2019

Education and Marriage Decisions of Japanese Women and the Role of the Equal Employment Opportunity Act

Linda N. Edwards
CUNY Graduate Center

Takuya Hasebe
Sophia University

Tadashi Sakai
Hosei University

Education and Marriage Decisions of Japanese Women and the Role of the Equal Employment Opportunity Act

Linda N. Edwards
City University of New York Graduate Center

Takuya Hasebe
Sophia University

Tadashi Sakai
Hosei University

The Japanese Equal Employment Opportunity Act (EEOA) of 1985 aimed to reduce gender discrimination in the labor market, especially for career-oriented jobs. This paper investigates whether this act had an unanticipated effect on women's marriage decisions. Using micro data from the Japanese Panel Survey of Consumers, we model women's interrelated decisions on university education and whether to marry, focusing on whether women have married by age 32. Our results show a negative relationship between university education and marriage that is much greater for post-EEOA cohorts of women than for pre-EEOA cohorts, consistent with our hypothesis that the enhanced career opportunities associated with the EEOA stimulated women to delay or forgo marriage.

I. Introduction

The striking decline in Japanese birth rates over past 30 years has prompted national concern, with fertility rates well below the population replacement rate (Faruqee and Mühleisen 2001; Japan Ministry of Health, Labour and Welfare 2015).[1] The resulting shrinking population means that in the fu-

We are grateful to the Institute for Research on Household Economics for permitting us to use the JPSC for this research. We thank participants in seminars at the City University of New York Graduate Center, the Japanese Economic Association, and the Western Economic Association International, anonymous reviewers, Yukiko Abe, Isaac Ehrlich, Michael Grossman, Akika Oishi, and Cordelia Reimers for helpful comments. We also thank Kaori Shiba for her excellent research assistance.

[1] The total fertility rate reached its lowest point, at 1.26, in 2005, and though it has risen to 1.42 in 2014, it is still well below the population replacement rate (Japan Ministry of Health, Labour and Welfare 2015).

[*Journal of Human Capital*, 2019, vol. 13, no. 2]

ture, the country's old-age dependency ratio will increase as the large postwar baby boom and baby boom echo cohorts are supported by subsequent, smaller cohorts.[2] Coincident with this decline in birth rates has been a decline in marriage rates (Sakamoto and Kitamura 2007) and a rise in the mean age at first marriage (Japan Ministry of Health, Labour and Welfare 2015), both of which are linked directly by fertility researchers to the decline in birth rates.[3] Over the same period, with the passage of the Equal Employment Opportunity Act (EEOA) in 1985 and subsequent supporting legislation, career opportunities available to women have expanded, especially for women with a university education.

The goal of this paper is to investigate the possible role of the passage of the EEOA in explaining the delay and decline in women's marriage, both directly and through the link of higher education. Existing literature has documented the increased proportion of women who get a university education over this period and has suggested that the EEOA may have played a role in this increase (Edwards and Pasquale 2003; Abe 2011). At the same time, the large economic and demographic literature on the determinants of women's marriage propensity and timing underscores the role of educational attainment in marriage decisions, with university-educated women more likely than others to delay marriage (e.g., Raymo 2003). To our knowledge, only one paper (Abe 2011) addresses the possibility that the passage of the EEOA could be a factor in women's marriage decisions, but that paper does not explicitly test this proposition. In our paper, we address this void by investigating whether the EEOA affected women's marriage decisions either directly or via their decisions to pursue university education. Our model treats education and marriage decisions as jointly determined—something that has not been done in previous research on Japanese women—and is estimated with data from the Japanese Panel Survey on Consumers (JPSC).

Focusing on the likelihood that women marry by age 32, our research provides strong support for the proposition that the passage of the EEOA played a role in the delay and decline of marriage. Specifically, even when we take explicit account of the effect of unmeasured personal attributes on education and marriage decisions, we find that the deterrent effect of university education on marriage is substantially larger for post-EEOA cohorts of women, as compared to pre-EEOA cohorts. University-educated

[2] The ratio of those aged 65 and above to the working-age population (aged 20–64 years) is estimated to rise from 27 percent in 2000 to 47 percent in 2025, higher than estimated for other low-birth-rate counties such as France and Italy (Faruqee and Mühleisen 2001, their table 1).

[3] As many researchers have noted (e.g., Hashimoto and Kondo 2012), because the average number of children borne by a married couple has stayed relatively constant since the 1970s and the percent of births that take place outside of marriage is very small (less than 2 percent in 2003), it is the decline in the marriage rate of women that accounts for the overall decline in fertility. See also Narayan and Peng (2007). For a general review of models of marriage and childbirth, see Ermisch (2003) and Brien and Sheran (2003).

women in post-EEOA cohorts are as much as 27 percentage points less likely than their less educated contemporaries to be married by age 32, whereas for pre-EEOA cohorts the corresponding decline is at most 13 percentage points. On the other hand, we find that the decision to obtain a university education is primarily determined by a young woman's ability and a host of family background characteristics, with the EEOA not playing a significant role. Overall, our findings indicate that for those seeking to understand the declines over the past 30 years in marriage and fertility in Japan, it is important to take into account the role played by the EEOA.

Our paper is organized as follows. In Section II, we briefly describe the EEOA and review selected recent research on the relationships among education, marriage, and the EEOA. In Section III, we sketch out a model of joint decision-making with regard to education and marriage and describe its econometric implementation. Section IV describes the JPSC data, followed by Section V, which provides estimates of our econometric model. Section VI summarizes our conclusions.

II. Background and Related Research

The trends that prompt our research and that of many others are illustrated in figure 1. Shown in this figure are data from 1970 to recent years for the total fertility rate, the percent of women aged 30–34 not married, the percent of female high school graduates who advance to university, and, for comparison, the percent of male high school graduates who advance to university. Throughout this period there has been a dramatic decline in the total fertility rate, which, while increasing slightly since its nadir in 2005, still remains well below the replacement rate. At the same time, the percent of women aged 30–34 who remain unmarried has steadily increased, from under 10 percent in 1970 to almost 35 percent in 2010.[4] Roughly parallel with this rise in the proportion unmarried is the increase in young women's advancement rate to university, growing from under 10 percent in 1970 to over 45 percent in 2010. It is noticeable that the slopes of both of these growth curves become steeper after 1985, the year in which the EEOA was enacted by the Japanese legislature. The advancement rate to university of young men also increased over the entire period, though less uniformly than that of women, but the difference between the advancement rates of men and women shrinks noticeably after 1985.

These concordant trends suggest the following set of hypotheses, which we investigate in this paper. (1) The passage of the EEOA, by expanding career opportunities of university-educated women, increased the proportion of qualified women who follow this educational path. (2) The

[4] Young women's mean age at first marriage has also been increasing over this period, from 24.2 in 1970, to 28.8 in 2010, to 29.3 in 2013 (Japan Ministry of Health, Labour and Welfare 2015).

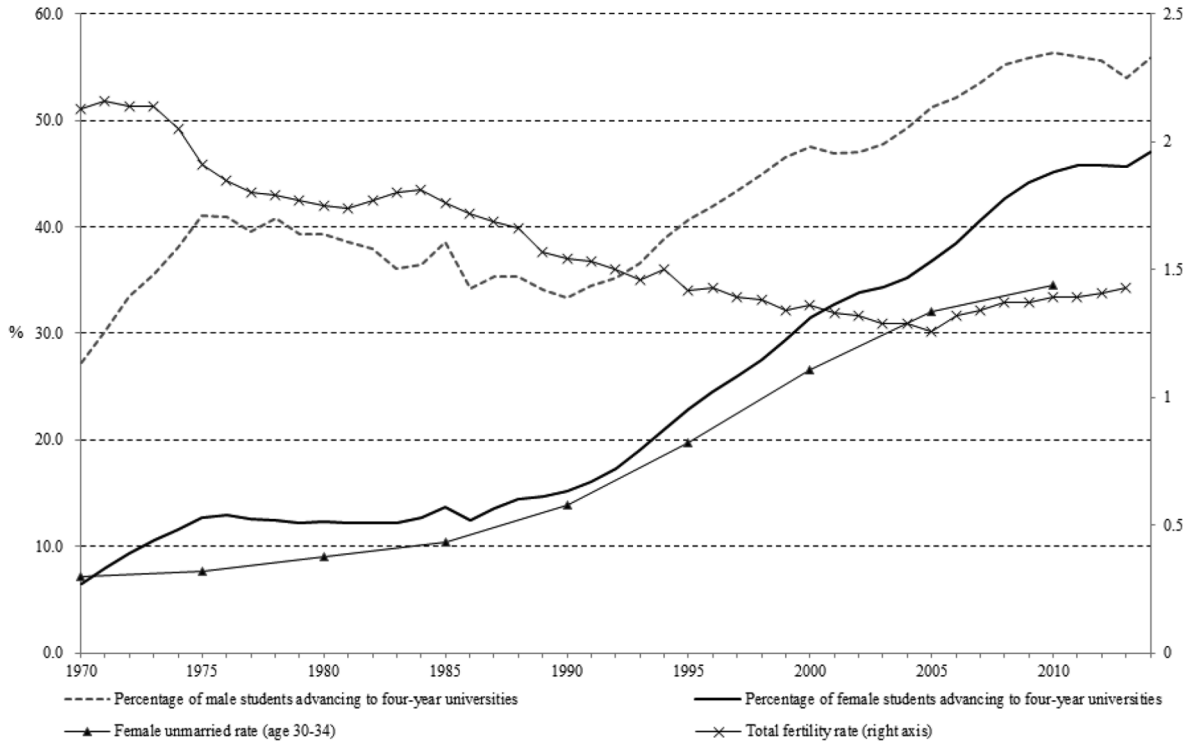

Figure 1.—Four-year university advancement rates, unmarried rate for women, and fertility rate. Sources: Basic School Survey (Japan Ministry of Education, Culture, Sports, Science and Technology), Vital Statistics (Japan Ministry of Health, Labour and Welfare), and Population Census (Japan Ministry of Internal Affairs and Communications).

expanded career opportunities associated with university education influence women's marriage decisions, leading them to delay or decline marriage. (3) The passage of the EEOA (and subsequent supporting legislation), which changed the legal and cultural landscape to make a career path more socially and economically attractive to women, increased the "deterrent" effect of university education on marriage.

To explore these hypotheses, we develop and estimate a multivariate model of the relationship between Japanese women's education and marriage decisions and the role of the EEOA in these decisions.[5] While no other studies directly address this set of hypotheses, a number of papers that examine some of the relevant relationships inform our research. They are reviewed in the subsections below.

A. The 1985 EEOA and Subsequent Supporting Legislation

The EEOA was enacted in 1985 and went into effect in April 1986.[6] Before 1985, the primary Japanese legislation that treated women's position in the labor market was the 1947 Labor Standards Law, which prohibited gender-based wage discrimination. Japan, as a signatory of the 1980 United Nations Convention Concerning the Elimination of All Forms of Discrimination against Women, sought to expand its legislation with regard to women in the labor market in order to meet the commitments in this convention. The 1985 EEOA was the result: it prohibited gender discrimination with respect to vocational training, fringe benefits, dismissal, and mandatory retirement by reason of marriage, pregnancy, or childbirth. The act also stated that firms have a "duty to endeavor" to equalize opportunity with regard to recruitment, hiring, job assignment, and promotion, though there were no prohibitions in these important areas. The Japanese government provided administrative guidance to firms to help them meet this duty, but there was no private right to legal action with regard to these areas of unequal treatment.[7] Even with these drawbacks, however, the EEOA of 1985 was enthusiastically welcomed by Japanese women as epoch-making legislation. Especially for university-educated women, it

[5] Models like the one we use in this paper owe a great debt to the seminal work of Gary Becker on human capital, marriage, and the economics of the family (see, e.g., Becker 1976, 1993).

[6] This subsection relies heavily on Araki (1998), which provides a good review (in English) of the 1985 EEOA as well as the 1997 legislation (which went into effect in 1999) that substantially strengthened the original law. Yamada (2013) also summarizes these two laws and provides a description of the subsequent law, which further expanded on the original EEOA. In earlier literature, the EEOA was referred to as the Equal Employment Opportunity Law, or EEOL, as opposed to the EEOA, but EEOA is a more apt translation of the Japanese title for this law. With regard to legislation covering leaves for child and elder care, Japan Ministry of Health, Labour and Welfare (2010) is a good reference.

[7] Government oversight in the form of "administrative guidance" is much more effective in the Japanese context than it would be in an American context; indeed, some argue that it is a "means more effective than criminal or civil sanctions in the Japanese social context" (Araki 1998, 11).

was expected to expand labor market opportunities, making "career" positions more available to them in an era when most women had been required by their employers to leave their jobs upon marriage or childbirth regardless of their educational level.

In order to strengthen the 1985 Act, the Japanese legislature revised it two times, in 1997 and 2003. The amendment to the EEOA of 1997 prohibited discrimination in hiring and promotion, and the amendment of 2003 prohibited discrimination against males. The amendment of 2003 also included a prohibition of implicit discrimination. This proscription was introduced in response to the fact that after the original EEOA went into effect, many larger firms adopted a dual-career-path system to steer women away from traditional career positions (Hamaguchi 2011). Other important legislation related to the EEOA is the 1991 Child Care and Family Care Leave Act, which was strengthened in 1995 and 1999. It mandates that employers give parental leave to any mother whose child is under the age of one.

B. The EEOA–Labor Market Link

The hypotheses we explore are based on the proposition that the EEOA expanded career opportunities for university-educated women. Three recent papers by Abe (2010, 2011, 2013) investigate this proposition by looking at effects of the EEOA on women's earnings and employment.

Abe (2010) examines the impact of the EEOA on the gender wage gap, using cohort data from the Basic Survey of Wage Structure at 5-year intervals from 1975 to 2005. Focusing on full-time workers only, she shows that while the overall female-to-male full-time wage gap decreased over this period, this decrease was mainly attributable to an increase in the educational attainment of the full-time female labor force; for university-educated women, the female-to-male wage gap narrowed very little for post-EEOA cohorts.

The gender wage gap within educational categories may not have been much affected by the EEOA, but what about women's employment? The relationship between the EEOA and women's labor force behavior over the life cycle is the focus of Abe (2011). Using data from the Japanese Employment Status Survey (*Shugyo Kozo Kihon Chosa*) from 1998 to 2007, this paper examines how the EEOA affected women's full- and part-time employment patterns both by marital status and by level of educational attainment. Using a methodology that compares cohorts of women who entered the labor market after the EEOA went into effect with earlier, pre-EEOA, cohorts, Abe finds that the employment rate in full-time positions increased after the EEOA only for university graduates. Taking the analysis further, Abe decomposed changes in full-time employment of this group by marital status, since unmarried women typically have higher employment rates than married women. She finds that the full-time employment rate did not increase for either married or unmarried university-educated women but rather that the proportion of these highly educated women who remained unmarried had increased.

Abe (2013) explores the possibility that the EEOA may have had different impacts across the various Japanese regions and concludes that such differences do exist: the post-EEOA increase in employment rates of university-educated women documented in her earlier research was most evident in the Tokyo area, most likely because that is where there is the greatest availability of managerial positions.

Taken together, these three studies suggest that the benefits to Japanese women of the career opportunities enabled by the EEOA were to be obtained mainly by investing in university education and working (especially in Tokyo) a full-time rather than a part-time schedule, the latter of which was facilitated by delaying or declining marriage. Abe's findings are based on a model that does not allow for the explicit possibility that marriage rates and educational attainment are themselves affected by the EEOA, but she recognizes these links in her conclusion: "Since the enactment of the [EEOA], more women with university education have married late or stayed unmarried" (Abe 2011, 52).

C. Higher Education and the EEOA

The role of the EEOA in young women's decisions with regard to post–high school education is addressed in Edwards and Pasquale (2003). Using micro data from the first wave of the JPSC, Edwards and Pasquale's analysis holds constant family background, demographic factors, and economic conditions in estimating the effect of the passage of the EEOA on the higher-education decisions of young Japanese women. Their model does a good job of explaining higher-education decisions, but the results with regard to the effect of the EEOA are not robust, possibly because only two cohorts in the survey had made educational decisions after the passage of the law. Nonetheless, their research provides suggestive evidence that the passage of the law was associated with an increased propensity of young women to choose university education over junior college.

D. Marriage

There is an extensive economic and demographic literature on women's marriage rates in Japan, much of it focusing on explaining the secular declines illustrated in figure 1. To our knowledge, none of this literature explicitly addresses the possible role of the EEOA in contributing to this decline, but a variety of other explanations have been explored. Some studies focus on the role of labor market conditions, including unemployment rates of men, women, or both (e.g., Higuchi 2001; Miyoshi 2014; Hashimoto and Kondo 2012). Other studies focus on the role of the women's own earnings and income (e.g., Higuchi 2001; Sakai 2009). Still others focus on the increasing levels of women's educational attainment and the resulting reduced relative availability of potential spouses with the requisite level of education, dubbed the "marriage mismatch" hypothesis (e.g., Raymo 2003; Raymo and Iwasawa 2005). Other studies tar-

get increased income or other transfers (e.g., housing) from parents to daughters as a potential explanation—dubbed the "parasite single" hypothesis (Sakamoto and Kitamura 2007).

These studies examine different hypotheses and use different data sets, but they have one common feature: all find that a woman's educational attainment is an important correlate of whether and when she marries. Specifically, all of these studies report that women with a university education are more likely to delay marriage.[8] With regard to the question of whether this delay translates into a lower overall likelihood that university-educated women marry, the studies are not definitive. Results differ, depending on the set of explanatory variables held constant in the analyses: for example, Raymo (2003) estimates a set of alternative models that yield contrasting results on this point.

Other factors that have been found to be statistically significant in one or more of these studies are the woman's age; measures that represent various aspects of the labor market for both men and women, including the woman's own income; measures that represent socioeconomic characteristics of her parents, including their income, health, and work status; measures that reflect income or other transfers from her parents, including housing; characteristics of the woman's natal family; demographic measures that reflect the availability of potential spouses; and the region in which she lives and its rural/urban characteristics.

III. A Model of Joint Education and Marriage Decisions

Pulling together the findings cited above, we see that the EEOA is likely to have positively affected the probability that women attend university, that university-educated women are more likely than other women to be employed in full-time positions and to delay marriage, and that a woman's decision to marry is empirically related to her level of education, her family background, her earnings and income, and labor market conditions at the time of her graduation and thereafter. The papers on marriage referenced above do not incorporate the possibility that marriage and education are jointly determined, nor do they consider the possibility that the EEOA might be related to marriage decisions. The model described below incorporates these innovations.

A. The Japanese Context

Japanese women typically choose between two types of post–high school education—university and junior college—but it is university education that

[8] Even though university-educated women delay marriage while in school, they catch up to some extent later—the difference in mean age at marriage between university graduates and high school graduates is substantially less than 4 years (see Shirahase 2000, especially table 1).

provides the background for a career.[9] Junior college curricula are typically limited, and three-quarters of them "offer a single curriculum in nonvocational subjects, such as music, home economics, and English literature" (Ishida 1998, 288). Junior college education is likely to be better preparation for marriage than for career employment, and the financial returns from a junior college education may run predominantly through the marriage market, as compared to the labor market. University education, in contrast, offers a curriculum that provides superior preparation for career employment, though it, too, may improve a young woman's marriage prospects.[10] The education decision we focus on, therefore, is the decision to attend or not attend university.

A distinguishing feature of Japanese higher education is that, unlike the United States, where people leave and reenter post–high school educational institutions at various points in life, education in Japan is more structured; few women are in any type of formal schooling after marriage. In addition, the path to university education is well defined, so that without proper preparation in the high school years, a Japanese student cannot expect to enter university.[11] These features provide the setting within which education decisions are made in Japan.

B. The Economic Model

The model we sketch out below captures in stylized form this context and is similar in spirit to the model outlined by Lefgren and McIntyre (2006). They posit a two-period model in which a woman's education decision is made in the first period and her marriage decision is made in the second period.[12] They also postulate that a woman's education does not directly affect her "draw" in the marriage market, but because higher education

[9] Other post–high school options are colleges of technology and specialized training colleges, which provide a wide variety of vocational and practical skills but are not typically considered to be comparable to university, though in some cases they may be comparable to junior colleges.

[10] In the context of the United States, Goldin (1992), Lefgren and McIntyre (2006), Ge (2011), and others have shown that a large part of the returns to university education is via the marriage market: by attending university, young women come in contact with highly educated young men, who will have greater future earning power. For example, doing a "back-of-the-envelope" computation, Lefgren and McIntyre estimate that about half of the increase in a woman's "available income" (including income that she receives through her marriage) associated with her own higher education comes through the marriage market.

[11] This characterization of access to university education is appropriate for the time the women in this sample were attending university, but more recently there have been changes. For example, in 1997 only 5 percent of private universities fell below their enrollment limits, but by 2008 the situation had changed dramatically, with 47 percent of private universities falling below their enrollment limits. As a result, more universities are now enrolling students with lower test scores than would have been acceptable in the past; such universities have been dubbed "free-pass" universities by the Japanese media. For a detailed discussion of recent changes in Japanese higher education, see Igami (2014).

[12] Lefgren and McIntyre (2006) apply this two-period model to data for the United States, but the model is more appropriate for Japan than it is for the United States, where it is not at all uncommon for people to enter and/or reenter university after marriage or after having had children.

is associated with higher earnings, her education does affect whether or not a particular draw from the distribution of potential husbands will be acceptable to her. The higher her own level of education, the fewer the number of men acceptable to her as a potential spouse. In this model, the resulting relationship between educational attainment and marriage can be positive or negative, depending on whether a woman's higher level of education has a stronger effect on her own earnings or on her share of her husband's earnings.[13] Lefgren and McIntyre also show, as we do below, that a woman's educational choice is related to her future marriage expectations and that not taking into account this potential endogeneity can lead to biased coefficients of the education variable in a marriage equation.

While our model is inspired by Lefgren and McIntyre (2006), it differs because we focus on tracing the effects of the EEOA on the interrelated decisions regarding education and marriage rather than on measuring the economic status of women before and after marriage. We assume that a young woman's (and her family's) decision with regard to whether she will get a university education is well defined by the time she is near the end of high school—at age 17 (this age corresponds to period 1 in Lefgren-McIntyre model). Variables that affect this decision would include family demographic and socioeconomic characteristics, the expected costs and returns to a university education, and unmeasured ability and taste factors that reflect a young woman's desire for career employment and marriage. The marriage decision is assumed to take place after her education is completed (this corresponds to period 2 in the Lefgren-McIntyre model) and is determined by the young woman's educational attainment (which, in line with Lefgren and McIntyre, will affect her financial returns to marriage), her family background, various indicators of the state of the marriage and labor markets, and unmeasured taste and cultural factors that influence both her career aspirations and her judgment about the desirability of marriage.

C. Econometric Implementation

1. The Basic Model

The features described above are best captured by a recursive bivariate probit statistical model, represented mathematically below and estimated through maximum likelihood methods (see Greene 2008, 823–26, for a discussion of this model). For $i = 1, \ldots, N$,

$$E_i = 1(\alpha_e A_i + x_{e,i}'\beta_e + \varepsilon_{e,i} > 0), \tag{1}$$

$$M_i = 1(\gamma E_i + \alpha_m A_i + \theta(E_i \times A_i) + x_{m,i}'\beta_m + \varepsilon_{m,i} > 0), \tag{2}$$

[13] Another paper that looks at the interrelationship between education and marriage decisions in the United States, Ge (2011), focuses on the increased financial gains from marriage obtainable by attending college (because of the better set of potential spouses from which to choose) and reports that the expected financial gains from marriage are a significant determinant of a woman's decision to attend college.

where $1(\cdot)$ is an indicator function,[14] and the error terms are assumed to be distributed as a bivariate normal:

$$\begin{pmatrix} \varepsilon_e \\ \varepsilon_m \end{pmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right).$$

In this system of equations, the dichotomous variable E_i represents whether or not a young woman i completed university, and M_i represents whether or not she has been married by the age of 32.[15] The factors that affect the education decision, denoted x_e, are similar to those in Edwards and Pasquale (2003), while the error term ε_e picks up unmeasured ability, taste for education, taste for marriage, and taste for career employment, all as of the time the young woman is making her higher-education decision. The factors that affect the marriage decision, denoted x_m, follow closely the marriage literature cited earlier, while the random error term, ε_m, picks up various luck factors that determine a marriage match and also the young woman's unobservable tastes for career employment and marriage at the time of completing her education. The variables in x_e and x_m, which have some common elements, are described in detail in the next section. The dichotomous variable A_i, appearing in both equations, indicates whether a young woman's education decision was made before or after the passage of the EEOA.

There are three aspects of our econometric model that should be highlighted. First, there is a potential correlation between the error terms in the education and marriage equations ($\rho \neq 0$) because they both include components that represent unmeasured tastes for marriage and career employment. Such a correlation implies that educational attainment is an endogenous variable in the marriage equation ($\text{Cov}(M, \varepsilon_m) \neq 0$). Indeed, including the education variable, which is the dependent variable in the first equation, in the marriage equation (eq. [2]) as an explanatory variable is what distinguishes this statistical model from a nonrecursive model. Greene (2008, 823) notes, however, that in models such as this one, the endogenous nature of education variable in the marriage equation "can be ignored in formulating the log-likelihood." Hence, we are able to treat the education variable E in the marriage equation (eq. [2]) as if it were exogenous by jointly estimating equations (1) and (2) and allowing for a correlation, ρ, between the error terms.

[14] Like Lefgren and McIntyre (2006), we posit the relationships in eqq. (1) and (2) in the form of regression equations. In an appendix, they sketch out how regression equations such as these could be derived, with a set of appropriate simplifying assumptions, from a utility maximization framework. Note also that the first equation in the system is similar to the estimating equation in Edwards and Pasquale (2003), which is derived from a random-utility model.

[15] In this paper, since we are focusing on the marriage decision, we define our marriage variable to include anyone who, at the point when we observe her, had decided to become married, whether or not that marriage ended in divorce. Note that divorce is relatively rare in Japan, at about 2 per 1,000 population in 2010 (Japan Ministry of Health, Labour and Welfare 2015). In the JPSC data, approximately 1.0 percent of the previously married women get divorced every year.

Second, our model is identified. In theory, the functional form is sufficient to identify the bivariate probit model without imposing any exclusion restrictions (Wilde 2000). However, it is still desirable to impose such restrictions because doing so increases the accuracy of parameter estimates. In our case, what is required is that at least one variable in the education equation (eq. [1]) be excluded from the marriage equation (eq. [2]). As shown in the next section, our model satisfies this restriction.

Third, we include an interaction term between the education variable and the EEOA variable in the marriage equation (eq. [2]) in order to test our hypothesis that the "deterrent" effect of university education on marriage increased after the passage of the EEOA. Including this interaction term also makes it possible to interpret our model as a variant of the widely used "difference-in-differences" design.

2. Computation of Partial Effects

Estimation of the model in equations (1) and (2) yields probit coefficients. These coefficients provide insight into the sign and significance of the relationship among education, marriage, and the EEOA, as well as the other explanatory variables in the above equations, but are not readily interpretable in terms of economic or social impact. To see which variables would be of meaningful consequence to decision-making, we compute partial effects, as described below.

The partial effects of the explanatory variables in the education equation can be computed in the same way as those in a usual probit model, since $\mathrm{E}(E \mid A, x_e) = \Phi(\alpha_e A + x_e'\beta_e)$. That is, because of the model's recursive structure, there is no impact of x_m on the education decision; only the variables x_e directly affect the education decision. For discrete variables such as A, we compute the partial effects by using the finite-difference method: $\mathrm{E}(E \mid A = 1, x_e) - \mathrm{E}(E \mid A = 0, x_e)$. For continuous variables, we compute the partial effects by using the calculus method: $\partial \mathrm{E}(E_i \mid x_e)/\partial x_e$.

Computing partial effects in the marriage equation is more complicated. Consider first one of our main interests: the impact of the education on the marriage decision. This can be computed as

$$\begin{aligned}&\mathrm{E}(M \mid E = 1, A, x_m) - \mathrm{E}(M \mid E = 0, A, x_m)\\ &\quad = \Phi(\gamma + (\theta + \alpha_m)A + x_m'\beta_m) - \Phi(\alpha_m A + x_m'\beta_m). \qquad (3)\end{aligned}$$

This partial effect measures the overall impact of the education variable, averaging the pre-EEOA and post-EEOA cohorts. To see how this partial effect differs between the pre-EEOA and post-EEOA cohorts, we also compute separate partial effects for these two cohort groups. The pre-EEOA education partial effect is $\mathrm{E}(M \mid E = 1, A = 0, x_m) - \mathrm{E}(M \mid E = 0, A = 0, x_m)$, and the post-EEOA education partial effect is computed as $\mathrm{E}(M \mid E = 1, A = 1, x_m) - \mathrm{E}(M \mid E = 0, A = 1, x_m)$.

In the case of other explanatory variables in the model, they can have direct and/or indirect impacts on the marriage decision, depending on whether they appear in the marriage equation, the education equation, or both. Direct partial effects are the impacts on the marriage decision of the explanatory variables that appear in the marriage equation (x_m). The signs of the direct effects are the same as the signs of the probit coefficients in the marriage equation (eq. [2]). Indirect partial effects are the impacts on the marriage decision of explanatory variables from the education equation (x_e) and operate through the education decision. Given the expected negative impact of education on the marriage decision, the signs of the indirect partial effects are opposite to the signs of the corresponding coefficients in the education equation. If a variable appears in both the marriage and education equations, it has both direct and indirect effects; the sum of these is reported as the "total" effect.[16]

IV. Data and Variables

The data used to estimate our model come from a unique micro-level panel survey called the JPSC, a nationwide longitudinal survey of young Japanese women and their husbands sponsored by the Institute for Research on Household Economics (*Kakei Keizai Kenkyujo*) in Japan. These data are especially suitable for our study because they provide a rich set of information about women's family background, education, and marriage. The first wave (wave A) of this survey was conducted in 1993 and

[16] Specifically, under the assumption of bivariate normality, the expected value of M (conditional on exogenous explanatory variables) can be written as

$$\mathrm{E}(M) = \Phi_2(\alpha_m A + x_m'\beta_m, -\alpha_e A - x_e'\beta_e; -\rho) + \Phi_2(\gamma + (\theta + \alpha_m)A + x_m'\beta_m, \alpha_e A + x_e'\beta_e; \rho),$$

where $\Phi_2(\cdot, \cdot; \rho)$ is the cumulative distribution function of the bivariate normal distribution with the coefficient of correlation ρ. For discrete variables, we compute the partial effects by using the finite-difference method. We evaluate the expected value $\mathrm{E}(M)$ at the relevant values of x_m for the direct effect and x_e for the indirect effect. For continuous variables, we compute the partial effects via the calculus method by taking partial derivatives. The direct effect on the marriage decision is

$$\frac{\partial \mathrm{E}(M)}{\partial x_m} = \left\{ \phi(\alpha_m A + x_m'\beta_m) \times \Phi\left(\frac{-\alpha_e A - x_e'\beta_e + \rho(\alpha_m A + x_m'\beta_m)}{\sqrt{1-\rho^2}}\right) + \phi(\gamma + (\theta + \alpha_m)A + x_m'\beta_m) \times \Phi\left(\frac{-\alpha_e A - x_e'\beta_e + \rho[\gamma + (\theta + \alpha_m)A + x_m'\beta_m]}{\sqrt{1-\rho^2}}\right)\right\} \times \beta_m.$$

The indirect effect is

$$\frac{\partial \mathrm{E}(M)}{\partial x_e} = \phi(\alpha_e A + x_e'\beta_e) \times \left[\Phi\left(\frac{\gamma + (\theta + \alpha_m)A + x_m'\beta_m - \rho(\alpha_e A + x_e'\beta_e)}{\sqrt{1-\rho^2}}\right) - \Phi\left(\frac{\alpha_m A + x_m'\beta_m - \rho(\alpha_e A + x_e'\beta_e)}{\sqrt{1-\rho^2}}\right)\right] \times \beta_e.$$

See Greene (1998) and Hasebe (2013) for a detailed discussion of partial effects in the bivariate probit model.

included 1,500 randomly selected women aged 24–34 in that year.[17] Subsequent waves (B and C) were added to the sample in 1997 and 2003: wave B included 500 women aged between 24 and 27 years in 1997, and wave C included 836 women aged between 24 and 29 years in 2003. As of 2008, there remained 1,648 respondents aged between 29 and 49 in the JPSC.

The structure of the data set is illustrated in figure 2. Each row in the figure corresponds to a year and shows the number of women of each age for whom data are reported for that year. For example, in 1993, the first survey year of wave A, there were 151 women aged 24, 161 aged 25, and so on, for a total of 1,500 women aged 24–34 in that year. In the following year, 1994, the women have aged one year, and there is some attrition, so that there are no women aged 24, 145 aged 25 (six women from that age cohort had dropped out of the survey over the year), 146 aged 26, and so on, for a total of 1,415 women aged 25–35 in that year (total attrition was 85). Things continue in a similar fashion in 1995 and 1996. Wave B begins in 1997, with a new group of 24–27-year-old women added to the survey, and wave C begins in 2003, with an additional group of women aged 24–29 added in that year. The potential number of women for whom we would have family background and education information—both of which come from the questionnaire administered in the initial survey year for each wave—is 2,836. However, because we are studying marital status as of age 32, the three cohorts that have not yet reached that age during our study must be excluded from our analysis, yielding a maximum number of 2,422 potential observations. When observations with missing data on any of the family background or education variables are removed, our actual working sample becomes 2,224 women.

Looking at figure 2 in a slightly different way, one can see that each column shows the number of observations available for women of a specified age but at different points in calendar time. For example, if one wanted to study women at age 32, there would be 122 of them observed in 1993, 124 observed in 1994, and so on, for a total of 1,641 women in the sample who responded to the survey at age 32. Also indicated in this figure is whether women of a particular age in a particular year are members of the pre-EEOA cohort or the post-EEOA cohort. The pre-EEOA cohort is defined to be women aged 18 or older in 1985, the year that the EEOA was passed; women in this cohort appear in the figure above the dashed diagonal. The post-EEOA cohort of women is defined to be those who were aged 17 or younger in 1985; women in this cohort appear below the dashed diagonal.

Our choice of marriage variable—whether a woman is or has been married by age 32—requires some explanation. Ideally, we would observe marital status at an older age, because not all women who plan to marry

[17] The survey originally contacted 3,623 randomly selected women in this age group, of whom 1,500 were ultimately selected to be in the first wave of the panel. Demographic characteristics of these participants were comparable to those of the same age group in the population census (Higuchi 2001).

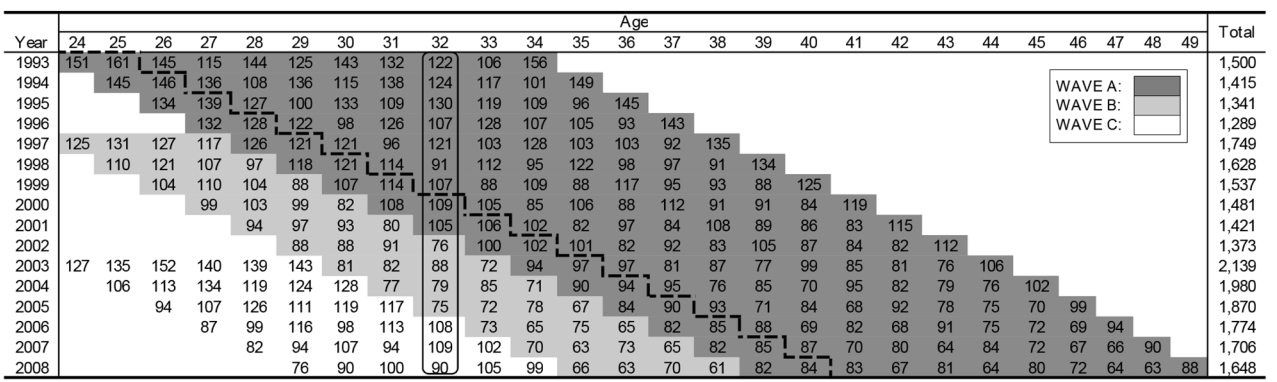

Figure 2.—Number of JPSC respondents by age in each year. Post-EEOA cohorts are below the dashed diagonal.

will in fact be married by age 32. However, given the construction of the sample and sample attrition, the later the age at which we observe marital status, the fewer observations will be available. Further, if we choose to observe marital status at a later age, the balance between the pre-EEOA and post-EEOA samples is reduced. Thus, our choice is a pragmatic one: by observing women at age 32, we capture a large proportion of marriages while still having a large enough sample size to address our main hypotheses.[18]

Among our working sample of 2,224, there are 1,985 women for whom marital status at age 32 can be determined. The difference between these two numbers is attributable primarily to attrition: women who had dropped out of the sample before age 32 and had not married before dropping out. The main differences between the subsample for which marital status is known and the full sample are that the women in the subsample are more likely to be from pre-EEOA cohorts (the proportions are 0.508 vs. 0.471) and that they are less likely to have a university education (the proportions are 0.149 vs. 0.157).[19]

The variables used in our estimation are defined in table 1. The variables that do not come from the JPSC are measured at the level of the prefecture in which the young woman resided as of age 17.[20]

The variables in x_e are similar to those in Edwards and Pasquale (2003) and include characteristics of the woman's family background (parents' educational attainment, family income, whether the young woman attended private high school, her number of siblings, whether she has any brothers, and whether her mother was primarily a homemaker); proxy measures of her academic ability (attendance at *juku* ["cram school"] in elementary [Juku 2], junior high [Juku 3], and high school [Juku 4]); proxy measures for the availability and opportunity costs of university education in her area as measured at her age 17 (the ratio of professors to high school graduates and the vacancy/application ratio); a proxy for the expected returns to university education (the ratio for males of the national average starting wage for university graduates relative to that of high school graduates); and a dummy variable (EEOA) indicating whether the passage of the EEOA took place when she was no older than 17 years—the age at which we assume her final decision with regard to university education was made. As discussed above, the last variable is included because the EEOA aimed to increase women's access to career employment (and the

[18] The mean age at first marriage for women in Japan over the time period covered in our data ranged from 25.9 (in 1990) to 28.8 (in 2010; Japan Ministry of Health, Labour and Welfare 2015).

[19] These differences between the subsample of 1,985 that we use and the total potential sample of 2,224 have the potential to make our results subject to selection bias. The observations without marriage information contribute to the likelihood function of education only.

[20] Prefectures in Japan are geographic units that are similar to states in the United States. One variable in table 1 is measured at the national level: the university/high school first-wage ratio.

TABLE 1
List of Variables

Name	Time Point of Measurement	Description
Marital status (M)[a]	Age 32	Ever married: 1, never married: 0
Completed education (E)[a]	Initial survey year[b]	University and above: 1, junior college and below: 0
EEOA (A)[a]	…	Aged 17 or younger in 1985 (the year the EEOA was passed): 1, otherwise: 0
Trend (cohort trend)[a]	…	Born in 1959 (oldest respondents): 1, born in 1960: 2,…, born in 1976 (youngest respondents): 18
Parents' income[a]	Initial survey year[b]	Parents' annual income in the previous year
High income		>10 million yen: 1, otherwise: 0
Middle income		2.5 million–10 million yen: 1, otherwise, 0
Low income		(Reference) <2.5 million yen: 1, otherwise, 0
Mother's education[a]	Initial survey year[b]	University: 1, otherwise: 0
Father's education[a]	Initial survey year[b]	University: 1, otherwise: 0
Private high school[a]	Initial survey year[b]	Attended private high school: 1, otherwise: 0
Homemaker[a]	Initial survey year[b]	During daughter's childhood (birth to age 20), mother was never employed for pay: 1, mother was at some point employed for pay: 0
Number of siblings[a]	Initial survey year[b]	Number of siblings
Having brother(s)[a]	Initial survey year[b]	Has one or more brothers: 1, otherwise: 0
Juku 2[a]	Initial survey year[b]	Attended *juku* in the late years of elementary school: 1, otherwise: 0
Juku 3[a]	Initial survey year[b]	Attended *juku* in junior high school: 1, otherwise: 0
Juku 4[a]	Initial survey year[b]	Attended *juku* in high school: 1, otherwise: 0

City size[a]	Initial survey year[b]	Size of cities of residence
Large city		14 major Japanese cities: 1, otherwise 0
Mid-sized city		Cities other than the 14 large cities: 1, otherwise: 0
Other		Towns, villages, or overseas: 1, otherwise: 0
Number of professors[c,d]	Age 17	Number of professors per high school graduate
Spouse availability[c,d]	Age 17	For respondents without a university degree, the ratio of (2-years-older) male high school graduates to female high school graduates who did not go to university; for respondents with a university degree, the ratio of (2-years-older) male high school graduates who went to university to female high school graduates who went to university
$\text{Vacancy/application}_{ED}$[d,e]	Age 17	Ratio of job offers to job seekers
$\text{Vacancy/application}_{MA}$[d,e]	Age at completion of education[f]	Ratio of job offers to job seekers
Univ./HS first-wage ratio[g]	Age 17	Ratio of university graduate's first wage to high school graduate's first wage for males (national average)
Rent[d,h]	Age at completion of education[f]	Real rent per tatami mat, in thousands of yen (a tatami mat is approximately 1.7 square meters).

Note.—Subscript MA: for marriage equation; subscript ED: for education equation.

[a] Source: JPSC.

[b] We use the first three waves of the JPSC. The initial survey year is 1993 for wave A, 1997 for wave B, and 2003 for wave C.

[c] Source: Basic School Survey (Japan Ministry of Education, Culture, Sports, Science and Technology).

[d] A not-JPSC variable that is aggregated at prefecture level.

[e] Source: Job/Employment Placement Services Statistics (Ministry of Health, Labour and Welfare).

[f] Assumed to be 18 for high school graduates, 21 for junior college or vocational school graduates, and 23 for university graduates.

[g] Source: Basic Survey on Wage Structure (Ministry of Health, Labour and Welfare).

[h] Source: Housing and Land Survey of Japan (Statistics Bureau, Ministry of Internal Affairs and Communications).

resulting higher lifetime earnings), and university education is the traditional route to this type of employment.[21]

In the case of the marriage equation, the explanatory variables x_m represent factors suggested by the economic and demographic literature surveyed in the previous section. Educational attainment has been found to be an important determinant of marriage decisions in almost all of the literature that we surveyed and falls directly out of the Lefgren and McIntyre (2006) utility maximization model described above; our education dummy variable indicates whether or not the young woman completed university. Family background variables such as parents' income, family structure (number of siblings and whether there is a male sibling), and whether the woman's mother was a full-time homemaker are also commonly used. To represent the state of the labor market around the time that the young woman completes her education, a variety of proxies have been used (see Higuchi 2001; Hashimoto and Kondo 2012; Sakamoto and Kitamura 2007). We use the prefecture vacancy/application ratio at the age she completes her schooling to proxy the strength of the labor market she faces after schooling.[22] A higher vacancy/application ratio indicates a stronger job market, which may be positively or negatively related to the probability of marriage.[23] In addition, following Abe (2013), we include two city size variables to proxy the state of the labor market for university-educated women.

To capture the state of the marriage market, we use several variables. The availability of potential spouses with a level of education equal to or greater than that of the woman (found to be an important factor by Raymo and Iwasawa 2005) is computed for each birth cohort for each prefecture as follows: for women who did not have a university degree, we use the ratio of the number of (2-years-older) male high school graduates (with or without a university education) to female high school graduates (without a university education); for women who had a university degree, we use the ratio of the number of (2-years-older) male university graduates to female university graduates.[24] We expect this variable to be positively related to the woman's probability of marriage. The cost of setting up a household is proxied by rent per tatami mat (in constant yen) in the woman's prefecture

[21] From this point onward, we use "EEOA" in two ways: to refer to the law itself and to represent the dummy variable that indicates whether each observation is part of a pre-EEOA cohort (EEOA = 0) or a post-EEOA cohort (EEOA = 1). We believe that the appropriate interpretation will be clear to the reader from the context.

[22] The age at which a woman's education is completed is assumed to be 18 for a high school graduate, 21 for a junior college or vocational school graduate, and 23 for a university graduate.

[23] Miyoshi (2014) and others, noting that a strong labor market affects both a woman's expected earning power and the earning power of a potential spouse, refers to the positive relationship as the "self-reliance effect" and to the negative relationship as the "good-catch effect."

[24] We construct our proxy measure for spouse availability using men 2 years older than the women because the average age difference between spouses over the period of our study ranged from 2.9 years in 1987 to 2.6 in 1992, 2.4 in 1997, 1.7 in 2002, and 1.7 in 2005 (see National Institute of Population and Social Security Research 2005).

as of the year she completes her education. The search costs associated with finding a mate and also varying cultural norms regarding marriage are proxied by the two city size variables mentioned above (Sakai 2009).

To explore the potential impact of the EEOA, we include in the marriage equation the EEOA dummy variable, as defined above, as well as an EEOA × education interaction term. This interaction term enables us to estimate separate education coefficients for pre- and post-EEOA cohorts and therefore allows us to test the hypothesis that the passage of the EEOA increased the "deterrent" effect of university education on marriage.

In addition to these variables, we include in both the education and marriage equations a set of dummy variables that indicate the geographic district in which the woman lived when she was aged 17 (Japan is divided into 10 such districts).[25] These are included to hold constant any district-specific unmeasured taste, economic, or cultural factors that may affect education or marriage decisions. Finally, in some specifications, we include a linear time trend variable. Descriptive statistics for all variables are shown in table 2. The final two columns of the table indicate whether the variable appears in the education equation, the marriage equation, or both. The variables that appear in the education equation but not in the marriage equation (i.e., those with "Yes" in the first of these columns and "No" in the second) serve to satisfy the exclusion restrictions for our estimation.

V. Results

In discussing our results, we focus on partial effects rather than probit coefficients. Partial effects have the advantage of being more readily interpretable than probit coefficients, yet share the same sign and, in most cases, the same level of statistical significance as the underlying probit coefficients.[26] These partial effects, reported in table 3, are shown for our main variables of interest and for those that are statistically significant in the probit estimation (probit estimates for all variables are reported in table A1).[27] In the first

[25] It is possible that women will not be living in the same district at the time they make their marriage decision as when they were age 17, but the JPSC data do not permit us to identify the district in which each woman lives subsequent to age 17. The 10 districts (called *chiho* in Japanese) are Hokkaido, Tohoku, Minami-Kanto, Kita-Kanto and Koshin, Hokuriku, Tokai, Kinki, Chugoku, Shikoku, and Kyushu.

[26] We compute all partial effects by computing them for each observation and then averaging across all observations to yield average partial effects. Standard errors are estimated via the bootstrap method, with 100 replicates clustering at the cohort level. The significance levels of the partial effects and coefficients may marginally differ.

[27] Two findings from our probit estimates in table A1 should be pointed out. First, the estimated value for the coefficient of correlation between the error terms in the education and marriage equations is negative, but small (−.0112) and not statistically significant. This means that the potential correlation between unmeasured characteristics of the young woman that affect both education and marriage decisions is not large enough to affect our estimates. Second, more than half of the district dummy variables (not shown) are statistically significant, indicating that it is important to include these variables to hold con-

TABLE 2
SUMMARY STATISTICS ($N = 2,224$)

Variables	Mean	Standard Deviation	Minimum	Maximum	Education Equation	Marriage Equation
Marriage[a]	.7955	.4035	0	1	No	Yes
Completed education	.1569	.3638	0	1	Yes	Yes
EEOA	.5081	.5000	0	1	Yes	Yes
Large city	.2567	.4369	0	1	No	Yes
Mid-sized city	.5719	.4949	0	1	No	Yes
Rent	2.1539	.9055	.9677	4.7601	No	Yes
Spouse availability	1.4212	.4302	.4390	2.7047	No	Yes
Vacancy/application$_{MA}$	.8773	.4536	.1200	2.6800	No	Yes
Middle income	.5423	.4983	0	1	Yes	Yes
High income	.1529	.3600	0	1	Yes	Yes
Mother's education	.0355	.1851	0	1	Yes	No
Father's education	.1668	.3729	0	1	Yes	No
Private high school	.3035	.4599	0	1	Yes	No
Homemaker	.3381	.4732	0	1	Yes	Yes
Number of siblings	2.4622	.9179	1	12	Yes	Yes
Having brother(s)	.5733	.4947	0	1	Yes	Yes
Juku 2	.3651	.4816	0	1	Yes	No
Juku 3	.5665	.4957	0	1	Yes	No
Juku 4	.1722	.3776	0	1	Yes	No
Number of professors	.0758	.0598	.0174	.2650	Yes	No
Vacancy/application$_{ED}$	.9071	.4578	.0900	2.6800	Yes	No
Univ./HS first-wage ratio	1.2357	.0364	1.1515	1.4225	Yes	No

Note.—See table 1 for definitions of variables.
[a] Summary statistics computed from the 1985 observations for which marriage data are available.

column of table 3 are the direct partial effects, which pertain to both the education and marriage equations. In the second column are indirect partial effects, which are relevant only for the marriage equation. The third column shows the sum of direct and indirect partial effects, again relevant only for the marriage equation. There are two parts to table 3: panel A contains partial effects computed from the coefficient estimates of our base model (as specified in eqq. [1] and [2]), while panel B contains partial effects computed from a modified model that holds time trends constant, as discussed below. Recall that partial effects are computed for each variable, holding constant all other variables, and are therefore not additive.

To get a sense of the scale of these partial effects, it is useful to keep in mind the level and changes in the prevalence of university education and marriage across the cohorts in our sample. The percent of women in our sample with a university education ranged from 11 percent in the earliest cohort to 24 percent in the final cohort, an increase of 13 percentage points. Over the same period, the percent of 32-year-olds ever married ranged from 92 percent in our earliest cohort to 69 percent in the final cohort, a decline of 23 percentage points.

stant cross-sectional socioeconomic differences that are not fully captured by the socioeconomic variables included in the analysis.

A. Base Model

We begin our discussion of table 3, panel A, with the variables that are the prime focus of this research: EEOA in the education equation and both EEOA and education in the marriage equation. Looking first at the education equation, the partial effect of EEOA on the probability of university education, while positive, is just under 2 percentage points and is not statistically significant. Thus, we do not have strong support for our first hypothesis.

In the case of the marriage equation, the partial effect of the EEOA variable is negative, but again is not significantly different from zero (this conclusion holds even when the contribution from the indirect effect [third column] is included). In contrast, the university education variable has a large partial effect—a negative and significant 20 percentage points. This estimated partial effect is essentially an average over pre-EEOA and post-EEOA cohorts. As a consequence, it conceals a crucial finding: it is the interaction between EEOA and education that is the real story here. The deterrent effect of university education on marriage is doubled after the passage of the EEOA. To be specific, before the passage of the EEOA, a university education is associated with a nonsignificant 12.6 percentage point reduction in the likelihood that a young woman has married by age 32. After the law's passage, the partial effect is much larger and is statistically significant, yielding a 26.7 percentage point reduction in the probability of marriage.[28] Given that in our sample the proportion of 32-year-olds who have married falls by 23 percentage points over the period in our study, the magnitude of this partial effect for post-EEOA cohorts is remarkable. This result clearly supports the proposition that university-educated women believe that they can best take advantage of the enhanced career options associated with the passage of the EEOA by delaying or declining marriage.

Partial effects of the other variables in the education and marriage equations, though not the primary focus of our study, are also informative. In the case of the education equation, it is evident in table 3 that family background variables play the strongest role in decisions regarding university education. The partial effect of mother's education is by far the largest: having a mother with a university education is associated with a 23 percentage point higher probability that a young woman herself completes university. Having a father with a university education is almost as powerful, associated with a 18 percentage point increased likelihood of completing university, as is attending *juku* in high school, which is associated with a 19 percentage point increase in the likelihood of completing university. Higher income is also positively associated with the likelihood of university education, with partial effects of 9 and 4 percentage points for the high- and middle-income variables, respectively. Other family background variables that are statistically significant have lesser partial effects ranging from 2 to 4 percentage points.

[28] The difference between these two partial effects is statistically significant, with a p-value of .050.

TABLE 3
PARTIAL EFFECTS ON EDUCATION AND MARRIAGE DECISIONS

	Direct Effect	Indirect Effect	Total Effect
	A. Base Model		
Education decision:			
EEOA	.019 (.019)		
Middle income	.045*** (.014)		
High income	.087*** (.023)		
Mother's education	.234*** (.061)		
Father's education	.180*** (.021)		
Private high school	−.033*** (.012)		
Number of siblings	−.024** (.010)		
Having brother(s)	−.017 (.018)		
Juku 3	−.047*** (.014)		
Juku 4	.192*** (.021)		
Marriage decision:			
Completed education	−.200* (.109)		
Pre-EEOA	−.126 (.113)		
Post-EEOA	−.267** (.109)		
EEOA	−.022 (.023)	−.004 (.004)	−.026 (.022)
Middle income	.019* (.011)	−.009** (.005)	.010 (.011)
High income	.008 (.035)	−.018* (.011)	−.010 (.030)
Homemaker	−.016 (.021)	−.006 (.005)	−.022 (.021)
Number of siblings	.035** (.015)	.005 (.004)	.040*** (.015)
Having brother(s)	−.049* (.025)	.004 (.003)	−.045* (.025)
Large city	−.063** (.025)		
Mid-sized city	−.047* (.026)		
Rent	−.049*** (.018)		
Vacancy/application$_{MA}$	−.059** (.028)		
Mother's education		−.048 (.030)	
Father's education		−.037** (.016)	
Juku 3		.010 (.008)	
Juku 4		−.039* (.021)	
	B. Trend and Trend × Education Interaction Included		
Education decision:			
EEOA	.004 (.032)		
Middle income	.045*** (.014)		
High income	.086*** (.023)		
Mother's education	.234*** (.061)		
Father's education	.179*** (.021)		
Private high school	−.033*** (.012)		
Number of siblings	−.024** (.010)		
Having brother(s)	−.017 (.018)		
Juku 3	−.048*** (.015)		
Juku 4	.192*** (.021)		
Marriage decision:			
Completed education	−.119 (.089)		
Pre-EEOA	.000 (.110)		
Post-EEOA	−.195** (.087)		
EEOA	.088*** (.033)	.000 (.005)	.087*** (.034)
Middle income	.024** (.011)	−.006 (.004)	.018 (.011)
High income	.009 (.035)	−.011 (.008)	−.001 (.032)
Homemaker	−.022 (.020)	−.003 (.004)	−.025 (.020)
Number of siblings	.035** (.015)	.003 (.003)	.038** (.016)
Having brother(s)	−.051** (.025)	.002 (.002)	−.049* (.025)
Large city	−.067*** (.025)		
Mid-sized city	−.048* (.026)		

TABLE 3 (*Continued*)

	Direct Effect	Indirect Effect	Total Effect
Rent	−.036** (.018)		
Vacancy/application$_{MA}$	−.059** (.029)		
Mother's education		−.028 (.021)	
Father's education		−.022 (.014)	
Juku 3		.006 (.006)	
Juku 4		−.023 (.017)	

Note.—Estimated effects are reported; bootstrap standard errors with 100 replications, clustering at the cohort level, are in parentheses. See table 1 for definitions of variables.
* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

In the case of the marriage equation, both direct and indirect partial effects must be considered. With regard to the direct effects, the single most important variable, in terms of the magnitude of the partial effect, is whether the young woman has a university education, as discussed in detail above. The other statistically significant direct partial effects are smaller. Women from large cities are 6 percentage points less likely to be married, as compared to those from small cities, and the corresponding difference is just under 5 percentage points for women from middle-sized cities versus those from small cities. The number and gender of siblings have impacts of similar magnitude: having an additional sibling is associated with about a 3.5 percentage point increase in the probability of marriage, while having at least one brother is associated with about a 5 percentage point decline. The partial effects of the rent and labor market variables are comparable in magnitude: a 1-standard-deviation increase in monthly rent (which corresponds approximately to a 900-yen increase) is associated with about a 4 percentage point decline in the likelihood of marriage ($0.905 \times (-0.049)$), and a 1-standard-deviation increase in the vacancy/application ratio (which we see from table 2 is 0.454) is associated with a decline of just under 3 percentage points (0.454×0.059). The direct partial effect of the two income variables is small and significant only for the middle-income class.

One of the innovations of our study is to explicitly take into account indirect effects on marriage of variables that affect university education decisions. In the second column of table 3, we can see that there are statistically significant indirect effects for the two income variables, father's education, and Juku 4. In the case of the two income variables, the indirect effect offsets the direct effect, so that the total partial effect of income on marriage is no longer statistically significant for the middle-income variable and even turns negative in the case of the high-income variable (higher income increases the likelihood that a young woman marries, but it also increases her likelihood of obtaining a university education, which in turn reduces her likelihood of marriage). In the case of father's education and Juku 4, there are indirect partial effects only, and both are statistically significant and negative: having a father with a university education is associated with

an almost 4 percentage point decline in the likelihood of marriage, and being more able, as reflected in attending *juku* in high school, is associated with a decline of 3.7 percentage points.

B. A Robustness Test

We explore one variation of our model. A skeptic could argue that our results with regard to the relationships among the marriage, education, and EEOA variables are simply reflecting secular trends in cultural attitudes toward the role of women in society rather than any "cause-and-effect" relationship among these three variables. Put differently, one could conjecture that the EEOA variable in both equations and the education and education/EEOA interaction variables in the marriage equation are simply proxies for omitted variables that capture secular changes in attitudes.[29] If this argument were true, a trend variable added to our estimating equations would be statistically significant and knock out some or all of the other variables that have monotonic trends. Even if it were not valid, the potential multicollinearity among the variables with common trends has the potential to raise the standard errors of coefficient estimates, reducing their likelihood of statistical significance.

We carry out this demanding robustness test by incorporating a trend variable into our base model. More specifically, we add a trend variable to the education equation and both a trend variable and a Trend × education interaction to our marriage equation. This variable ("Trend") is coded from 1 for the oldest cohort in our data (those born in 1959) to 18 for the youngest cohort (born in 1976). The resulting estimates of partial effects appear in panel B of table 3 (computed from the probit coefficients in panel B of table A1).

How are the conclusions that we drew about the interrelationships among university education, marriage, and the EEOA altered? In the case of the education decision, adding the trend variable does not cause us to change our conclusions: the partial effect of the EEOA variable remains positive, shrinks in value, and is still not statistically significant. Thus, our initial finding remains unchanged: the EEOA does not appear to have significantly increased young women's propensity to obtain a university education.

In the case of the marriage decision, our main finding—that the deterrent effect of university education on marriage is much greater for post-EEOA cohorts than for pre-EEOA cohorts—remains unchanged. However,

[29] An alternative way of casting this argument is to say that the EEOA is an endogenous variable, a result of these changing attitudes. While changing attitudes within Japan undoubtedly played a role, this is a case where exogenous forces were at work: it was widely recognized at the time the act was under discussion that Japan felt some pressure, as a signatory of the 1980 United Nations Convention Concerning the Elimination of All Forms of Discrimination against Women, to pass legislation that would put it into compliance with this convention.

the inclusion of the Trend and Trend × education interaction variables, both of which have statistically significant probit coefficients, does change some of the other estimated partial effects. The estimated partial effect of university education on marriage is reduced (in absolute value) for both cohort groupings separately and for the entire period taken as a whole. To be specific, the pre-EEOA partial effect of education was reduced to virtually zero (from −0.126), the post-EEOA negative partial effect declines (from −0.267 to −0.195) but is still statistically significant, and the negative partial effect of education taken over the entire period declines (from −0.200 to −0.119) and is no longer statistically significant. Despite these changes, the results still confirm our earlier finding that the deterrent effect of university education marriage is greatly increased after the passage of the EEOA. Indeed, the difference in partial effects between post-EEOA cohorts and pre-EEOA cohorts is larger in this specification (−0.195 − 0.000 = −0.195) than in our base specification (−0.267 − (−0.126) = −0.141). The issue of the statistical significance of these differences is pursued in the next subsection, in which we interpret our model in the context of a "difference-in-differences" framework.

Two other results in panel B of table 3 merit discussion.[30] First, the partial effect of the EEOA variable on the marriage decision is now positive and statistically significant. Specifically, ceteris paribus, post-EEOA cohorts have an 8.8 percentage point higher probability of being married by age 32, as compared with pre-EEOA cohorts. We do not have an explanation for why the EEOA would have encouraged marriage, but we do have a potential explanation for this finding. Around the same time that the EEOA was passed, there were two other pieces of legislation that affected after-tax income of married women: the "Special Tax Exemption for Spouses," introduced in 1985, and the "Exemption from National Pension Premiums for Spouses (Category III Insured Persons)," introduced in 1987.[31] These two policy changes effectively reduced the "marriage penalty" for working women with low earnings, thereby reducing their opportunity cost of marriage and potentially increasing their likelihood of marriage.[32]

[30] Except for the partial effects discussed in the text, the other partial effects in panel B are very similar to those in panel A.

[31] The "Special Tax Exemption for Spouses" and the "Exemption from National Pension Premiums for Spouses (Category III Insured Persons)" are *Haigusha-Tokubestu-Kojo* and *Daisango-Hihokenja* in Japanese, respectively.

[32] These two legislative changes are family-based, income-tested tax credits, so they are likely to have had a greater proportionate positive impact on the effective after-tax earnings of women with lower potential earnings (women who worked part-time or, if they worked full-time, did not have a university education) than on those of women with higher potential earnings (university graduates who worked full-time). If so, it is possible that our estimated post-EEOA increase in the negative partial effect of university education on marriage is caused in part by the coincident change in tax law. To determine the importance of this possibility, we do a "back-of-the-envelope" calculation to estimate the likely order of magnitude of the effect of the change in the tax treatment of married women's earnings on their marriage propensity by using existing estimates of the elasticity of women's marriage propensity with regard to their own after-tax earnings, combined with the change in effective after-tax income implied by the two tax laws. We compute an upper-limit estimate by assuming that

Second, none of the indirect partial effects in the marriage equation are statistically significant in panel B. This finding follows directly from the fact that the partial effect of university education on marriage is reduced in panel B, necessarily reducing (in absolute value) the resultant indirect partial effect.

In sum, this robustness test confirms our earlier findings of no significant effect of the EEOA on university education decisions and of a significantly greater deterrent effect of university education on marriage after the passage of the EEOA.[33] It also reveals a positive partial effect of the EEOA on marriage, but we believe that this is likely the result of a coincident change in the tax laws that applied to the earnings of married women.

C. A "Difference-In-Differences" (DID) Model

Another way to look at the results of our analysis is by applying a DID methodology. This methodology typically looks at the effect on a particular outcome of a "treatment" on a specified group before and after the treatment,

---

only women without a university education would have had their effective after-tax earnings affected by this change in tax law. The resulting estimate is 5 percentage points (details of the calculation are available from the authors upon request). That is, at most 5 percentage points of the post-EEOA education differential in predicted marriage rates would be associated with the change in tax laws. Further, if university-educated women have earnings that are low enough to be eligible for the tax reduction (e.g., because they work part-time), this estimate would be even smaller. Since the pre- versus post-EEOA difference in estimated partial effects from panels A and B of table 3 are −0.141 and −0.195, respectively, even if the portion of this difference attributable to the change in tax law is as much as 5 percentage points, our paper's conclusions would not be altered.

[33] We perform an alternative robustness test in response to a reviewer's request. Recall that our specification of the cohorts to be affected by the EEOA includes young women who were age 17 or younger when the act was passed in 1985—our reasoning was that post–high school education plans would already have been made for women aged 18 or older at that time. The reviewer suggested, however, that women who were aged 18–21 in 1985 might have been able to alter their post–high school education plans upon learning of the passage of the act and suggested that as a "robustness test" we also estimate a version of our model that includes these four age cohorts in the post-EEOA group rather than in the pre-EEOA group. We conduct this test, recomputing the estimates in panel A of table 3 by using a revised definition of the EEOA dummy variable to reflect the recommended changes. Given that the four cohorts being shifted from the pre-EEOA group to the post-EEOA group are less likely to have been affected by the passage of the act, we expected that the partial effects computed from the coefficients in the education and marriage equations of the revised EEOA variable (denoted "EEOA-rev") and any relevant interactions to decline in absolute value. For the most part, this is what we find. In the education equation, the partial effect of EEOA-rev is 0.007 (vs. 0.019 in table 3) and remains statistically nonsignificant. In the marriage equation, the partial effect of university education for pre-EEOA-rev cohorts remains about the same (−0.129 vs. −0.126 in table 3), but for post-EEOA-rev cohorts it falls in absolute value, to −0.211 (vs. −0.267 in table 3). There is one exception to this general pattern: in the marriage equation, the partial effect of EEOA-rev is a statistically significant −0.076, whereas the corresponding partial effect in table 3 is just −0.022 and nonsignificant. Overall, the conclusion that we draw from this robustness test is that the expansion in the definition of post-EEOA cohorts does not appreciably alter our main conclusions regarding the EEOA: the finding of no significant effect on education decisions remains unchanged, and the finding of lower predicted marriage rates by age 32 for post-EEOA university graduates (as compared to women without a university education) remains, though the differential is reduced.

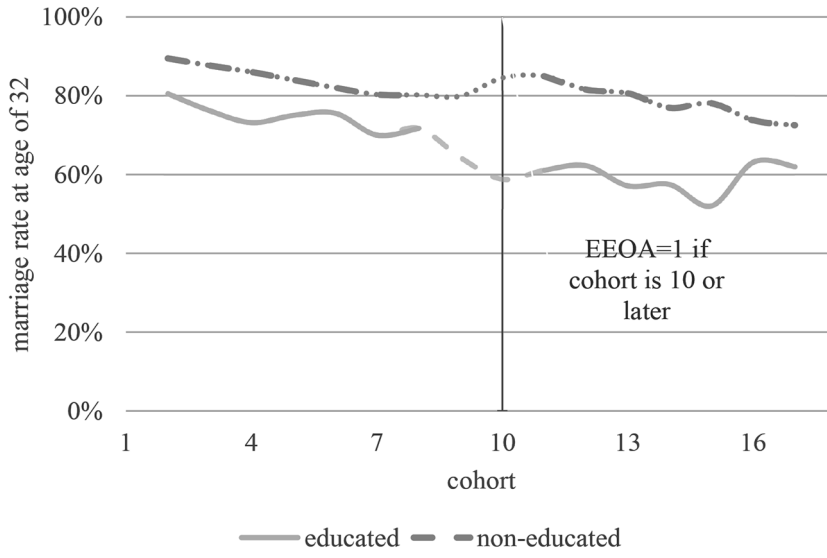

Figure 3.—Marriage rates by educational status (three-cohort moving average): three-cohort average including previous and subsequent cohorts. For cohorts 9 and 10, only the average of the eighth and ninth cohorts and that of tenth and eleventh cohorts, respectively, are used.

using an untreated group as the control. In the context of our research, the outcome would be marriage by age 32, the treatment group is university graduates, the untreated (control) group is women without a university degree, and treatment period is the post-EEOA period. Figure 3 illustrates this structure by graphing marriage rates for university graduates and non–university graduates in our sample over the study period. The data are presented as three-cohort moving averages (graphed at the middle cohort), because, with micro data such as these and the relatively small sample size for each cohort, there is substantial random variation.[34] Evident in this figure are the findings that we have highlighted above: that university-educated women have lower marriage rates than not-university-educated women and that this difference increases after the passage of the EEOA.

Figure 3 also illustrates why it is reasonable to treat the marriage patterns of not-university-educated women as a "control" group for a DID analysis: we see that the downward trend in marriage rates for university-educated women and not-university-educated women are roughly parallel before the passage of the EEOA. The parallel trend indicates that the common-trend assumption is met in our study. Also relevant is the fact that the correlation between the unobserved determinants of education and marriage decisions is small and not statistically significant (see table A1). That is, the selection into treatment can be considered exogenous. Together, these two

[34] Note also that because we are using three-cohort moving averages, (1) there is no entry for the first or last cohort and (2) for the last cohort of the pre-EEOA period (cohort 9) and the first cohort of the post-EEOA period (cohort 10), only two-cohort averages are used.

TABLE 4
Difference-in-Differences (DID) Estimation Results

	Base Model	Model Including Trend
DID estimate	−.1355* (.0726)	−.2110** (.0833)

Note.—Bootstrap standard errors with 100 replications, clustering at the cohort level, are in parentheses.
* Significant at the 10 percent level.
** Significant at the 5 percent level.

factors suggest that we can use a DID model to examine whether it is reasonable to interpret our findings as reflecting a "causal" effect on marriage decisions of the EEOA via the increased deterrent effect of university education in the post-EEOA period.

We use the probit estimates in table A1 to carry out this test. We have already computed separate partial effects of education on marriage for the pre- and post-EEOA cohorts (see table 3). In the context of a linear regression model, the difference between these two partial effects could be interpreted as the DID estimator of the "average treatment effect on the treated," that is, the differential effect of university education on marriage in the post-EEOA period. In the context of a nonlinear model such as ours, however, the DID estimator is more complicated; this simple cross difference does not yield this parameter of interest (Puhani 2012). In a probit model, the DID estimator is $\Phi(\gamma + \alpha_m + \theta + x_m'\beta_m) - \Phi(\gamma + \alpha_m + x_m'\beta_m)$.[35]

The resulting DID estimators appear in table 4. Both estimates are negative and statistically significant, confirming our earlier findings that the negative effect of university education on marriage is substantially larger after the passage of the EEOA, with the differential ranging from 13 to 21 percentage points, depending on which specification is preferred.

VI. Conclusions

Prompted by declines in Japanese birth rates and marriage rates over the past 30 years, this paper seeks to understand how women's declining propensity to marry interacts with the growth over the same period in women's propensity to attend university and how both of these trends may have been affected by the passage in 1985 of the Japanese EEOA. Using data from a

[35] Our model is slightly different from a standard DID model, as we allow for self-selection into E by employing the bivariate probit model. However, conditioning on E, the expectation of M can be expressed in the bivariate model in the same way as in a single probit model. Moreover, as reported in table A1, ρ is not statistically significantly different from zero, and thus, the bivariate probit model is statistically equivalent to two separate single probit models. Indeed, we also compute the DID estimate, as well as other partial effects, on the basis of the single probit model. The results are almost the same as those we report in table 4. Since we estimate the "average treatment effect on the treated," the expression above is averaged among observations with $E = 1$ and $A = 1$, that is, those who completed a university education and are in the post-EEOA period.

unique Japanese panel survey, the JPSC, we estimate a model that treats education and marriage decisions as jointly, though not simultaneously, determined. Specifically, we use a recursive bivariate probit econometric model to capture the particular context within which education and marriage decisions are made in Japan.

What are our conclusions? First, a young woman's decision with regard to university education is determined primarily by her parents' education and income, by the young woman's ability, and by her family's structure. The passage of the EEOA does not appear to have had an important effect.

Second, it is clear that young women's decisions with regard to university education and marriage are closely interlinked. The single most important variable among those we study in determining whether a woman is married by age 32 is whether she has a university education. Notably, this linkage is found to be strongest for post-EEOA cohorts. Specifically, for pre-EEOA cohorts, university-educated women are estimated to be at most 13 percentage points less likely to be married by age 32, compared to their less-educated contemporaries, but this estimate is not statistically significant. In contrast, for post-EEOA cohorts, we see a strikingly large, statistically significant negative partial effect of university education on marriage by age 32, with point estimates from -19 to -27 percentage points. This larger post-EEOA differential effect of university education on marriage is also evident in our DID analysis.

Third, our analysis pinpoints other socioeconomic factors that significantly affect marriage decisions by age 32, though to a lesser extent than university education. Marriage is less likely for women who live in large or middle-sized cities or who have a male sibling. In contrast, having additional siblings (holding their sex constant) is associated with a higher likelihood of marriage. The role of the labor market is similar to that reported by other researchers: when the vacancy/application rate is higher and jobs more plentiful, women are less likely to be married by age 32. Also, when the cost of setting up a marital home, as reflected by average rental costs, is higher, women are less likely to be married by that age. The passage of the EEOA does not appear to have had an important impact in and of itself but rather operates by increasing the responsiveness of the marriage decision to university education, as described above.

At the beginning of this paper, we set out three hypotheses: (1) the passage of the EEOA, by expanding career opportunities of university-educated women, increased the proportion of qualified women who follow this educational path; (2) the expanded career opportunities associated with university education influence women's marriage decisions, leading them to delay or decline marriage; and (3) the passage of the EEOA (and subsequent supporting legislation), which changed the legal and cultural landscape to make a career path more socially and economically attractive to women, increased the "deterrent" effect of university education on marriage. In the case of our first hypothesis, our evidence about the role of the EEOA in university education decisions does not provide unambiguous support. It may

be that some young women chose other paths not studied here, like vocational training, as the avenue for taking advantage of the opportunities affording by the EEOA. In the case of the second and third hypotheses, we find that women who were university educated had a lower probability of being married by the age of 32, as compared to otherwise similar women, and that, most notably, the deterrent effect of university education was significantly greater for post-EEOA cohorts than for their predecessors. Overall, our research strongly suggests that the Japanese EEOA and the expansion in career opportunities it made available to university-educated women was a contributory factor in the delay and decline over the past 30 years of marriage in Japan.

Appendix

. Results of Bivariate Probit Estimation

TABLE A1
Estimation Results: Bivariate Probit Model of Completed Education and Marital Status

	A. Base Model	B. Model Including Trend and Trend × Education Interaction
Education equation:		
EEOA	.1004 (.0925)	.0196 (.1323)
Trend		.0109 (.0145)
Middle income	.2536*** (.0844)	.2519*** (.0845)
High income	.4484*** (.1011)	.4453*** (.1006)
Mother education	.8870*** (.1760)	.8861*** (.1761)
Father education	.7402*** (.0783)	.7383*** (.0792)
Private high school	−.1790** (.0742)	−.1780** (.0739)
Homemaker	.1393 (.0927)	.1441 (.0941)
Number of siblings	−.1263** (.0499)	−.1266** (.0498)
Having brother(s)	−.0914 (.0915)	−.0885 (.0931)
Juku 2	−.0796 (.0763)	−.0793 (.0763)
Juku 3	−.2463*** (.0656)	−.2527*** (.0699)
Juku 4	.7910*** (.0634)	.7911*** (.0634)
Number of professors	.3074 (.4301)	.3004 (.4422)
Vacancy/application$_{ED}$	−.1007 (.0977)	−.1208 (.1041)
Univ./HS first-wage ratio	.2876 (1.4191)	.0388 (1.4809)
Constant	−1.8586 (1.7506)	−1.6018 (1.8018)
Marriage equation:		
Completed education	−.4256 (.3133)	−.4773 (.3478)
EEOA	.0022 (.1102)	.4719*** (.1168)
Education × EEOA	−.3940** (.2005)	−.6949*** (.2669)
Trend		−.0649*** (.0117)
Education × Trend		.0456* (.0270)
Middle income	.0710 (.0444)	.0877* (.0459)
High income	.0305 (.1369)	.0338 (.1345)
Homemaker	−.0606 (.0783)	−.0795 (.0761)
Number of siblings	.1327** (.0553)	.1317** (.0570)
Having brother(s)	−.1841** (.0917)	−.1913** (.0913)
Large city	−.2449** (.1040)	−.2586** (.1049)
Mid-sized city	−.1851 (.1154)	−.1881 (.1162)
Rent	−.1831** (.0769)	−.1337* (.0731)
Spouse availability	−.3302*** (.1239)	−.0320 (.1381)

TABLE A1 (*Continued*)

	A. Base Model	B. Model Including Trend and Trend × Education Interaction
Vacancy/application$_{MA}$	−.2213** (.1124)	−.2207* (.1188)
Constant	1.3376*** (.2688)	1.2531*** (.2835)
ρ	−.0112 (.1811)	−.001 (.181)
Observations	2,224	2,224
Log likelihood	−1,719.1221	−1,711.0866

Note.—Coefficients (standard error) are reported. Standard errors are clustered at the cohort level. See table 1 for definitions of variables. Both education and marriage equations also contain the district dummy variables.
* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.

References

Abe, Yukiko. 2010. "Equal Employment Opportunity Law and the Gender Wage Gap in Japan: A Cohort Analysis." *J. Asian Econ.* 21 (2): 142–55.
———. 2011. "The Equal Employment Opportunity Law and Labor Force Behavior of Women in Japan." *J. Japanese and Internat. Econ.* 25 (1): 39–55.
———. 2013. "Long-Term Impacts of the Equal Employment Opportunity Act in Japan." *Japan Labour Rev.* 10 (2): 20–34.
Araki, Takashi. 1998. "Recent Legislative Developments in Equal Employment and Harmonization of Work and Family Life in Japan." *Japan Labor Bull.* 37 (4): 7–18.
Becker, Gary S. 1976. *The Economic Approach to Human Behavior.* Chicago: Univ. Chicago Press.
———. 1993. *Human Capital.* 3rd ed. Chicago: Univ. Chicago Press.
Brien, Michael J., and Michelle E. Sheran. 2003. "The Economics of Marriage and Household Formation." In *Marriage and the Economy: Theory and Evidence from Advanced Industrial Societies*, edited by Shoshana A. Grossbard, 37–54. Cambridge: Cambridge Univ. Press.
Edwards, Linda N., and Margaret K. Pasquale. 2003. "Women's Higher Education in Japan: Family Background, Economic Factors, and the Equal Employment Opportunity Law." *J. Japanese and Internat. Econ.* 17 (1): 1–32.
Ermisch, John. 2003. *An Economic Analysis of the Family.* Princeton, NJ: Princeton Univ. Press.
Faruqee, Hamid, and Martin Mühleisen. 2001. "Population Aging in Japan: Demographic Shock and Fiscal Sustainability." Working Paper no. 01/40, International Monetary Fund, Washington, DC.
Ge, Suqin. 2011. "Women's College Decisions: How Much Does Marriage Matter?" *J. Labor Econ.* 29 (4): 773–818.
Goldin, Claudia. 1992. "The Meaning of College in the Lives of American Women: The Past One-Hundred Years." Working Paper no. 4099 (June), NBER, Cambridge, MA.
Greene, William H. 1998. "Gender Economics Courses in Liberal Arts Colleges: Further Results." *J. Econ. Educ.* 29 (4): 291–300.
———. 2008. *Econometric Analysis.* 6th ed. Upper Saddle River, NJ: Prentice Hall.
Hamaguchi, Keiichiro. 2011. *Employment and Labor Law in Japan.* Tokyo: Nikkei.
Hasebe, Takuya. 2013. "Marginal Effects of a Bivariate Binary Choice Model." *Econ. Letters* 121 (2): 298–301.
Hashimoto, Yuki, and Ayako Kondo. 2012. "Long-Term Effects of Labor Market Conditions on Family Formation for Japanese Youth." *J. Japanese and Internat. Econ.* 26 (1): 1–22.

Higuchi, Yoshio. 2001. "Women's Employment in Japan and the Timing of Marriage and Childbirth." *Japanese Econ. Rev.* 52 (2): 156–84.
Igami, Koh. 2014. "Reform of University Education for Non-elite University Students." *Japan Labor Rev.* 11 (2): 53–68.
Ishida, Hiroshi. 1998. "Educational Credentials and Labour Market Entry Outcomes in Japan." In *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations*, edited by Yossi Shavit and Walter Müller, 287–309. Oxford: Clarendon.
Japan Ministry of Health, Labour and Welfare. 2010. "Introduction to the Revised Child Care and Family Care Leave Law." http://www.mhlw.go.jp/english/policy/affairs/dl/05.pdf.
———. 2015. "Vital Statistics 2015." e-Stat. https://www.e-stat.go.jp/en/stat-search/files?page=1&toukei=00450011&tstat=000001028897&tyear=20150&second=1.
Lefgren, Lars, and Frank McIntyre. 2006. "The Relationship between Women's Education and Marriage Outcomes." *J. Labor Econ.* 24 (4): 787–830.
Miyoshi, Koyo. 2014. "The Labor Market and Marriage Decisions in Japan." *Japan Labour Rev.* 11 (4): 52–66.
Narayan, Paresh Kumar, and Xiujian Peng. 2007. "Japan's Fertility Transition: Empirical Evidence from the Bounds Testing Approach to Cointegration." *Japan and the World Economy* 19 (2): 263–78.
National Institute of Population and Social Security Research. 2005. *Marriage Process and Fertility of Japanese Married Couples—The Thirteenth Japanese National Fertility Survey.* Tokyo: National Institute of Population and Social Security Research.
Puhani, Patrick A. 2012. "The Treatment Effect, the Cross Difference, and the Interaction Term in Nonlinear "Difference-in-Differences" Models." *Econ. Letters* 115 (1): 85–87.
Raymo, James M. 2003. "Educational Attainment and the Transition to First Marriage among Japanese Women." *Demography* 40 (1): 83–103.
Raymo, James M., and Miho Iwasawa. 2005. "Marriage Market Mismatches in Japan: An Alternative View of the Relationship between Women's Education and Marriage." *American Sociological Rev.* 70 (5): 801–22.
Sakai, Tadashi. 2009. "Role of Income to Marriage Behavior for Japanese Women: Marriage Timing, Desire to Marry, Actions toward Marriage." *Japanese J. Soc. Security Policy* 8 (1): 20–32.
Sakamoto, Kazuyasu, and Yukinobu Kitamura. 2007. "Marriage Behavior from the Perspective of Intergenerational Relationships." *Japanese Econ.* 34 (4): 76–122.
Shirahase, Sawako. 2000. "Women's Increased Higher Education and the Declining Fertility Rate in Japan." *Rev. Population and Soc. Policy* 9:47–63.
Wilde, Joachim. 2000. "Identification of Multiple Equation Probit Models with Endogenous Dummy Regressors." *Econ. Letters* 69 (3): 309–12.
Yamada, Shozo. 2013. "Equal Employment Opportunity Act, Having Passed the Quarter-Century Milestone." *Japan Labour Rev.* 10 (2): 6–19.