in contrast to the accumulated evidence showing that an increase in the precarity of employment is associated with a decline in marriage (e.g., Piotrowski et al. 2015).

Importantly, the perspective that our research provides on employment uncertainty in the context of a segmented labor market and a strong gender division of labor deepens our understanding of the role that institutional settings play in mediating how early life disadvantage propagate throughout the life courses of individuals in society. As previous studies have highlighted, the economic uncertainty associated with disadvantaged employment status is likely to play a significant role in explaining low fertility in rich countries (Alderotti et al. 2021; Gutierrez-Domenech 2008; Karabchukl 2020; Raymo and Shibata 2017; Sobotka et al. 2011). This study adds an important life-course perspective to the literature by examining the long-term consequences of early-career employment disadvantages on fertility outcomes. Specifically, our study suggests that the way that early life disadvantages accumulate over an individual's life course is shaped by institutional arrangements (Kerckhoff 1995). In this sense, Japan presents a compelling opportunity for scholars to examine how certain institutional features, such as standard vs nonstandard employment and labor market practices, shape the critical importance of one's early-career disadvantages for later life-course outcomes. This implication is likely applicable to many other institutional contexts, for example, as characterized by the growing labor market deregulation that has increased young adults' life-course uncertainty (McDonald

2009; Mills and Blossfeld 2005). Additionally, the negative impacts of economic uncertainty on fertility that are intensified by labor market deregulation might have a more pronounced effect on fertility outcomes in gender inegalitarian settings where full-time dual-earner arrangements are not yet a feasible option and men's nonstandard employment is particularly disadvantageous (Brinton et al. 2018; Brinton and Oh 2019). As such, the case of Japan provides important insights into how these labor market and gender contexts shape the long-term impacts of early-career employment disadvantages on fertility outcomes.

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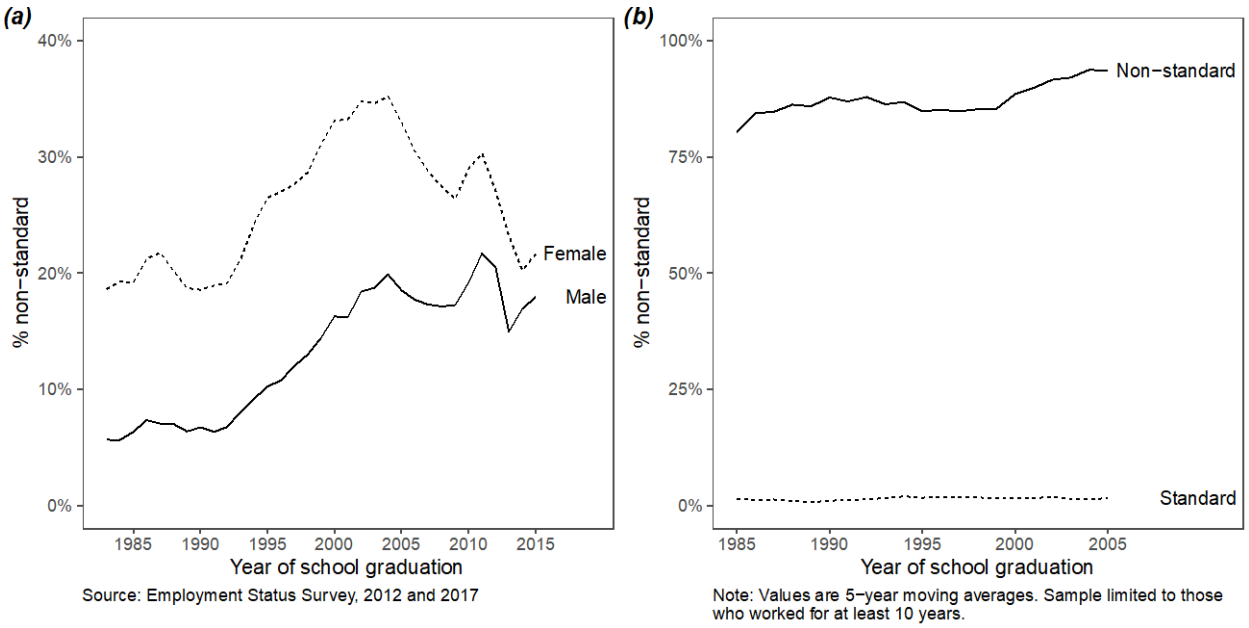

Figure 1. Trends in nonstandard employment as first-job status by sex (a), and the share of nonstandard employment as a current job status among men by first job employment status (b)

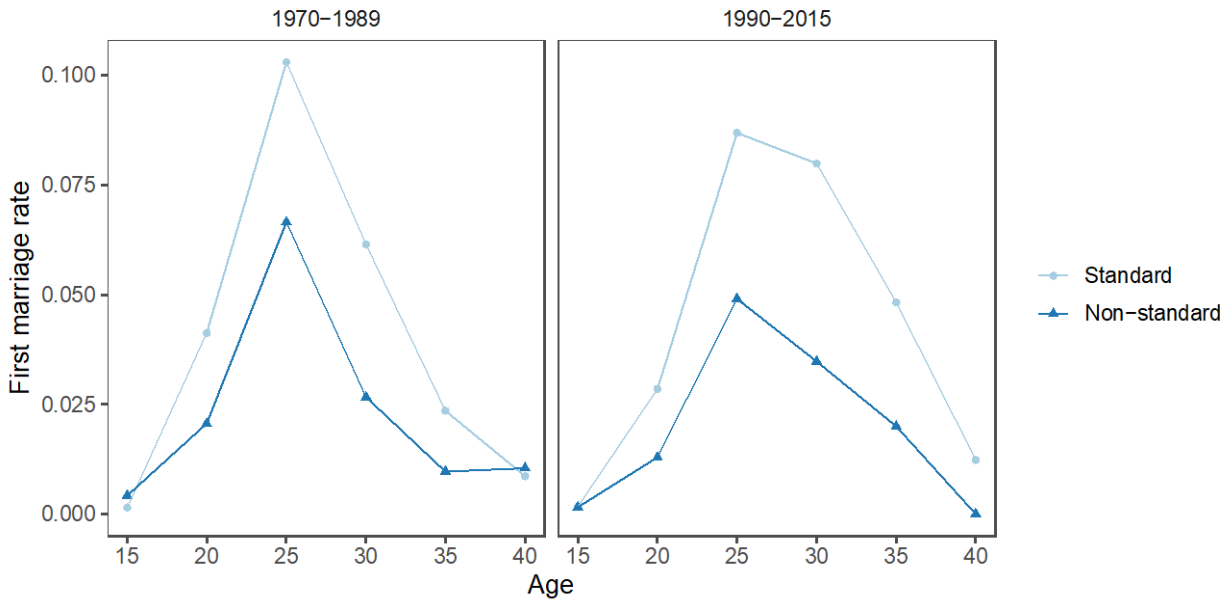

Figure 2. Age-specific first marriage rates by employment status and work entry cohort

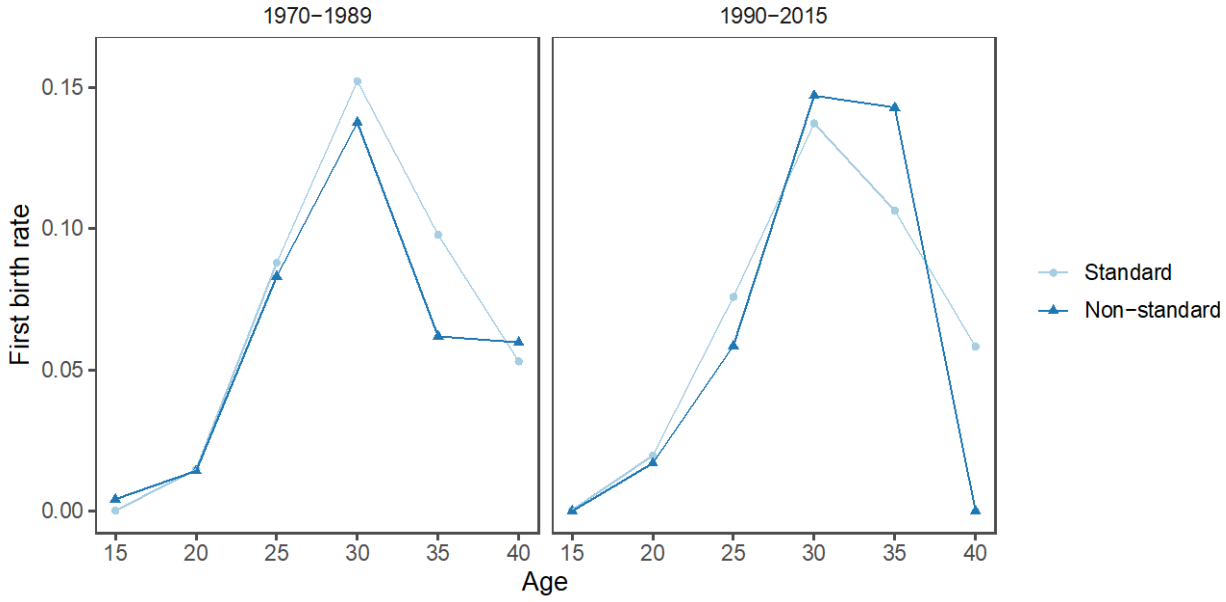

Figure 3. Age-specific first marital fertility rates by employment status and work entry cohort

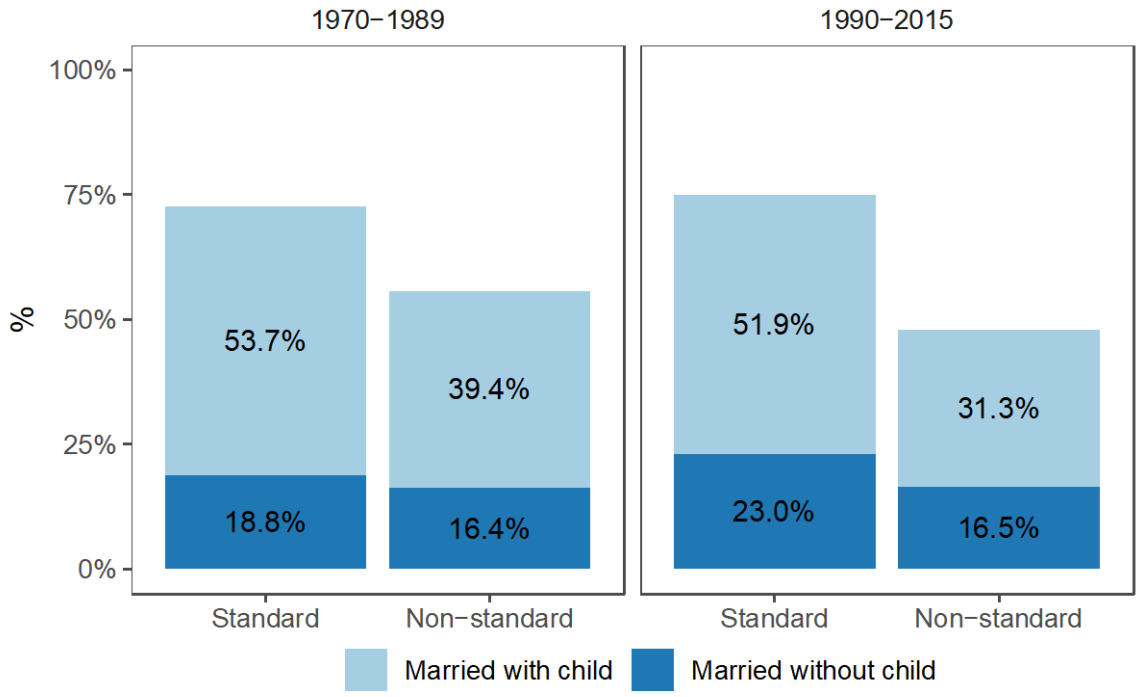

Figure 4. Proportion of ever married by age 45 listed by employment status and work entry cohort (male)

Figure 5. Comparison between observed and counterfactual estimates (nonstandard employment)

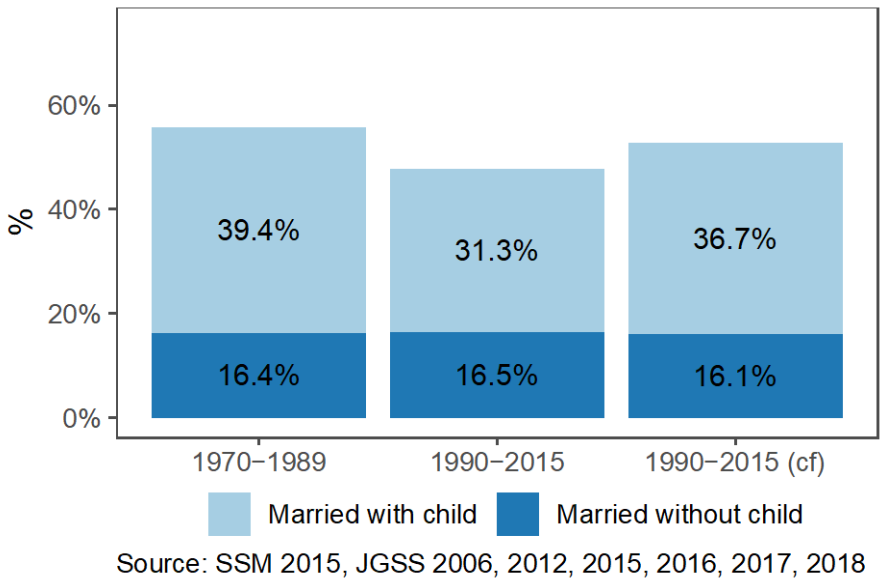

Table 1. Descriptive statistics

	Labor market entry cohort			
	1970-1989		1990-2015	
	Mean	SD	Mean	SD
Standard	0.946	0.226	0.857	0.35
Nonstandard	0.054	0.226	0.143	0.35
Mean age at marriage	27.34	4.80	27.45	4.21
Mean age at first childbearing	30.19	4.83	29.49	4.44
Observations	2,977		2,939	

Appendix

Table 1. Summary of the datasets used in our analysis

	Sample population	Sample size (N of respondents contacted)	Response rate after omitting invalid cases
SSM 2015	Men and women aged 20-79	16,000	50.1%
JGSS 2006	Men and women aged 20-89	8,000	59.8%
JGSS 2012	Men and women aged 20-89	9,000	59.0%
JGSS 2015	Men and women aged 20-89	4,500	52.4%
JGSS 2016	Men and women aged 25-49	2,100	50.8%
JGSS 2017	Men and women aged 20-89	1,500	55.6%
JGSS 2018	Men and women aged 20-89	4,000	54.3%

Source: http://www.l.u-tokyo.ac.jp/2015SSM-PJ/index.html, https://jgss.daishodai.ac.jp/english/index.html

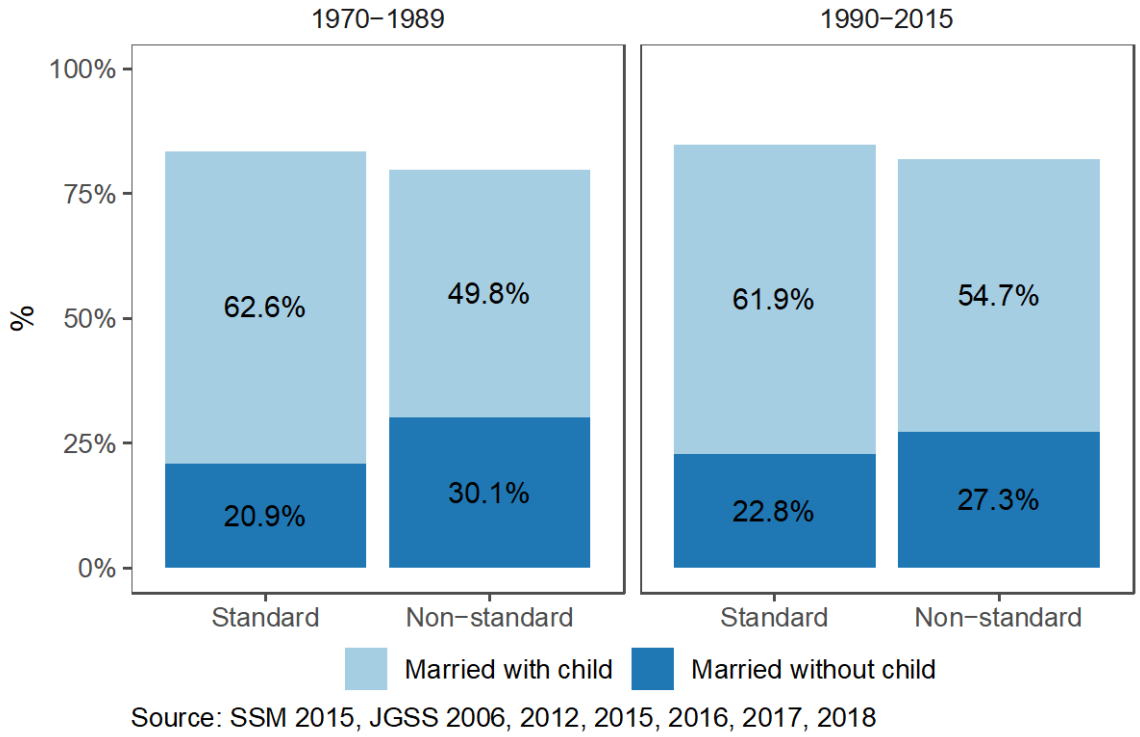

Figure 1. Proportion of ever married by age 45 listed by employment status and work entry cohort (female)