Role of Income to Marriage Behavior for Japanese Women: Marriage Timing, Desire to Marry, Actions toward Marriage*

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Abstract

Research on the relationship between income and marriage has paid little attention to how income affects one's decision to marry. This paper investigates the role of Japanese women's own income to her marriage timing, intention to marry, and actions taken toward marriage. I find that as income increases, marriage occurs later. However, this is not due to the fact that they reduce incentives to marry when they become financially better off, as one theory predicts. Rather, her intention to marry is independent of income. I also find that income has nothing to do with activities to get married, particularly activities in finding marriage partners by those who do not seem to have a boyfriend. These findings suggest that in making a decision to marry, women's income plays a role not as an ability to earn their living, but as something other that would interfere with marriage.

1. Introduction

In order to predict the impact of policies concerning family formation and employment, it is extremely important to have a detailed and accurate understanding of the relationship between income and family formation, such as marriage and childbirth. For instance, income support for families with children, such as child allowance or child-care allowance, are expected to curb the current decline in the birthrate, though they were originally introduced to prevent poverty by mitigating the decline in disposable earnings associated with childbearing and subsequent child rearing. It is still uncertain, however, whether increasing income support will really help raise the fertility level in Japan (Note 1). Further, in recent years, an increasing number of temporary employment among the young is said to be behind the growing tendency for marriage postponement and non-marriage. Indeed, a delay in marriage timing is observed in the cohort graduating from school during the recession in the late 1990s, who faced difficulties in finding stable jobs (Sakai and Higuchi, 2005). Slow growth in their income is considered to be the reason for the delay in marriage. If that is the case, will there be more marriages in this generation once the labor market recovers, and

their employment stabilizes and their income increases? Meaningful discussion will become possible only after we precisely understand how income affects family formation.

There has been a great deal of empirical studies on the effects of income on family formation in Japan, especially marriage behavior, and there have also been a lot of political motivations to explore it. However, with respect to the role of income to marriage behavior, the following points remain unclear: does an increase in income encourage marriage or does it interfere with marriage? Does income have a similar effect on the marriage of both lower and higher income groups? Further, the decision-making on marriage is affected by what kind of changes in income? Is it change in temporary income or is it change in permanent income? Does income have an effect on the desire to marry or on the actions taken toward marriage?

One theory predicts that a higher income facilitates household formation by reducing the cost of finding a partner, while the other predicts that a higher income weakens incentive to form a household. Therefore, the effects of income on marriage behavior cannot be determined *a priori*. What do people think as to the advantages of marriage? According to *The 13th National Fertility Survey: Attitudes toward marriage and the family among the unmarried Japanese youth,* which is conducted by the National Institute of Population and Social Security Research, a higher percentage of female than male respondents cite "Being better off financially" as an advantage of marriage. This means Japanese women are more likely than men to anticipate being better off financially by getting married. In other words, marriage might become less attractive for women if they can financially live on their own. It is necessary to see if the probability of getting married is higher in the female low-income group.

The aim of this paper is to investigate how women's income affects their marriage and their behaviors related to marriage by using longitudinal data for Japanese women. In order to clarify through which channel income affects marriage, this paper makes new contributions in two points to which the previous studies explicitly

have not paid careful attention. First, by using different income variables, I try to detect the true effects of income on women's marriage timing. In particular, in addition to the actual income in the previous year, I also use the individual effect as an income variable, which was estimated using a fixed-effect model wage function, as well as the average income for the past three years. Further, in order to examine whether income effect is non-linear, I also use dummy variables that are constructed by dividing income into quintiles (or deciles). Even if these variables are used as an independent variable, not all of the aforementioned concerns will be resolved. But the examination using multiple variables will help derive more robust results of estimation on how income affects family formation. Second, I also examine the effects of income on the intention to marry and actions toward marriage. Many previous studies on marriage behavior have focused only on marriage as a fact, but marriage is a consequence of romance, and usually followed by many steps such as dating. Thus, paying attention only to marriage as a fact leads to dismissing all other relating marriage behaviors. This aspect of marriage makes analyses difficult. Furthermore, focusing on marriage solely as an established fact might constrain what we know about the way income actually has an influence on marriage. The effects of an increased income, for example, might be influencing marriage behavior through changes in reservation utility, not through changes in opportunity cost, etc. The data used in this paper includes questions on the desire to marry and detailed actions taken toward marriage. By utilizing them, I attempt to capture the mechanism through which income affects marriage behavior.

The analysis results reveal that a woman's income in the previous year could significantly delay marriage, even after variables such as education are controlled. Similar results are obtained when individual effects derived from the fixed-effect model wage function are used instead of income in the previous year. Although a definite conclusion is not obtained on whether or not this effect is non-linear, it is found at any rate that marriage among the low-income group is suddenly delayed when income increases. When analyzing the effects of income on the desire to marry, the results however, do not show a decrease in the desire to marry as income increases. In addition, investigations into the actions toward marriage show that persons with a boyfriend are likely to take actions toward marriage when income increases. Meanwhile,

among those without a boyfriend, there is no significant relationship between income and behavior aimed at finding a partner. These findings suggest that the reason why people with high incomes remain unmarried is *not because they no longer have incentives to marry once they become financially better off.*

This paper is organized as follows. The next section will explain the background of this analysis and the previous literature. Section 3 will introduce the estimation method and data used in this paper. Section 4 will cover the estimation results, and section 5 is the concluding remarks.

2. Theoretical Background and Literature (Note 2)

The effects of income on marriage behavior are not determined theoretically, and this has widely been pointed out as the reason for the difficulty in empirical analysis (e.g. Burgess *et al.*, 2003). A person's own income can affect a decision on marriage in two ways. First is its role as an outside option. Assuming that the household income is pooled, if an individual's economic resource were to increase through marriage, then an increase in a person's capacity to earn income would reduce the person's incentive to marry. This is because for a person with high income, getting married makes his/her standard of living lower. She or he is less likely to choose getting married unless She or he will get much more than wealth from marriage. On the other hand, if a person's present capacity to earn income is low, then She or he would have an incentive to raise his economic level through marriage. Thus, high income increases the utility of being unmarried.

Second is its role as an indicator (or a signal) for an individual's qualities. If the capacity to earn income represents eligibility as a marriage partner, a higher income means a stronger incentive to marry *for the potential marriage partner*. This means that the higher a person's income, the easier it is to find a marriage partner. In other words, high income reduces the costs of getting married.

The impact of income on making a decision to marry depends on which role of income is larger. Both roles above, however, are two sides of the same coin. Someone's large income enables himself/herself to live alone, while it allows himself/herself to feed a family, i.e. to make someone better off.

Most of the empirical research, especially done in the US, has found that the probability of getting married increases among men as their income increases and among women as their

income decreases (e.g. Keely, 1977). These results seem to indicate that the effect of income as an outside option is stronger among women, at least in the US.

There are also many empirical studies on how *employment status* or *labor market conditions* affect marital decisions. If these indicators such as employment status are considered as a proxy variable for income, then this research can be also included in analyses on how a person's economic status affects marriage behavior. To sum up the findings in these studies, men are less likely to marry if their employment status or employment opportunities worsen (Wood, 1995; Ahn and Mira, 2001; Ohta, 2007; Gutierrez-Domenech, 2008; Kondo, 2008). On the other hand, a great deal of research has been done on the relationship between education and marriage probability, and in case education is the only explanatory variable used, then it may be considered as being a proxy variable for income, while there is a possibility that it also represents other factors.

Also in Japan, people's marriage behaviors have been studied empirically by many researchers. Especially since the panel data from the Institute for Research on Household Economics, the same data used in this paper, became available for use, there has been more research starting with Higuchi and Abe (1999) and Higuchi (2001) that have used the hazard model to analyze marriage behavior. This series of research has observed the effects of income, but neither the types of variable used as the proxy variable for income nor the estimation results are consistent among these analyses. Further, in the research using other types of data, the effects of income might not be explicitly examined. Sakai and Higuchi (2005), for example, conducts a survival analysis on age of marriage using the Keio Household Panel Survey, and the results reveal that people who have experience being unemployed or a non-regular employees are likely to marry later than regular employees. However, Sakai and Higuchi (2005) focuses only on the employment conditions at the time of graduation and does not control income.

The reasons why the effects of income have not been clarified are summarized as follows: 1) Frequently, income variable is just one of the control variables and not the principal concern in the research, 2) Detailed information on income cannot be obtained due to data constraints, and 3) There are problems related to the difficulties in handling endogeneity of income. The last "endogeneity" problem refers to the possibility

that marriage also has an effect on income. For example, labor force participation may be adjusted when marriage is scheduled.

Recently, Fukuda (2007) used the abovementioned panel data from the Institute for Research on Household Economics to conduct a hazard analysis on marriage timing to study the effects of income on marriage timing. His estimation result shows that the coefficient of income in the previous year is positive, but the coefficient of annual income squared is adverse, so, the study concludes that the women's annual income "has a positive marginal effect on marriage probability up to an income of 4.1 million yen, but the marginal effect turns negative when income exceeds that figure, and the upward effect of higher income on marriage probability begins to diminish."

Sakamoto and Kitamura (2007) also uses the same data to do a detailed analysis on marriage behavior from the perspective of a parent-child intergenerational relation. Sakamoto and Kitamura (2007) concludes that, there is a significantly lower marriage probability if income transfer from parents is higher, while the relative income ratio of father to prospective husband does not affect marriage probability.

Meanwhile, Tachibanaki and Kimura (2008) uses the individual data from *The 11th National Fertility Survey* (1997), and classifies the sample into those with a full-time housewife and those with a working wife to analyze how the husband's income affects the husband's age of first marriage. The results show a relationship for the group with full-time housewives that a higher husband's income significantly lowers the husband's age of marriage. This is interpreted as indicating that men's income signals a quality as a marriage partner (from the women's perspective), but if we recall that the husband's income and other factors may have an influence on the employment decision of the wife, this result may be somewhat biased. The relationship between income and marriage probability needs to be examined in more detail.

In this paper when I look at marriage probabilities, in addition to the actual annual income, I will do an estimate with individual effect, based on the estimation of wage function by the fixed-effect model, used as an explanatory variable. This method follows that of Burgess *et al.* (2003).

From a different perspective, using such a method in the estimation enables us to answer the question, "What kind of income is important to the decision to marry?" It has been a long-shared

perception that it is the household permanent income that influences the decisions on consumption and women's employment (Note 3). However, there is not a stylized fact that permanent income is important also in the decisions on marriage. Even if the starting salary is low, it might not mean lifetime income is also low if the wage slope is steep. Further, it is sometimes pointed out that temporary increases in income due to insecure jobs should not be treated in the same manner as income changes such as periodic salary increases. The estimated income (individual effect) based on the fixed-effect model can be regarded as expressing her potential capacity to earn income, which may in many ways alleviate problems arising from the possibilities as mentioned above. It is more suitable also in avoiding endogeneity problems compared to the OLS estimated income used in the previous literature.

The approaches above, however, might be still insufficient to clarify the true relationship between income and marriage behavior. The outside option hypothesis explains that a person is unmarried because with a higher income, She or he has less incentive to form a household so as to avoid low standards of living. Then, if the outside option hypothesis holds true, the will to marry must also decrease as income increases. In other words, even if we observe the fact that people with high incomes are unlikely to get married, there might be the case where their desires to marry are not little, which is inconsistent with the outside option hypothesis. Because the data used in this paper annually asks about the desire to marry and actions toward marriage in a relatively detailed manner, I will use these to see how income affects the desire to marry and actions toward marriage, together with its relationship with the actual facts on marriage. Analyzing behaviors such as actions to take steps to marriage is also a response to criticism that observed that the linkage between income and marriage is likely to be tenuous because the decision for marriage does not respond to change in income right away. Even if it takes much time to lead to marriage, behaviors such as desire for marriage and actions taken toward marriage seem to respond to change in income right away. Kobayashi (2006) examines the relationship between desire to marry and marriage by using the same data as used in this paper, but She or he does not analyze explicitly the relationship with income.

On the relationship between income and marriage, there are a series of studies examining the income change brought about by marriage, which is referred to as *marriage premium*. This paper, however, will not cover that topic because it is beyond scope of my study (Note 4).

3. Analytical Framework and Data
3-1. Estimation Model
This paper will first use the hazard model to investigate the effects of income on marriage timing. The hazard analysis is also called the survival analysis where the period to marriage is regarded as the "survival period." If income had a significant effect on marriage timing, it would mean that this "survival period" varies by each individual's income. The hazard model is expressed as follows.

$$\lambda \left[\, t \, ; x(t) \, \right] = \kappa \left[\, \boldsymbol{x}(t) \, \right] \lambda_0 \, (t)$$

Here, λ represents conditional hazard probability (i.e. the probability of ceasing to be single at period t). In addition to time-invariant individual attributes such as education and year of birth, $\boldsymbol{x}$ represents variables that change with time, such as the female unemployment rate and status of living together or separately with parents. The estimation in this paper will primarily be based on the Cox Proportional Hazard Model that does not specify the baseline hazard $\lambda_0(t)$. The lapsed years since the panel start are used as duration time, t.

The imputed income is estimated by the following fixed-effect model.

$$w_{it} = x_{it}\beta + v_i + u_{it} \quad (1)$$

In equation (1), w_{it} is the "total annual income" or "earned income" for the applicable year. The individual effect v_i obtained from the estimated result is used as an independent variable in the hazard analysis in place of the actual income. The individual effect can be interpreted to represent the income that the individual is capable of earning on a long term. It can be also considered the indicator for the individual's permanent income. By using this type of indicator, I can avoid the endogenous bias due to changes in employment before marriage. Hence, equation (1) is estimated without controlling the employment status.

In addition, I estimate the logit model to analyze the effects of income on the desire to marry and actions toward marriage, while I use the principal component score based on the principal component analysis as a dependent variable in OLS estimation.

3-2. Data

Analysis in this paper uses the "Japanese Panel Survey of Consumers (hereafter, the JPSC)" offered by The Institute for Research on Household Economics, which is a survey that began in 1993. It surveys women between the ages of 24 and 34 at the initial time (Cohort A) (Note 5), and asks about the changes in employment and lifestyle, as well as household income, expenditures and savings for them and their spouse (husband). As of the tenth survey (2002), the data compiled responses from more than 1,300 women including married and single women, and data up through the twelfth survey is currently being disclosed. This paper will use data from the first to twelfth surveys for the analysis.

The JPSC annually asks questions on any changes in marital status and the household, while also obtaining information on household income. Indeed, it asks by dividing the annual income in the previous year into categories such as "Earnings from employment," "Business income," and "Revenue from assets." In this paper, "Earnings from employment" or "Business income" will be used as "Earned income," and the total earnings combining any other earnings will be used as "Total annual income" (Note 6).

In the estimation for individual effect, I regress the "Earned income" or "Total annual income" on age, age squared, size of residing city/county, and time dummy, for the premarital period. The estimation result is shown in Appendix Table 1. Imputed income is incalculable for respondents who never worked during the period or who never answered questions concerning income. In the estimation of the hazard model, other information such as employment status, status of living together or separately with parents, and size of city/county are used.

Since the second wave, the JPSC also asks about intention to marry and actions toward marriage (matchmaking meetings, joining a marriage introduction club, getting engaged, etc). Based on these questions, the variables mentioned later are constructed as dependent variables.

The respondents that attended school even once during the panel period are removed from the sample. The respondents who were already married at the initial time are also removed. The respondents who were already married at the initial time are also removed. Since this paper investigates the relationship between income and marriage behavior, this reduction might bias the estimates. Suppose, for instance, that most of the women with high income had already been married at the initial time and those were removed from the sample. Then, if we observed in the remaining respondents the negative relationship between her income and the probability of getting married, it would be overestimated because the estimation is based only on the low income group. However, the JPSC does not ask the respondents who had a husband at the initial time about her income before marriage. Hence, I cannot check the extent to which the sample used in this analysis is biased, although I need to be careful of the possibility of overestimation/underestimation by selection bias. The basic statistic of the variables mainly used in the analysis is shown in Table 1.

4. Estimation Results

4-1. Relationship between Income and Marriage Timing, Desire to Marry, and Marriage Actions

Table 2 shows results from the estimations based on the Cox proportional hazard model. Columns (1) and (2) use the previous year's "Total annual income" and "Earned income" (and its squared income) as an independent variable respectively. It is found that in either case that "Total annual income" or "Earned income" is used as an independent variable, the first marriage timing is significantly delayed as income in the previous year increases. Because the coefficient of the square of annual income indicates a positive value, the effects of income become smaller as the income increases. The above finding contradicts the result from Fukuda (2007). Age, age squared, education (Note 7), status of living together or separately with parents, size of city/county, birth cohort, and female unemployment rate are also controlled in the estimation. From the coefficients of these explanatory variables, it is found that if income is controlled, then the first marriage timing becomes earlier as the years of schooling increase, and that first marriage timing is delayed when the unemployment rate is high.

In Table 2, column (3) shows the estimation result when average income for the past three years is used as the explanatory variable instead of income in the previous year. The sign of the coefficient is the same as the estimation using the previous year's income, though it is not statistically significant. Column (4) in Table 2 shows the result when imputed income (individual effect), which is estimated from earned income, is used as an independent variable. As in the case with the previous year's income, it is likely that the larger the individual effect of the earned income, the later the first marriage timing.

Table 1: Sample Characteristics

	N. of Obs.	Mean	Std. Dev.	Min	Max
Age	5231	29.555	4.294	24	45
Real total annual income in the previous year	5043	268.978	141.384	0	1112.1
Real earned income in the previous year	5043	260.888	145.697	0	2293.1
Self-employed	5231	0.030	0.170	0	1
Regular worker	5231	0.642	0.479	0	1
Part-time worker	5231	0.204	0.403	0	1
Junior High School Graduate	5231	0.054	0.226	0	1
High school graduate	5231	0.490	0.500	0	1
Junior college graduate	5231	0.246	0.431	0	1
College graduate	5231	0.210	0.407	0	1
Living with father	5224	0.680	0.466	0	1
Living with mother	5224	0.794	0.405	0	1
Female unemployment rate	5231	3.946	0.793	2.6	5.1

Table 2: The Effect of Income on Timing of First Marriage

	(1) Hazard Ratio	Std. Error		(2) Hazard Ratio	Std. Error		(3) Hazard Ratio	Std. Error		(4) Hazard Ratio	Std. Error		(5) Hazard Ratio	Std. Error	
Age	1.731	0.528	*	1.794	0.553	*	1.363	0.512		1.862	0.587	**	1.902	0.603	**
Square of age	0.367	0.189	*	0.351	0.183	**	0.478	0.286		0.299	0.159	**	0.289	0.154	**
Income in the previous year:															
Total annual income	0.994	0.001	***												
Square of total annual income	1.001	0.000	***												
Annual earned income				0.996	0.001	***									
Square of annual earned income				1.000	0.000	***									
Average income for the past three years							1.001	0.002							
Square of average income for the past three years							1.000	0.000							
Imputed income (individual effect)										0.999	0.001	***	0.998	0.001	**
Square of imputed income										1.000	0.000		1.000	0.000	
Employment status in the previous year:															
Self-employed													0.520	0.208	
Regular worker													0.909	0.216	
Part-time worker													0.774	0.175	
Education:															
Hgh school graduate	2.237	0.736	**	2.287	0.761	**	1.782	0.674		1.943	0.624	**	1.951	0.650	**
Junior college graduate	2.438	0.834	***	2.481	0.860	***	1.695	0.684		1.879	0.636	*	1.917	0.671	*
College graduate	2.669	0.941	***	2.774	0.991	***	2.155	0.897	*	1.976	0.696	*	1.995	0.722	*
Coresidence with parents:															
Living with father	0.953	0.139		0.970	0.139		0.991	0.169		1.153	0.167		1.186	0.176	
Living with mother	1.137	0.201		1.137	0.198		1.092	0.222		0.959	0.161		0.927	0.160	
Size of city:															
Large (14 biggest cities)	0.781	0.107	*	0.790	0.108	*	0.782	0.125		0.729	0.102	**	0.725	0.102	**
Small	0.943	0.167		0.933	0.166		1.049	0.224		0.876	0.158		0.876	0.159	
Birth cohort:															
1961-63	1.623	1.305		1.634	1.330		1.376	1.205		1.329	0.886		1.285	0.859	
1964-66	1.950	1.694		2.085	1.838		1.099	1.115		1.091	0.813		1.068	0.795	
1967-69	2.285	2.225		2.470	2.436		1.013	1.206		1.213	1.045		1.166	1.004	
1970-71	3.599	3.662		3.870	3.994		1.132	1.354		1.628	1.477		1.471	1.338	
1972-	3.586	3.815		3.870	4.172		1.344	1.729		1.756	1.689		1.572	1.517	
Female uenmployment rate	0.491	0.143	**	0.482	0.141	**	0.624	0.213		0.576	0.166	*	0.619	0.180	*
N. Obs.	5013			5013			2643			4807			4796		

Note- All results are estimated by Cox proportional hazard model. ***<1%， **<5%， *<10%.

The square of the individual effect did not indicate a significant value. Because effect on marriage timing does not change even in the estimation that uses imputed income rather than actual income, it suggests that the results in columns (1) and (2) are not due to endogeneity of income. In Table 2, column (5), the employment status in the previous year is also controlled in addition to the imputed income above. If the respondent is a regular employee in the previous

year, the marriage timing is later than if the respondent is unemployed, but earlier than non-regular employees in the previous year. However, none of the coefficients are statistically significant. Meanwhile, column (6) is the estimate result with the sample narrowed down to ages

between 24 and 26 at the initial time. The purpose of this is to confirm whether there was any bias due to a large variance in age at the start. The result shown in column (6) indicates that the coefficient of imputed income on marriage timing remains unchanged.

Table 3: The Effect of Quintile/Decile Income on Timing of First Marriage

	(1)			(2)			(3)			(4)		
	Hazard Ratio	Std. Error		Hazard Ratio	Std. Error		Hazard Ratio	Std. Error		Hazard Ratio	Std. Error	
Age	1.717	0.501	*	1.745	0.499	*	1.618	0.477		1.656	0.491	*
Square of age	0.352	0.174	**	0.339	0.164	**	0.372	0.186	**	0.358	0.180	**
Quintile income in the previous year:												
1st quintile	2.312	0.375	***									
2nd quintile	0.698	0.125	**									
4th quintile	0.604	0.103	***									
5th quintile	0.577	0.110	***									
Decile income in the previous year:												
1st decile				2.793	0.484	***						
2nd decile				1.151	0.235							
3rd decile				0.520	0.122	***						
4th decile				0.542	0.123	***						
6th decile				0.434	0.100	***						
7th decile				0.300	0.081	***						
8th decile				0.585	0.117	***						
9th decile				0.535	0.117	***						
10th decile				0.325	0.093	***						
Quintile *imputed* income:												
1st quintile							1.279	0.192		1.355	0.215	*
2nd quintile							1.250	0.184		1.299	0.196	*
4th quintile							0.908	0.148		0.894	0.153	
5th quintile							0.890	0.145		0.870	0.150	
Employment status in the previous year:												
Self-employed	0.764	0.314		1.009	0.427					0.478	0.179	**
Regular worker	1.809	0.363	***	2.425	0.497	***				0.825	0.156	
Part-time worker	1.115	0.221		1.503	0.313	*				0.704	0.143	*
Education:												
Hgh school graduate	1.686	0.486	*	1.740	0.496	*	1.444	0.397		1.490	0.425	
Junior college graduate	1.832	0.551	**	1.912	0.568	**	1.413	0.409		1.492	0.446	
College graduate	1.775	0.555	*	1.870	0.578	**	1.405	0.422		1.471	0.458	
Coresidence with parents:												
Living with father	1.101	0.152		1.115	0.154		1.063	0.145		1.070	0.149	
Living with mother	0.982	0.162		0.959	0.158		1.066	0.172		1.051	0.175	
Size of city:												
Large (14 biggest cities)	0.823	0.107		0.829	0.106		0.746	0.102	**	0.739	0.101	**
Small	0.887	0.151		0.887	0.149		0.885	0.153		0.884	0.153	
Birth cohort:												
1961-63	1.194	0.819		1.067	0.718		1.381	0.903		1.306	0.854	
1964-66	1.212	0.912		1.054	0.774		1.142	0.839		1.108	0.810	
1967-69	1.310	1.118		1.133	0.945		1.279	1.072		1.213	1.015	
1970-71	1.793	1.615		1.573	1.395		1.803	1.597		1.613	1.427	
1972-	1.744	1.655		1.599	1.495		1.785	1.669		1.588	1.484	
Female uenmployment rate	0.600	0.168	*	0.589	0.166	*	0.576	0.161	**	0.618	0.174	*
N. Obs.	5186			5186			5200			5186		

Note- All results are estimated by Cox proportional hazard model. ***<1%，**<5%，*<10%.

In Table 3, the income variables are divided into several quantiles to create dummy variables, in order to explore in more detail if the effect of income is non-monotonous. This estimation helps in finding a bias due to outliers with extremely high or low income. Columns (1) and (2) in Table 3 show the estimation result when dividing the "Total annual income" in the previous year into quintiles and deciles respectively. The effect on hazard rate decreases as income increases, but this trend is reversed at one point in the

middle-income group before starting to decrease again. The income effect that seems to go up and down repeatedly, however, shows quite a different result by changing the reference of the dummy variables. Therefore, based on this estimate, I cannot make the conclusion that the effect of income is non-linear (in other words, the effect varies between the higher and lower income groups). I can say, however, that at least in the lower income group, income seems to have a larger effect on delaying marriage. In the lower

income group, it is likely that marriage is enormously delayed when income increases. I also divide the individual effect into five quantiles to see if the effect of "permanent income" is non-linear (columns (3) and (4) in Table 3). With or without controlling the employment status in the previous year, a relatively monotone transition is observed in which the marriage timing is delayed when the individual effects of income are larger. Assuming that the individual effect indicates a permanent capacity to earn income, we might have to think that the estimated effect of actual income included noise. In columns (3) and (4), however, none of the coefficient values are significant.

The findings so far show that marriage timing tends to be later as the income increases among women. This is consistent with the findings of Burgess *et al.* (2003) and other studies in the US. Does this finding indicate that as income increases, people won't marry because they no longer have incentives to marry? Or, for any other reason, does a higher income make it more difficult to get married even though they have an intention to do so? In the remaining part of this section, I will see the relationship between the individual's income and the desire to marry or actions taken toward marriage.

As mentioned before, the JPSC asks respondents with no spouse about their marriage intention and various actions taken toward marriage. For the question on marriage intention, "Do you want to marry?" there are five responses available: "I am going to marry soon," "I want to marry as soon as I can," "I want to, but not right now," "I don't necessarily want to," and "I don't want to marry." Of these responses, the respondents who chose "I am going to marry soon," are removed from the sample. Then, I create a dummy variable (intention-to-marry dummy) with "1" for the responses "I want to marry as soon as I can" and "I want to, but not right now," which are used as a dependent variable in a logit analysis. Table 4 shows the result from estimation on determinants of marriage intention. The number of observations here is reduced from the hazard analysis also because there are a lot of respondents who do not answer the question about marriage intention (Note 8). The income coefficients show positive values, which means that marriage intention is higher as income increases. Panel estimation, however, shows that the income coefficient is no longer significant. In any case, no relationship is found to indicate that marriage intention *decreases* as the income increases (Note 9).

For the actions taken toward marriage, the JPSC asks the question, "Have you taken any of the following actions toward marriage in the past year?" The choices for the response are "I was formally introduced to a prospective marriage partner by my family or relative," "I was formally introduced to a prospective marriage partner by my friend," "I asked my friend or relative to introduce me a partner," "I joined a marriage introduction club in the past year," "I have been in a marriage introduction club for more than a year," "I bought a marriage information magazine," "I had a talk with my boyfriend about marriage," "I got engaged," "Other," and "I did nothing" (multiple answers allowed). Before analyzing determinants of actions taken toward marriage, it is helpful to see in this sample what percentage of women got married in the following year by action. As shown in Table 5, compared to the respondents who took action to "Be formally introduced to a prospective marriage partner" or who asked "to be introduced to a partner" in the past year, those who took actions to "Buy a marriage information magazine," "Have a talk with my boyfriend about marriage," or "Get engaged" show a higher marriage rate in the following year. The actions of the former group are thought of as actions by those who do not have a boyfriend and are trying to find a marriage partner, while the actions for the latter group are by those who already have a boyfriend and are taking a step to get married. These may be considered different types of actions. Hence, I create two dummy variables; as a dependent variable, a "mate-search" dummy with "1" if any one of the responses in the former group (Note 10) is chosen, and a "preparation-for-marriage" dummy with "1" if any one of the responses in the latter group (Note 11) is chosen. To complement the estimation above, I also apply a principal component analysis to the response choices for the former and latter groups separately, and use its first principal component score as a dependent variable. Because the JPSC does not ask about whether the respondent has a boyfriend, I cannot estimate separately by groups with or without a boyfriend. In Table 6, we can see whether the actions to search for a marriage partner are affected by income (columns (1) and (2)). In neither case when "mate-search" dummy is used as a dependent variable or when principal component score is used, income variable has no effect at all. Panel estimation does not show income having any effect on actions to find a marriage partner either (columns (3) and (4)). Meanwhile, columns (5) and (6) look at whether

income encourages people to take a step forward from dating to marriage. This time, in both cases when the "preparation-for-marriage" dummy is used as a dependent variable and when the principal component score is used as a dependent variable, income has a significantly positive effect. The panel estimation also shows that income contributes to taking steps toward marriage (columns (7) and (8)).

Table 4: The Effect of Income on Desire to Marriage

	(1) Coefficient	(1) Std. Error		(2) Coefficient	(2) Std. Error		(3) Coefficient	(3) Std. Error		(4) Coefficient	(4) Std. Error	
Age	0.102	0.136		-0.011	0.142		0.356	0.261		0.167	0.230	
Square of age	-0.372	0.212	*	-0.218	0.218		-0.843	0.384	**	-0.604	0.348	*
Income in the previous year:												
Total annual income	0.001	0.001					0.001	0.002		0.003	0.002	
Square of total annual income	0.000	0.000					0.000	0.000		0.000	0.000	
Imputed income (individual effect)				0.002	0.001	***						
Employment status in the previous year:												
Self-employed	0.044	0.244		0.095	0.254		0.579	1.020		0.819	0.668	
Regular worker	0.524	0.176	***	0.512	0.186	***	0.728	0.337	**	1.112	0.303	***
Part-time worker	0.167	0.165		0.239	0.177		0.640	0.325	**	0.628	0.288	**
Education:												
Hgh school graduate	0.345	0.165	**	0.351	0.170	**				1.246	0.622	**
Junior college graduate	1.015	0.185	***	0.991	0.192	***				2.008	0.665	***
College graduate	0.720	0.190	***	0.740	0.204	***				1.790	0.678	***
Coresidence with parents:												
Living with father	0.351	0.101	***	0.292	0.106	***	-0.234	0.528		0.360	0.316	
Living with mother	0.269	0.111	**	0.290	0.118	**	0.420	0.540		0.318	0.340	
Size of city:												
Large (14 biggest cities)	0.334	0.095	***	0.328	0.100	***	0.956	0.668		0.583	0.294	**
Small	-0.349	0.114	***	-0.386	0.117	***	-2.232	1.206	*	-0.853	0.357	**
Birth cohort:												
1961-63	0.244	0.260		0.056	0.252					0.707	1.001	
1964-66	0.679	0.283	**	0.529	0.277	*				1.797	0.978	*
1967-69	0.632	0.321	**	0.449	0.321					1.975	0.994	**
1970-71	0.650	0.376	*	0.370	0.380					1.832	1.069	*
1972-	0.992	0.417	**	0.677	0.421					2.325	1.077	**
Female uenmployment rate	-0.262	0.111	**	-0.186	0.117		-0.349	0.207	*	-0.359	0.183	*
Intercept	0.070	2.180		2.330	2.302					-0.640	3.839	
N. Obs.	3900			3734			1369			3900		
Model	Logit Model			Logit Model			Fixed-effect Logit			Random-effect Logit		

Note- All results are estimated by logistic regression model. ***<1%, **<5%, *<10%.

Table 5: Actions taken toward marriage by single women and marriage rate in the next year

	Marriage rate in the next	
(*Actions to find a marriage partner*)	(%)	
I was formally introduced to a prospective marriage partner by my family or relative.	19.51	(56)
I was formally introduced to a prospective marriage partner by my friend.	18.57	(44)
I asked my friend or relative to introduce me a partner.	17.62	(71)
I joined a marriage introduction club in the past year.	26.92	(14)
I have been in a marriage introduction club for more than a year.	9.09	(3)
(*Actions to prepare for marriage*)		
I bought a marriage information magazine.	48.89	(44)
I had a talk with my boyfriend about marriage.	36.52	(321)
I got engaged.	86.5	(173)
Other.	30.95	(26)
I did nothing.	13.11	(344)

Note- The numbers of respondents are in parentheses.

Table 6: The Effect of Income on Actions toward Marriage

	Actions to find a marriage partner									
	(1)			(2)			(3)		
	Coefficient	Std. Error		Coefficient	Std. Error		Coefficient	Std. Error	
Age	1.356	0.183	***	0.365	0.051	***	0.279	0.060	***
Square of age	-2.226	0.301	***	-0.582	0.078	***	-0.412	0.085	***
Income in the previous year:									
Total annual income	0.000	0.001		0.000	0.000		0.000	0.001	
Square of total annual income	0.000	0.000		0.000	0.000		0.000	0.000	
Employment status in the previous year:									
Self-employed	-0.300	0.328		-0.141	0.099		0.005	0.128	
Regular worker	0.335	0.186	*	0.099	0.069		0.141	0.079	*
Part-time worker	0.126	0.183		0.025	0.065		0.023	0.071	
Education:									
Hgh school graduate	1.150	0.324	***	0.216	0.050	***			
Junior college graduate	1.744	0.329	***	0.529	0.063	***			
College graduate	1.419	0.336	***	0.326	0.062	***			
Coresidence with parents:									
Living with father	0.156	0.115		0.063	0.045		-0.103	0.109	
Living with mother	0.119	0.131		0.076	0.047		0.175	0.105	*
Size of city:									
Large (14 biggest cities)	-0.022	0.092		-0.066	0.039	*	-0.025	0.166	
Small	-0.147	0.127		-0.059	0.051		0.185	0.299	
Birth cohort:									
1961-63	-0.324	0.326		-0.055	0.104				
1964-66	-0.499	0.352		-0.146	0.114				
1967-69	-0.649	0.401		-0.197	0.135				
1970-71	-0.927	0.455	**	-0.282	0.154	*			
1972-	-1.001	0.497	**	-0.333	0.170	*			
Female uenmployment rate	-0.069	0.121		-0.066	0.044		-0.103	0.053	*
Intercept	-22.521	2.741	***	-5.553	0.791	***	-4.386	0.976	***
N. Obs.	4225			4225			4225		
Model	Logit Model			OLS			Fixed-effect Model		

	(4)			(5)		
	Coefficient	Std. Error		Coefficient	Std. Error	
Age	0.308	0.046	***	0.101	0.151	
Square of age	-0.471	0.067	***	-0.320	0.250	
Income in the previous year:						
Total annual income	0.000	0.000		0.004	0.001	***
Square of total annual income	0.000	0.000		0.000	0.000	***
Employment status in the previous year:						
Self-employed	-0.081	0.109		0.111	0.255	
Regular worker	0.105	0.065		-0.566	0.159	***
Part-time worker	0.011	0.061		-0.328	0.153	**
Education:						
Hgh school graduate	0.245	0.082	***	-0.053	0.201	
Junior college graduate	0.515	0.097	***	0.118	0.212	
College graduate	0.390	0.096	***	-0.112	0.218	
Coresidence with parents:						
Living with father	-0.015	0.063		0.141	0.110	
Living with mother	0.128	0.065	**	0.095	0.125	
Size of city:						
Large (14 biggest cities)	-0.066	0.056		-0.019	0.087	
Small	-0.046	0.075		-0.133	0.117	
Birth cohort:						
1961-63	0.054	0.201		-0.212	0.403	
1964-66	-0.002	0.200		0.177	0.421	
1967-69	-0.078	0.204		0.291	0.446	
1970-71	-0.203	0.216		0.428	0.480	
1972-	-0.210	0.226		0.410	0.505	
Female uenmployment rate	-0.075	0.042	*	-0.130	0.099	
Intercept	-4.934	0.764	***	-1.584	2.163	
N. Obs.	4225			4225		
Model	Random-effect Model			Logit Model		

Note- Columns (2)-(4) and (6)-(8) are the results from estimation using the principal component as a dependent variable. ***<1%，**<5%，*<10%.

To summarize the above, marriage tends to be delayed if the woman's own income increases, and this is also the case when the indicator that is thought to represent the potential capacity to earn income is used as an explanatory variable. However, this fact does not necessarily mean that women do not marry because they no longer have incentives to marry when income increases. This is because it is not found that desire to marry tends to decrease when income increases. Furthermore, no significant relationship is found between actions to find a marriage partner and income. However, the probability of taking actions toward marriage among those with a boyfriend tends to increase as income increases. Once the woman's income increases, there might appear barriers that make it more difficult to find a marriage partner even if they have a desire to marry, although other interpretations might be possible (Note 12).

4-2. Discussion on empirical results
In the previous section, the impact of income on the desire to marry is examined. The fact that questions on marriage intention are only for single people, however, is a potential source of bias in the estimation above. For instance, if people would remain unmarried as income increased, information on the desire to marry would be relatively scarce because people with low income had an earlier marriage. Therefore, I do another estimation using the Heckman probit model that takes into account the possibility of sample selection bias (Note 13). The result shows a significant positive coefficient of income. That means that higher the income, the higher the desire to marry.

In the analysis of the previous section on actions toward marriage, the "Actions toward marriage taken by someone who does not seem to have a boyfriend currently (A)" and "Actions toward marriage by someone who seems to have a boyfriend (B)" were separated to construct different dependent variables, but estimation was done using the same sample. This was due to the fact that the JPSC does not ask if the respondent has a boyfriend, although the estimation ideally should be done by splitting the sample up into those with and without a boyfriend. Instead, I remove the respondents who chose (B) out of the sample for the estimation on the former actions, and remove the respondents who chose (A) for the estimation on the latter actions. I find a significant positive effect of income on "Actions toward marriage by someone who seems to have a boyfriend (B)," while in the estimation that uses (A) as the dependent variable, income has no effect and the estimation results are the same as shown in Table 5.

5. Concluding Remarks
Although the relationship between income and marriage has attracted much attention, its actual mechanism of how an individual's income affects

marriage behavior is less known. This paper used several indicators as income variables to look at the effects on the first marriage timing, which revealed that getting married is likely to be late as income increases among women. However, what was not found was that the desire to marry decreases when income increases. In addition, those who seem to have a boyfriend tend to take actions toward marriage when income increases, while income did not have any effect on those without a boyfriend to take actions to find a marriage partner. Because desire to marry is not reduced when income increases (but rather showed a tendency to increase in some cases), income plays a role not as an "outside option," but as something other that interferes with the steps leading to marriage. These may be "longer working hours" or "higher reservation utility."

Recently, the positive actions taken toward marriage are referred to as "*Konkatsu* (marriage partner hunting)" in headlines, and supports for these actions are said to be a key to increasing marriages. This trend might be one side of the fact that there are more factors preventing marriage than in the past. The existence of non-marriage, which is behind the rapidly declining birthrate, is said to have something to do with women's growing participation rates. The above results, however, do not show a simple (adverse) relationship between marriage and women's income. Rather, it suggests that even among women with a high income, marriage will increase if other factors are removed.

Furthermore, understanding how family formation behaviors react to changes in income will be important in considering future policies. For example, an implication may be derived that the advantages are greater for policies providing stable employment compared to temporary income support. This remains a topic for future studies.

Notes

(Note 1) Recent studies examine the marginal effects of financial incentives on fertility in Israel (Cohen *et al.*, 2007) and France (Laroque and Salanie, 2008).

(Note 2) Economic theories and earlier empirical studies on marriage and childbirth are well summarized in Ermisch (2003), Kato (2001) and Tachibanaki and Kimura (2008).

(Note 3) Takeuchi (2003) and Abe and Inakura (2008) are typical examples that empirically investigate the role of permanent income using panel data from the Institute for Research on Household Economics.

(Note 4) A number of studies have found that men's own income increases after marriage. Kawaguchi (2008) includes a useful survey on empirical researches on marriage premium.

(Note 5) In the fifth year, women between the ages of 24 and 27 (Cohort B) were added to the sample. Moreover, in the 11th year, women between the ages of 24 and 29 (Cohort C) were added.

(Note 6) These are all deflated with the consumer price index. It might be possible to use the wage rate instead of annual income in the estimation. To calculate the wage rate using the JPSC, however, I would have to divide income by working hours, which is responded by discrete values. Thus, the wage rate variable would be at greater risk of measurement errors. Moreover, income on a longer span rather than an hourly wage rate is important in the decision making for family formation. For instance, the wage rate of temporary workers is sometimes high, but his/her annual income is not high because his/her working hours are often limited to short hours.

(Note 7) In this sample, graduate school graduates are also included in "college graduate."

(Note 8) The same is true of the question about action taken toward marriage.

(Note 9) The same result is found when dependent dummy variable with "1" is created only for the response "I want to marry as soon as I can."

(Note 10) Those are "I was formally introduced to a prospective marriage partner by my family or relative," "I was formally introduced to a prospective marriage partner by my friend," "I asked my friend or relative to introduce me a partner," "I joined a marriage introduction club in the past year," or "I have been in a marriage introduction club for more than a year."

(Note 11) Those are "I bought a marriage information magazine," "I had a talk with my boyfriend about marriage," or "I got engaged."

(Note 12) In Japan, there are few quantitative studies on activities concerning marriage such as how to find marriage partner in Japan, and Iwasawa and Mita (2005) is an exception.

(Note 13) Even this strategy of correcting sample selection cannot avoid *the selection bias at the*

initial time as mentioned in section 4-2.

References

Abe, N., and N. Inakura, 2008, "Income Inequality and Recent Changes in Permanent Income Shocks: Understanding Income Inequality Through Covariance Structure Based on Household Panel Data" *The Quarterly of Social Security Research,* 44(3) (in Japanese)

Ahn, N. and P. Mira, 2001, "Job Bust, Baby Bust?: Evidence from Spain," *Journal of Population Economics* 14(3): 505-521

Burgess, S., Propper, C., and A. Aassve, 2003, "The Role of Income in Marriage and Divorce Transitions among Young Americans," *Journal of Population Economics* 16(3) 455-475

Cohen, A., Dehejia, R., and D. Romanov, 2007, "Do Financial Incentives Affect Fertility?" *NBER Working Paper* No. 13700

Ermisch, J., 2003, *An Economic Analysis of the Family* Princeton University Press.

Fukuda, S., 2007, "Gender System and Women's Choice to Marry (2): Examination of 'Women's Economic Independence Hypothesis' in Japan," *The Quarterly Research on Household Economics,* No.76: 54-62 (in Japanese)

Gutierrez-Domenech, M., 2008, "The Impact of the Labour Market on the Timing of Marriage and Births in Spain," *Journal of Population Economics* 21(1): 83-110

Higuchi, Y., 2000, "Dynamic Analysis of Women's Marriage, Childbirth, and Employment Using Panel Data," in Trends in Contemporary Economics 2000 edited by Okada, A., Kamiya. K., Kuroda, M., and K. Ban, Toyo Keizai (in Japanese)

Higuchi, Y., and M. Abe, 1999, "Economic Changes and Women's Marriage, Childbirth, and Work Timing: Analysis of Fixed Factors and Variable Factors" in *Contemporary Women as Viewed from the Panel Data: Marriage, Childbirth, Employment, Consumption and Savings*, edited by Higuchi, Y., and M. Iwata, Toyo Keizai (in Japanese)

Iwasawa, M., and F. Mita, 2005, "Boom and Bust in Marriages at Work and Marriage Decline in Japan," *The Japanese Journal of Labour Studies,* 535: 16-28 (in Japanese)

Kato, H., 2001, *Introduction to Population Economics*, Nippon Hyoronsha (in Japanese)

Kawaguchi, A., 2008, *Gender Inequality in* Keely, M., 1977, "The Economics of Family Formation," *Economic Inquiry*, 15(2): 238-250

Kenjoh, E., 2008, "Postponement of Motherhood and Career Costs in Japan," *mimeo*

Kobayashi, Y., 2006, "Relationship between Consciousness of Marriage and Employment and Family Formation: Verification by Recursive Model," *The Journal of Population Studies*, 39: 1-16

Kondo, A., 2008, "Gender-specific Labor Market Conditions and Family Formation," *mimeo*

Laroque, G., and B. Salanié, 2008, "Does Fertility Respond to Financial Incentives?" *IZA Discussion Paper* No. 3575

Ohta, S., 2007, "Life Events and Youth Labor Market: Higher Education, Marriage, and Childbearing Behaviors Viewed from the National Census," in *Empirical Analysis of the Japanese Economy: Overcoming the Lost Decade* edited by Toshiaki Tachibanaki, Toyo Keizai (in Japanese)

Wood, R., 1995, "Marriage Rates and Marriageable Men: A Test of the Wilson Hypothesis," *The Journal of Human Resources*, 30(1): 163-193

Sakai, T., and Y. Higuchi, 2005, "The Long-Term Effect of the Past Unstable Employment Status," *The Japanese Journal of Labour Studies*, 535: 29-41 (in Japanese)

Sakamoto, K., and Y. Kitamura, 2007, "Marriage Behavior from the Perspective of Intergenerational Relationships," *The Japanese Economy* 34(4): 76-122

Tachibanaki, T., and M. Kimura, 2008, *Family Economics: Struggle Between Money and Family Ties*, NTT Publishing (in Japanese)

Takeuchi, M., 2003, "Panel Analysis of Women's Decision to Work: Re-examination of the Effects of the Husband's Income," *The Japanese Journal of Labour Studies*, 527: 76-88 (in Japanese)

Appendix Table 1: The Estimation Result of Wage Function

Dependent Variable:	(1) Total annual income			(2) Earned income		
	Coefficient	Std. Error		Coefficient	Std. Error	
Age	**24.005**	5.080	***	**20.033**	4.857	***
Square of age	**-31.143**	7.904	***	**-23.456**	7.557	***
Size of city:						
Large (14 biggest cities)	**64.415**	15.455	***	**58.752**	14.772	***
Small	**-7.378**	21.670		**0.601**	20.713	
Intercept	**-147.359**	80.270	*	**-105.584**	76.748	
Year Dummy	**Yes**			**Yes**		
N. Obs.	**3475**			**3474**		
Model	**Fixed-effect Model**			**Fixed-effect Model**		

Note- Estimated indivisual effects in column (2) are used as an imputed wage in the analysis. ***<1%, **<5%, *<10%.

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