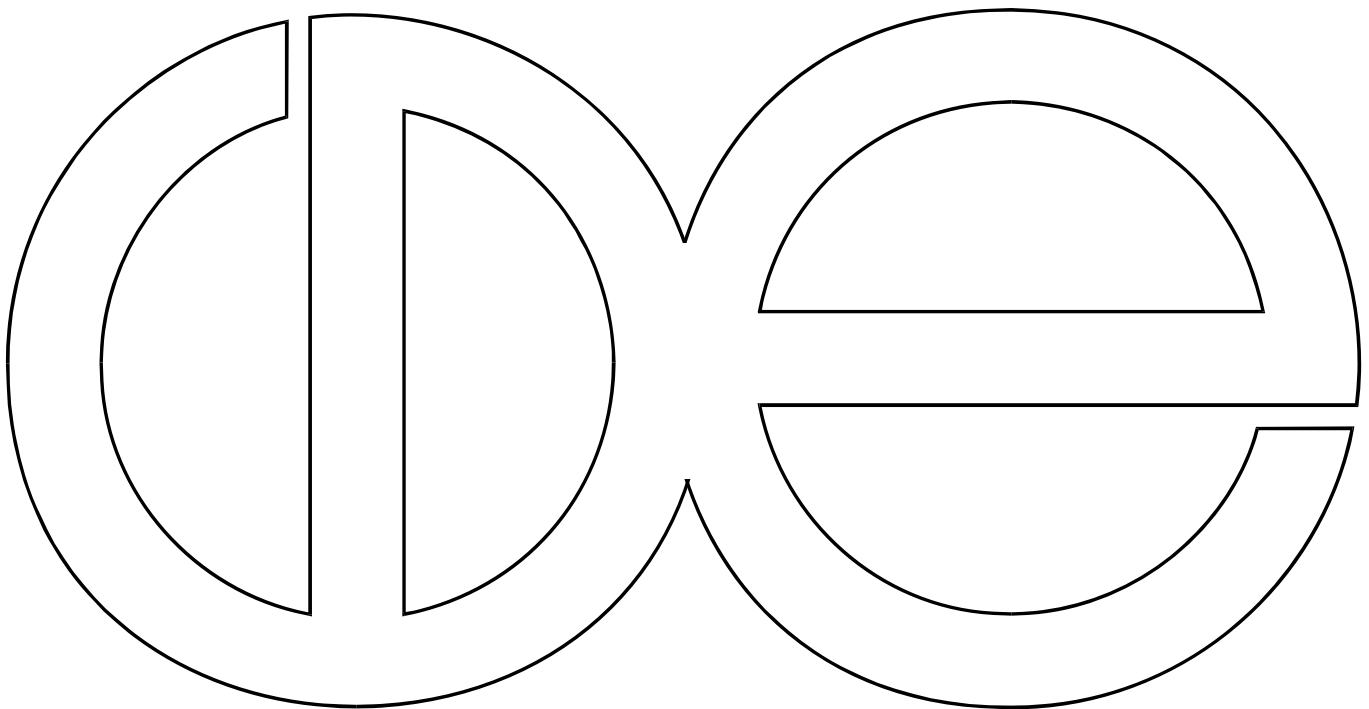


**Center for Demography and Ecology
University of Wisconsin-Madison**

**"Gender Revolution", Globalization, and
Educational Assortative Mating:
New Evidence from Japan**

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**"Gender Revolution", Globalization, and Educational Assortative Mating:
New Evidence from Japan**

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Abstract

Weakening or reversal of the negative educational gradient in women's marriage represents a profound shift in patterns of family formation in many high-income countries. However, efforts to explain this shift in the "economic foundations of marriage" have been limited in both theoretical scope and geographical focus. In this paper, we articulated two mechanisms of change by drawing upon one broad theoretical framework focusing on "gender revolution" and another emphasizing processes of globalization and associated trends in labor market bifurcation. We used harmonic-mean two-sex marriage models to generate evidence with which to evaluate hypotheses derived from these two alternative, but not mutually exclusive, explanations for change in the educational gradient in marriage. Our analyses of Japanese data from 1990-2008 showed that the negative educational gradient in women's first marriage disappeared in the late 2000s. This change was brought about by a combination of declines in the marriage rates of less-educated women and increases in the marriage rates of highly-educated women. The former finding is consistent with expectations derived from the globalization framework whereas the latter is consistent with the gender revolution framework.

Keywords

Marriage, Education, Assortative mating, Gender, Globalization, Japan

Introduction

Educational differences in whether and when people marry are of great interest to demographers and stratification researchers, reflecting the strong association of marriage with fertility, economic well-being, and health across the life course (Kalmijn 2013). The educational gradient in women's marriage has undergone a profound shift in many high-income countries. In the past, highly-educated women tended to marry later and were more likely to never marry (Goldin 2004; Torr 2011). Today, women with higher levels of education continue to marry later, but are no longer more likely than their less-educated counterparts to remain unmarried. This weakening or reversal of the negative educational gradient in marriage has been documented in Australia and New Zealand (Heard 2011), several European countries (Goldscheider et al. 2001; Kalmijn 2013), the U.S. (Fry 2010; Goldstein and Kenney 2001; Schoen and Cheng 2006; Torr 2011), and in East Asia (Cheng 2014; Park et al. 2013; Park and Lee 2017).

Efforts to explain this shift in the “economic foundations of marriage” draw attention to a trio of social and economic changes: growth in women's educational attainment and earnings potential, decline in men's capacity to fulfill the role of breadwinner, and change in gender attitudes (e.g., Sweeney 2002). This work has shed important light on the implications for marriage of profound changes in the societal organization of men's and women's opportunities and roles, but is limited in that it does not consider the relative importance of these three factors and that it focuses primarily on the U.S. As a result, we know relatively little about how the roles played by these factors in shaping the educational gradient in marriage may differ across social and economic contexts.

To address these shortcomings, we draw upon two broad research frameworks, one of which places primary emphasis on shifting gender attitudes and related behaviors and one of which

emphasizes labor market changes that hinder economic independence at young ages. The former highlights the role of increasing educational attainment and employment opportunities for women in the emergence of gender-egalitarian attitudes and the growing valuation of women's economic potential in the marriage market. This work describes a "gender revolution" (Esping-Andersen 2009; Esping-Andersen and Billari 2015; Goldscheider et al. 2015) that has profound implications for the desirability of marriages involving highly-educated women (Sweeney and Cancian 2004), the relative likelihood of marriage among well-educated women (Goldstein and Kenney 2001), growing educational differences in non-marital fertility (Ellwood and Jencks 2004), and trends in inequality both within and across generations (Schwartz 2010).

In contrast, the latter framework stresses changing labor market conditions that accompany globalization and associated difficulties in establishing and maintaining male breadwinner-female homemaker marriages, especially for men with lower levels of educational attainment. This work describes the decline of low-skill work that provides a pathway to the middle class (Cherlin 2014) and an associated decline in the availability of "marriageable men" (Sawhill and Venator 2015; Wilson and Neckerman 1987). These changes are thought to contribute to later and less marriage among less-educated men and the low-educated women most likely to marry them (Oppenheimer et al. 1997), a rise in non-marital relationships (Smock et al. 2005), a decoupling of marriage and childbearing (Edin and Kefalas 2005), and exacerbation of social and economic inequality (Blossfeld and Buchholz 2009; Ellwood and Jencks 2004).

We evaluate the relevance of insights from these two broad frameworks in the Japanese context by examining trends in both the educational gradient in marriage rates and change over time in specific educational pairings. A relatively understudied country characterized by a pronounced trend toward later and less marriage (Raymo 2003; Retherford et al. 2001) and a

strong negative educational gradient in women's marriage (Raymo 2003), Japan is a source of potentially valuable insight for a variety of reasons. It is a society in which changes in gender attitudes have been slow to emerge, norms and expectations of female status hypergamy remain strong, and breadwinner-homemaker marriages remain more common than in well-studied Western countries. It is also a society characterized by growing economic inequality, rapid expansion of non-standard employment, and policy efforts to promote female labor force participation. As discussed below, these distinctive features of the Japanese social, economic, and policy context lead to a range of alternative, theoretically-informed expectations about the likelihood of change in the educational gradient and the relative importance of "gender revolution" and "labor market change" for understanding changes we do observe.

Two Broad Frameworks for Understanding Family Change

Gender Revolution

Changes in men's and women's life course and in the gender division of labor within marriage have occurred in all developed countries. One striking example is reversal of the gender gap in education, with women now completing more education than their male counterparts in most countries (DiPrete and Buchmann 2006; Esteve et al. 2016; van Bavel 2012). Changes in men's and women's relative educational attainment are reflected in other economic indicators, including labor force participation and earnings. Men's labor force participation rates remain higher than women's, but the gap has shrunk markedly over the past several decades (Goldin 2006; Oppenheimer 1994) as has the gender wage gap (Blau and Kahn 2017; Mandel and Semynov 2014). As higher education and employment across the life course have become expected parts of women's life course, attitudes toward gender roles and the division of household labor have also become more egalitarian (Goldin 2006).

This broad set of ideas is articulated in recent research on the “gender revolution” or the “female revolution” (Esping-Andersen and Billari 2015; Goldscheider et al. 2015).¹ This framework depicts substantial changes in family behavior observed in recent decades as part of a broader shift from a societal equilibrium characterized by male-breadwinner, female-homemaker families to a new equilibrium characterized by gender-egalitarian, dual-earner families. This new societal equilibrium corresponds to the “second half” of the gender revolution in which shifts in men’s attitudes and behavior make the emergence of gender-egalitarian families possible (Goldscheider et al. 2015). The scope of the gender revolution framework is broad, but evidence that “the educational gradient of family behavior is upended” sits at its core (Esping-Andersen and Billari 2015:2). As Goldscheider et al. (2015:207) note, the weakening and reversal of long-standing linkages between socioeconomic status and family behavior (e.g., the negative educational gradient in marriage) “are rooted in changing gender relationships, as female employment has become not only ubiquitous, but expected.”

Convergence in men’s and women’s educational attainment makes older patterns of spouse pairing, including female educational hypergamy, numerically more difficult (Esteve et al. 2016; Hou and Myles 2008; van Bavel 2012). It may also strengthen the role of shared values and expectations regarding the gender division of labor within marriage as a spouse selection criterion, resulting in more educationally homogamous marriages characterized by more gender egalitarian relationships, especially among the more highly educated (Blossfeld and Timm 2003; Esping-Andersen and Billari 2015; Hou and Myles 2008). To the extent that the earnings potential associated with higher education enhances women’s willingness and ability to “cast a wider net” in the marriage market (perhaps in response to declining social sanctions or stigma),

¹ Note that Goldin (2006) refers to these same changes as the “quiet revolution.”

we might also expect an increase in formerly non-normative female status hypogamous marriages (Blossfeld 2009; Blossfeld and Timm 2003; Oppenheimer and Lew 1995).

Globalization and Labor Market Change

Another broad body of literature articulates theoretical and empirical linkages between the changing educational gradient in marriage and the forces of globalization and associated changes in employment security and pathways to economic independence (Buchholz et al. 2009; Lundberg et al. 2016; Mills and Blossfeld 2013). These changes include increasing difficulty of establishing economic independence at young ages (Oppenheimer et al. 1997), declining labor union membership (Schneider and Reich 2014), increases in involuntary job loss (Farber 2005), and a rise in “bad jobs” characterized by low pay, limited employment security, and lack of pension and health insurance coverage (Kalleberg 2009, 2011; Kalleberg et al. 2000). The decline in stable jobs providing a “family wage” has increased the difficulty of forming and maintaining marriages based on gender-based specialization in market and domestic labor (Cherlin 2014; Oppenheimer 1994, 1997), and these changes are particularly pronounced among lower-skilled and less-educated workers (Blossfeld et al. 2005; Breen 1997; Buchholz et al. 2009). These shifting employment patterns are observed across wealthy countries, but are particularly prominent in the English-speaking countries and in East Asia (Buchholz et al 2009; Kalleberg and Hewison 2013).

Research on marriage in the U.S. discusses these changes with reference to an economic “bar” to marriage (e.g., Gibson-Davis 2007; Gibson-Davis et al. 2005) and marriage as a “capstone” event (Cherlin 2004). Tension between declining economic security at young ages and maintenance of high expectations for economic stability as a prerequisite for marriage is thought to underlie the relatively rapid reduction in marriage rates among men and women with

lower levels of education. Unable to meet the high normative expectations of economic stability prior to marriage, less-educated men and women are increasingly forming cohabiting unions (Lundberg et al. 2016; Smock et al. 2005) and having children outside of marriage (Edin and Kefalas 2005).

The differential impact of globalization and associated loss of manufacturing jobs in many wealthy countries also has implications for spouse pairing, with less-educated men finding it more difficult to attract a spouse. In the U.S., this focus on the shrinking pool of “marriageable men” has played an important role in research on declining rates of marriage among Blacks (Lichter et al. 1992; Raley 1996; Wilson and Neckerman 1987) and a similar argument can be made for men with lower levels of education. Additionally, the diverging employment and earnings trajectories of those with lower and higher levels of education may also contribute to growing educational homogamy via increasing segmentation of the spheres of activity in which these groups live their lives (McClendon et al. 2014).

Synthesis

These two frameworks for understanding family change (and educational differences therein) are not mutually exclusive, but their primary foci differ in ways that can be leveraged to generate useful insights about the relevant forces of change in different social and economic contexts. Of particular importance is the fact that, because the central mechanism of change is different, the primary subgroup affected by change is different and predicted patterns of change differ by education. As described above, the “gender revolution” framework focuses primarily on changes relevant at higher levels of education. Increases in educational attainment, especially for women, drive the shifts in both attitudes and opportunities (Esping-Andersen and Billari 2015). As such, this scenario suggests that change in the educational gradient of marriage primarily reflects

increases in marriage rates among the highly educated. It also suggests that part of the reason for this shift is an increasing propensity for the highly educated to marry each other (esp. a shift from a tendency for highly-educated men to marry hypogamously to a tendency for them to marry homogamously). This scenario would also be consistent with an increase in the propensity for highly-educated women to marry men with less education than themselves (Oppenheimer 1988; Oppenheimer and Lew 1995).

In contrast to the gender revolution framework, theoretical emphases on changing labor market conditions in the context of globalization focus primarily on changes relevant at lower levels of education. In this framework, it is increasingly tenuous economic prospects among the less educated, especially men, that underlie declines in marriage. As such, this scenario suggests that emergence of a positive educational gradient in marriage primarily reflects relatively large decrease in marriage rates among the least educated. It also suggests that part of the reason for this shift is a decreasing propensity for all marital pairings involving less-educated men.

Research on the gender revolution emphasizes the ways in which expanding economic opportunities for women interact with changing gender values and expectations to facilitate marriage among highly-educated women. A general inference from these theoretical frameworks is that we should see a negative educational gradient in marriage in relatively gender-inegalitarian societies that weakens over time in response to an increasingly egalitarian organization of social institutions, including the workplace and the family.

Research on educational differences in marriage in relatively gender-inegalitarian countries is generally consistent with these predictions. Several studies have shown that women's educational attainment and earnings are associated with later age at marriage and a higher likelihood of never marrying in Southern European, East Asian, and Southeast Asian countries

(Blossfeld 1995; Goldscheider et al. 2001; Jones 2007; Ono 2003; Park et al. 2013; Raymo 1998, 2003). Research on educational assortative mating is also consistent with these expectations, showing that female status hypergamy remains common (Smits and Park 2009) and that gender asymmetry in pairing preferences, combined with convergence in men's and women's educational attainment, has resulted in marriage market mismatches that reduced the marriage rates of highly-educated women in East Asia (Raymo and Iwasawa 2005; Raymo and Park 2018).

East Asia includes some of the most gender-inegalitarian industrialized countries and is thus an area where we should not expect to see a weakening or reversal of the educational gradient in marriage. However, recent studies do provide evidence of a reversal in the negative socioeconomic gradient in marriage in Japan (Fukuda 2013), Korea (Park et al. 2013; Park and Lee 2017), and Taiwan (Cheng 2014). Should we view these results as a reflection of progress in the “gender revolution?” Might we observe a shift in the economic foundations of marriage even in the absence of substantial change in the degree of gender egalitarianism? Theoretical emphases on labor market bifurcation in the context of globalization predict similar patterns of marital change and may be more relevant in countries like Japan where gender-egalitarian attitudes have been relatively slow to emerge while labor market change has been particularly rapid.

Reasons to (Not) Expect a Shift in the Economic Foundations of Marriage in Japan

Gender Revolution

Cross-national measures of gender equality show Japan to be one of the most gender-unequal industrialized countries. For example, the 2017 Global Gender Gap Report ranked Japan 114 out of 144 countries (http://www3.weforum.org/docs/WEF_GGGR_2017.pdf) accessed January 11,

2018). Pronounced gender inequality is also evident at the level of individuals and couples. Recent data show that, among married men with an employed wife and a pre-school age child(ren), the average weekly time spent on childrearing and other household tasks was 67 minutes in Japan, slightly under 3 hours in the U.S., the U.K., France and Germany, and over three hours in the Nordic countries (Cabinet Office 2013). As a result, many women continue to face an either-or choice between work and childbearing, reflected in the fact that less than 30% of married women remained in the labor force after giving birth to their first child between 2000 and 2009 (National Institute of Population and Social Security Research (NIPSSR) 2017b). Among mothers who are employed, the large majority works part-time or in other non-standard arrangements (Yu 2002). As Esping-Andersen and Billari (2015:24) note, “gender-symmetric unions are unlikely to take hold as long as substantial proportions of women opt for part-time employment or make significant career interruptions in order to raise children.” The data cited above offer little evidence of the “feminization of men’s domestic role” that Esping-Andersen and Billari (2015) argue is essential for the emergence of a new gender-egalitarian equilibrium. On the surface, there thus seems to be little evidence in Japan for the arrival of a new “gender-egalitarian equilibrium” (Esping-Andersen and Billari 2015) or the “second stage of the gender revolution” (Goldscheider et al. 2015).

However, there is some evidence of recent change that, although not dramatic, is potentially consistent with the emergence of more gender-egalitarian family attitudes and behavior. Particularly notable is decline in support for gender specialization within marriage. For example, the proportion of unmarried men (somewhat) agreeing that “husbands should work while wives take care of the house” fell from 0.62 in 1992 to 0.31 in 2015 and the proportion of married women (somewhat) agreeing that “mothers should not work and stay at home when children are

young” declined from 0.88 to 0.64 over this same period (NIPSSR 2017b). It is not clear whether these trends reflect the emergence of more gender-egalitarian attitudes (consistent with the gender revolution framework) or an increase in the difficulty of establishing and maintaining breadwinner-homemaker marriages (consistent with the globalization and labor market change framework), but they do appear to be consistent with behavioral change. For example, the proportion of dual-earner marriages (both husband and wife are working either full-time or part-time) among couples in which the wife was aged 25-34 increased from 0.32 in 2000 to 0.43 in 2009 (Cabinet Office 2010). Similarly, the proportion of mothers who did not leave the labor force around the birth of their first child increased from 0.24 for those giving birth in 1985-89 to 0.38 for those who had their first child in 2010-14 (NIPSSR 2017b). These figures may not seem large when compared with trends in other countries, but the changes are in a direction consistent with an increase in wives’ economic role in supporting the family.

Labor Market Change and Economic Uncertainty

Patterns of labor market change in Japan are also generally consistent with the expectations articulated in research on the family implications of globalization and growing economic uncertainty. Of particular importance is evidence that the educational and employment circumstances of women have improved while those of men have stagnated. For example, Fig. 1 depicts the rapid convergence in men’s and women’s educational attainment. While male high school graduates were more than twice as likely as their female counterparts to enter university in 1990 (33% vs 15%), the relative difference shrank markedly by 2014 (56% vs. 47%).

<Fig. 1 around here>

Figure 1 also shows women’s shift away from two-year colleges to four-year universities – a trend with potentially important implications for patterns of educational assortative mating and

the educational gradient in marriage. As noted by Brinton (1993), among others, Japanese junior college curricula have typically emphasized subjects such as home economics, education, literature, and foreign languages that are likely to attract women whose marriage and family aspirations are stronger than their career aspirations. Relative to junior college graduates and those with lower levels of education, female university graduates typically possess greater labor market skills, enjoy higher wage growth, and have somewhat better chances of entry into large firms, which typically offer higher pay and more opportunities for advancement (Ishida 1998).

These relative improvements in women's educational and economic circumstances took place during a time of increasing economic uncertainty among young adults, especially men. The early 1990s recession and subsequent economic stagnation is often referred to as Japan's "lost decade" or more recently, Japan's "lost 20 years" (Fukao 2012). According to the Labour Force Survey conducted by Statistics Bureau, unemployment rates for 25-34 year olds rose sharply after the collapse of the so-called "bubble economy" in 1989 (from 2.4% in 1989 to 6.2% in 2010).

Table 1 shows that young adults are increasingly likely to be employed in non-standard positions, such as part-time work, temporary work, and contract employment. The long-term implications of early-career employment in non-standard work include lower wages across the life course (Genda and Kurosawa 2001, Sakai and Higuchi 2005), limited opportunities for regular, full-time employment (Yu 2002), and lower levels of marriage for both men and women (Nagase 2002; Piotrowski et al. 2015; Sakai and Higuchi 2005). The concentration of these indicators of economic uncertainty among young men and women with lower levels of education is thus consistent with a scenario in which the implications of globalization and changing patterns of employment are manifested in a shrinking of the negative educational gradient in

marriage for women. Growing economic uncertainty among university-educated men in more recent years (documented in Table 1) may also contribute to a weakening of the positive educational gradient in marriage for men.

<Table 1 around here>

Spouse Pairing

As in other East Asian countries, Japanese marriages have been characterized by a strong tendency toward educational homogamy and female hypergamy (Miwa 2007; Raymo and Iwasawa 2005; Raymo and Xie 2000; Shirahase 2005; Smits and Park 2009). Gender-asymmetric spouse selection criteria, combined with rapid improvements in women's educational attainment, are relevant for understanding the educational gradient in marriage. Raymo and Iwasawa (2005) showed that relative improvements in women's educational attainment resulted in marriage market mismatches detrimental to highly-educated women. Specifically, they found that one-fourth to one-third of the decline in marriage for junior college and university graduates between 1980 and 1995 could be explained by the increasing numerical difficulty of meeting a potential husband with the same (or higher) educational qualifications as themselves. These findings can be seen as consistent with a scenario in which continued preference for marriages characterized by a gender-asymmetric division of labor helps to maintain a negative educational gradient in marriage.

However, recent research based on census data from 1980-2010 finds that the prevalence of female hypergamy has declined while that of female hypogamy has increased. These trends in pairing patterns, which are net of changes in marriage market composition, appear to be particularly strong for women with two-year and four-year college educations, respectively (Fukuda et al. 2017). Both can be seen as consistent with expectations derived from the gender

revolution framework, with declining hypergamy reflecting men's increasing valuation of women's earnings potential and increasing hypogamy reflecting women's increasing ability to marry for reasons other than economic security. Fukuda et al. (2017) also suggested that the observed increase in educational hypogamy among highly-educated women may reflect growing heterogeneity in the meaning of a university education for men, with a blurring of boundaries between lower-ranked universities and technical colleges for men.

Hypotheses

(1) Both the gender revolution (Esping-Andersen and Billarli 2015, Goldscheider et al. 2015) and globalization (Buchholz et al. 2009; Kalleberg and Hewison 2013) frameworks suggest that the negative educational gradient in female marriage should disappear and perhaps become positive. Recent findings on women's earnings and marriage formation in Japan (Fukuda 2009, 2013; Ministry of Health, Labour and Welfare (MHLW) 2013) provide suggestive evidence that is consistent with this hypothesis.

(2) The gender revolution framework suggests that the shrinking negative educational gradient in marriage is due to an increasing marriage rates of highly-educated women whereas the globalization framework suggests that it is due to relatively large declines in the marriage rates of less-educated women and men.

(3-a) The gender revolution framework posits that educational homogamy and educational hypogamy should both increase among highly-educated women.

(3-b) The gender revolution framework also posits that educational hypergamy should decline among female junior college graduates who not only face increasing competition from the growing population of female university graduates, but may also find their tendency to prioritize domestic labor over employment (Brinton 1993) less valued by men in the marriage market.

(3-c) In contrast, the globalization framework posits a decline in marriages for all pairings involving less-educated men.

(3-d) Because university-educated men have also experienced a rise in non-standard employment in the 2000s (see Table 1), increasing economic heterogeneity among these men should also be reflected in a declining likelihood of pairings involving highly-educated men.

Analytical Strategy

Method

We employ the harmonic-mean two-sex marriage model proposed by Schoen (1981) to generate evidence with which to evaluate alternative explanations for changes in the educational gradient in marriage.² In this model, the marriage rates of one sex are influenced by both the composition of the unmarried population and the degree of attraction between the two sexes. For example, the first marriage rate for women of age (i) and educational attainment (k) paired with men age (j) and educational attainment (l), $m_{ijkl}^{f,t}$, can be expressed as:

$$m_{ijkl}^{f,t} = \frac{N_{ijkl}^t}{F_{ik}^t} = \left(\frac{N_{ijkl}^t}{F_{ik}^t} + \frac{N_{ijkl}^t}{M_{jl}^t} \right) \times \frac{M_{jl}^t}{F_{ik}^t + M_{jl}^t} = \alpha_{ijkl}^t \times \frac{M_{jl}^t}{F_{ik}^t + M_{jl}^t} \quad \text{Eq. 1}$$

Here t denotes time period and the superscript f indicates that this marriage rate is for females (an m superscript would denote the corresponding rate for males). N_{ijkl}^t is the number of observed marriages involving men and women of a given age and educational attainment combination at time t , and F_{ik}^t and M_{jl}^t are the number of women and men of these ages and education levels who are at risk of first marriage at time t .

² Raymo and Iwasawa (2005) applied the same method to analyze educational assortative mating in Japan during the period 1980-1995. Our analysis extends theirs by adding 15 additional years of data and applying the method in different ways to address our specific research questions.

The first term is thus a sum of male and female first marriage rates and represents the likelihood of this specific pairing independent of marriage market composition (with respect to age and education). This quantity is often called the “force of attraction” (FA) (Qian and Preston 1993; Raymo and Iwasawa 2005) and is represented as α_{ijkl}^t in equation (1). The second term in Eq. 1 can be called the “availability ratio” (AR) and is a measure of the availability of marriageable men for women at risk of forming a particular age and education pairing. In the equation for the male marriage rate, the AR numerator is the corresponding number of available women (i.e., F_{ik}^t).

The harmonic mean two-sex marriage model is particularly suitable for our analysis for a number of reasons. First, the model is based on pairing-specific marriage rates (by age and education) which can be summed to produce education-specific marriage rates, by sex. This allows us to calculate the proportion of observed change in the total first marriage rate for women of a particular education level that is explained by changes in marriage rates for each specific educational pairing. After first describing trends in educational differences in total first marriage rates for both sexes, we can thus examine how changes in specific educational pairings have contributed to the overall change in marriage rates for women at each educational level.

Second, and most importantly, the harmonic mean two-sex marriage model also allows us to examine the extent to which observed changes in marriage rates reflect behavioral changes in spouse selection (as reflected in changes in FA) or structural changes in the marriage market with respect to age and educational attainment (as reflected in changes in AR). Because hypotheses 3a-3d are about pairing propensities (or preferences), net of marriage market composition, it is essential that we are able to distinguish the contributions of FA and AR to changes in marriage rates. Marriage rates may change, even in the absence of shifting pairing propensities, due to

structural shifts in the marriage market such as a shrinking pool of eligible men for highly-educated women due to relative improvements in women's educational attainment (e.g., Raymo and Iwasawa 2005).

The gender revolution and globalization frameworks implicitly assume that both structural and behavioral changes affect the educational gradient in marriage and patterns of assortative mating, but previous studies have not attempted to assess the relative importance of these two factors (Goldscheider et al. 2015; Esping-Andersen and Billarli 2015). The harmonic mean two-sex marriage model allows us to shed light on the processes underlying observed changes by filling this gap in the literature on the educational gradient in marriage.

Data

We use individual-level data pooled across the 11th through 14th Japanese National Fertility Surveys (JNFS)³. These surveys, conducted in 1997, 2002, 2005 and 2010, sample from two populations: 18-49 year-old married women and 18-49 year-old unmarried men and women. Conducted by the National Institute of Population and Social Security Research, the JNFS employs the drop-off/pick-up method common in Japan and achieves response rates of around 80%. In each survey year, a total of 8,000 to 10,000 women and 4,000 to 5,000 single men provided information on their educational attainment, their date of marriage (if married), and husband's educational attainment (if present).⁴ These data constitute the largest and the highest

³ Permission to use the data on National Fertility Surveys was obtained through National Institute of Population and Social Security Research on the basis of the Statistics Act (Act No. 53 of 2007), Article 32 (2016.3.30).

⁴ The prevalence of missing information on age at first marriage is 10% for women and 12% for men. We also do not have information on the educational attainment of previous spouses for remarried and divorced

quality sample with which to analyze recent trends in the educational differentials in marriage and patterns of assortative mating in Japan.

Our measure of educational attainment is defined as the highest level of completed education. We use the following four educational categories; (1) junior high school (JHS: ISCED level 2), (2) high school (HS: ISCED level 3), (3) two-year junior college / technical school / vocational school (JC/VS: ISCED level 4/5), and (4) university and graduate school (UNI: ISCED level 6+).⁵ To accurately measure exposure (i.e., F_{ik}^t and M_{jl}^t), we construct this education

respondents (6% of women and 7% of men in our sample). We imputed missing values for age at first marriage and education level using Predicted Mean Matching (PMM) (Little 1988, Morris, White and Royston 2014).

We first imputed missing values on age at first marriage for respondents whose education level is known. We next imputed education levels of former spouses using information on respondents' age at first marriage, education level, birth cohort, and survey year. Finally, we imputed age at first marriage of former spouses using the imputed education levels as well information on respondents' age at first marriage, education level, birth cohort, and survey year. Because we use five-year age groups for the calculation of age- and education-specific marriage rates, imputation of age at first marriage should have little impact on our results. Imputation of education levels is also unlikely to influence results given the small proportions in our sample with missing education data (around 6% for both men and women). Rather than the use of imputed data per se, imputation is likely to influence our results by increasing the number of marriages used in the calculation of marriage rates – i.e., increasing N_{ijkl}^t in Eq. 1.

⁵ The JC/VS category is comprised of graduates from different kinds of schools, the composition of which differs markedly by sex. According to the “Basic School Survey,” only 1-2% of male HS graduates enrolled in junior college. The majority of men in the JC/VS category graduated from vocational schools (specialized training colleges) or two-year technical colleges. In contrast, the National Fertility Surveys show that 60 to 70% of women in the JC/VS category are junior college graduates. Schools in the JC/VS are also

variable as a time-varying indicator. Because the JNFS questionnaires do not include an educational history module, we assumed that all respondents followed a standard educational trajectory in assigning education levels prior to age 22 (i.e., JHS through age 18 for all respondents, HS beyond age 18 if HS is highest completed education, HS at ages 19-20 if JC/VS is highest completed education, and HS at ages 19-22 if UNI is highest completed education).

Result

Educational Differentials in First Marriage

We began by using the JNFS marriage history data to construct person-age records for men and women born between 1950-1992. Focusing on first marriages occurring between the ages 15 and 49 during the period 1988-2010, we used these data to calculate period marriage rates for each of the twenty-eight age-education pairings (seven age groups x four education levels). We then calculated education-specific total first marriage hazard rates (TFMH) by summing these pairing-specific marriage rates over education levels (separately for men and women). Finally, we transform these TFMH into tempo-adjusted total first marriage rates (TFMR^s) using the following formula proposed by Yamaguchi and Beppu (2004).

$$\text{TFMR}_k^{s,f,t} = \left\{ 1 - \exp \left[- \sum_{i=15-19}^{45-49} \sum_{j=15-19}^{45-49} \sum_{l=1}^4 m_{ijkl}^{f,t} \right] \right\}$$

i, j: age groups, k, l: education levels, t: period (t), f: female, m: first marriage rate

We used TFMR^s to describe educational differentials in first marriage. As TFMR^s is constructed from hazard rates, it can be seen as a tempo-adjusted period rate (Bongaarts and

heterogeneous with respect to the content, with some focusing on job training and others focusing on liberal arts. It is thus important to keep in mind that the definition of educational homogamy or heterogamy for men and women in this group is more ambiguous than for other education categories.

Sobotka 2012), measuring the synthetic cohort probability of ever marrying by age 50. To reduce sampling error in these period estimates, we calculated the TFMR^s for the following periods; 1988-1992, 1993-1997, 1998-2002, 2003-2005 and 2006-2010. Because men and women in the lowest educational category (JHS) comprise only 5% of our sample, reliable estimation of marriage rates for this group is difficult. We therefore limit our focus to the education-specific marriage rates of those who have completed high school or more education.

Figures 2a and 2b describes trends in TFMR^s by education level for women and men, respectively. Consistent with vital statistics data (NIPSSR 2017a), these TFMR^s show that first marriage declined over the period 1990-2008. Figure 2a also shows that, consistent with previous research (e.g., Raymo 2003), the educational gradient in women's first marriage has been negative. Importantly, however, the negative educational gradient is no longer visible in the most recent period (2008). This finding is consistent not only with the results of earlier research on income, education, and marriage (Fukuda 2009, 2013; MHLW 2013), but also with hypotheses derived from both the gender revolution and the globalization frameworks. In contrast to the U.S. and some other western countries (Kalmijn 2013; Torr 2011), a positive educational gradient in women's marriage has yet to emerge in Japan, but the direction of change in the gradient is similar. It is also worth noting that disappearance of the negative educational gradient is the result of increasing marriage rates among university-educated women. This increase is small (a 0.05 point, or 7% increase in TFMR^s), but is consistent with the pattern of change posited by the gender revolution framework.

< Fig. 2a and 2b around here >

Figure 2b shows that, in contrast to women, men's educational gradient in marriage is consistently positive, with marriage rates highest for men with a university education.

Furthermore, the educational gap in TFMR^s has grown over time as the marriage rates of men with a high school education have declined faster than those of university-educated men. These findings are consistent with predictions of the globalization framework and suggest a role for labor market bifurcation in shaping Japanese marriage behavior. Taken as a whole, trends in the educational gradient in marriage are consistent with expectations derived from the gender revolution framework in some cases and with predictions of the globalization framework in other cases.

Educational Assortative Mating

Next, we turn our attention to trends in patterns of educational pairing, which we analyze by disaggregating the education-specific female TFMR^s to examine the contributions of each educational pairing. In these analyses, we consider a total of 12 different educational pairings because we do not present results for women with JHS education, but we do include men with JHS education in both the number of observed marriages (N_{ijkl}^t) and in exposure to the risk of marriage (M_{jl}^t). This approach reflects the fact that marriages involving JHS men contribute to the educational differentials in female TFMR^s presented in the previous section. By focusing on education pairing-specific female TFMR^s, we can examine how changes in patterns of educational assortative mating have contributed to the observed changes in the educational gradient in women's marriage described above.

As shown in Fig. 2a, trends in female TFMR^s can be divided into two broad periods – a period of decline for all educational groups between 1990-2004 and a period of increase between 2004-2008 for women with at a two-year college education or more. After first summarizing the absolute change over time in TFMR^s for each educational pairing, we proceeded to calculate counterfactual TFMR^s to ascertain how much of the change in TFMR^s in each time period is

accounted for by behavioral factors (i.e., the force of attraction) and how much is accounted for by compositional changes in the marriage market (i.e., availability ratios).

Table 2 shows that trends in women's pairing-specific TFMR^s vary, with some moving in the same direction as the overall education-specific TFMR^s and some moving in the opposite direction. This pattern suggests that multiple forces of change are operating simultaneously. For example, the observed decline in TFMR^s for high school-educated women between 1990 and 2004 ($b-a = -0.06$) is mainly due to a decline in homogamous marriages (as shown in the fourth column). This pattern of change is consistent with expectations derived from a focus on labor market bifurcation (hypothesis 3-c). In contrast, the decline in TFMR^s during the same period for women who completed junior college and university primarily reflects a decline in marriages to university-educated men. The large decline in hypergamous marriages among female junior college graduates may reflect changing gender values and expectations (hypothesis 3-b), but this explanation is not consistent with the large decline in homogamous marriages among university graduates during the same period. In a recent study documenting the decline in educational homogamy among university graduates, Fukuda et al. (2017) noted that this shift in pairing patterns has occurred in tandem with increasing economic uncertainty among highly-educated men since the late 1990s. Our findings may thus reflect an overall decline in men's economic prospects as suggested by hypothesis 3-d, rather than a shift in gender norms. Taken as a whole, observed changes in pairing-specific TFMR^s between 1990 and 2004 appear to be more consistent with expectations derived from the globalization framework than with those from the gender revolution framework.

<Table 2 around here>

Turning to the increase in TFMR^s for both junior college- and university-educated women

between 2004-2008 (shown in Fig. 2a), the fifth column of Table 2 shows that all of the increase for university graduates is due to an increase in hypogamous marriages. The TFMR^s for female university graduates paired with men who completed high school or vocational school increased by 0.1 points (0.06 + 0.04) between 2004 and 2008. This increase in hypogamous marriages among university-educated women is consistent with the recent findings of Fukuda et al. (2017) and with expectations from the gender revolution framework (hypothesis 3-a). Contrary to the expectations derived from this framework, however, the TFMR^s for homogamous pairings among university graduates declined by 0.06 points during the same period. As just noted, this pattern of change may reflect increasing economic heterogeneity among university-educated men in this period (hypothesis 3-d), an interpretation that is potentially consistent with the globalization framework.

Homogamous pairings among junior college/vocational school graduates increased somewhat between 2004-2008 (0.03). However, it is not clear if marriages within this category should actually be interpreted as educational homogamy (see footnote 5). It is possible that improved employment conditions might explain the increase in educational homogamy for this group. Recent data show that junior college/vocational school graduates, particularly women, enjoy better labor market outcomes than high school graduates, including substantially higher wages and a lower prevalence of non-standard employment (author's calculation of the Basic Survey on Wage Structure 2016 and Table 1). In light of these data, the small, but steady, increase in educational homogamy among junior college/vocational school graduates might reflect growth in gender egalitarian marriages, consistent with the gender revolution framework.

Taken as a whole, the patterns of change summarized in Table 2 are partially consistent with both the globalization framework and the gender revolution framework. Declines in TFMR^s for

pairings involving men with a high school education, homogamous pairings among university graduates, and hypergamy among female junior college graduates are generally consistent with expectations derived from the globalization framework. However, the relatively large increase in educationally hypogamous pairings among women with a university education as well as the steady increase in homogamous marriages among junior college/vocational school graduates are consistent with predictions of the gender revolution framework.

Because these changes in TFMR^s reflect trends in both marriage market composition and patterns of educational pairing, it is important to quantify the contribution of pairing preferences. We do this by first constructing counterfactual TFMR^s in which we hold forces of attraction constant at earlier levels and by then comparing ratios of change in both observed TFMR^s and counterfactual TFMR^s between 1990-2004 and between 2004-2008. The difference between the ratio of observed TFMR^s and the ratio of counterfactual TFMR^s can be interpreted as the proportion of overall change in marriage rates across the two periods that is accounted for by changes in forces of attraction.

These results are presented in Table 3. The third column and the sixth column show the proportion of observed change in TFMR^s that is accounted for by changes in FA. In some cases, the proportions are greater than one, indicating that change in FA accounts for more than 100% of the increase or decrease in TFMR^s, with changes in marriage market composition (AR) impacting TFMR^s in the opposite direction. Between 1990 and 2004, much of the decline in the TFMR^s for each educational pairing was due to change in forces of attraction. For example, over 90% of the decline in TFMR^s for high school homogamy is explained by the changes in FA. Similarly, the observed decline in hypergamy for junior college/vocational school-educated women and hypogamous pairings involving university-educated women and high school-

educated men were due primarily to changes in the force of attraction. Also, two-thirds of the decline in homogamy among university graduates in this period was explained by changes in pairing preferences, with changes in marriage market composition being less important.

<Table 3 around here>

In contrast, the relatively large (40%) increase in TFMR^s for hypergamous pairings involving high school-educated women and junior college/vocational school-educated men in the 1990-2004 period is almost entirely accounted for by changing marriage market composition, i.e., an increasing availability of potential partners. Similarly, the increase in TFMR^s for other education pairings involving junior college/vocational school-educated men are largely due to changes in AR. These findings indicate that the relative increase in men with junior college/vocational school education in the marriage market contributed to an increase in female marriage rates for pairings with these men. Consistent with the findings of Raymo and Iwasawa (2005), we can also see that one-fourth of the decline in TFMR^s for university-educated women is due to changes in marriage market composition, especially the relative growth in women with university degrees.

For the period 2004-2008, the ratios of counterfactual TFMR^s are all close to 1.0, indicating that observed changes in TFMR^s were largely or fully explained by changes in FA and that changes in the availability of potential spouses (AR) were of limited importance. The only exceptions can be found in the slight increases in hypergamous marriages of female high school graduates and junior college/vocational school graduates, with junior college/vocational-educated men and university-educated men, respectively. These small increases in female hypergamy are driven by both changes in marriage market composition and changes in matching preference (in roughly equal measure). It is important to distinguish differences in the source of

increasing TFMR^s for women with junior college/vocational school degrees and university degrees. For the former, less than half of the small increase in TFMR^s is accounted for by changes in marriage market composition whereas more than 100% of the larger increase for university graduates is explained by changing forces of attraction (i.e., changing behavior more than offset a decline in the availability of potential mates). This distinction suggests that changes in behavior, consistent with predictions of both the gender revolution and globalization/uncertainty frameworks, was particularly important for understanding the increase in marriage rates among the most highly educated Japanese women.

Conclusion

Weakening or reversal of the negative educational gradient in women's marriage represents a profound shift in patterns of family formation in many high-income countries. However, efforts to explain this shift in the "economic foundations of marriage" have been limited in both theoretical scope and geographical focus. In this paper, we articulated two different mechanisms of change by drawing upon two broad theoretical frameworks – one of which focuses on "gender revolution" and one of which emphasizes processes of globalization and associated trends in economic uncertainty and labor market bifurcation. These two frameworks offer testable hypotheses about trends in both education-specific marriage rates and the propensity for specific educational pairings.

We used Schoen's (1981) harmonic-mean two-sex marriage model to generate evidence with which to evaluate hypotheses derived from these two alternative, but not mutually exclusive, explanations for change in the educational gradient in marriage. Our analyses of Japanese data from 1990-2008 showed that the negative educational gradient in women's first marriage disappeared in the late 2000s. This change was brought about by a combination of declines in the

marriage rates of less-educated women and increases in the marriage rates of highly-educated women. The former finding is consistent with expectations derived from the globalization and labor market bifurcation framework whereas the latter is consistent with the gender revolution framework.

Closer examination of changes in pairing-specific marriage rates showed that decline in the marriage rates of high school-educated women was the result of decline in educational homogamy. In contrast, increasing marriage rates of university-educated women were brought about by a rise in educationally hypogamous pairings. Marriage rates of junior college/vocational school educated-women show a small increase in educational homogamy. For the most part, these changes in the most recent period (2004-2008) reflect changes in pairing behavior (FA) rather than changes in marriage market composition (AR).

Importantly, we find no evidence of an increase in educational homogamy among university graduates. Indeed, this type of pairing decreased in both periods – a pattern of change that contrasts with findings from the U.S. and other western societies (Blackwell 1998; Blossfeld and Timm 2003; Esping-Andersen and Billari 2015; Hou and Myles 2008; Schwartz and Mare 2005). In light of the research linking increasing homogamy among the highly educated to growing economic inequality (Burtless 2003; Greenwood et al. 2014; Sweeney and Cancian 2004), the implications of declining homogamy among university graduates for processes of stratification in Japan merits further attention.

Perhaps the most important conclusion from our analyses is that patterns of change are consistent with hypotheses derived from both the labor market bifurcation framework and the gender revolution framework. This presumably reflects the coexistence of both male-breadwinner/female-homemaker marriages and more gender-egalitarian marriages in Japan.

Stated differently, our mixed results suggest that Japan remains in the transitional phase between gender-inegalitarian and gender-egalitarian social equilibria. The Japanese context is one in which gender change and labor market change interact in ways not articulated in Esping-Andersen and Billari's (2015) depiction of this transitional phase. Rather than a transition led by changing norms and expectations regarding the gender division of labor, it is possible that growing economic uncertainty promotes a (perhaps reluctant) shift in attitudes as men's capacity to fulfill the role of primary breadwinner declines. In this scenario, continued decline in the certainty of men's long-term earnings prospects may push Japan further toward a gender egalitarian equilibrium by slowly changing both gender norms and behaviors. At the same time, the labor market implications of rapid population aging and decline (NIPSSR 2017c) may provide additional impetus in the same direction by restructuring gender relations via the implementation of new policies designed to promote women's labor force attachment (Abe 2013). Monitoring these changes and their implications for family behavior will be an important task for demographers in the years to come.

Other important tasks for subsequent research include extending our theoretical framework and analytical tools to other countries and examining educational differentials in other demographic events that involve joint decision making between men and women. Examining trends in educational assortative mating and the educational gradient in marriage in other relatively gender-inegalitarian East Asian countries like South Korea would be particularly valuable for assessing the relative importance of (and interaction between) growing economic uncertainty and changing gender attitudes. Extending our theoretical and analytical framework to the study of fertility would also provide potentially valuable new ways of thinking about and understanding the gender revolution and related family changes posited by Esping-Andersen and

Billarri (2015) and Goldscheider et al. (2015).

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Table 1 Percent^a of recent graduates employed in non-standard work, by sex and education^b, 1985-2010

Year ^c	Male			Female		
	HS	JC/VS	UNI	HS	JC/VS	UNI
1985	6.3	5.1	3.2	20.2	16.0	15.5
1990	8.8	4.3	3.6	19.8	14.3	12.4
1995	13.7	7.4	7.4	30.5	21.0	17.8
2000	22.7	19.0	10.9	44.1	27.2	22.1
2005	26.9	21.4	12.7	41.9	30.7	21.5
2010	29.9	22.7	15.5	44.1	28.5	20.8

a: Percentages are calculated for first-time employment among those who ever had a job.

b: HS = High School, JC/VS = Junior College and Vocational School, UNI = University.

c: Year of graduation

Source: Author's calculation of Employment Status Survey 2012. Statistics Bureau, Ministry of Internal Affairs and Communications

Table 2 Education pairing-specific TFMRs for women: 1988-1992, 2003-2005 and 2006-2010

Wife-Husband	1988-92 a	2003-05 b	2006-10 c	b-a	c-b
HS-JHS	0.08	0.06	0.09	-0.02	0.03
HS-HS	0.53	0.47	0.42	-0.06	-0.05
HS-JC/VS	0.09	0.13	0.14	0.04	0.00
HS-UNI	0.23	0.22	0.21	-0.02	-0.01
TFMR ^s - HS	0.94	0.88	0.85	-0.06	-0.02
JC/VS-JHS	0.04	0.04	0.02	0.01	-0.02
JC/VS-HS	0.31	0.29	0.29	-0.02	0.00
JC/VS-JC/VS	0.13	0.17	0.21	0.05	0.03
JC/VS-UNI	0.45	0.33	0.34	-0.12	0.01
TFMR ^s - JC/VS	0.93	0.83	0.85	-0.09	0.02
UNI-JHS	0.00	0.00	0.01	0.00	0.01
UNI-HS	0.10	0.07	0.13	-0.02	0.06
UNI-JC/VS	0.05	0.07	0.11	0.02	0.04
UNI-UNI	0.75	0.65	0.59	-0.10	-0.06
TFMR ^s - UNI	0.89	0.79	0.84	-0.10	0.05

Note: The education-specific TFMR^s are the sum of education pairing-specific TFMR^s.

Table 3 Period ratios of observed and counterfactual education pairing-specific TFMRs for women: 2003-2005/1988-1992 and 2006-2010/2003-2005

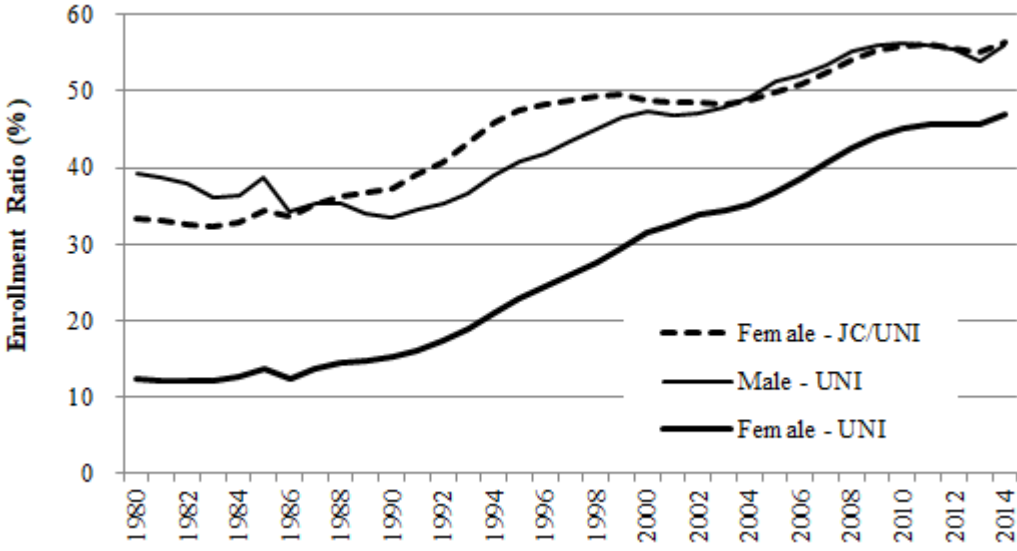
Wife-Husband	<u>2003-05 / 1988-92</u>			<u>2006-10 / 2003-05</u>		
	Observed	Counterfactual	The proportion	Observed	Counterfactual	The proportion
	TFMR ^s ratio	TFMR ^s ratio ^a	explained by FA ^c	TFMR ^s ratio	TFMR ^s ratio ^b	explained by FA
	a	b	(a - b) / (a - 1)	c	d	(c - d) / (c - 1)
HS-JHS	0.75	0.85	0.42	1.44	0.94	1.13
HS-HS	0.88	0.99	0.93	0.90	1.01	1.13
HS-JC/VS	1.40	1.40	0.02	1.03	1.02	0.40
HS-UNI	0.93	1.01	1.19	0.96	1.00	0.98
TFMR ^s - HS	0.94	1.03	1.40	0.97	1.01	1.20
JC/VS-JHS	1.19	0.74	2.38	0.48	1.09	1.16
JC/VS-HS	0.92	0.93	0.18	1.01	0.99	2.11
JC/VS-JC/VS	1.35	1.27	0.24	1.19	1.04	0.81
JC/VS-UNI	0.73	0.98	0.93	1.03	1.02	0.47
TFMR ^s - JC/VS	0.90	1.00	0.96	1.03	1.02	0.41
UNI-JHS	2.67	0.72	1.17	2.66	0.91	1.06
UNI-HS	0.75	1.02	1.08	1.81	0.98	1.02
UNI-JC/VS	1.41	1.15	0.63	1.66	1.01	0.99
UNI-UNI	0.87	0.96	0.67	0.91	0.98	0.79
TFMR ^s - UNI	0.89	0.97	0.76	1.07	0.98	1.26

a: FA constant at 1990 value.

b: FA constant at 2004 value.

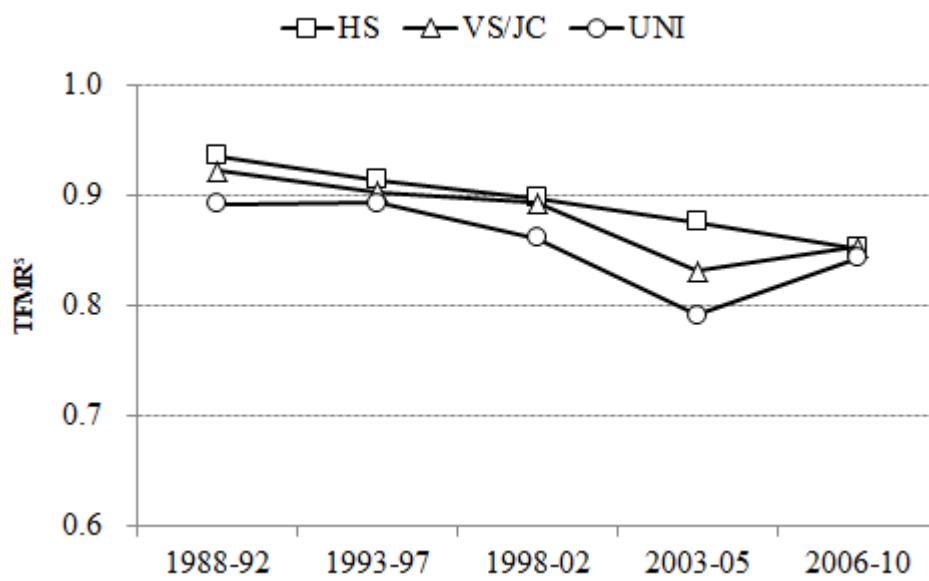
c: FA = Force of Attraction.

Fig. 1 Enrollment ratios in tertiary education among high school graduates, by sex, 1980-2014



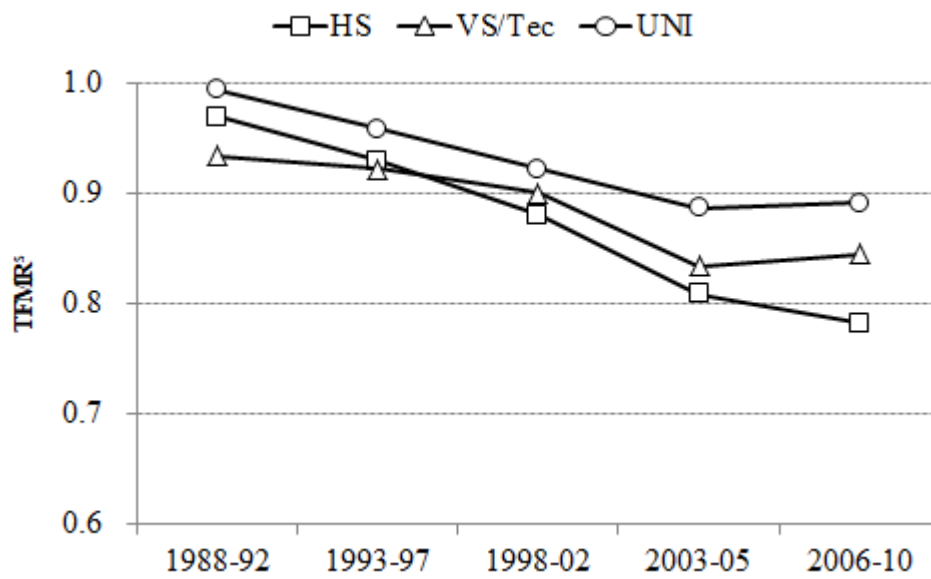
Source: Report on Basic School Survey (various years)

Fig. 2a Education-specific TFMR^s for women: 1988-1992, 1993-1997, 1998- 2002, 2003-2005 and 2006-2010



Note: TFMR^s : Tempo adjusted Total First Marriage Rate for ages 15-49.

Fig. 2b Education-specific TFMR^s for men: 1988-1992, 1993-1997, 1998- 2002, 2003-2005 and 2006-2010



Note: TFMR^s : Tempo adjusted Total First Marriage Rate for ages 15-49.

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