
The Labor Market and Marriage Decisions in Japan

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This paper examines the impact of supply-demand balance in the labor market on the recent ongoing trend toward marriage avoidance in Japan, incorporating reviews of previous studies. From a theoretical standpoint, declining income and wages could be seen either as encouraging or as discouraging marriage, but according to empirical analyses in previous studies of Japanese marriage behavior, for men in particular regular employment with high earning potential appears to have the effect of encouraging marriage, and being hired as a regular employee immediately upon graduation appears correlated with younger marriage ages. For women, as well, some previous studies have found a positive correlation between being hired as a regular employee immediately upon graduation and getting married younger. It follows that the decline in hiring of young people as regular employees, as a result of economic stagnation, may be one of the causes of the recent trend toward marriage avoidance.

I. Introduction

The fertility rate in Japan has fallen, and remains, below the population replacement level. According to the Cabinet Office (2013), the fertility rate in 2011 was low even compared to other developed nations at 1.39, and its decline was expected to continue for the foreseeable future. Among the causes of a low birth rate, marriage avoidance, or marrying at later ages, has drawn particular attention. Kaneko (2004), for example, has pointed out that a lower number of births per person (or number of children per married couple) resulting from non-marriage or later marriage is particularly pronounced among the cohort born from 1960 onward.

The Cabinet Office (2013) has proposed that securing young people's economic stability is a means of promoting marriage, and specifically mentions support aimed at fostering young people's financial independence and career formation, and the hiring of regular employees, as effective countermeasures. In theory, however, declining incomes and unstable labor markets amid an economic recession do not necessarily lead to marriage avoidance or marrying at later ages. Becker (1973) notes that a married couple sharing a household, where one of them is engaged in home-based, non-labor-market production (housework, for example), may have higher utility from an economic standpoint, and this may be a factor encouraging marriage. If this is the case, declining incomes due to a recession or other factors means a reduction in market wages as an opportunity cost of (non-wage-earning)

* This paper is a translation of one originally published in *The Japanese Journal of Labour Studies* (vol. 55, no. 9, 2013, 33–42), with some expressions revised for publication in the *Japan Labor Review*. Tables showing results of analysis are taken from the original paper, revised, translated and reprinted.

household production such as housework and child-rearing, and may boost the utility of selecting marriage and non-wage-earning household production over participation in the labor market.

Among the previous studies analyzing the impact of labor market conditions and income on marital status is Burgess, Propper, and Aassve (2003), which noted two effects of income or earning potential on marriage, the “self-reliance effect” and the “good catch effect.” In the latter, a person with higher income is seen as having a higher probability of being a desirable marriage partner (a “good catch”), and thus a higher likelihood of getting married, whereas in the former, a higher income increases the probability of deciding to stay single. In other words, a higher income has the potential to encourage both marriage and marriage avoidance, depending on the situation. The empirical analysis of marital status performed by Burgess, Propper, and Aassve (2003), and others like them, examine the impact on marital status of declining incomes and changing labor markets in times of recession. This paper reviews these previous studies, including ones that focus on Japan, and performs an empirical analysis using procedures like those of the previous studies, so as to examine and discuss the extent to which current trends toward marriage avoidance and later marriage are truly driven by economic stagnation.

The remainder of this paper is structured as follows: Section II reviews previous studies, Section III briefly summarizes the data and models used for this empirical study and the outcomes of the study, and Section IV discusses the impact of a stagnant economy on Japan’s lower marriage rate, later marriage ages, and falling birth rate, incorporating reviews of previous findings.

II. Previous Studies on Marriage and the Labor Market

This section discusses some previous studies that examined the impact of labor market supply-demand conditions on marriage, and considers these studies’ implications for Japan’s current trend toward marriage avoidance.

Becker (1973) could be called the pioneering study of marriage in the context of economics. The study notes that marriage changes a couple’s production possibility frontier, theoretically increasing both utility as each specializes on market labor or household production, whichever each has a comparative advantage. This is not accompanied by an empirical analysis, but the study does state that rising (or falling) individual wage rates alone do not provide clear motivation for marriage (divorce). However, it also states that a change in male and female wage ratio due to some sort of economic disturbance may have an impact on marital status (when unaccompanied by a change in the productivity level of household production). If market wages rise only for the gender with a relative advantage in terms of household production, it raises the opportunity cost of household production and lowers the economic incentive for marriage. At the time of this study, generally speaking men were more geared toward market labor and women toward household production, and

Becker (1973) cites previous studies that found lower marriage rates in American states where women's incomes were relatively high compared to men's. According to Becker's study, there is no clear theoretical basis for the impact on marriage of supply-demand disturbances in labor markets without pronounced male-female discrepancies, such as during recessions.

In addition to changes in the economic advantages of marriage as outlined by Becker (1973), another factor causing higher rates of marriage avoidance may be a decrease in opportunities to meet potential marriage partners. Several studies have focused on opportunities to obtain a spouse and the quality of potential spouses. Drewianka (2003) performed an empirical analysis using data from American states, which showed that a rising percentage of single adults in a given state was correlated with an increased probability of marriage for these single adults. Loughran (2002) also employed US data in an empirical analysis examining the extent to which rising wage inequality levels for men affected women's marriage rates. As grounds for this analysis, the study points to the possibility that greater disparity (wider distribution) of men's earnings leads women to spend more time searching for an acceptable marriage partner. The findings suggested that from 1970 to 1990, rising income disparity levels among men led to a lower probability of marriage among white and highly educated black women. If it is true that the recent Japanese recession has led to wider income disparity among young people, for example between regular and non-regular employees, these findings may be applicable to present-day Japan.

As both marriage and divorce are very costly, it does not seem likely that temporary (or possibly only temporary) changes in wages would spur immediate action leading to change in marital status. For this reason, previous studies on marital and childbirth status have generally focused on indicators other than temporary changes in wages or economic conditions. For example, Adserà (2004) utilized panel data from 23 OECD countries, including Japan, to show that high unemployment rates and insecure employment contracts had a negative effect on fertility rates. The findings suggest that women may be postponing or altogether avoiding childbearing so as to boost lifetime income and reduce the risk of unemployment, and also that highly flexible labor markets like that of the US tend to be correlated with high fertility rates. In these flexible labor markets, women may withdraw from the labor market for reasons such as childbirth, but be able to reenter the market without significant difficulty. In light of the decrease in job security and rise in non-regular employment accompanying Japan's recent recession, Adserà's (2004) argument may be applicable to contemporary Japan. It suggests that women in Japan may be reluctant to have children because of the high risk that they will be unable to reenter the labor market.

Burgess, Proper, and Aassve (2003) employed data from 1979 on whites aged 14 to 21 from the American NLSY (National Longitudinal Survey of Youth) to analyze the impact on legal marriage of earning potential, taking into account not only current income and wage rates, but also earning potential, which is estimated using educational background and age, unaffected by economic fluctuations. For men, higher long-term income had a signifi-

cant positive effect on earlier marriage, whereas for women it had a significant negative effect. In other words, the findings suggest that for men the “good catch effect” was dominant, whereas for women the “self-reliance effect” was. Gutiérrez-Domènech (2008) compared two Spanish-born cohorts, those born between 1945–1960 and those born between 1961–1977, using the Cox proportional hazards model to analyze the impact of education and labor markets on the timing of marriage and childbirth. The findings showed different effects of employment among women, with higher levels of employment correlated with later marriage among the 1945–1960 cohort and correlated with earlier marriage among the 1961–1977 cohort. In other words, we may conclude that the “self-reliance effect” dominated during the earlier period, whereas the “good catch effect” dominated during the later period. At the same time, employment was correlated with later childbearing for both cohorts. Kondo (2012) utilized 1990–2004 data from the American SIPP (Survey of Income Program Participation) to analyze the impact of worsening supply-demand balance in the labor market in marital status and timing of marriage. This study focused on the effects of youth unemployment rates on the timing of marriage, and showed that unemployment among young women was correlated with significantly earlier marriage. However, the scope of this correlation was limited to the timing of marriage, and did not extend to impact on the probability of marriage or childbearing over an entire lifetime. On a different note, Alm and Whittington (1999) examined the impact on marriage of the economic advantages of spousal tax deductions. Using US data, they found a statistically significant but extremely small incentive effect. Also using US data, Amato and Beattie (2011) analyzed the effect of unemployment rates on divorce, and found that from 1980 onward in particular, unemployment rate had a significant negative correlation to divorce rate.

These previous studies suggest that the dominance of either the “self-reliance effect” or the “good catch effect” was dependent on the country or period under examination. Another thing we must take into account is the simultaneous determination (reciprocal, self-reinforcing relationship) of marriage and human capital factors like employment status and education. Field and Ambrus (2008) examined regional data from Bangladesh and demonstrated the possibility that the social norm of marriage at a young age was having an impact on educational level. Empirical analysis showed that girls’ marriages at extremely young ages had an adverse effect on their education. When performing analyses related to marriage, it may be necessary to take such social norms into consideration.

Empirical Studies in Japan are summarized as follows. Ohta (2007), who analyzed relationships between potential spouses’ income and marriage, employed national census data, and found that a rise in the percentage of men employed for short-term periods was correlated with a drop in the percentage of women with spouses. Also, Nagase (2002) utilized individual data from the The National Fertility Survey and performed an empirical analysis showing that the trend toward non-regular employment was correlated with later marriage among both men and women. These findings are consistent with those of Loughran (2002) and Adserà (2004), and it seems likely that this employment trend is con-

tributing to the rising percentage of unmarried people in Japan. The findings of these studies suggest that an increasing number of short-term employees may lead to wider income disparity and lead people to spend longer periods of time searching for marriage partners, or that the increase in insecure employment such as short-term or non-regular employment (or the non-flexibility of the labor market) causes people to hesitate to get married or have children, so as to maintain their employment status.

Sakai and Higuchi (2005), Mizuochi (2006), and Hashimoto and Kondo (2012) analyzed the relationship between latent earning potential and marriage in Japan. Sakai and Higuchi (2005) focused on employment status at the time of graduation as an indicator of latent earning potential. This is because, as elucidated by Genda, Kondo, and Ohta (2010), the supply-demand balance of the Japanese labor market at time of graduation is known to have a persistent effect on wage levels thereafter.

In a hazard analysis employing Keio Household Panel Survey data by Sakai and Higuchi (2005), which analyzed the impact of employment status at time of graduation on family formation, employment, and income thereafter, it was found that unemployment or non-regular employment, rather than regular employment, at time of graduation was correlated with marriage and childbirth at a later age. Mizuochi (2006) similarly focused on form of employment immediately following graduation and analyzed its impact on age of first marriage thereafter. This study utilized data from JGSS (Japanese General Social Surveys), using the Kaplan-Meier estimator and Cox proportional hazards model to examine this impact for both men and women. The findings suggest that for men, being a regular employee immediately following graduation was correlated with a stable marital status thereafter. In other words, the findings of both Sakai and Higuchi (2005) and Mizuochi (2006) suggest that in recent years in Japan, the “good catch effect” is particularly dominant with regards to men, and these findings are consistent with the fact that the percentage of never-married people has been rising during the nation’s recent prolonged recession. Meanwhile, Sakata and McKenzie (2007) analyzed divorce using Japanese data broken down by prefecture, and showed that a higher unemployment rate led to an increase in incidences of divorce. This, too, suggests that in Japan at least, high earning potential increases the probability of choosing marriage.

Working with data on Japanese women, Hashimoto and Kondo (2012) focused on unemployment rate at time of graduation as an indicator of latent earning potential, and performed analyses on marriage and childbearing. In their analysis of childbearing trends broken down by educational level, they obtained different results for female high school graduates and female university graduates. Among female high school graduates, those that enter the labor market when the unemployment rate is high are less likely to have children, but among their university-graduate counterparts the opposite is true, and entering the labor market when the unemployment rate is high increases the likelihood of having children. It was also found that women who enter the labor market during a recession have a higher probability of having two or more children. The study also included an analysis of marriage

utilizing regional panel data, which found that a high unemployment rate at time of graduation was correlated with marriage at later ages. This is the opposite of the results obtained by Kondo (2012) using US data.

Ueda (2007) employed panel data from the Japanese Panel Survey of Consumers conducted by the Institute for Research on Household Economics, and estimated marriage, employment, and childbearing using a dynamic discrete choice model. The estimated utility function parameters for marriage, employment, and childbearing showed that among Japanese women of all educational backgrounds, the utility function parameter for marriage was significantly negative. This study suggests that for Japanese women, the disadvantages of marriage such as housework and other obligations tend to outweigh advantages such as economies of scale and happiness level.

III. Empirical Analyses of Marriage and Childbirth

In this section, the Japanese Panel Survey of Consumers (hereafter, JPSC), which is panel data on Japanese women from the Institute for Research on Household Economics was utilized for an analysis of the effects of latent earning potential on marriage, with unemployment rate at time of graduation and estimated market wages used as indicators of latent earning potential. This paper employs data from Panel 1 (1993) to Panel 17 (2009) of JPSC. At its start in 1993, JPSC covered women aged 24–34 (cohort A), thereafter adding women aged 24–27 in 1997 (cohort B), women aged 24–29 (cohort C) in 2003, and women aged 24–28 (cohort D) in 2008. While the survey subjects are women, items such as the income and employment status of other household members are examined as well, and for married women the same items are surveyed for spouses as for the women themselves. Unemployment rates by age group at time of graduation and at each time point thereafter, derived from the Labour Force Survey, are also used. Descriptive statistics for the variables used for estimation are shown in Table 1.

When using this data for analysis of marriage, several points need to be taken into account. One is that data on income is not available for subjects aged younger than 24. However, women may participate in the marriage market or be involved in childbearing at a younger age (starting at age 18, according to the general consensus), and this analysis is unable to cover these women. Also, as the Institute for Research on Household Economics does not provide data on respondents' prefecture of residence to researchers utilizing its data for the first time, it was not possible to estimate data with the assumption that marriage markets are divided by region, as has generally been the practice in previous studies. For example, Drewianka (2003) employs the percentages of never-married people by region as explanatory variables, but this factor does not come into play in this analysis.

The model employed is the Cox proportional hazards model, also used by Mizuochi (2006) and Gutiérrez-Domènech (2008). For this model the baseline hazard at time t is denoted $h_0(t)$, and the hazard rate formulated as

Table 1. Descriptive Statistics

	Entire sample		Not married		Married	
	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev
Age	34.75	5.93	31.98	5.77	35.91	5.60
Married	70.36%	0.46				
Junior high school graduate	6.06%	–	5.86%	–	6.14%	–
High school graduate	40.46%	–	33.87%	–	43.24%	–
Vocational school or junior college graduate	38.70%	–	38.00%	–	38.99%	–
University graduate	14.78%	–	22.27%	–	11.62%	–
Year of graduation	1987.73	6.34	1990.40	6.44	1986.61	5.95
Has occupation	63.87%	–	88.06%	–	53.67%	–
Currently employed	57.12%	–	84.04%	–	45.78%	–
Regular employee	32.53%	–	62.11%	–	20.08%	–
Regular employee immediately upon graduation	76.31%	–	72.21%	–	78.04%	–
Father is junior high school graduate	37.56%	–	30.66%	–	40.47%	–
Father is high school graduate	40.45%	–	39.48%	–	40.86%	–
Father is vocational school or junior college graduate	4.84%	–	5.47%	–	4.58%	–
Father is university graduate	15.74%	–	21.98%	–	13.11%	–
Mother is junior high school graduate	37.92%	–	28.70%	–	41.81%	–
Mother is high school graduate	47.00%	–	50.61%	–	45.47%	–
Mother is vocational school or junior college graduate	10.45%	–	13.70%	–	9.08%	–
Mother is university graduate	3.06%	–	4.85%	–	2.30%	–
Annual income from work	140.28	169.75	250.30	163.26	93.56	149.71
Unemployment rate at time of graduation	5.06	1.55	5.51	1.64	4.87	1.47
Sample size	18938		5613		13108	

Source: Japanese Panel Survey of Consumers, 1993–2009.

Note: Unemployment rate is derived from the Labour Force Survey, with figures for men and women broken down by 5-year blocks.

$$h(t) = h_0(t)e^{x'\beta} \quad (1)$$

For this model, subjects with past divorces are omitted from the sample.

The variables used are as follows. Annual market income, viewed as the opportunity cost to women of marrying and engaging in household production rather than market labor, is estimated in a similar way to Burgess, Propper, and Aassve (2003). Limiting the sample to subjects earning annual market income, Mincerian income equation is estimated. The explanatory variables are dummy variable for the subject’s educational level, unemployment rate at time of graduation by age group, dummy variables for parents’ educational lev-

el, number of years continuously working and its square, dummy variable for whether or not first job after graduation was as a regular employee, and total years of work experience and its square. The estimated parameters used as the basis for calculating the annual market income the entire sample can expect to earn in the labor market. The estimated income is used in estimating (1) as the covariate. In Burgess, Propper, and Aassve (2003), the endogeneity of work hours is also taken into account, and similar estimated variables produced for hourly wage rates are used as well, but in JPSC for the majority of subjects only class values for work hours are given, and as a result these variables were omitted from this model.

While the division of the marriage market into regions is not taken into account, the model considered the possibility that the labor markets may be divided by workplace, and for this reason dummy variable for the subject's educational level, unemployment rate at time of graduation by age group, dummy variables for parents' educational level, and dummy variable for whether the subject was hired as a regular employee within one year after graduation were added to the model. For example, if the subject has a high level of education and was hired when economic conditions were good, she would not only have a high income, but also be likely to be employed in workplace where there is a high probability of meeting a potential spouse with a high income. However, the above are explanatory variables used in estimating annual income, and it is necessary to take into account the possibility of multi-collinearity issues occurring. In addition to the above, the annual income of other members of the household was employed as an explanatory variable to proxy reservation utility.

The estimation results for hazard analysis of marriage are shown in Tables 2 through 5. Table 2 shows the results of analysis using all samples, Table 3 only cohort A, Table 4 only cohort B, and Table 5 only cohort C. The results show a significant negative coefficient for estimated annual market income.¹ In other words, the higher estimated annual market income is, the stronger the trend toward late marriage becomes. In a similar fashion, household income can be seen to have a significant negative impact on the timing of marriage. Furthermore, when estimating with the unemployment rate at time of graduation, the subject's educational level, and parents' educational level, without using estimated annual market income as a covariate, generally the higher the subject's and her father's educational level were, the later marriage became. Also positively correlated with later marriage was a low unemployment rate at time of graduation. These findings suggest that for women in Japan, the "self-reliance effect" is dominant. However, its effects are extremely small. At the same time, for most estimation results, dummy variables that had normal values immediately following graduation were statistically insignificant.

However, when both annual market income and unemployment rate at time of graduation are used in estimation simultaneously, they are significantly negative. This is consistent with the marriage analysis results of Hashimoto and Kondo (2012), and there seem

¹ The variance-covariance matrix is unadjusted here.

Table 2. Marriage Hazard Model Results: Entire Sample

	Entire sample	Junior high / High school graduate	Vocational school, junior college or university graduate
Unemployment rate at time of graduation	-1.007*** (0.0772)	-2.531*** (0.154)	-1.752*** (0.142)
Junior high school graduate dummy	0.213*** (0.0223)	0.208*** (0.0304)	0.215*** (0.0341)
Junior college / Vocational school graduate dummy	-4.315*** (0.329)	-9.494*** (0.591)	
University graduate dummy	0.377*** (0.144)		
Junior high school graduate father dummy	-0.152* (0.0784)		
Vocational school / Junior college graduate father dummy	7.103*** (0.502)		
University graduate father dummy	-0.629*** (0.113)		
Junior high school graduate mother dummy	-0.733*** (0.0957)	-1.532*** (0.144)	6.056*** (0.494)
Vocational school / Junior college graduate mother dummy	-0.0495 (0.0854)	-0.0179 (0.115)	(0.114)
University graduate mother dummy	-1.140*** (0.195)	-1.991*** (0.304)	-1.363*** (0.163)
Junior high school graduate father dummy	-0.309* (0.186)	-0.103 (0.282)	-0.448* (0.252)
University graduate mother dummy	1.384*** (0.134)	2.876*** (0.266)	2.278*** (0.207)
Vocational school / Junior college graduate mother dummy	0.0149 (0.105)	-0.0534 (0.216)	0.00103 (0.125)
University graduate father dummy	-1.750*** (0.149)	-3.902*** (0.262)	-3.064*** (0.275)
Junior high school graduate mother dummy	0.0752 (0.0871)	0.0673 (0.117)	0.0840 (0.132)
Vocational school / Junior college graduate mother dummy	-1.412*** (0.144)	-0.0551 (0.259)	-2.337*** (0.226)
University graduate mother dummy	-0.105 (0.110)	-0.686 (0.190)	-0.0521 (0.136)
Unemployment rate	0.217 (0.197)	0.762 (0.737)	0.277 (0.209)
Income of person other than subject	0.00160 (0.00132)	0.000318 (0.00218)	-0.000590 (0.00178)
Estimated annual income	-9.19e-05*** (4.89e-06)	-0.00229*** (7.58e-06)	-9.94e-05*** (6.57e-06)
Regular employee immediately upon graduation dummy	-0.00259*** (0.000169)	-0.00587*** (0.000343)	-0.00429*** (0.000323)
Sample size	5,865	2,212	3,653

Notes: 1. Figures in parentheses show standard deviation.

2. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively.

3. Educational level dummy reference is "High school graduate."

Table 3. Marriage Hazard Model Results: Cohort A

	Entire sample	Junior high / High school graduate	Vocational school, junior college or university graduate
Unemployment rate at time of graduation	-0.948*** (0.136)	-4.363*** (0.369)	-1.827*** (0.291)
Junior high school graduate dummy	4.738*** (0.610)	-16.64*** (1.432)	0.0324 (0.118)
Junior college / Vocational school graduate dummy	4.140*** (0.475)	-0.138 (0.135)	
University graduate dummy	7.801*** (0.905)	-0.621*** (0.227)	6.140*** (0.882)
Junior high school graduate father dummy	-0.836*** (0.159)	-0.117 (0.139)	-0.452** (0.226)
Vocational school / Junior college graduate father dummy	-1.437*** (0.366)	-0.618* (0.350)	-1.393*** (0.281)
University graduate father dummy	1.429*** (0.259)	-0.131 (0.210)	-2.469*** (0.565)
Junior high school graduate mother dummy	-1.794*** (0.261)	0.286** (0.143)	2.116*** (0.349)
Vocational school / Junior college graduate mother dummy	-1.136*** (0.290)	0.641*** (0.236)	-0.349 (0.255)
University graduate mother dummy	-1.646*** (0.471)	-0.0198 (0.442)	0.288 (0.485)
Unemployment rate	-0.00817*** (0.00241)	0.0573 (0.0543)	0.767** (0.319)
Income of person other than subject	-4.26e-05*** (6.49e-06)	-0.000979*** (0.000189)	0.0727 (0.455)
Estimated annual income	-0.00263*** (0.000287)	-0.00599*** (0.00115)	-0.00839*** (0.00293)
Regular employee immediately upon graduation dummy	0.0941 (0.134)	0.0864 (0.132)	-0.000958*** (0.000252)
Sample size	2,470	2,470	1,377

Notes: 1. Figures in parentheses show standard deviation.

2. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively.

3. Educational level dummy reference is "High school graduate."

Table 4. Marriage Hazard Model Results: Cohort B

	Entire sample		Junior high / High school graduate	Vocational school, junior college or university graduate
Unemployment rate at time of graduation	-0.585*** (0.209)	-0.110 (0.128)	-2.875*** (0.469)	-0.915* (0.515)
Junior high school graduate dummy	-1.784** (0.780)	0.284 (0.300)	-10.48*** (1.818)	(0.160)
Junior college / Vocational school graduate dummy	1.305* (0.750)	-0.594** (0.277)	(0.349)	
University graduate dummy	3.223** (1.404)	-1.064*** (0.309)		3.134* (1.781)
Junior high school graduate father dummy	-0.359 (0.234)	0.000297 (0.221)	-1.715*** (0.370)	-0.908* (0.497)
Vocational school / Junior college graduate father dummy	-0.885 (0.746)	-1.077 (0.726)	-2.344** (1.115)	-1.458 (1.120)
University graduate father dummy	0.738** (0.355)	-0.158 (0.269)	3.881*** (0.752)	0.962 (0.674)
Junior high school graduate mother dummy	-0.538 (0.369)	0.264 (0.223)	-4.417*** (0.815)	-1.210 (0.895)
Vocational school / Junior college graduate mother dummy	-0.516 (0.382)	0.0460 (0.288)	-3.172*** (0.573)	-1.021 (0.716)
University graduate mother dummy	-0.526 (0.525)	0.454 (0.473)	-4.230*** (1.312)	-1.253 (0.855)
Unemployment rate	-0.0365*** (0.0109)	-1.313*** (0.327)	-0.0681*** (0.0228)	-0.0235* (0.0127)
Income of person other than subject	-0.000119*** (1.37e-05)	-0.00295*** (0.000359)	-0.000116*** (1.91e-05)	-0.000122*** (1.90e-05)
Estimated annual income	-0.00129*** (0.000473)	-0.00394*** (0.00129)	-0.00737*** (0.00119)	-0.00218* (0.00117)
Regular employee immediately upon graduation dummy	0.0380 (0.176)	-0.0418 (0.173)	0.0937 (0.265)	-0.172 (0.253)
Sample size	1,297	1,297	485	812

Notes: 1. Figures in parentheses show standard deviation.

2. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively.

3. Educational level dummy reference is "High school graduate."

Table 5 Marriage Hazard Model Results: Cohort C

	Entire sample	Junior high / High school graduate	Vocational school, junior college or university graduate
Unemployment rate at time of graduation	-1.282*** (0.185)	-3.669*** (0.457)	-3.425*** (0.367)
Junior high school graduate dummy	0.108** (0.0513)	0.210*** (0.0740)	0.0438 (0.0742)
Junior college / Vocational school graduate dummy	-6.035*** (0.652)	-14.68*** (1.671)	
University graduate dummy	5.689*** (0.535)	-0.213* (0.118)	
Junior high school graduate father dummy	10.90*** (1.076)	-0.585*** (0.147)	12.09*** (1.186)
Vocational school / Junior college graduate father dummy	-1.113*** (0.161)	0.0834 (0.128)	-2.332*** (0.284)
University graduate father dummy	-1.588*** (0.274)	-0.0896 (0.237)	-3.124*** (0.419)
Junior high school graduate mother dummy	2.009*** (0.230)	0.199 (0.139)	4.456*** (0.431)
Vocational school / Junior college graduate mother dummy	-2.736*** (0.293)	-0.0641 (0.135)	-5.998*** (0.597)
University graduate mother dummy	-2.246*** (0.244)	-0.205 (0.141)	-4.663*** (0.460)
Unemployment rate	-2.479*** (0.323)	-0.335 (0.252)	-4.885*** (0.511)
Income of person other than subject	0.0315*** (0.00414)	0.630*** (0.105)	0.965*** (0.176)
Estimated annual income	-0.000122*** (1.01e-05)	-0.00291*** (0.000270)	-0.00220*** (1.34e-05)
Regular employee immediately upon graduation dummy	-0.00394*** (0.000373)	-0.00583*** (0.000910)	-0.00852*** (0.000793)
Sample size	2,098	634	634

Notes: 1. Figures in parentheses show standard deviation.

2. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively.

3. Educational level dummy reference is "High school graduate."

to be several possible interpretations. One is that the better a woman's job is, the more likely she is to meet a potential spouse with a high income. Another is that in Japan, the larger a company is, the more likely it is to offer full maternity leave, making it easier for a woman to choose marriage. We must keep in mind, though, that the annual market income used here is an estimated value based on educational level and unemployment rate at time of graduation as explanatory variables, meaning there is a possibility of issues caused by multi-collinearity. Also, the unemployment rate at each point in time is significantly negative except for when modeled only with cohort C, in which case it was significantly positive.

IV. Summary

Here, JPSC was utilized to perform hazard analyses of marriage using, respectively: earning potential, employment status (regular or non-regular employment), unemployment rate illustrating the supply-demand balance in the labor market, and covariates showing human capital such as educational level. The analyses found that higher estimated annual market income was positively correlated with later age of marriage, as was higher household income. Also, unless unemployment rate at time of graduation and estimated annual income were applied simultaneously, the effect of unemployment rate at time of graduation was significantly positive (i.e. was correlated with earlier marriage) for cohort A and cohort B. These findings suggest that for women in Japan, the "self-reliance effect" is dominant, a result that differs from those of previous studies cited earlier. However, the impact of these factors is extremely minor, and it must be kept in mind that the scope of this analysis is limited insofar as it applies only to women who remain unmarried at the age of 24.

These findings and those of previous studies point to the following conclusions. First of all, as suggested by Sakai and Higuchi (2005) and Mizuochi (2006), for men in Japan being hired as a regular employee immediately following graduation is associated with earlier marriage. This implies that the recent recession, accompanied by a drop in the percentage of workers who are regular employees, is a factor in the trend toward marriage avoidance. As illustrated by Nagase (2002) and Ohta (2007), the rise in non-regular employment among men is driving down the percentage of individuals who are married.

With regard to marriage among Japanese women, while Mizuochi (2006) did not obtain a stable conclusion, Nagase (2002) obtained results indicating that non-regular employment among youth was accompanied by a lower likelihood of marriage, and Hashimoto and Kondo (2012) found that a high rate of youth unemployment was correlated with later age of marriage. These conclusions are different from those drawn in the United States by Kondo (2012), where women with lower earning potential were more likely to marry earlier. While the findings of this study, in contrast to the other Japanese studies above, suggest that the "self-reliance effect" is dominant among women in Japan, it is not seen as having a major impact.

It appears likely that the increasing prevalence of non-regular employment among

men is contributing to the ongoing trend toward marriage avoidance. In this sense, the measures compiled by the Cabinet Office (2013) to facilitate the shift of non-regular workers to regular employment and to assist with career formation may be effective to some extent. However, as shown by Adserà (2004), a lack of flexibility in the labor market may be connected to a drop in the fertility rate, and what is needed in Japan today is not only repositioning of non-regular employees as regular ones, but also measures to change the fundamental nature of a labor market polarized between regular employees and non-regular, insecurely employed workers.

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