Marriage Preceded by Pregnancy and Women's Employment

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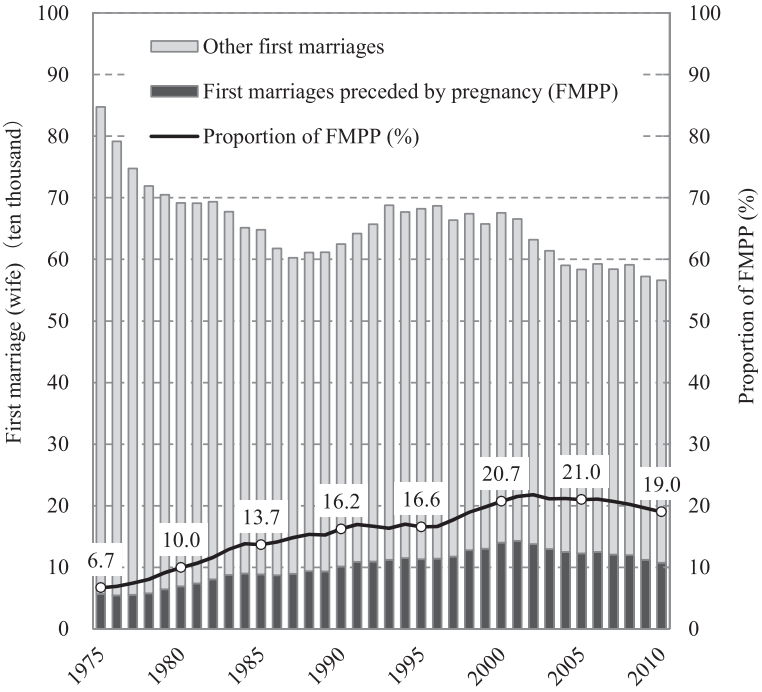
When a woman's pregnancy precedes her marriage, what sort of impact does it have on her future career? In this paper, we examine this issue. Since marriage preceded by pregnancy is concentrated in certain socioeconomic status groups, in addition to ordinary methods of estimation, we also employed models using the propensity score of marriage preceded by pregnancy, in order to balance the structure of covariates. The results show that although those who have experienced marriage preceded by pregnancy are more likely than their counterparts to quit their jobs after marriage, the likelihood of their being full-time (rather than non-regular) employees after childbirth is higher than those in the other group. They are also more likely to be employed full-time when their first child is one year old. However, we found no statistically significant difference between the two groups in terms of childcare leave utilization, employment status after controlling for age of youngest child, or annual income. While the likelihood of resignation from work is higher among women who have experienced marriage preceded by pregnancy, their status does not appear to place them at an extreme disadvantage in terms of likelihood of employment, or employment status, after childbirth. In a social climate marked by an ongoing weakening of factors other than pregnancy that encourage women to marry, we speculate that marriage precipitated by pregnancy will gain increasing social acceptance as a pattern of family formation.

I. Introduction

Since the 1970s, Japanese society has seen an ongoing decline in childrearing, with more people remaining unmarried and a very low fertility rate. There have been changes not only in the number of children born, but also in terms of patterns in family formation. According to the Japanese Vital Statistics released by the Ministry of Health, Labour and Welfare (MHLW), among first marital births, the percentage where children were conceived prior to marriage (or prior to the beginning of mother's and father's marriage-like life) rose from 18.0% in 1995 to 25.3% in 2009 (Ministry of Health, Labour and Welfare 2010). Other nationwide surveys show that the prevalence of marriage preceded by pregnancy (shotgun weddings) is higher among younger or more recently married couples (Ohtani 1993; Yamada 2005; Raymo and Iwasawa 2008; Kamata 2012). Research thus far indicates that there are qualitative differences between marriages preceded by pregnancy and other marriages, but what sorts of differences might these be? In this paper, we will focus on the impact on women's careers after childbirth, and examine correlations with employment status and income at various life stages.



Note: Figures for the number of Japanese women marrying for the first time based on marriage data of Vital Statistics tabulated by year and age of the beginning of married life, with corrections for marriages where registration was delayed. Figures for the number of marriages preceded by pregnancy were derived from the Vital Statistics for the number of Japanese women giving birth to their first child within seven months after the beginning of mother's and father's married life, tabulated by year and mother's age at the beginning of married life.

Figure 1. Wife's First Marriages and First Marriages Preceded by Pregnancy, by Year

II. Trends in Marriage Preceded by Pregnancy

In recent years, the number of first marriages experienced by women has been slightly under 600 thousands annually. Of these first marriages, how many are preceded by pregnancy? As there are no official statistics on marriage preceded by pregnancy, we need to tabulate individual data from the Vital Statistics based on our own definition.

In this paper, by reference to a large body of existing research (Ruzicka 1976; Kamata 2006; Kamata 2012), we define marriage preceded by pregnancy as referring to cases where childbirth occurs within seven months after first marriage. Using data on births within seven months after the beginning of mother's and father's married life drawn from the Vital Statistics for the years 1974 to 2011, we can estimate the number of marriages preceded by pregnancy over the 1974–2010 period. Figure 1 and Table 1 show the results of estimates of

Table 1. Number of First Marriages of Japanese Women and Estimated Number and Percentage of Marriages Preceded by Pregnancy with First Child

		Year							
		1975	1980	1985	1990	1995	2000	2005	2010
Number of first marriages (wives) by year of register (in thousands) (Official figures from the Vital Statistics) Age of wife: 15−49		871.4	701.4	656.6	637.5	700.2	691.5	599.7	586.7
Number of first marriages (wives) by year of the start of married life (in thousands) (Estimates by inputting delayed registrations)									
Type of first marriage	Age of wife								
All first marriages	15–19	33.8	28.5	28.5	29.8	24.6	27.0	20.0	15.0
	20–24	487.6	350.4	296.2	247.0	249.7	194.0	137.4	118.6
	25–29	276.4	251.7	259.9	280.1	310.9	328.1	260.4	239.4
	30–34	32.8	45.5	44.4	50.1	75.4	98.2	124.3	127.0
	35–39	9.5	10.0	13.5	11.8	15.4	22.1	32.7	51.0
	40–44	4.8	3.6	3.8	4.4	4.1	4.6	6.9	12.2
	45–49	2.6	2.2	1.8	1.8	2.1	1.6	1.9	3.0
	Total	847.4	691.9	648.1	624.9	682.1	675.6	583.6	566.3
First marriage preceded by pregnancy with first child	15–19	4.7	6.8	9.7	11.1	11.9	15.3	11.2	8.1
	20–24	34.4	39.6	50.5	54.8	60.6	64.6	51.5	40.8
	25–29	14.8	17.9	22.5	28.0	30.6	44.5	39.0	35.3
	30–34	2.1	3.9	4.6	5.9	7.9	12.4	16.1	16.0
	35–39	0.4	0.6	1.2	1.3	1.7	2.8	4.2	6.5
	40–44	0.0	0.1	0.1	0.2	0.2	0.3	0.5	0.9
	45–49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	56.5	68.9	88.6	101.4	113.0	139.9	122.5	107.5
Proportion of marriage preceded by pregnancy with first child (%)									
	Age of wife								
	15–19	13.8	23.7	34.2	37.2	48.6	56.8	56.1	53.5
	20–24	7.1	11.3	17.0	22.2	24.3	33.3	37.5	34.4
	25–29	5.4	7.1	8.6	10.0	9.9	13.6	15.0	14.7
	30–34	6.3	8.6	10.4	11.9	10.5	12.7	12.9	12.6
	35–39	4.5	6.3	9.1	11.2	10.9	12.6	12.9	12.8
	40–44	0.9	1.4	2.8	4.6	4.7	6.1	7.2	7.2
	45–49	0.0	0.2	0.1	0.2	0.1	0.3	0.3	0.7
	15−49	6.7	10.0	13.7	16.2	16.6	20.7	21.0	19.0

Note: Same data as Figure 1. Official values by the Vital Statistics for the number of first marriages include those for marriages in which either husband or wife is non-Japanese.

the total number of first marriages and total number of marriages preceded by pregnancy, and the percentage of the latter. In 1975, marriages preceded by pregnancy accounted for just below 7% of total first marriages, a figure that rose above 20% during the 2000s, and stood at 19.0% in 2010. The number of first marriages preceded by pregnancy registered in 2010 is estimated to be approximately 108 thousands.

How should we interpret the dramatic rise in marriages preceded by pregnancy? There are two major factors that may be contributing to the trend.

The first scenario is that marriage preceded by pregnancy is in itself more likely to occur. For one thing, an attitude of tolerance toward premarital sex became much more prevalent during the 1990s (Kamano 2012). Also, age at first sexual intercourse fell between the 1980s and 2005 (Japanese Association for Sex Education 2007). Low-dose oral contraceptive pills, which are highly effective at preventing pregnancy, were not approved in Japan until 1999, and even thereafter the most common methods of birth control among young people remained condoms and withdrawal (Mita and Iwasawa 2007), which suggests that as the prevalence of premarital sex increases, pregnancies prior to marriage are likely to increase as well. It is also possible that as negative perceptions of marriage preceded by pregnancy have become diluted, more people are intentionally choosing this pattern. Over the second half of the 20th century, in developed countries other than Japan, normative or conformist attitudes toward family life have retreated amid the growth of individualism (Lesthaeghe 2010). In Japan, as well, it is possible that people are intentionally choosing new lifestyles that are unconstrained by the conventional progression of marriage, pregnancy, and childbirth. In addition, factors such as enhancement of the Act on Advancement of Measures to Support Raising Next-Generation Children may be contributing to a rise in the number of pregnancies which in the past would have been terminated for economic reasons and so on, but today are resulting in childbirth in the context of marriage preceded by pregnancy.

The second scenario is that there is no actual change in the risk of the occurrence of marriages preceded by pregnancy, but that people are more often choosing to postpone or avoid marriage, thus increasing the probability of marriage being precipitated by pregnancy. According to this explanation, a decline in the generally perceived advantages of marriage, or a variety of obstacles preventing people from getting married, are leading to an increase in the prevalence of marriage preceded by pregnancy.

The propensity toward marriage preceded by pregnancy can be expressed as a hazard, for which population at risk consists of never-married women. When calculating the hazard of occurrence of marriage preceded by pregnancy, and the hazard of occurrence of other marriage, we observe that the hazard of first marriage not accompanied by pregnancy grows dramatically lower year by year among women in their 20s (figures are not shown). However, the hazard of marriage preceded by pregnancy shows hardly any change. This does not bear out the first scenario above for the increase in marriage preceded by pregnancy. The recent rise in marriage preceded by pregnancy can, however, be nearly entirely explained as

the result of a lengthening of the never-married period at risk, as more and more women postpone marriage that is not accompanied by pregnancy. In recent years, an increasing number of both men and women have been giving "having one's own children and family" as a primary advantage of marriage (Kaneko and Kamata 2012), and in the context of a decline in other factors that actively encourage people to get married, it is clear that pregnancy is providing people with an important incentive for first marriage.

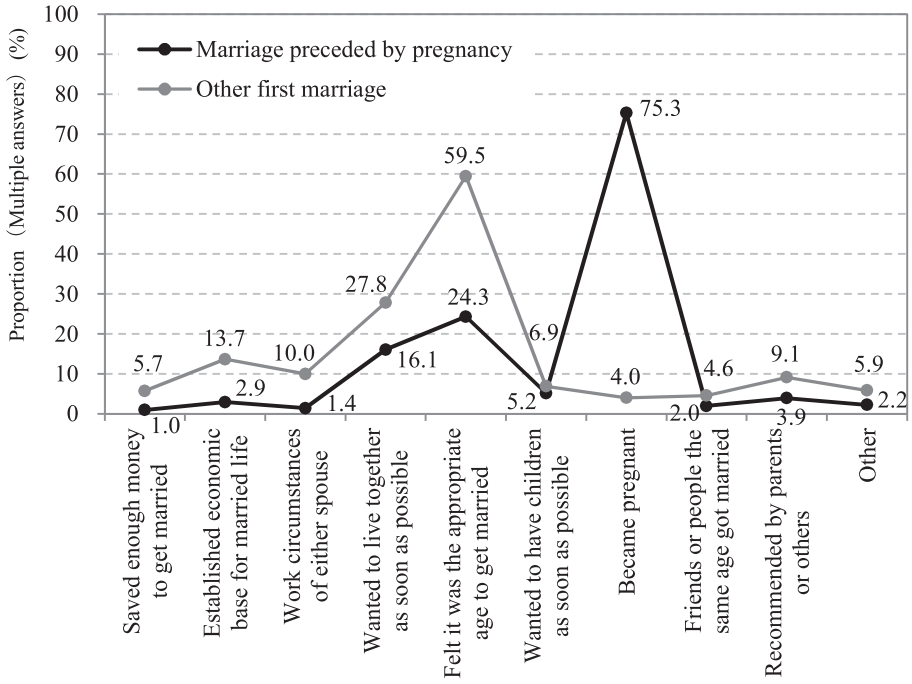
III. Married Life Following Marriage Preceded by Pregnancy

Previous studies have found that compared to marriages not preceded by pregnancy, marriages preceded by pregnancy tend to be qualitatively inferior, with a higher degree of spousal conflict and greater likelihood of divorce (Surra et al. 1987; Teachman 2002; Knab 2006). Analysis by Tsutsui (2006) employing data from the National Family Research of Japan found that marriage preceded by pregnancy was correlated to lower levels of spouses' mutual satisfaction with and support for one another. Raymo and Iwasawa (2008) indicated that marriage preceded by pregnancy is correlated with lower levels of education, which generally have a negative influence on quality of married life. It has also been found that marriage preceded by pregnancy is more likely to occur during the early stages of a couple's relationship (Otani 1993), and when marriages are precipitated by pregnancy, the couple has often had a relatively short time to get to know one another and explore their relationship. It is possible to interpret these factors as having a negative impact on married life. However, is this negative impact limited to the relationship between husband and wife?

Figure 2 shows a comparison of motives for the decision to get married (multiple answers possible) among couples whose marriages were preceded by pregnancy and other couples, based on the Japanese National Fertility Surveys. In cases of marriage preceded by pregnancy, the response "Became pregnant" is by far the most common (75.3%), while all other responses are less common than for the other group. Marriage preceded by pregnancy suggests the possibility that a couple decided to marry when not financially stable, or one or the other of the spouses did not have sufficiently secure employment, and this state of affairs may exert a negative influence on the economic stability or employment situation of one or both spouses after marriage. With this in mind, in the following section we will focus on married women who have given birth to one or more children, and examine how their careers or earning ability after having their first child are affected by whether their marriage was preceded by pregnancy.

IV. Data and Methods

Data is pooled from married couples' responses to the 13th (2005) and 14th (2010) Japanese National Fertility Surveys, which are nationally representative sample surveys conducted by the National Institute of Population and Social Security Research (2012). The



Note: From the 14th Japanese National Fertility Survey (2010). Responses are by wives in couples who were married, both for the first time, during the past 15 years. Sample size: marriage preceded by pregnancy 716, other first marriages 3,172.

Figure 2. Couples' Motives for the Decision to Get Married in Cases of Marriages Preceded by Pregnancy and Other First Marriages

targets of analysis were wives under 50 years of age in couples who were married, both for the first time, during the past 15 years, and have children aged one year or older, so as to compare various conditions after the birth of their first child.

Analysis was carried out using a basic model with a minimum of covariates such as age, and using a full model incorporating all observable variables with a potential relationship to the dependent variables. In the first analysis, we examined the impact of marriage preceded by pregnancy on married women's employment situation immediately after marriage. We input the covariates shown in Table 2, Model 1F, including marriage preceded by pregnancy (cases where the first child was born within seven months after the beginning of married life) into a multinomial logistic regression model with the dependent variables being the options of full-time employment (regular employee or self-employed), non-regular employment (part-time or dispatched), or unemployment (including students).

The second analysis examines how the experience of marriage preceded by pregnancy impacts a wife's employment situation when her first child is one year old. We employed a multinomial logistic regression model with the options of full-time employment,

non-regular employment, or unemployment, including the covariates shown in Table 2, Model 2F. Also, only for married women who were employed when their first child was one year old, we employed a binomial logistic regression model for whether or not they utilized childcare leave, and examined whether the experience of marriage preceded by pregnancy is related to her utilization of childcare leave (Table 2, Model 3F).

Finally, we examined the impact of marriage preceded by pregnancy on married women's employment status at the time of the survey. Many covariates are the same as those in the above-described models, but we employed a multinomial logistic regression model with the options of full-time employed, non-regularly employed, or unemployed status (Table 2, Model 4F) including as variables the number of children at the time of the survey, age of youngest child, whether or not the woman is currently pregnant, and whether or not she utilized childcare leave after having the first child. Also, for mothers who were working at the time of the survey, we used an OLS (Ordinary Least Squares) model (Table 2, Model 5F) with the log of estimated annual income (based on monthly income at time of survey) as a dependent variable, so as to determine whether marriage preceded by pregnancy was correlated with income disparity.

Incidentally, when examining the impact of a specific experience, as we are doing here, it is necessary to pay attention to whether the structure of covariates that influence the phenomenon being analyzed differs greatly depending on whether the subject has had that particular experience or not. For example, if the experience of marriage preceded by pregnancy tends to be concentrated in a particular category, it is possible that the results of estimates regarding the impact of marriage preceded by pregnancy will be biased in some way. To avoid this, in this study the group in which marriage is preceded by pregnancy was viewed as the treatment group, while the group in which marriage is not preceded by pregnancy was the control group, and in order to balance the demographics within the treatment group and the control group and produce something close to a randomized experiment, we performed adjustments using the propensity score for marriage preceded by pregnancy (Hoshino 2009; Guo and Fraser 2010). We attempted two adjustment methods, propensity score matching and inverse probability treatment estimation (IPTE), and compared the results of these as well as the unadjusted results. Predicted values for propensity score were calculated using a binomial logistic regression model.

The propensity score matching method is one in which members of the treatment group and the control group (marriage preceded by pregnancy and other first marriage) having highly similar observed covariates are matched and analyzed, but if only pairs with precisely matching propensity scores are selected, the analyzed group will become extremely small. For this reason, we employed a caliper matching method in which observed values for the control group with propensity scores within standard deviation × 0.25 (called "caliper widths") are matched with observed values for the treatment group. Meanwhile, the IPTE method is a method based on weighting observations by the inverse of estimated propensity score.

Table 2. Outline of Models Used to Examine the Impact

		After marriage		First child is	
Dependent variables		Part-time vs. Full-time, Not working vs. Full-time		Part-time vs. Full-time, Not working vs. Full-time	
Observations		All mothers		All mothers	
Models		Multinomial logistic model		Multinomial logistic model	
		Basic model Model 1B	Full model Model 1F	Basic model Model 2B	Full model Model 2F
Covariates	Year of marriage	○	○		
	Year of first child's birth			○	○
	Wife's age at time of marriage		○		
	Wife's age at time of first child's birth				○
	Wife's educational level		○		○
	Husband's educational level		○		○
	Wife lived with mother before marriage		○		○
	Husband lived with mother before marriage		○		○
	Couple lived with mother immediately after marriage		○		○
	Couple lived with mother at time of survey				
	Arranged marriage		○		○
	Length of relationship before marriage		○		○
	Wife's employment situation before marriage		○		○
	Wife's occupation before marriage		○		○
	Wife's employment situation when first pregnancy is ascertained:				
	Wife's employment situation when first child is one year old				
	Wife's employment situation at time of survey				
	Wife's occupation at time of survey				
	Husband's employment situation before marriage		○		○
	Husband's occupation before marriage		○		○
	Husband's employment situation at time of survey				
	Husband's occupation at time of survey				
	Husband's annual income (log) at time of survey		○		○
	Husband's age at time of survey		○		○
	Agree that husbands should work and wives should take care of the home after marriage		○		○
	Agree that mothers should not work and should stay home at least when their children are young		○		○
	Agree that unmarried couples may have sexual intercourse		○		○
	Ideal number of children		○		○
	Regional bloc		○		○
	Multiple children at first birth				○
	Number of children already born				
	Age of youngest child				
	Currently pregnant				
	Maternity leave used for first child				
	Wife's age at time of survey				
Treatment	Marriage preceded by pregnancy	○	○	○	○

Note: ○ indicates covariates input into model.

of Marriage Preceded by Pregnancy

1 year old		At time of survey				*Reference category*
Maternity leave vs. No leave		Part-time vs. Full-time, Not working vs. Full-time		Log of annual income		
Working mothers		All mothers		Working mothers		
Binomial logistic model		Multinomial logistic model		OLS model		
Basic model Model 3B	Full model Model 3F	Basic model Model 4B	Full model Model 4F	Basic model Model 5B	Full model Model 5F	
						2000–04
○	○	○	○		○	*2000–04*
						25–29
	○		○		○	*25–29*
	○		○		○	*High school*
	○		○		○	*High school*
	○					*Not living with mother*
	○					*Not living with mother*
	○					*Not living with mother*
			○		○	*Not living with mother*
	○		○		○	*Non-arranged marriage*
	○					*1 year*
	○		○		○	*Regular employee of company with less than 300 or unclear number of employees*
	○		○		○	*Office work / Sales / Service industry / Unemployed*
	○					*Regular employee of company with less than 300 or unclear number of employees*
			○			*Regular employee of company with less than 300 or unclear number of employees*
					○	*Regular employee of company with less than 300 or unclear number of employees*
					○	*Office work / Sales / Service industry / Unemployed*
	○					*Regular employee of company with less than 300 or unclear number of employees*
	○					*Office work / Sales / Service industry / Unemployed*
			○		○	*Regular employee of company with less than 300 or unclear number of employees*
			○		○	*Office work / Sales / Service industry / Unemployed*
	○		○		○	—
	○		○		○	*35–39*
	○		○		○	*Disagree*
	○		○		○	*Agree*
	○		○		○	*Disagree*
	○		○		○	*3*
	○		○		○	*Kanto*
	○		○		○	*Only one child at first birth*
		○	○		○	*2*
		○	○		○	*3–5 years old*
		○	○		○	*Not pregnant*
			○		○	*Not used*
				○	○	*35–39*
○	○	○	○	○	○	*Other marriage*

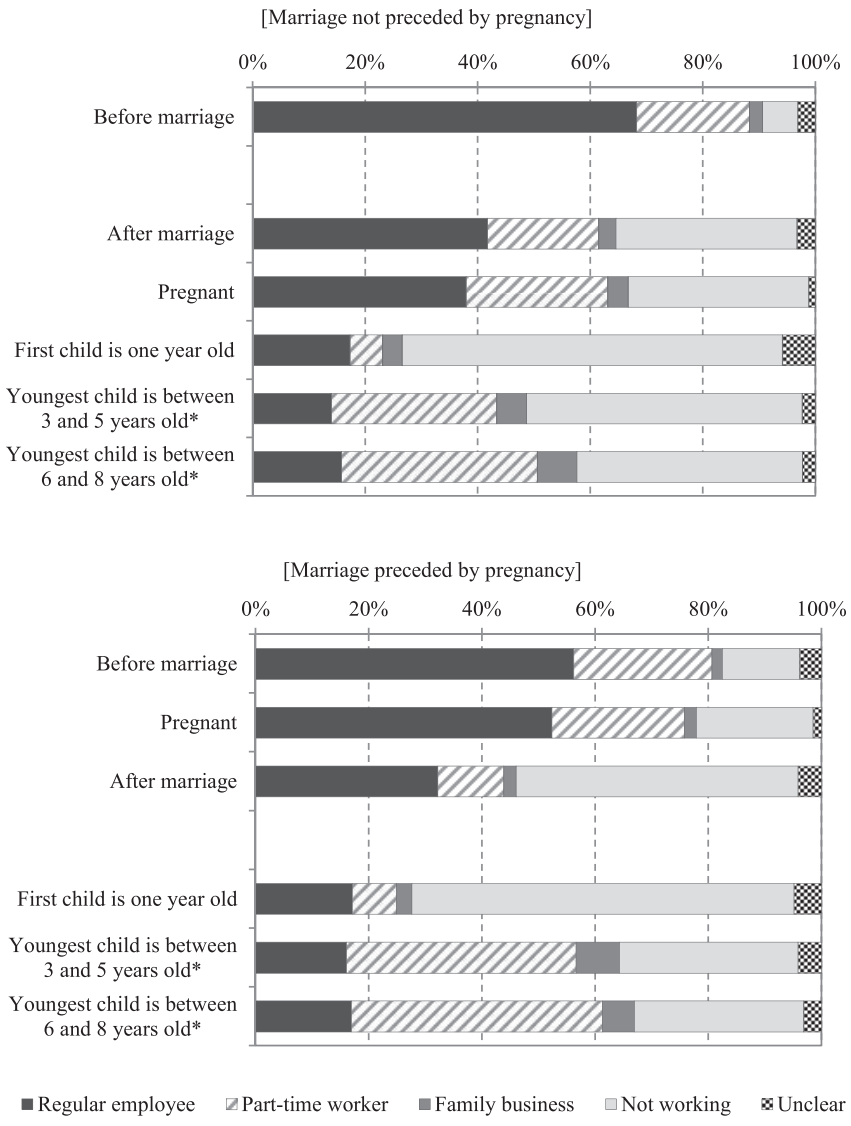
This study is based on the National Fertility Survey Project at the National Institute of Population and Social Security Research, and permission to use the data on Japanese Vital Statistics and National Fertility Surveys was obtained through the National Institute of Population and Social Security Research on the basis of the Statistics Act (Act No. 53 of 2007), Article 32.

V. Results

1. Married Women's Employment Status by Life Stage

Before estimating the impact of marriage preceded by pregnancy, let us demonstrate Japanese married women's employment status by life stage, i.e. before and after marriage and before and after childbirth, broken down by whether or not marriage is preceded by pregnancy. As shown in Figure 3, for marriages not preceded by pregnancy, the percentages of women working are: before marriage 90.6%, just after marriage 64.6%, at time pregnancy is ascertained 66.8%, at time first child is one year old 26.6%, when youngest child is between three and five years old 48.3%, and when youngest child is between six and eight years old 57.2%. Meanwhile, for those experiencing marriage preceded by pregnancy, the percentages working are: before marriage 82.4%, at time pregnancy is ascertained 77.9%, just after marriage 46.0%, at time first child is one year old 27.6%, when youngest child is between three and five years old 62.6%, and when youngest child is between six and eight years old 66.7%. Meanwhile, among women working at the time of the survey, when annual income (estimated by multiplying current monthly income by 12) is compared, the average when marriage was not preceded by pregnancy was 1.69 million yen and the average when marriage was preceded by pregnancy was 1.54 million yen (N=1,946, N=638). Those for whom marriage is preceded by pregnancy have both a higher likelihood of resigning from work upon marriage and a higher rate of employment during childrearing years, but these figures are not controlled for women's characteristics associated with work behavior. Below, we will employ a method in which covariates are controlled and structure of covariates balanced, and examine differences, if any, in married women's working conditions or income after childbirth depending on whether marriage is preceded by pregnancy.

Table 3 shows the mean values of variables used for analysis, both overall, and separated into marriages preceded by pregnancy and other marriages. Results of a chi-square test or *t*-test are for the null hypothesis, which states that distributions of categories are independent of the type of marriage or mean values of variables exhibit no difference between the types of marriage. It is evident that subjects for whom marriage is preceded by pregnancy are concentrated in certain characteristics for a large number of attributes.



Note: From the 13th and 14th Japanese National Fertility Surveys (2005, 2010). Responses are by wives under 50 years of age in couples who were married, both for the first time, during the past 15 years, who have children aged one or older. Sample size: before marriage, immediately after marriage, and at time pregnancy is ascertained: N = 4,329 (marriage not preceded by pregnancy), N = 1,253 (marriage preceded by pregnancy), when the youngest child is between three and five years of age: N = 1,201, N = 311, when the youngest child is between six and eight years of age: N = 971, N = 248. *Status at time of survey. Currently pregnant women not included in sample.

Figure 3. Married Women's Employment Status by Life Stage (Women with Children Aged One or Older)

Table 3. Descriptive Statistics of

Variables	
Year of marriage	Before 1994
	1995–99
	2000–04
	2005–09
Year first child was born	Before 1994
	1995–99
	2000–04
	2005–09
Wife's age at time of marriage	22 or below
	23–25
	25–29
	29–31
	32–24
	35 or above
Wife's age at time of first child's birth	22 or below
	23–25
	25–29
	29−31
	32−34
	35 or above
Wife's educational level	Junior high school
	High school
	Vocational school
	Junior college
	University
Husband's educational level	Junior high school
	High school
	Vocational school
	Junior college
	University
Wife lived with mother before marriage	
Husband lived with mother before marriage	
Couple lived with mother immediately after marriage	
Couple lived with mother at time of survey	
Arranged marriage	
Length of relationship before marriage	Less than 1 year
	1 year
	2 years
	3–4 years
	5–8 years
	9 years or more
	Unclear

Analysis Variables

Mean				Chi-square Test for Independence (p-value)
All	(range)	Marriage preceded by pregnancy	Other marriage	
0.185	(0–1)	0.127	0.201	0.00 ***
0.410	(0–1)	0.346	0.428	0.00 ***
0.308	(0–1)	0.363	0.292	0.00 ***
0.098	(0–1)	0.164	0.079	0.00 ***
0.116	(0–1)	0.122	0.114	0.42
0.330	(0–1)	0.326	0.331	0.77
0.388	(0–1)	0.378	0.391	0.43
0.167	(0–1)	0.173	0.165	0.48
0.149	(0–1)	0.326	0.097	0.00 ***
0.310	(0–1)	0.284	0.318	0.02 *
0.311	(0–1)	0.197	0.343	0.00 ***
0.154	(0–1)	0.121	0.164	0.00 ***
0.055	(0–1)	0.049	0.057	0.28
0.021	(0–1)	0.023	0.020	0.51
0.092	(0–1)	0.289	0.036	0.00 ***
0.188	(0–1)	0.292	0.157	0.00 ***
0.304	(0–1)	0.212	0.331	0.00 ***
0.251	(0–1)	0.135	0.285	0.00 ***
0.111	(0–1)	0.053	0.128	0.00 ***
0.053	(0–1)	0.018	0.064	0.00 ***
0.029	(0–1)	0.064	0.019	0.00 ***
0.375	(0–1)	0.469	0.347	0.00 ***
0.149	(0–1)	0.170	0.144	0.02 *
0.273	(0–1)	0.194	0.295	0.00 ***
0.174	(0–1)	0.103	0.195	0.00 ***
0.054	(0–1)	0.103	0.039	0.00 ***
0.378	(0–1)	0.487	0.347	0.00 ***
0.110	(0–1)	0.133	0.103	0.00 **
0.051	(0–1)	0.054	0.049	0.52
0.408	(0–1)	0.222	0.462	0.00 ***
0.566	(0–1)	0.503	0.584	0.00 ***
0.450	(0–1)	0.476	0.443	0.04 *
0.185	(0–1)	0.287	0.156	0.00 ***
0.208	(0–1)	0.254	0.194	0.00 ***
0.082	(0–1)	0.038	0.095	0.00 ***
0.149	(0–1)	0.172	0.142	0.01 **
0.206	(0–1)	0.239	0.196	0.00 **
0.155	(0–1)	0.168	0.152	0.17
0.191	(0–1)	0.166	0.198	0.01 *
0.185	(0–1)	0.151	0.194	0.00 ***
0.064	(0–1)	0.049	0.068	0.01 *
0.052	(0–1)	0.055	0.051	0.53

Table 3

Variables	
Wife's status immediately before marriage: Employment situation	Regular employee of company with less than 300 employees[1] Regular employee, company with 300 or more employees Full-time civil servant Non-regular employee Self-employed Unemployed
Wife's occupation immediately before marriage	Office work / Sales[2] Manual labor Specialized or administrative
Wife's status when first pregnancy is ascertained: Employment situation	Regular employee of company with less than 300 employees[1] Regular employee, company with 300 or more employees Full-time civil servant Non-regular employee Self-employed Unemployed
Wife's status when oldest child is one year old: Employment situation	Regular employee of company with less than 300 employees[1] Regular employee, company with 300 or more employees Full-time civil servant Non-regular employee Self-employed Unemployed
Wife's status at time of survey: Employment situation	Regular employee of company with less than 300 employees[1] Regular employee, company with 300 or more employees Full-time civil servant Non-regular employee Self-employed Unemployed
Wife's status at time of survey: Occupation	Office work / Sales[2] Manual labor Specialized or administrative
Wife's status at time of survey: Annual income	[3]
Wife's status at time of survey: Annual income	Logarithmic scale [3]

(*Continued*)

Mean				Chi-square Test for Independence (p-value)
All	(range)	Marriage preceded by pregnancy	Other marriage	
0.381	(0–1)	0.358	0.388	0.06 #
0.259	(0–1)	0.207	0.274	0.00 ***
0.037	(0–1)	0.020	0.042	0.00 ***
0.218	(0–1)	0.254	0.207	0.00 **
0.023	(0–1)	0.019	0.024	0.36
0.082	(0–1)	0.142	0.065	0.00 ***
0.584	(0–1)	0.529	0.600	0.00 ***
0.050	(0–1)	0.074	0.043	0.00 ***
0.252	(0–1)	0.218	0.261	0.00 **
0.237	(0–1)	0.329	0.210	0.00 ***
0.147	(0–1)	0.183	0.137	0.00 ***
0.033	(0–1)	0.019	0.037	0.00 **
0.251	(0–1)	0.237	0.255	0.22
0.034	(0–1)	0.022	0.037	0.01 **
0.299	(0–1)	0.209	0.324	0.00 ***
0.086	(0–1)	0.097	0.083	0.11
0.066	(0–1)	0.067	0.065	0.82
0.031	(0–1)	0.015	0.036	0.00 ***
0.066	(0–1)	0.082	0.061	0.01 *
0.035	(0–1)	0.029	0.037	0.17
0.716	(0–1)	0.710	0.718	0.59
0.083	(0–1)	0.089	0.081	0.34
0.051	(0–1)	0.050	0.052	0.78
0.027	(0–1)	0.015	0.031	0.00 **
0.289	(0–1)	0.353	0.271	0.00 ***
0.056	(0–1)	0.055	0.057	0.79
0.494	(0–1)	0.438	0.509	0.00 ***
0.278	(0–1)	0.319	0.266	0.00 ***
0.054	(0–1)	0.057	0.054	0.61
0.149	(0–1)	0.154	0.148	0.60
81.6	(1–1440)	84.6	80.7	0.36
2.32	(1–7.27)	2.565	2.246	0.00 ***

Table 3

Variables	
Wife's status at time of survey: Annual income	[3, 4]
Wife's status at time of survey: Annual income	Logarithmic scale [3, 4]
Husband's status immediately before marriage: Employment situation	Regular employee of company with less than 300 employees[1] Regular employee, company with 300 or more employees Full-time civil servant Non-regular employee Self-employed Unemployed
Husband's occupation immediately before marriage	Office work / Sales[2] Manual labor Specialized or administrative
Husband's status at time of survey: Employment situation	Regular employee of company with less than 300 employees[1] Regular employee, company with 300 or more employees Full-time civil servant Non-regular employee Self-employed Unemployed
Husband's occupation at time of survey:	Office work / Sales[2] Manual labor Specialized or administrative
Husband's status at time of survey: Annual income	[3]
Husband's status at time of survey: Annual income	Logarithmic scale[3]
Husband's age time of survey:	29 or below 30–34 35–39 40–44 45 or above
Agree that husbands should work and wives should take care of the home after marriage	
Agree that mothers should not work and should stay home at least when their children are young	
Agree that unmarried couples may have sexual intercourse	
Ideal number of children	0–1 3 2 4 or more

(*Continued*)

Mean				Chi-square Test for Independence (p-value)
All	(range)	Marriage preceded by pregnancy	Other marriage	
165.3	(1–1440)	154.3	168.9	0.02 *
4.724	(0–7.27)	4.699	4.732	0.51
0.455	(0–1)	0.523	0.436	0.00 ***
0.346	(0–1)	0.246	0.374	0.00 ***
0.071	(0–1)	0.031	0.082	0.00 ***
0.046	(0–1)	0.096	0.031	0.00 ***
0.071	(0–1)	0.080	0.068	0.16
0.012	(0–1)	0.024	0.008	0.00 ***
0.380	(0–1)	0.339	0.391	0.00 **
0.196	(0–1)	0.264	0.176	0.00 ***
0.362	(0–1)	0.312	0.376	0.00 ***
0.440	(0–1)	0.510	0.419	0.00 ***
0.337	(0–1)	0.266	0.357	0.00 ***
0.072	(0–1)	0.036	0.083	0.00 ***
0.032	(0–1)	0.046	0.027	0.00 **
0.108	(0–1)	0.126	0.103	0.02 *
0.011	(0–1)	0.016	0.010	0.11
0.344	(0–1)	0.313	0.353	0.01 *
0.198	(0–1)	0.283	0.174	0.00 ***
0.409	(0–1)	0.343	0.429	0.00 ***
422.5	(1–2520)	351.7	442.8	0.00 ***
5.872	(0–7.83)	5.647	5.936	0.00 ***
0.094	(0–1)	0.230	0.055	0.00 ***
0.241	(0–1)	0.316	0.219	0.00 ***
0.335	(0–1)	0.255	0.358	0.00 ***
0.240	(0–1)	0.142	0.268	0.00 ***
0.091	(0–1)	0.056	0.101	0.00 ***
0.331	(0–1)	0.301	0.340	0.01 *
0.719	(0–1)	0.706	0.723	0.26
0.891	(0–1)	0.922	0.883	0.00 ***
0.036	(0–1)	0.038	0.035	0.58
0.475	(0–1)	0.418	0.492	0.00 ***
0.430	(0–1)	0.459	0.421	0.02 *
0.059	(0–1)	0.085	0.052	0.00 ***

Table 3

Variables	
Regional bloc	Hokkaido
	Tohoku
	Kanto
	Chubu
	Kinki
	Chugoku / Shikoku
	Kyushu / Okinawa
Multiple children at first birth	
Number of children already born	1
	2
	3
	4 or more
Age of youngest child	0–2
	3 to 5
	6 to 8
	9 or above
Currently pregnant	
Maternity leave used for first child	
Wife's age at time of survey	29 or below
	30–34
	35–39
	40–44
	45 or above
Marriage preceded by pregnancy	

Note: From the 13th and 14th Japanese National Fertility Surveys (2005, 2010). Responses are by 15 years, who have children aged one or older (5,582 cases).

[1] "Less than 300 employees" category includes companies where the number of employees is not known.

[2] "Office work / Sales" includes "Service industry" and "Unemployed."

[3] *t* test.

[4] Limited to employed persons.

*** $p<0.001$.

** $p<0.01$.

* $p<0.05$

# $p<0.1$.

(*Continued*)

Mean				Chi-square Test for Independence (p-value)
All	(range)	Marriage preceded by pregnancy	Other marriage	
0.033	(0–1)	0.030	0.033	0.49
0.086	(0–1)	0.104	0.080	0.01 **
0.306	(0–1)	0.297	0.309	0.41
0.212	(0–1)	0.209	0.213	0.74
0.153	(0–1)	0.112	0.165	0.00 ***
0.091	(0–1)	0.099	0.089	0.28
0.118	(0–1)	0.150	0.109	0.00 ***
0.010	(0–1)	0.007	0.011	0.20
0.302	(0–1)	0.262	0.314	0.00 ***
0.535	(0–1)	0.515	0.541	0.10 #
0.145	(0–1)	0.192	0.132	0.00 ***
0.017	(0–1)	0.032	0.012	0.00 ***
0.359	(0–1)	0.381	0.352	0.06 #
0.289	(0–1)	0.273	0.293	0.17
0.221	(0–1)	0.201	0.227	0.06 #
0.130	(0–1)	0.142	0.127	0.15
0.047	(0–1)	0.061	0.043	0.01 *
0.161	(0–1)	0.126	0.171	0.00 ***
0.131	(0–1)	0.293	0.084	0.00 ***
0.290	(0–1)	0.331	0.279	0.00 ***
0.398	(0–1)	0.267	0.436	0.00 ***
0.155	(0–1)	0.094	0.173	0.00 ***
0.025	(0–1)	0.015	0.028	0.01 **
0.224	(0–1)	1.000	0.000	–

wives under 50 years of age in couples who were married, both for the first time, during the past

2. Estimation of Propensity Scores

Table 4 shows the results of estimates of a binomial logistic regression model for estimation of the propensity scores for marriage preceded by pregnancy (probabilities allo cated to the treatment group), which are required for the estimations shown in Table 2, Model 1F. The propensity scores for marriage preceded by pregnancy are higher than the reference category in cases where: marriage took place in or after 2005, the wife is aged 22 or younger, the mother of husband or wife lives with the couple immediately following marriage, the wife is unemployed immediately prior to marriage, the husband is a non-regular employee before marriage, the couple approves of premarital sexual intercourse, the couple's ideal number of children is four or more, or the couple resides in Kyushu or Okinawa. Meanwhile, propensity scores are lower in cases where: the wife is a junior college, the husband is a university graduate, the wife lived with her mother before marriage, the marriage is arranged, the couple dated for at least three years before marriage, one or both are regular employees of companies with 300 or more employees, or civil servants, the husband has high earning capacity, the couple's ideal number of children is two, or the couple resides in Hokkaido or the Kinki region. We estimated propensity scores for marriage preceded by pregnancy for other models as well, using covariates including models. Comparing the distribution of observed attributes for the treatment group and the control group prior to adjustment, there are statistically significant disparities at the 5% level for almost all attributes. However, after adjusting using the matching or IPTE methods, statistically significant disparities between the two groups disappear for all attribute distributions, and we were able to verify that a mimicked randomized experiment was more or less replicated for the observable covariates.

3. Impact on Career Immediately after Marriage, When First Child Is One Year Old, and at Time of Survey

Table 5 shows the odds-ratio for dummy variables for marriage preceded by pregnancy (treatment variables) in each model (the ratio of the marginal odds-ratio for option *j* and the marginal odds-ratio for the reference option is equivalent to the relative risk compared to the "other marriage" category for reference), as well as the coefficients and *p*-value (the probability of obtaining a test statistic). Analyses of each stage are carried out with the basic model estimate (B) with only a minimum number of covariates for age, etc. and dummy variables for marriage preceded by pregnancy; standard estimate (Fn), without balancing covariates of the full model (F) with all covariates added; adjusted estimate (Fm) with structure of covariates balanced using propensity score matching; and adjusted estimate (Fi) using the IPTE method with structure of covariates balanced using weighting by inverse of propensity scores. If odds-ratios based on coefficients are statistically significant (different from 1), it means that the experience of marriage preceded by pregnancy causes some kind of change to circumstances in each of the life stages expressed by dependent variables.

Table 4. Model of Propensity Scores for "Marriage Preceded by Pregnancy"

Covariates		Coefficient	Odds-ratio	
Year of marriage (2000 - 04)				
	1994 and before	-0.307	0.736	*
	1995−99	-0.027	0.973	
	2005−09	0.335	1.398	*
Wife's age at time of marriage (25−29)				
	22 or below	0.868	2.381	***
	23−25	0.192	1.211	#
	29−31	0.328	1.388	*
	32−34	0.695	2.003	**
	35 or above	0.823	2.277	**
Wife's educational level (High school)				
	Junior high school	0.315	1.370	
	Vocational school	0.180	1.197	
	Junior college	-0.222	0.801	#
	University	-0.170	0.843	
Husband's educational level (High school)				
	Junior high school	0.137	1.147	
	Vocational school	-0.125	0.883	
	Junior college	0.144	1.155	
	University	-0.583	0.558	***
Wife lived with mother before marriage (Did not live with mother)		-0.271	0.762	**
Husband lived with mother before marriage (Did not live with mother)		0.026	1.026	
Couple lived with mother immediately after marriage (Did not live with mother)		0.617	1.853	***
Arranged marriage (non-arranged marriage)		-0.693	0.500	**
Length of relationship before marriage (1 year)				
	Less than 1 year	0.077	1.081	
	2 years	-0.173	0.841	
	3−4 years	-0.399	0.671	**
	5−8 years	-0.412	0.662	**
	9 years or more	-0.269	0.764	
	Unclear	-0.558	0.572	*
Wife's employment status immediately before marriage (regular employee of company with less than 300 or unclear number of employees)				
	Regular employee, company with 300 or more employees	0.164	1.178	
	Full-time civil servant	-0.145	0.865	
	Non-regular employee	0.037	1.038	
	Self-employed	-0.078	0.925	
	Unemployed	0.702	2.018	***
Wife's occupation immediately before marriage (Office work / Sales / Service industry / Unemployed)				
	Manual labor	0.197	1.218	
	Specialized or administrative	-0.012	0.988	
Husband's employment status immediately before marriage (regular employee of company with less than 300 or unclear number of employees)				
	Regular employee, company with 300 or more employees	-0.172	0.842	#

Table 4 (*Continued*)

Covariates		Coefficient	Odds-ratio	
	Full-time civil servant	-0.787	0.455	**
	Non-regular employee	0.523	1.686	**
	Self-employed	-0.009	0.991	
	Unemployed	0.090	1.094	
Husband's occupation immediately before marriage (Office work / Sales / Service industry / Unemployed)				
	Manual labor	-0.131	0.878	
	Specialized or administrative	-0.077	0.925	
Log of husband's annual income at time of survey		-0.115	0.892	*
Husband's age at time of survey (35−39)				
	29 or below	0.980	2.664	***
	30−34	0.346	1.413	**
	40−44	-0.152	0.859	
	45 or above	-0.287	0.751	
Agree that husbands should work and wives should take care of the home after marriage (Disagree)		-0.14256	0.867	
Agree that mothers should not work and should stay home at least when their children are young (Disagree)		0.022705	1.023	
Agree that unmarried couples may have sexual intercourse (disagree)		0.34866	1.417	*
Ideal number of children (3)				
	0−1	0.016	1.017	
	2	-0.176	0.839	*
	4 or more	0.374	1.454	*
Regional bloc (Kanto)				
	Hokkaido	-0.442	0.642	#
	Tohoku	0.051	1.053	
	Chubu	-0.102	0.903	
	Kinki	-0.271	0.763	#
	Chugoku / Shikoku	0.022	1.022	
	Kyushu / Okinawa	0.334	1.397	*
Intercept		-0.821		*
Number of events		913		
Observations		4,236		
Pseudo R^2		0.1712		

Note: Model predicting propensity scores used for adjustment of covariates in Table 2, Model 1F. From the 13th and 14th Japanese National Fertility Surveys (2005, 2010). Responses are by wives under 50 years of age in couples who were married, both for the first time, during the past 15 years, who have children aged one or older. Items in parentheses indicate the reference category.

*** p<0.001, ** p<0.01, * p<0.05, # p<0.1.

Here we will focus on the effects of marriage preceded by pregnancy, as shown in Table 5. With regard to employment immediately after marriage, in the basic model the odds-ratio of the non-regular employment option to the full-time employment option is less than 1 in the "marriage preceded by pregnancy" category. This means that people to whom this category applies (the treatment group) are, compared to the control group (people experiencing "other marriage"), more likely to be full-time as opposed to non-regular employees. At the same time, compared to the control group, people in the treatment group have a higher likelihood of being unemployed rather than working full-time (as shown in Model 1B). In other words, women who are already pregnant when they get married are, compared to those marrying without being pregnant, more likely to resign from work upon getting married, and have particular difficulty continuing to work if they are non-regular employees. This propensity is visible even after controlling for covariates or after balancing the structure of covariates (Model 1 Fn, Model 1 Fm, Model 1 Fi).

When the first child is one year old, there was no statistically significant odds-ratio in the basic model (Model 2B), but when controlling for covariates, those for whom pregnancy precedes marriage showed a stronger propensity than the other group to be full-time as opposed to non-regular employees (Model 2 Fn, Model 2 Fm). Also, when weighting with inverses of propensity scores, those for whom pregnancy precedes marriage showed a stronger propensity than the other group to be working full-time as opposed to being unemployed (Model 2 Fi). However, with regard to utilization of childcare leave after giving birth to the first child, while in the basic model the odds of those for whom pregnancy precedes marriage taking childcare leave is significantly lower (below the 1% level) than the control group, when controlling for covariates no significant difference between those for whom pregnancy precedes marriage and others is apparent, whether adjustment is carried out or not (Model 3 Fn, Model 3 Fi). Here it should be noted that as the sample size was small for the analysis of childcare leave utilization, adjustment with propensity score matching was not carried out, as this would limit the number of targets even further.

Finally, we focused on the employment status of women at the time of the survey. In the basic model, controlling for number of children already borne and age of youngest child, compared to the control group, those for whom pregnancy preceded marriage showed a stronger propensity to be non-regular as opposed to full-time employees (Model 4B). However, when controlling for other covariates or adjusting the structure of covariates, there was no statistically significant difference, and it is evident that whether or not pregnancy precedes marriage has little association with the employment status of women raising children (Model 4 Fn, Model 4 Fm, Model 4 Fi). In addition, when examining only married women who are working, when estimation is carried out with the OLS model with the logs of estimated annual income as dependent variables, income for the treatment group was actually found to be higher than for the control group only when weighting with inverse propensity scores (Model 5 Fi), but there was no significant difference with the other models (Model 5 B, Model 5 Fn, Model 5 Fm).

Table 5. Impact on Careers of Women Experiencing

Life stage				
Target				
Model		Basic model Model 1B		No adjustment Model 1Fn
Dependent variables		Non-regular employment vs. Full-time	Unemployed vs. Full-time	Non-regular employment vs. Full-time
Treatment variables				
Marriage preceded by pregnancy dummy	Odds-ratio	0.742	1.986	0.508
	p value	0.012	0.000	0.000
		*	***	***
Pseudo R^2		0.016		0.267
No. of subjects		4,236		4,236

Life stage				
Target				
Model		Basic model Model 2B		No adjustment Model 2Fn
Dependent variables		Non-regular employment vs. Full-time	Unemployed vs. Full-time	Non-regular employment vs. Full-time
Treatment variables				
Marriage preceded by pregnancy dummy	Odds-ratio	1.289	1.013	0.643
	p value	0.119	0.893	0.030
				*
Pseudo R^2		0.005		0.211
No. of subjects		4,074		4,074

Life stage		When first child is one year old		
Target		Married women employed when first child is one year old		
Model		Binomial logistic regression model		
		Basic model Model 3B	Full model	
			No adjustment Model 3Fn	IPTE Model 3Fi
Dependent variables		Maternity leave vs. No leave	Maternity leave vs. No leave	Maternity leave vs. No leave
Treatment variables				
Marriage preceded by pregnancy dummy	Odds-ratio	0.597	0.983	1.318
	p value	0.000	0.941	0.200
		***		
Pseudo R^2		0.036	0.455	0.526
No. of subjects		1,150	1,150	1,150

Marriage Preceded by Pregnancy, by Life Stage

Immediately after marriage				
Entire sample				
Multinomial logistic regression model				
		Full model		
		Matching Model 1Fm		IPTE Model 1Fi
Unemployed vs. Full-time	Non-regular employment vs. Full-time	Unemployed vs. Full-time	Non-regular employment vs. Full-time	Unemployed vs. Full-time
1.607	0.571	1.712	0.438	1.638
0.000	0.005	0.000	0.000	0.000
***	**	***	***	***
	0.318		0.304	
	1,539		4,236	

When oldest child is one year old				
Entire sample				
Multinomial logistic regression model				
		Full model		
		Matching Model 2Fm		IPTE Model 2Fi
Unemployed vs. Full-time	Non-regular employment vs. Full-time	Unemployed vs. Full-time	Non-regular employment vs. Full-time	Unemployed vs. Full-time
0.860	0.578	0.789	0.546	0.780
0.215	0.036	0.134	0.004	0.054
	*		**	#
	0.253		0.252	
	1,384		4,074	

Table 5

Life stage				
Target				
Model		Basic model Model 4B		No adjustment Model 4Fn
Dependent variables		Non-regular employment vs. Full-time	Unemployed vs. Full-time	Non-regular employment vs. Full-time
Treatment variables				
Marriage preceded by pregnancy dummy	Odds-ratio	1.404	0.892	1.046
	p value	0.002	0.263	0.778
		**		
Pseudo R^2		0.056		0.371
No. of subjects		4,028		4,028

Life stage		At time of survey		
Target		Married women employed at time of survey		
Model		OLS model		
		Basic model Model 5B	Full model	
			No adjustment Model 5Fn	Matching Model 5Fm
Dependent variables		Log of estimated annual income	Log of estimated annual income	Log of estimated annual income
Treatment variables				
Marriage preceded by pregnancy dummy	Odds-ratio	-0.010	0.068	0.092
	p value	0.860	0.127	0.060
Adjusted R^2		0.001	0.260	0.273
No. of subjects		2,054	2,054	756

Among the group for whom pregnancy precedes marriage, there may be a difference in the relationship to the dependent variables depending on whether the person has a high or low propensity score for marriage preceded by pregnancy. Besides the analysis just discussed, we also conducted analyses in which propensity scores were input as covariates when modeling, and in which targets were divided into two groups depending on high or low propensity score, but there was no statistically significant difference in the coefficients of propensity score variables, and no outcome that would necessitate a revision of the above interpretations of the consequences of marriage preceded by pregnancy.

VI. Conclusions

We demonstrated that an increasing number of young people are experiencing premarital pregnancy, and using survey data with a nationally representative sample, examined

(*Continued*)

At time of survey				
Entire sample				
Multinomial logistic regression model				
Full model				
Matching Model 4Fm		IPTE Model 4Fi		
Unemployed vs. Full-time	Non-regular employment vs. Full-time	Unemployed vs. Full-time	Non-regular employment vs. Full-time	Unemployed vs. Full-time
0.970	1.028	0.915	0.995	0.802
0.853	0.888	0.660	0.975	0.194
	0.356		0.379	
	1,399		4,028	

IPTE Model 5Fi
Log of estimated annual income
0.093
0.024 *
0.381
2,054

Note: Model predicting propensity scores used for adjustment of covariates in Table 2, Model 1F. From the 13th and 14th Japanese National Fertility Surveys (2005, 2010). Responses are by wives under 50 years of age in couples who were married, both for the first time, during the past 15 years, who have children aged one or older. Items in parentheses indicate the reference category.

*** p<0.001.

** p<0.01.

* p<0.05

# p<0.1.

the impact of experiencing premarital pregnancy on women's careers thereafter.

Among younger generations, the probability of experiencing marriage preceded by pregnancy is increasing, and if this experience has a negative impact on individuals' lives thereafter and their lives' economic foundations in particular, we should be concerned about the issue when discussing various aspects of their lives. What this study found was that the experience of marriage preceded by pregnancy did not place women at an extreme disadvantage after childbirth, at least in terms of their employment status or income.

However, it is also a clear fact that marriage preceded by pregnancy tends to be concentrated among people with particular attributes and circumstances, and these circumstances often place women at a significant career disadvantage after childbirth. For example, women who experience marriage preceded by pregnancy tend to get married younger or to have a shorter relationship period before marriage. Marriage at a younger age is correlated with a higher risk of unemployment immediately following marriage, and shorter length of

relationship period is correlated with a lower rate of utilizing childcare leave. These environments or attributes often associated with women who experience marriage preceded by pregnancy do place them at a disadvantage, making it difficult for them to continue working after childbirth, making it more likely that they will be non-regular employees, and causing them to have lower incomes.

In this study, using methods of matching and weighting with propensity scores, we were able to balance the structure of covariates of observable variables, but we came away with several conclusions that should be noted, as follows.

The fact that marriage preceded by pregnancy does not show negative impact on careers, and to some extent actually appears to be correlated to higher income and higher probability of working full-time, is thought to be related to the "opportunity cost of marriage." In recent years general incentives for marriage have been declining, and particularly in Japan where it is very challenging for women to balance work and raising children, the higher a woman's opportunity cost of marriage is, the more likely she is to postpone getting married (Ogawa 1994; Ono 2003; Tsuya 2011). To some extent marriage preceded by pregnancy may be occurring selectively among women who tend to postpone marriage for other reasons, because they have high earning capacity and strong desire to continue working.

It should be noted that the targets of this study were married women who had children at the time of the survey, and whose marriages were the first marriages for both husband and wife, meaning that the survey did not cover divorced, widowed, or remarried women with children. This is because the surveys employed for this study did not include information on the employment status of women in these groups at time of first marriage, or before and after childbirth. Previous studies have indicated that marriage preceded by pregnancy is correlated with a higher divorce rate and lower quality of spousal relationships (Surra et al.1987; Teachman 2002; Tsutsui 2006). Assuming that married couples whose marriages were preceded by pregnancy tend to face economic and marital troubles and are more likely than other couples to get divorced, then only the couples with marriages preceded by pregnancy who had good relationships would remain as the targets of the analysis, and thus provide a biased view of the impact of such marriages. It is necessary to explore this issue further by obtaining survey data that includes details on divorced women as well, and reexamining the findings of this study accordingly.

As we have seen, the impact of marriage preceded by pregnancy shown in this study was not examined under ideal conditions like those of a natural-sciences experiment, but the findings were relatively stable and consistent during the process of analysis. Even when a marriage is precipitated by pregnancy, there does not appear to be a drastic long-term negative effect, at least on the career of the woman. As incentives for marriage itself grow weaker, we believe it is possible that marriage preceded by pregnancy will gain increasingly widespread acceptance as a mode of family formation.

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