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Unemployment, Nonstandard Employment, and Fertility: Insights From Japan's "Lost 20 Years"

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Abstract In this study, we examine relationships of unemployment and nonstandard employment with fertility. We focus on Japan, a country characterized by a prolonged economic downturn, significant increases in both unemployment and nonstandard employment, a strong link between marriage and childbearing, and pronounced gender differences in economic roles and opportunities. Analyses of retrospective employment, marriage, and fertility data for the period 1990–2006 indicate that changing employment circumstances for men are associated with lower levels of marriage, while changes in women's employment are associated with higher levels of marital fertility. The latter association outweighs the former, and results of counterfactual standardization analyses indicate that Japan's total fertility rate would have been 10 % to 20 % lower than the observed rate after 1995 if aggregate- and individual-level employment conditions had remained unchanged from the 1980s. We discuss the implications of these results in light of ongoing policy efforts to promote family formation and research on temporal and regional variation in men's and women's roles within the family.

Keywords Fertility · Marriage · Nonstandard employment · Unemployment · Japan

Introduction

Research on economic conditions and fertility has a long history (Butz and Ward 1979; Macunovich and Easterlin 1988; Rindfuss et al. 1988; Silver 1965), and a resurgence of work in this area reflects recent macroeconomic volatility and widespread concern about the social, economic, and demographic implications of very low fertility rates. In

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this research, unemployment is the most commonly used measure of economic conditions, with fertility modeled as a function of both aggregate unemployment rates (Adsera 2011; Ahn and Mira 2001; Goldstein et al. 2013; Gutiérrez-Domènech 2008; Kravdal 2002) and individual experience of unemployment (Amialchuk 2013; Andersson 2000; Kreyenfeld 2010). Increasingly, researchers have also focused on the role of nonstandard employment in shaping relationships between macroeconomic trends and fertility (Golsch 2003; González and Jurado-Guerrero 2006).

Recent studies have typically concluded that fertility is negatively associated with increases in unemployment and nonstandard employment (see Sobotka et al. 2011 for a review), but this work pays insufficient attention to the theoretical ambiguity introduced by potentially important gender differences. The tendency either to focus on men and women separately (Andersson 2000; Dehejia and Lleras-Muney 2004) or to consider economic circumstances at the household level (Ranjan 1999) may obscure insights about how fertility is associated differently with the employment circumstances of men and women as well as how those gender-specific relationships may be shaped by social and economic context.

We address this limitation by examining relationships between men's and women's employment circumstances and fertility in Japan. Japan is characterized by very low fertility and a prolonged economic downturn during which both unemployment and nonstandard employment increased markedly among young adults. Importantly, Japan is also a country in which men's and women's economic roles within the family remain highly differentiated. In contrast to the relatively gender-egalitarian societies examined in most of the recent research, Japan is a setting where relationships of unemployment and nonstandard employment with fertility may be negative for men but positive for women, thus limiting the overall effect of economic downturn. In the following sections, we draw on existing theory and distinctive features of the Japanese context to express these ideas in the form of testable hypotheses.

We examine data covering the period 1990–2006. Retrospective employment histories for respondents and their spouses allow us to examine links between individual employment circumstances and fertility for both men and women. By compiling and appending data on unemployment rates and the prevalence of nonstandard employment (by age, sex, and year), we can also examine the role of current and early-career aggregate employment circumstances. Using predicted values from models of both marital status and parity-specific marital fertility to calculate observed and counterfactual standardized total fertility rates (TFRs), we evaluate the relative importance of (1) men's and women's employment circumstances, and (2) marriage and marital fertility.

Background

Economic Conditions, Gender-Based Specialization Within Marriage, and Fertility

Fertility has declined during recent periods of economic downturn, including the 2008 recession (Goldstein et al. 2013; Morgan et al. 2011; Schneider 2015), the 1997–1999 Asian economic crisis (Eun 2003; Kim 2009), and the market transition in Eastern Europe and Russia (Billingsley 2011; Kharkova and Andreev 2000; Kohler and Kohler

2002; Ranjan 1999; Witte and Wagner 1995). This relationship is particularly pronounced for first births, reflecting both the role of economic uncertainty in postponement of family formation and selection processes that result in those exposed to second and higher-order births being relatively less responsive to economic uncertainty (Adsera 2011; Andersson 2000; Goldstein et al. 2013; Sobotka et al. 2011).

Economic models linking economic downturns to fertility are built on assumptions that children are costly in terms of money and time and that gains to marriage derive from spouses' pooling of complementary specializations in market production and domestic production (Becker 1981; Butz and Ward 1979; Hotz et al. 1997; Ranjan 1999; Willis 1973). Emphasis on the financial costs of children suggests that growth in unemployment and nonstandard employment during economic downturns will contribute to reductions in fertility via reduced income or increased uncertainty regarding future income (a negative income effect). At the same time, emphasis on the time costs of children suggests that limited access to stable, well-paid, rewarding employment opportunities may reduce the opportunity costs for women of substituting time spent on market labor for time spent on childrearing, thus leading to an increase in fertility during recessionary periods (a positive substitution effect) (Becker 1981; Butz and Ward 1979). Empirical evaluations of these theoretical relationships have focused on both aggregate unemployment rates—a measure of general economic uncertainty—and individual experiences of unemployment—a proxy for theoretically relevant quantities such as income, time costs, and uncertainty about one's own future employment and earnings (Adsera 2011; Kravdal 2002).

The overall association between economic downturn and fertility depends on the relative magnitude of these income and substitution effects (Butz and Ward 1979; Ciganda 2015), which in turn is influenced by the degree of specialization between spouses. In settings characterized by relatively pronounced gender-based specialization within marriage, the overall impact of changing employment circumstances will be positive, negative, or zero depending on the relative magnitude of the negative income effect for men and the positive substitution effect for women (Sobotka et al. 2011). In more egalitarian settings, where men's and women's economic contributions to the household are similar, the relationship between fertility and changing employment circumstances in recessionary periods is expected to be unambiguously negative (i.e., because the negative income effect should predominate for both men and women).

In light of this theoretical ambiguity, failure to account for the employment circumstances of both men and women in models of fertility may produce results that are misleading in ways systematically related to the context in which they are observed. In relatively gender-egalitarian societies, focusing on only one sex will likely understate the association of growth in unemployment and nonstandard employment with fertility by not accounting for the negative income effect for the other sex (that is not captured by the correlation between indicators of men's and women's employment circumstances). In less egalitarian settings, where economic uncertainty for women may be positively associated with fertility, focusing on men only will presumably overstate the negative association of changing employment circumstances with fertility, whereas focusing only on women will understate or obscure the negative association.

Predictions derived from economic models of marriage and fertility have received a good deal of empirical support. Most studies have found that men's unemployment

(and part-time/nonstandard employment) is negatively associated with fertility (e.g., Ahn and Mira 2001; Amialchuk 2013; Schmitt 2012) and the transition to marriage (Blau et al. 2000; Oppenheimer et al. 1997). Similarly, several studies have found that women's unemployment is positively associated with fertility (e.g., Francesconi and Golsch 2005; Mills et al. 2005; Schmitt 2012). However, others have found that women's unemployment is negatively associated, or largely unrelated, with fertility (e.g., Andersson 2000; Kravdal 2002) and that this relationship has become more negative over time or is negative in more recent cohorts (Gutiérrez-Domènech 2008; Örsal and Goldstein 2010). These findings are suggestive of increasing symmetry in husbands' and wives' economic contributions to the family—a trend that sociologists have called the "shifting economic foundations of marriage" (Sweeney 2002).

Nonstandard Employment and the Long-Term Implications of Graduating During a Recession

In addition to rising unemployment, recent economic downturns have been accompanied by growth in *nonstandard employment*—a term that encompasses a variety of arrangements, including part-time work, seasonal work, dispatch work, and other types of short-term contract work (Kalleberg 2009; Kalleberg and Hewison 2013; Osawa et al. 2013). Previous research has documented a negative association of nonstandard employment with marriage and childbearing for both men and women (e.g., Adsera 2004, 2011; de la Rica and Iza 2005; Oppenheimer et al. 1997; Pailhé and Solaz 2012).

The spread of nonstandard employment has been observed in all wealthy countries (Mills and Blossfeld 2005), but there is regional variation in its nature and quality. For example, research on the United States and Japan has emphasized the precarious nature of nonstandard employment, arguing that this work tends to be in "bad jobs," characterized by low pay, weak employment security, limited access to benefits, and few opportunities for promotions or raises (Gottfried 2014; Houseman and Osawa 2003; Imai 2015; Kalleberg 2009; Kalleberg et al. 2000; Osawa et al. 2013). In other settings, such as the Netherlands and Scandinavian countries, part-time work and other nonstandard employment arrangements more closely resemble regular, full-time employment in terms of job quality and protection and are viewed positively for the flexibility they provide, particularly for married women (Blossfeld 1997; Hakim 1997; Kalleberg 2000; Smith et al. 1998).

Most analyses of the fertility implications of changing employment circumstances during economic downturns have focused on current employment (or expectations about future employment and earnings), but some have also considered the long-term implications of completing one's education during a recession. This research builds on evidence that entering the labor market in periods of high unemployment is associated with flatter income and wage trajectories (Altonji et al. 2016; Kahn 2010; Oreopoulos et al. 2012), a lower likelihood of subsequent labor force participation among women (Hershbein 2012), lower occupational attainment (Kahn 2010), and worse health (Maclean 2013).

Because the years following school completion are also prime ages for family formation, the economic consequences of entering the labor market during a recession have potentially important implications for family formation. Early-career experience of unemployment or nonstandard employment may affect

subsequent family formation indirectly via its impact on short- and mid-term economic attainment (Hershbein 2012; Oppenheimer et al. 1997) or perhaps more directly as a signal of economic prospects in the marriage market. Empirical results are mixed, with some finding that graduating during a recession is associated with later marriage and fertility (Ahn and Mira 2001; Wolbers 2007) and others concluding that graduating in an economic downturn accelerates the transition to parenthood (Hoffman and Hohmeyer 2016; Kondo 2012). Patterns appear to differ by gender, with a higher unemployment rate at graduation associated with earlier marriage and higher fertility for women, but later marriage and lower fertility for men (Kondo 2012; Maclean et al. 2016).

The Japanese Context

Japan's "Lost 20 Years"

Since 1989, Japan has experienced a period of economic stagnation sometimes called the "lost decade," and more recently, the "lost 20 years" (Fukao 2012). During this period, the unemployment rate and the prevalence of nonstandard employment increased markedly, and the TFR continued its steady decline. As shown in Fig. 1, unemployment rates peaked in the early 2000s at levels more than twice their 1990 values, the proportion of men and women employed in nonstandard work increased steadily, and the TFR fell from 1.54 to in 1990 to 1.26 in 2005
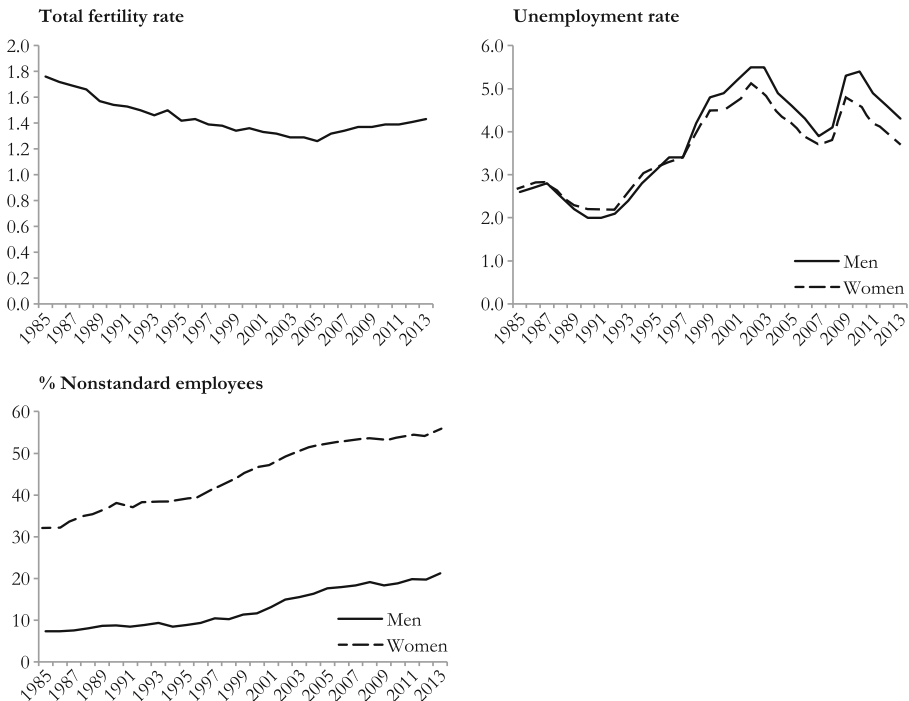
Fig. 1 Trends in fertility, unemployment, and nonstandard employment: 1985–2013. *Source:* Vital Statistics, Labor Force Survey (various years)

before rebounding slightly during the late 2000s. Links among these trends are suggested by evidence that higher male unemployment rates are associated with lower fertility (Ogura and Kadoda 2008) and that nonstandard employment is associated with lower rates of marriage and childbearing for both men and women (Kondo 2014; Nagase 2002; Piotrowski et al. 2015; Sakai and Higuchi 2005).

Because marriage and childbearing are closely related components of the "family package" in Japan (Rindfuss et al. 2004), it is important to distinguish the pathway through which employment circumstances are related to fertility. Nonmarital childbearing remains negligible, and earlier research has demonstrated that the steady decline in the TFR from the early 1970s through the 1990s was largely due to decline in the proportion of reproductive-age women who were married (Retherford et al. 2001).[1] The fact that marriage can be reasonably viewed as a signal of childbearing intentions in Japan suggests that employment instability or uncertainty may act as an important barrier to marriage but may have little relationship with childbirth after couples have married. For the same reason, relationships between changing employment circumstances and fertility conditional on marriage may be less pronounced for first births than for second and higher-order births.

The Japanese Gender Context

The highly asymmetric gender division of labor within Japanese marriages (Tsuya et al. 2005) provides an interesting contrast to the United States and most other Western countries. Despite rapid growth in women's educational attainment and the implementation of a range of policies designed to promote work-family balance (Boling 2008), married women's economic contributions to the family have remained largely supplemental. Recent data show that 60 % to 70 % of married women exit the labor force following marriage or pregnancy—a figure that has remained stable over the past 30 years (Iwasawa 2004; National Institute of Population and Social Security Research 2012). Most mothers ultimately return to the labor force, but opportunities for employment in secure well-paid jobs for returnees are limited, tax disincentives to full-time employment are strong, and normative expectations of "intensive mothering" increase the difficulties of work-family balance (Rosenbluth 2007).

Early-Career Employment in Japan

As in the United States, early-career circumstances and experiences, especially periods of nonstandard employment, are consequential for subsequent economic outcomes in Japan (e.g., Genda et al. 2010; Yu 2012). For example, nonstandard employment following school completion is associated with continued nonstandard employment and lower wages relative to those who were in standard employment following graduation (Sakai and Higuchi 2005). This is especially true for women (Genda and Kurosawa 2001).

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[1] The proportion of births registered to unmarried mothers is currently .02, up from .01 in the 1990s (National Institute of Population and Social Security Research 2015).

Research examining links between early employment experiences and subsequent family formation in Japan has produced mixed results. Some studies have concluded that completing school during a period of high unemployment is associated with relatively rapid transitions to marriage and parenthood for women (Higuchi 2001; Miyoshi 2014), whereas others have found that graduating in a recession is associated with later fertility among women with a high school education or less (Hashimoto and Kondo 2012). Similarly, some analyses of individual-level employment experiences have found that nonstandard employment in early adulthood is related to later marriage for both men and women (Nagase 2002; Sakai and Higuchi 2005), whereas others found an association with earlier marriage for men (Mizuochi 2006). Consistent with expectations based on the strong link between marriage and childbearing in Japan, there is little evidence of a relationship between early-career employment experiences and the timing of parenthood apart from the indirect link via marriage (Sakai and Higuchi 2005).

Hypotheses

In this section, we summarize the general theoretical framework and the distinctive features of the Japanese labor market and family environments described earlier in the form of testable hypotheses. Beginning with the overall relationship between changing employment circumstances and fertility, a theoretical framework stressing the pooling of complementary specializations within gender-asymmetric Japanese marriages suggests the following hypotheses:

> *Hypothesis 1*: Trends in men's unemployment and nonstandard employment are associated with lower fertility (negative income effect).

> *Hypothesis 2a*: Trends in women's unemployment and nonstandard employment are associated with higher fertility (positive substitution effect).

However, some recent evidence of decline in the negative association between women's earnings potential and marriage (Fukuda 2013; Fukuda and Raymo 2016) suggests that relationships between changing employment circumstances and fertility may be similar for men and women (as in the United States and other more gender-egalitarian societies).

> *Hypothesis 2b*: Trends in women's unemployment and nonstandard employment are associated with lower fertility (negative income effect).

The strong association between marriage and childbearing in Japan and evidence that much of the decline in the TFR since the mid-1970s can be explained by later and less marriage suggests the following:

> *Hypothesis 3*: Trends in unemployment and nonstandard employment for both men and women are associated with fertility primarily through marriage rather than marital fertility.

The facts that marriage can be reasonably viewed as a signal of childbearing intentions and the prevalence of childless marriages is low suggest the following hypothesis:

> *Hypothesis 4*: Relationships of unemployment and nonstandard employment with marital fertility should be stronger for higher-order births than for first births.

Data

To evaluate these hypotheses, we use data from the Keio Household Panel Survey (KHPS), a longitudinal study (2004–2011) of a nationally representative sample of adult men and women aged 20–70 at the initial interview.[2] Collection of retrospective employment histories from age 18 for the respondent and spouse in the initial surveys (2004 for the original sample, and 2007 for a second, supplementary sample) is a critical feature of the KHPS that allows us to evaluate the hypothesized relationships between employment circumstances and family formation.

At the same time, the KHPS does have two important shortcomings. The first is the absence of fertility history data, which necessitates inference of women's childbearing experience from the ages of coresident children enumerated in the household rosters. This is not overly problematic for children under age 18 at the time of the survey, but it does preclude observation of children who have left the parental home for postsecondary education, employment, or marriage. Concern about this data limitation is mitigated by our focus on fertility following the onset of the economic downturn. Because children aged 18 or younger at the time of the initial surveys in 2004/2007 were born after 1985/1988, construction of fertility histories from household rosters is suitable for our analyses of period fertility rates in the 1990s and early 2000s.

A more serious concern is the difficulty of measuring the parity of women who could have children older than age 18 and thus potentially missing from the household rosters. Without information on the ages of all children ever born, we were unable, in some cases, to construct the time-varying retrospective measure of parity required for parity-specific analyses of relationships between employment circumstances and childbearing. We addressed this problem by excluding from our analyses all women for whom we could not calculate with certainty a simple dichotomous measure of parity. These are women who did not report any coresiding children born prior to 1990 but could plausibly have a child age 18 or older who has left the parental home. The number of such women was small ($n = 112$ or 5 % of the sample on which the marital fertility analyses are based).

A second limitation of the KHPS data is underrepresentation of unmarried individuals in the initial surveys (2004 and 2007) and evidence that subsequent attrition from the panel was associated with both marriage and childbearing. To adjust for differential response rates in the initial surveys, we used census data to construct poststratification weights by sex, age, and marital status and used those weights in all analyses. To circumvent problems associated with nonrandom panel attrition, we limited our focus to the retrospective employment, marriage, and inferred fertility histories collected in the initial surveys in 2004 and 2007. We did not use information collected after the initial surveys.

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[2] Information about the KHPS is available online (https://www.pdrc.keio.ac.jp/en/paneldata/datasets/jhpskhps/).

Using these retrospective data, we constructed person-year records for female respondents and wives of married male respondents, including time-varying indicators of employment status, marital status, and childbearing from age 20 through age 40 (or age at initial survey if younger than age 40 in 2003 for the original sample or 2006 for the supplemental sample).[3] As described later, we estimated separate models for women's marital status at age x and childbearing among married couples between wife's age x and $x + 1$ ($x = 20$–40). Marital status is a three-category measure (never married, currently married, formerly married), and childbearing is a 0–1 indicator of birth within the next year.[4] Estimates based on these retrospective KHPS data were similar to marital status and fertility data from the Japanese census and vital statistics.

Individual and Aggregate Measures of Employment Circumstances

Women's (and husbands') current employment status is a five-category measure. Regular employment is the reference category, and unemployed and nonstandard employment are the two statuses of primary interest. The remaining two categories are those who were not in the labor force and those who were in other types of employment (self-employment, family work, and piecework). Regular employment refers to full-time employment with benefits and protections, and nonstandard employment refers to part-time work or employment on a fixed-term contract. The prevalence of unemployment based on the employment history data KHPS is lower than that observed in the census and labor force surveys, and we suspect that some person-years of unemployment have been coded as "not in the labor force" because respondents did not indicate that they were actively looking for work in that year.[5] Our models included this individual-level indicator of employment status at two points in time: in the current year and in the years following completion of schooling.[6] In the models for marital status, these measures of individual employment circumstances are for women only. In the models for marital fertility, we included separate measures for both the wife and husband.

In addition to these measures of individual employment circumstances, we also included aggregate measures of current and early-career employment conditions. These aggregate measures of age- and sex-specific unemployment rates and proportions of employees who are in nonstandard work reflect the broader employment environment and associated uncertainty. Both of these measures were taken from published tables in the annual Labor Force Survey.

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[3] We limited our focus to ages 20–40, given the very small numbers of births occurring outside of that age range. Vital statistics data show that for the period in question (1990–2006), 98 % of childbearing occurred between the ages of 20 and 40.

[4] Because the 2004 survey asked only about age at which respondents entered their current marriage and not about previous marriages for the formerly married, we imputed age at marriage and age at divorce for these women using data on modal durations between first marriage and first childbirth and between youngest child's birth and divorce observed in the National Fertility Surveys conducted by the National Institute for Population and Social Security Research. We used his imputation procedure for a small number of observations ($n = 116$, or 7 % of the women in the analyses of marital status).

[5] The employment history calendar asked respondents to identify their employment status(es) at each age, with response options being in school, looking for work (unemployed), nonstandard employment, regular employment, self-employment, piecework, and family work. If none of these statuses were marked, the respondent was coded as "not in the labor force" at that age.

[6] For simplicity, measures of employment status following school completion include only time spent unemployed and in nonstandard employment.

For both the individual- and aggregate-level measures of employment circumstances, we used lagged values to ensure appropriate temporal ordering. For the aggregate measures of current employment circumstances, we used three-year averages across ages $x - 3$ to $x - 1$. For individual measures of early-career employment circumstances, we used the cumulative proportion of years that individual respondents (and spouses) spent unemployed or in nonstandard employment within the first five years of completing their schooling. The aggregate measure of early-career employment circumstances is the mean value of the sex- and age-specific unemployment rate during the first five years following school completion.

After combining the 2004 and 2007 samples and dropping observations with missing data, we were left with 1,649 respondents and 16,995 person-year records between 1990 and 2006 for women aged 20–40 (for analyses of marital status), and 2,228 respondents and 18,761 married couple-year records constructed from the responses of both male and female respondents in which the wife (and husband) were aged 20–40 (for analyses of marital fertility). These members of our analytic sample were born between 1953 and 1986. As described in the next section, our analyses also incorporated data on unemployment and nonstandard employment (at both the aggregate and individual levels) measured over the period 1980–1989. Individual-level measures of pre-1990 employment circumstances were constructed from the person-year records for women (and their husbands) aged 20–40 between 1980 and 1989.

Method

Because the level of nonmarital childbearing is extremely low in Japan, the TFR in a given year (or range of years) can be expressed as the product of age-specific proportions married and age-specific marital fertility rates summed across reproductive ages (which we limit to 20–40):

$$TFR_t = \sum_{x=20}^{40} \frac{B_{xt}^m}{N_{xt}} = \sum_{x=20}^{40} \frac{B_{xt}^m}{M_{xt}} \times \frac{M_{xt}}{N_{xt}}.$$

Here, B_{xt}^m is the number of births (at all parities) to married women age x in year t, N_{xt} is the number of women age x in year t, and M_{xt} is the number of currently married women age x in year t. Using the person-year data just described, we began by estimating separate models for each of these two components of the TFR. We estimated the model for marital status using multinomial logistic regression and the model for marital childbearing using logistic regression. The outcomes of interest in these analyses were the log odds of being married at age x and the log odds of having a birth between ages x and $x + 1$, conditional on being married at age x.

Both models included a categorical measure of period (1990–1994, 1995–1999, 2000–2006), measures of women's age (quadratic in the marital status model and linear in the marital fertility model), the interaction between period and age, educational attainment (high school or less, vocational school or junior college, four-year college or more), and the aforementioned employment measures. The marital status model also included enrollment status (enrolled in school, not enrolled in school); and the marital fertility model

included husband's age, a dichotomous time-varying indicator of parity (parity 0 and parity 1+), and interactions between parity and all other variables in the model.

Both models included the corresponding current and early-career employment circumstances for men (i.e., husbands in the marital fertility models and "potential husbands" in the marital status models). Potential husbands are defined as men in the five-year age group three years older than women. For example, men in the 25–29 age group are the potential husbands of women aged 22–26. Inclusion of the three-category measure of calendar time (in addition to year-specific indicators of unemployment rates and the prevalence of nonstandard employment) accounts for concurrent trends in other factors, such as changes in attitudes (e.g., Esping-Andersen and Billari 2015), while also facilitating the calculation of TFR across five-year periods. Our goal in these analyses is not to estimate the causal effects of employment circumstances on family formation, but rather to estimate models of marital status and marital fertility as a function of employment circumstances in a way that approximately reproduces observed TFRs and allows for descriptive assessment of the substantive importance of changing employment circumstances using standardization techniques.

From these models, we generated predicted values of age-specific marital birth rates B_{xt}^m / M_{xt} and age-specific proportions of women currently married M_{xt} / N_{xt}, multiplied these two components of the age-specific fertility rate, and summed across ages 20–40 to produce an observed TFR at five-year intervals for the period 1990–2006. We then calculated counterfactual values of TFR by replacing observed measures of individual respondents' employment characteristics with pre-recession (1980s) values, regenerating age-specific predicted values, and summing to calculate TFR. As noted earlier, the 1980s values of employment characteristics are the age-sex-education–specific (and parity-specific) mean values of individual and aggregate measures of unemployment and nonstandard employment, both at age x and following school completion, for person-year records observed during the period 1980–1989. These person-year records are based on the full sample and are not restricted to women (wives) who were age 20–40 for at least one year between 1990 and 2006.[7]

Using these pre-recession measures of employment circumstances, we calculated nine counterfactual TFRs. First, by using 1980s measures of men's employment circumstances, we calculated (1) age-specific proportions of women married, (2) age-specific marital fertility rates, and (3) both proportions married and marital fertility rates. We then constructed three analogous counterfactual TFRs using 1980s values of women's economic characteristics, and then constructed three more TFRs using 1980s values for both men's and women's characteristics. Comparisons of these counterfactual TFRs with the observed TFR (and with each other) allow for descriptive evaluation of the relative substantive importance of changes in men's and women's employment circumstances and how each is related to change in TFR via marriage and marital fertility (Hypothesis 3). Similarly, insights into the ways in which employment circumstances and TFR may depend on parity are generated by comparison of observed and counterfactual parity-specific marital fertility rates (Hypothesis 4). Our primary interest is in trends in overall

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[7] Values of early-career measures were changed only for those who completed school in 1986 or later and were thus within five years of graduation for at least one year during the period 1990–2006. In the analyses of marital status, 57 % of women graduated from school in 1986 or later; and in the analyses of marital fertility, 41 % of women and 32 % of their husbands completed schooling in 1986 or later.

fertility rates, but parity-specific analyses provide valuable insights into how changing employment circumstances are related to marital fertility. To evaluate the statistical significance of differences between observed and counterfactual TFRs, we estimated bootstrapped standard errors for the 12 TFRs.

Results

Table 1 presents descriptive statistics for all variables in the marital status and marital fertility models. These figures are weighted means and percentages for all person-years comprising each of the two analytic samples. The bottom half of the table presents the mean values of the individual- and aggregate-level indicators of unemployment and nonstandard employment for both men and women, with individual measures for women and men followed by the aggregate measures for women and men. Men and women spent only a small proportion of their early-career years unemployed or working in nonstandard employment, current employment in nonstandard work is far more common among women than among men (0.16 vs. 0.02 in the marital fertility model), and current unemployment rates are relatively low (3 % to 5 %).

Table 2 presents mean values of the individual- and aggregate-level economic characteristics by period for both analytic samples. The values for 1980–1989 reflect the pre-recession characteristic-specific means used to calculate the counterfactual TFRs, and the other three columns present the observed means for each period for which TFR was calculated.[8] The individual measures show large increases in nonstandard employment for women. Changes in the individual characteristics of husbands (lower panel) are less pronounced—a pattern that may reflect the increasing selectivity of marriage for men with respect to employment characteristics. That is, the limited change observed for men in Table 2 may reflect the increasing tendency for men in the most tenuous economic circumstances to marry at older ages or to never marry (Kitamura and Sakamoto 2007; Piotrowski et al. 2015; Sakai and Higuchi 2005). The aggregate measures (from the Labor Force Surveys) clearly show the increase over time in unemployment rates and the prevalence of nonstandard employment for both men and women.

Tables 3 and 4 present the estimated coefficients for three models of women's marital status and couples' marital fertility, respectively. In both tables, Model 1 includes indicators of women's employment circumstances, Model 2 includes the corresponding indicators of (potential) husbands' employment circumstances, and Model 3 includes the employment circumstances of both men and women.

Marital Status

Results presented in panel A of Table 3 show that the log odds of being married increase with age before reaching a plateau.[9] Women who are currently in nonstandard employment, other employment, or not employed are significantly more likely to be married than women in regular employment, but other indicators of current employment

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[8] The values for 1980–1989 are summed across all observations (1990–2006).
[9] Results for the contrast between being formerly married and never married are presented in panel B of Table 3. Because these results are not central to the subsequent standardization exercise, we do not discuss them here.

Table 1 Descriptive statistics for all variables in marital status models and marital fertility models[a]

Variable	Marital Status Models		Marital Fertility Models	
	Mean/%	SD	Mean/%	SD
Marital Status				
Never married	0.48		0.00	
Married	0.49		1.00	
Formerly married	0.03		0.00	
Childbirth	—		0.12	
Parity				
0	—		0.17	
1+	—		0.83	
Age	28.73	5.77	32.01	4.71
Age Squared	866.35	348.10	—	
Husband's Age	—		35.16	5.78
Year				
1990–1994	0.28		0.33	
1995–1999	0.30		0.31	
2000–2006	0.43		0.36	
Educational Attainment				
High school or less	0.55		0.60	
Vocational/junior college	0.28		0.29	
University	0.18		0.11	
Enrolled in School	0.08		—	
Individual Measures of Employment Circumstances (female)				
Current employment status[b]				
Regular employment	0.36		0.25	
Nonstandard employment	0.20		0.16	
Other employment	0.11		0.16	
Unemployed	0.03		0.01	
Not employed	0.25		0.43	
Nonstandard employment following school	0.11	0.24	0.07	0.20
Unemployment following school	0.03	0.11	0.02	0.10
Individual Measures of Employment Circumstances (male)				
Current employment status[b]				
Regular employment	—		0.79	
Nonstandard employment	—		0.02	
Other employment	—		0.16	
Unemployed	—		0.01	
Not employed	—		0.02	
Nonstandard employment following school	—		0.02	0.18
Unemployment following school	—		0.04	0.08
Aggregate Measures of Employment Circumstances (female)				
Current unemployment rate	5.18	1.59	4.47	1.51

Table 1 (continued)

Variable	Marital Status Models		Marital Fertility Models	
	Mean/%	SD	Mean/%	SD
Current nonstandard employment prevalence	37.69	10.77	38.20	10.71
Early-career unemployment rate	5.30	1.65	4.28	1.48
Aggregate Measures of Employment Circumstances (male)				
Current unemployment rate	4.08	1.64	3.15	1.32
Current nonstandard employment prevalence	9.87	6.78	6.02	4.10
Early-career unemployment rate	5.94	2.02	5.03	2.00
N (person-years)	16,995		18,761	

[a] Based on weighted data.

[b] The sum of proportions is less than 1.0 because "enrolled in school" is also a status on the employment histories. The sum of proportions including "enrolled in school" is greater than 1.0 because respondents can be in more than one category in a given year.

circumstances are unrelated to the log odds of being married. This is true of both individual and aggregate measures for both men and women. In contrast, measures of early-career exposure to unemployment and nonstandard employment are associated with a significantly lower likelihood of being currently married. This is true for women's experience of nonstandard employment or unemployment following school completion and for the male unemployment rate during the five years following women's school completion. Auxiliary analyses show that the substantive importance of the early-career male unemployment rate is much larger than that of other variables.

Marital Fertility

Table 4 presents the results for the marital fertility models. In these models, coefficients for all variables are allowed to vary by the dichotomous indicator of parity (0 vs. 1+). To understand differences by parity in relationships between employment circumstances and marital fertility, we not only present the interaction coefficients (in the second column for each model, labeled "× Parity 1+") but also indicate the statistical significance of all parity-specific relationships. The former show whether relationships between a given variable and the risk of childbearing differ by parity, while the latter indicates whether relationships with childbearing differ significantly from 0, conditional on parity. Interaction coefficients displayed in bold identify variables whose association with marital fertility at parity 1+ is significantly different from 0. For example, in Model 1, the sum of the coefficient for university education (–0.44) and the interaction between university education and parity 1+ (1.12) is 0.68 and is significantly different from 0.

Results of these models are complex and differ by sex, parity, and the career stage and level at which employment circumstances are measured. Individual employment circumstances were largely unrelated to fertility. Two exceptions are women's current unemployment (negatively associated with higher-order births) and women's early-career experience of nonstandard employment (positively associated with higher-order births). The substantive magnitude of the relationship was not large in either case.

Table 2 Descriptive statistics for indicators of unemployment and nonstandard employment, by period and sample[a]

Variable	1980–1989[b] (mean / %)	1990–1994 (mean / %)	1995–1999 (mean / %)	2000–2006 (mean / %)
A. Marital Status Models				
Individual measures of employment circumstances (female)				
Current employment status				
Regular employment	0.39	0.37	0.36	0.36
Nonstandard employment	0.08	0.13	0.18	0.26
Other employment	0.15	0.14	0.12	0.09
Unemployed	0.01	0.01	0.02	0.06
Not employed	0.29	0.31	0.27	0.19
Nonstandard employment following school	0.05	0.06	0.09	0.16
Unemployment following school	0.01	0.02	0.02	0.04
Aggregate measures of employment circumstances (female)				
Current unemployment rate	3.37	3.16	4.79	6.76
Current nonstandard employment prevalence	26.18	31.91	35.21	43.17
Early-career unemployment rate	2.90	3.63	4.75	6.77
Aggregate measures of employment circumstances (male)				
Current unemployment rate	2.26	1.91	3.22	6.09
Current nonstandard employment prevalence	5.53	4.87	6.53	15.44
Early-career unemployment rate	3.12	4.39	5.32	7.38
N (person-years)	16,995	5,545	6,021	5,429
B. Marital Fertility Models				
Individual measures of employment circumstances (female)				
Current employment status[a]				
Regular employment	0.24	0.25	0.25	0.24
Nonstandard employment	0.08	0.14	0.15	0.20
Other employment	0.21	0.19	0.17	0.13
Unemployed	0.01	<0.01	0.01	0.02
Not employed	0.46	0.42	0.43	0.42
Nonstandard employment following school	0.05	0.05	0.06	0.09
Unemployment following school	0.01	0.01	0.02	0.02
Individual measures of employment circumstances (male)				
Current employment status[b]				
Regular employment	0.78	0.74	0.81	0.82
Nonstandard employment	0.02	0.02	0.02	0.04
Other employment	0.18	0.22	0.15	0.11
Unemployed	<0.01	<0.01	<0.01	0.02
Not employed	0.05	0.03	0.02	0.02
Nonstandard employment following school	0.04	0.04	0.05	0.06
Unemployment following school	0.01	0.01	0.02	0.03
Aggregate measures of employment circumstances (female)				
Current unemployment rate	2.99	2.84	4.35	6.07
Current nonstandard employment prevalence	30.55	35.88	36.68	41.64

Table 2 (continued)

Variable	1980–1989[b] (mean / %)	1990–1994 (mean / %)	1995–1999 (mean / %)	2000–2006 (mean / %)
Early-career unemployment rate	2.24	2.94	4.14	5.61
Aggregate measures of employment circumstances (male)				
Current unemployment rate	1.90	1.61	2.81	4.85
Current nonstandard employment prevalence	3.57	3.75	4.76	9.18
Early-career unemployment rate	2.61	3.52	4.92	6.50
N (person-years)	18,761	5,729	6,782	6,250

[a] Based on weighted data.

[b] Values are summed across the full 1990–2006 analytical sample.

In contrast, several of the aggregate employment measures were significantly associated with fertility. For example, the current female unemployment rate was positively associated with first births but negatively associated with higher-order births in Model 3: the former is consistent with Hypothesis 2a, while the latter is consistent with Hypothesis 2b. Coefficients for early-career unemployment rates (for both women and men) were in the opposite direction, indicating a negative association with first births but a positive association with higher-order births. In conjunction with the results for the marital status models, these estimates suggest that early-career economic uncertainty slowed subsequent family formation but was positively associated with fertility for women who already had at least one child. These results are only partially consistent with Hypothesis 3 and indicate that evaluations of Hypotheses 1 and 2 depend on parity. Auxiliary analyses indicated that the current female unemployment rate was of greatest substantive importance for understanding trends in marital fertility. The counterfactual fertility rate calculated based on 1980s values of the unemployment rate was lower than observed for first births and higher than observed for higher-order births. The current male unemployment rate and the early-career female unemployment rate also played a substantively important role in changing patterns of marital fertility, but the magnitude of relationships of fertility with individual employment characteristics and other aggregate employment measures was small.

Counterfactual TFR

Figures 2, 3, and 4 present the predicted TFR between 1990 and 2006 (solid line) and three counterfactual TFRs (dashed lines) calculated by holding men's and women's employment characteristics constant at their 1980s levels in the marital status model (circle markers), the marital fertility model (triangle markers), and both models (square markers). The observed TFR for the periods 1990–1994, 1995–1999, and 2000–2006 was calculated by summing the products of predicted age-specific proportions married and marital fertility rates from Model 3 in Tables 3 and 4 across the age range 20–40.[10]

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[10] The estimated values of TFR (1.59 in 1990–1994, 1.51 in 1995–1999, and 1.38 in 2000–2006) are somewhat (9 % to 12 %) higher than the TFR based on registration data. This primarily reflects somewhat higher estimated age-specific marital fertility rates at ages 20–25 in the KHPS data (relative to vital statistics data).

Table 3 Estimated coefficients from multinomial logistic regression models of women's marital status: Married versus never married (panel A) and formerly married versus never married (panel B)

Variable	Model 1	Model 2	Model 3
A. Married Versus Never Married			
Age	0.47**	0.56**	0.45**
Age squared	–0.01**	–0.02**	–0.01**
Year			
1990–1994 (omitted)	0.00	0.00	0.00
1995–1999	0.55*	0.51*	0.46†
2000–2006	0.19	0.65*	0.29
Age × Year			
Age × 1995–1999	–0.19**	–0.14**	–0.16**
Age × 2000–2006	–0.10*	–0.17**	–0.11*
Age squared × Year			
Age squared × 1995–1999	0.01**	0.01**	0.01**
Age squared × 2000–2006	0.00†	0.01**	0.00*
Educational attainment			
High school or less (omitted)	0.00	0.00	0.00
Vocational/junior college	–0.37**	-0.81**	–0.80**
University	–0.49**	–1.07**	–0.91**
Enrolled in school	–2.33**	–2.01**	–2.01**
Individual measures of employment circumstances (female)			
Current employment status			
Regular employment (omitted)	0.00		0.00
Nonstandard employment	1.23**		1.24**
Other employment	1.60**		1.59**
Unemployed	0.11		0.14
Not employed	2.83**		2.84**
Nonstandard employment following school	–1.31**		–1.32**
Unemployment following school	–1.71**		–1.76**
Aggregate measures of employment circumstances (female)			
Current unemployment rate	0.02		0.03
Current nonstandard employment prevalence	0.00		0.00
Early-career unemployment rate	–0.09**		0.05
Aggregate measures of employment circumstances (male)			
Current unemployment rate	—	–0.05	–0.03
Current nonstandard employment prevalence	—	0.01	0.00
Early-career unemployment rate	—	–0.15**	–0.19**
Constant	–2.62**	–1.50**	–2.41**
N (person-years)	16,995	16,995	16,995
B. Formerly Married Versus Never Married			
Age	0.69**	0.72**	0.67**
Age squared	–0.02**	–0.02**	–0.02**

Table 3 (continued)

Variable	Model 1	Model 2	Model 3
Year			
1990–1994 (omitted)	0.00	0.00	0.00
1995–1999	0.79	0.52	0.69
2000–2006	0.09	–0.03	0.08
Age × Year			
Age × 1995–1999	–0.23	–0.14	–0.20
Age × 2000–2006	–0.04	–0.02	–0.03
Age Squared × Year			
Age squared × 1995–1999	0.01*	0.01	0.01
Age squared × 2000–2006	0.00	0.00	0.00
Educational attainment			
High school or less (omitted)	0.00	0.00	0.00
Vocational/junior college	–0.53**	–1.40**	–1.06**
University	–0.87**	–1.80**	–1.38**
Enrolled in school	–8.13**	–7.74**	–8.04**
Individual measures of employment circumstances (female)			
Current employment status			
Regular employment (omitted)	0.00		0.00
Nonstandard employment	1.06**		1.07**
Other employment	0.82**		0.81**
Unemployed	–0.02		0.02
Not employed	1.67**		1.67**
Nonstandard employment following school	–2.54**		–2.53**
Unemployment following school	0.47*		0.40
Aggregate measures of employment circumstances (female)			
Current unemployment rate	0.07		0.10
Current nonstandard employment prevalence	0.00		0.00
Early-career unemployment rate	–0.26**		–0.08
Aggregate measures of employment circumstances (male)			
Current unemployment rate	—	0.00	–0.06
Current nonstandard employment prevalence	—	0.00	0.01
Early-career unemployment rate		–0.32**	–0.25**
Constant	–5.95**	–4.62**	–5.17**
N (person-years)	16,995	16,995	16,995

$^\dagger p < .10$; $^* p < .05$; $^{**} p < .01$

To calculate the counterfactual TFR under different scenarios, we recalculated predicted probabilities of being married and of childbirth after replacing individual respondents' observed employment characteristics with mean values from men and women of similar age and education (and parity) observed during the period 1980–1989.[11] This

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[11] Aggregate employment measures are not education-specific (or parity-specific).

Table 4 Estimated coefficients from logistic regression models of childbirth within marriage

Variable	Model 1		Model 2		Model 3	
	Coefficient	× Parity 1+[a]	Coefficient	× Parity 1+[a]	Coefficient	× Parity 1+[a]
Wife's Age	-0.08**	**0.00**	-0.06*	**-0.05**	-0.08**	**-0.03**
Husband's Age	-0.03	**-0.03**	-0.05	**0.02**	-0.05**	0.02
Year						
1990–1994 (omitted)	0.00	0.00	0.00	0.00	0.00	0.00
1995–1999	-0.43	0.37	0.09	-0.24	-0.37	0.25
2000–2006	-1.11*	1.33*	-0.33	0.32	-0.95	1.02*
Educational Attainment						
High school or less (omitted)	0.00	0.00	0.00	0.00	0.00	0.00
Vocational/junior college	-0.06	**0.38***	-0.02	**0.28**	-0.09	**0.45***
University	-0.44**	**1.12****	-0.51**	**1.29****	-0.55**	**1.34****
Individual Measures of Employment Circumstances (female)						
Current employment status						
Regular employment (omitted)	0.00	0.00			0.00	0.00
Nonstandard employment	0.09	-0.38			0.07	-0.36
Other employment	0.74**	-0.84**			0.76**	**-0.82****
Unemployed	-0.18	**-0.80**			-0.24	**-0.76**
Not employed	0.56**	**-0.19**			0.57**	**-0.17****
Nonstandard employment following school	0.02	**0.41**			0.01	**0.40**
Unemployment following school	-0.21	0.04			-0.21	0.08

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Table 4 (continued)

Variable	Model 1		Model 2		Model 3	
	Coefficient	× Parity 1+[a]	Coefficient	× Parity 1+[a]	Coefficient	× Parity 1+[a]
Individual Measures of Employment Circumstances (male)						
Current employment status						
Regular employment (omitted)			0.00	0.00	0.00	0.00
Nonstandard employment			0.21	-0.16	0.33	-0.42
Other employment			0.12	-0.28	-0.07	-0.02
Unemployed			-0.45	0.88	-0.45	0.86
Not employed			-0.10	0.46	-0.23	0.58
Nonstandard employment following school			0.30	-0.15	0.27	-0.07
Unemployment following school			0.32	-0.51	0.20	-0.29
Aggregate Measures of Employment Circumstances (female)						
Current unemployment rate	0.30**	-0.41**			0.38**	**-0.56****
Current nonstandard employment prevalence	-0.01	**0.00**			-0.01	**-0.01**
Early-career unemployment rate	-0.16*	**0.41****			-0.13*	**0.36****
Aggregate Measures of Employment Circumstances (male)						
Current unemployment rate			-0.07	0.12	-0.15	0.29*
Current nonstandard employment prevalence			0.01	-0.03	0.03*	**-0.05****
Early-career unemployment rate			-0.09**	**0.18****	-0.07*	**0.14***
Constant	-0.10	-1.05	0.91	-1.87**	0.06	-1.49
N (person-years)	18,761		18,761		18,761	

Note: Bold font indicates variables that are significantly associated with fertility at parity 1+.

[a] Column contains an interaction between the variable and an indicator of parity 1+.

[†] $p < .10$; *$p < .05$; **$p < .01$

regression standardization exercise allows us to observe what the TFR would have been had employment circumstances counterfactually remained at their pre-recessionary levels, all else being equal. We use solid markers to denote counterfactual TFRs found to be significantly different from the observed TFR for that period based on our estimation of bootstrapped standard errors.

In Fig. 2, the counterfactual TFR calculated by holding men's employment circumstances constant at their 1980s levels in the marital status model was higher than the observed TFR, meaning that changes in men's employment were associated with lower fertility via their negative association with marriage. This association is substantively large and statistically significant, with the counterfactual TFR stable at about 1.7—a level that was roughly 20 % higher than the calculated value for the period 2000–2006. The dashed line with triangle markers shows that trends in men's employment circumstances were largely unrelated to trends in marital fertility, except during the most recent period in which the counterfactual value was somewhat lower than the observed TFR (primarily reflecting the positive association between early-career male unemployment rates and fertility among couples with at least one child). The dashed line with square markers represents the combined relationships via marriage and marital fertility. The fact that it was higher than the observed TFR reflects the negative relationship between changes in men's employment circumstances and the proportion of women married. This difference was statistically significant in 1990–1994 and approached significance in 1995–1999 ($p = .06$).

Figure 3 presents the observed TFR and counterfactual TFRs that reflect the role of changes in women's employment circumstances. The solid line is the predicted TFR shown in Fig. 2. The dashed line with circle markers is similar to the solid line, indicating that holding women's employment circumstances constant at their pre-1990 values does not change the predicted age-specific proportions of women married. This does not mean that women's employment circumstances are unrelated to marriage, but rather that relationships are not substantively large and that changes in different aspects of employment offset each other. As shown in Table 3, women's early-career experiences of
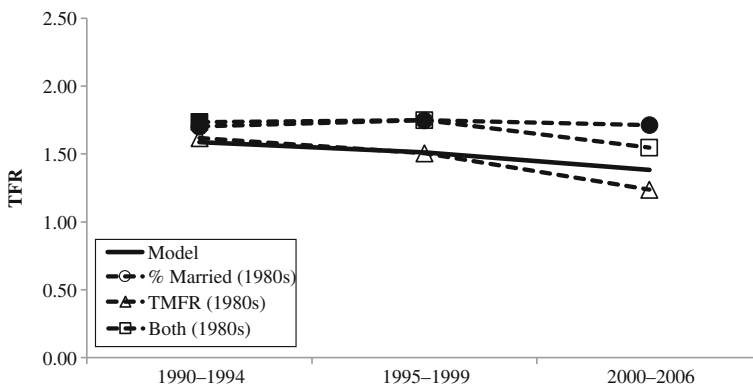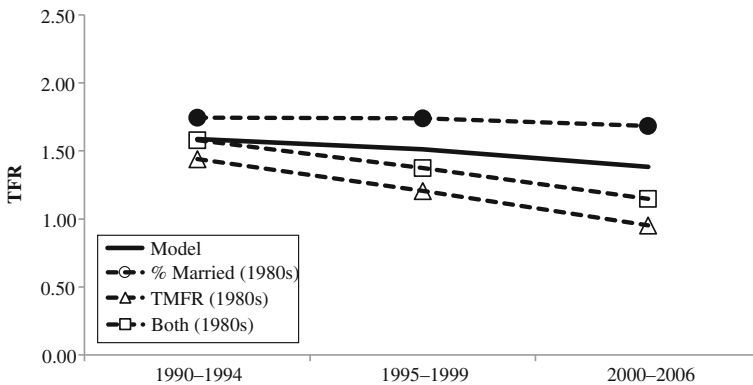

Fig. 2 Model and counterfactual TFR, holding men's employment constant at 1980s values. % Married (1980s) is the TFR calculated by holding men's employment characteristics constant at their 1980s values in the marital status model. TMFR (1980s) is the TFR calculated by holding men's employment characteristics constant at their 1980s values in the marital fertility model. % Married and TMFR (1980s) is the TFR calculated by holding men's employment characteristics constant at their 1980s values in both the marital status and marital fertility models
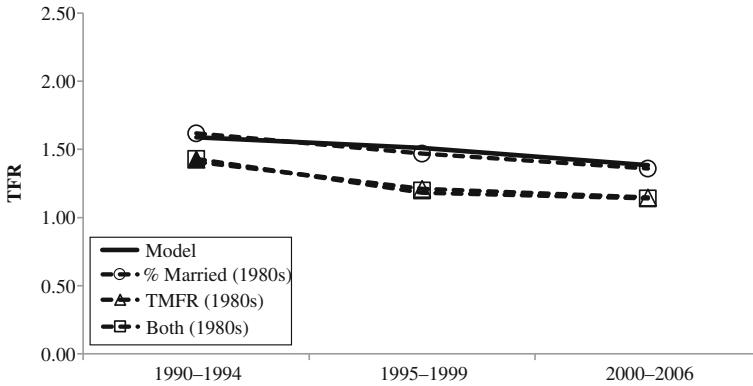
Fig. 3 Model and counterfactual TFR, holding women's employment constant at 1980s values. % Married (1980s) is the TFR calculated by holding women's employment characteristics constant at their 1980s values in the marital status model. TMFR (1980s) is the TFR calculated by holding women's employment characteristics constant at their 1980s values in the marital fertility model. % Married and TMFR (1980s) is the TFR calculated by holding women's employment characteristics constant at their 1980s values in both the marital status and marital fertility models

unemployment and nonstandard employment are negatively associated with marriage, but women currently employed in nonstandard work are more likely to be married.

In contrast, the dashed line with triangle markers is well below the observed TFR, indicating that changes in women's economic circumstances since 1990 were associated with a higher TFR via their positive relationship with marital fertility. The results in Table 4 (along with auxiliary analyses of the substantive magnitude of relationships) show that this primarily reflects the parity-specific implications of women's increasing unemployment rates (both current and early-career). The counterfactual TFR calculated by holding women's employment characteristics constant in both the marriage and marital fertility models was 10 % to 22 % lower than the observed TFR. Changes in women's employment circumstances were thus associated with higher fertility via their

Fig. 4 Model and counterfactual TFR, holding men's and women's employment constant at 1980s values. % Married (1980s) is the TFR calculated by holding men's and women's employment characteristics constant at their 1980s values in the marital status model. TMFR (1980s) is the TFR calculated by holding men's and women's employment characteristics constant at their 1980s values in the marital fertility model. % Married and TMFR (1980s) is the TFR calculated by holding men's and women's employment characteristics constant at their 1980s values in both the marital status and marital fertility models

positive relationship with marital fertility. Parity-specific analyses show that this relationship was most pronounced at parity 1+ in the first period (1990–1994) but at parity 0 beyond 1995. In the first two periods, the *p* values for Wald tests comparing the observed TFR values with the counterfactual TFRs calculated by holding employment characteristics constant in the fertility model in both the marriage and marital fertility models were less than .10.

Figure 4 presents the counterfactual values in which both women's and men's characteristics were counterfactually replaced with their characteristic-specific mean values for the period 1980–1989. Because these figures are a combination of those shown in Figs. 2 and 3, the dashed line with circle markers reflects the link between changes in men's employment circumstances and a lower prevalence of marriage, and the dashed line with triangle markers reflects the link between changes in women's employment circumstances and higher marital fertility. The dashed line with square markers indicates that the latter outweighed the former beyond 1995. The counterfactual TFR calculated by holding both men's and women's employment characteristics constant in both the marital status and marital fertility models was 10 % to 20 % lower than the observed TFR from our models. Stated differently, changes in unemployment and nonstandard employment during Japan's economic downturn were associated with higher fertility in this counterfactual accounting exercise (although the bootstrapped standard errors indicate that these differences are not statistically different from 0).

As shown in the preceding figures, the difference between observed and counterfactual TFRs clearly reflects the positive association between changes in women's employment circumstances and marital fertility more than offsetting the negative association between changes in men's employment circumstances and the proportion of women married. As noted earlier, parity-specific analyses show that the relationship between women's changing employment circumstance and higher fertility is most pronounced at parity 0 (beyond 1995).

Discussion

In this article, we used a unique source of survey data to demonstrate that changing employment circumstances in Japan, especially rising unemployment rates, were associated with somewhat higher fertility during the period 1990–2006. This reflects a positive relationship between women's changing employment circumstances and marital fertility that more than offsets a negative relationship between men's changing employment circumstances and marriage. These findings are consistent with predictions derived from theoretical emphases on the highly differentiated economic roles of men and women within the family (Hypotheses 1 and 2a).

Our analyses shed light on the relevance of two other distinctive features of the Japanese context: the close link between marriage and childbearing and the long-term implications of early-career employment circumstances and experiences. Finding that growth in men's unemployment and nonstandard employment contributes to lower fertility via marriage is consistent with emphases on the central role of men's economic resources in shaping the economic threshold for marriage, especially in societies where breadwinner-homemaker families remain common (Hypothesis 3). Our finding that growth in women's unemployment and nonstandard employment is positively

associated with marital fertility (but not marriage) is not consistent with Hypothesis 3 but is consistent with emphases on the supplementary nature of married women's employment and earnings within marriages characterized by a highly asymmetric gender division of labor and a labor market characterized by limited career opportunities for women.

Results relevant to the evaluation of Hypothesis 4 are mixed. As shown in Table 4, some employment characteristics were associated only with the probability of higher-order births (e.g., women's unemployment), and several were associated with first and higher-order births but in different directions (e.g., the current female unemployment rate). To better understand how these mixed results contribute to the patterns observed in Figs. 2, 3 and 4, we conducted a supplemental series of standardization analyses analogous to those presented in Figs. 2, 3, and 4. In these analyses, we examined trends in marital fertility rates, with the two component processes being first births and higher-order births (rather than marriage and marital fertility). Results indicate that changes in women's employment circumstances (especially increase in the current unemployment rate) contributed to keep first-birth rates from falling further: counterfactual first-birth rates calculated by holding women's employment circumstances constant at their 1980s levels were well below the observed rates.

The employment histories in the KHPS were essential for our analyses, but these data are limited by the need to partially impute or indirectly measure marriage and fertility histories. Concern about the quality of marriage and fertility data was mitigated by the correspondence of age-specific trends in marital status and fertility in the KHPS and in registration data. The analyses in this article could be meaningfully extended in several ways. First, perhaps relationships between employment circumstances and fertility (and gender differences therein) are stronger at some ages than others or for some socioeconomic groups relative to others. For example, uncertain or precarious employment for men may be particularly important at younger ages to the extent that it acts as a barrier to marriage (Oppenheimer et al. 1997). Alternatively, the role of uncertain employment may be more pronounced for more highly educated men and women than for those on flatter career trajectories (e.g., Huttunen and Kellokumpu 2016; Kreyenfeld 2010).

Second, our theoretical framework and empirical analyses focus on relationships of men's and women's employment circumstances with marriage and fertility while only indirectly referencing the division of unpaid labor within the family. We are unaware of any surveys that contain retrospective domestic work histories, but analyses of pro-spective data would allow for incorporation of information on the division of household labor. The use of such data would also allow for more direct assessment of the extent to which our speculation about the role of gender-inegalitarian marriages in shaping relationships between changing employment circumstances and family formation is borne out at the individual/couple level.

Third, our use of retrospective family and employment histories presumably intro-duces measurement error and also complicates the estimation of causal links between (changing) employment circumstances and family formation. Retrospective reports of year of marriage are presumably reliable, but retrospective employment histories are more problematic, as evidenced by the low levels of unemployment reported in the KHPS. Measurement error may be particularly relevant for those with more complex employment histories, especially women and men who are not employed in the primary

labor market. This is not particularly problematic for our descriptive standardization exercise, but it does preclude direct evaluation of predictions from the theoretical models motivating our analyses. In light of ongoing policy efforts to promote marriage and fertility (Suzuki 2006), pursuing the evaluation of causal relationships between employment circumstances and family formation is an important direction for future research (see, e.g., Nagase 2015; Shigeno and Ohkusa 1998).

Fourth, our counterfactual standardization approach is designed to facilitate comparisons under an unrealistic set of assumptions. In particular, it assumes that all other factors would remain as observed when we counterfactually hold one set of variables constant at their 1980s values. For example, when we hold women's employment characteristics constant at their 1980s values, men's employment characteristics are assumed to change across time as observed in the data. Our simulations based on this conventional demographic technique should thus be viewed as part of an accounting exercise designed to facilitate insights into the mechanical links between changing employment circumstances and fertility.

Taken as a whole, our results are most important for their contrast with the findings of other recent studies of economic uncertainty and fertility. Unlike the large body of research on the United States, Western Europe, and Eastern Europe, our research suggests that rising levels of unemployment and nonstandard employment have prevented even more pronounced fertility decline, and we demonstrated how this pattern reflects offsetting relationships for men's and women's employment circumstances. We view these findings as particularly important for their insights into the ways in which gender context and the strength of the link between marriage and childbearing matter for understanding relationships between changing employment conditions and fertility. Exploring similar questions in a range of settings will facilitate further contextual modification of theoretical links between precarious employment and family formation. For example, a similar analysis of relationships between men's and women's employment circumstances and fertility in Korea or Taiwan during the Asian economic crisis of the late 1990s would provide useful insight regarding the generality of our results. Evidence that our findings for Japan are not idiosyncratic, and reflect a more general pattern of fertility decline being muted during economic downturns in more gender-inegalitarian countries, would be an important contribution to our understanding of how economic shocks are related to patterns of family formation.

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