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RELATION BETWEEN RELATIVE INCOME AND MARRIAGE IN JAPAN

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Abstract

This study investigates the relationship of relative income on males' marital behavior using individual data taken from the Japanese Employment Status Survey. The data show that relatively low-income males among each reference group are more likely to marry when their income approaches the 50th percentile in his reference group's income distribution. However, if males' earnings are above the 50th percentile around, the influence of an increase in income becomes very small. The findings show that the mean income of a regular-employment worker within his own reference group is an important predictor of marital status, particularly for Japanese males in the bottom of national income distribution.

Keywords: Marriage behavior, Income distribution, Identity

JEL classification: D91, D31, J12

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1 Introduction

Many developed countries are experiencing a decrease in their fertility rates. In Japan, a drop in the birthrate is exacerbated due to people postponing the timing of marriage. According to previous studies (e.g., Retherford et al., 2001, Fukuda 2020), late marriage is the main cause of the current low birthrate in Japan because the rate of illegitimate childbirth is very low. While the average number of births is increasing slightly for older married women, owing mainly to progress in medical technology, the total fertility rate (TFR) is overwhelmingly decreasing as a result of the trend of late marriages. The postponement of marriage timing means women give birth to fewer children because they have less time in which to do so.

This problem is viewed as urgent in many developed countries and, as a result, the decision by those in low-income groups on when to marry has attracted much attention. Many previous studies about marriage are based on traditional economic search models (e.g., Becker and Lewis, 1973; Becker, 1981). In Japan, several studies have examined theoretical hypotheses using empirical analyses, with most focusing on the marriage rate of females. Sasaki (2017) suggests that the income inequality among Japanese males reduces the female marriage rate by decreasing the probability of meeting an attractive partner. However, the marital behavior of males is different to that of females, and remains unclear.

On the other hand, behavioral models on social prescription or the identity of gender have been applied to marital behavior to provide alternative explanations to those of standard economic models of the marriage market, especially in the United States (e.g., Akerlof and Kranton, 2000).

The purpose of this study is to investigate males' marital behavior using the concept of "relative income" (e.g., Watson and McLanahan, 2011) and extensive individual data taken from Japan's Employment Status Survey. In Japan, prior studies have found a positive correlation between an increase in individual income and the probability of marriage for males. Here, we find that those who earn a high income are not necessarily more likely to marry than those who earn a low income in Japan. Why do these high-income males not marry, and what are the reasons for low-income males deciding to marry? Some researchers believe that the relative income within a person's own social reference group is more important than the absolute income in terms of marital decisions (e.g., Easterlin, 1980, Akerlof and Kranton 2000). In this context, relative income refers to the difference between the income of an individual and that of others with similar social characteristics.

Our results suggest that relative income is a good predictor of an individual's marital status, especially for males in the low-income group. In other words, where a person's income falls relative to the mean for regular-employment workers within the local reference group is more important than the absolute value of income or the median of the population. This result is

similar to those found for the United States.

This study makes two contributions to the related literature. First, this is the first empirical study of relative income and marriage decisions based on behavioral models and Japanese data. Second, the findings show that the income distribution of the reference group is a primary factor in Japanese males' marriage decisions. Several empirical studies suggest that financial status affects marital status. However, to the best of our knowledge, no studies have focused on the relationship between relative income status and marriage in the case of Japan.

First, we create reference groups based on social status, and then sort individuals into these groups in order to estimate the parameters for each group's income distribution. Second, we calculate the reference group median income. Then, relative income is defined as an individual's income relative to the group median income. We use this variable to infer an individual's financial status relative to others within their social group. Then, in the main analysis, we estimate the effect of this variable on marital status.

This paper proceeds as follows. Section 2 discusses the current situation with regard to marriage in Japan. In Section 3, we review the literature on the relationship between income and childbirth and marriage behavior. In Section 4, we develop a simple theoretical framework based on the model of Watson and Mclanahan (2011), which is based on the theoretical framework of relative status of Akerlof and Kranton (2000). In Section 5, we discuss the data, and then describe the empirical method employed here in Section 6. Section 7 presents the empirical results, which are then discussed in Section 8. Section 9 concludes the paper.

2 Japanese marriage and fertility

In general, the minimum TFR necessary to maintain the current population level is around 2.09. The Japanese TFR has been lower than this value, and lower than all other developed countries, since 1973. At the same time, the Japanese marriage rate has been decreasing. The National Fertility Survey shows that Japanese people have a strong concern about getting married, and believe that the main purpose of marriage is having children.[1] Since 1970, the average ideal number of children for a household has been greater than 2.3, which exceeds the TFR required to maintain the current population. However, the real value of the TFR has been less than 1.9, and is decreasing. The survey also shows that 40 percent of males believe that finding a suitable partner is the biggest obstacle to a marriage decision. In addition, 52 percent of households responded that the financial cost of children is the reason why they cannot have the ideal number of children.

[1] "The National Fertility Survey" (2015) by The National Institute of Population and Social Security Research.

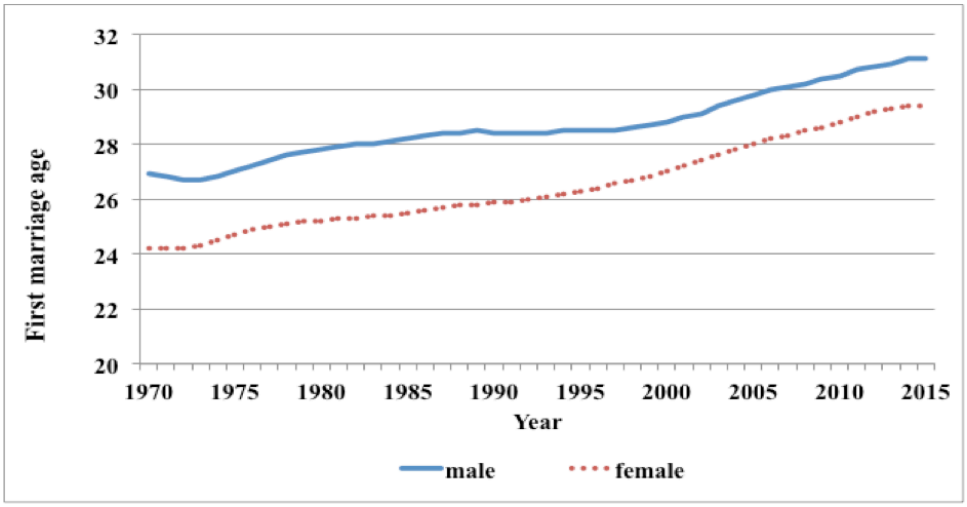

Figure 1: Proportion of unmarried males who want to get married.
Source : The National Fertility Survey (2015)

Thus, people's financial situation is an important factor in marriage decisions and after marriage.

This problem is more serious for those in the low-income group, and will become so for those in the high-income group who are planning on having several children in the future. In Japan, the low marriage rate among male non-regular employees has attracted much attention. Sasaki (2017) suggests that an increase in the number of irregular employees has reduced the number of "marriageable men" and the marriage rate, especially for those who are less educated.

Figure 2 depicts the distribution of Japanese males aged 35 to 39 years who currently work relative to the number of males who have ever been married, by reference group income (percentiles). The vertical line indicates the median income of the reference group by education level. The figure shows that, for all education groups, the share of males who have been married kinks around the vertical lines, and then increases gradually to the right of the line. Because education level and income are strongly positively correlated, the median value of college graduate income at this age is much higher than that of high school graduates. However, we observe a similar trend in all education groups.

The figure also indicates a possibility that the relative position of an individuals in their reference groups, measured by the relative income ranking, affects their marriage decisions. Although individuals may earn a high income in absolute terms, they may not feel rich, and so might hesitate to marry if they belong to a reference group in which the other members earn a higher high income.

Table 1: Descriptive Statistics from The National Fertility Survey (2010)

The rate of males who think that "Marriage fund is the biggest obstacle" (Sample Size $N = 2,155$)		Average the ideal number of children for unmarried male (Sample Size $N = 3,164$)	
Age20-24		Age20-24	
Middle-School	52%	Elementary	2.00
High-School	61%	High-School	2.08
Some College	60%	Some College	2.08
College+	41%	College+	2.11
Age25–29		Age25–29	
Middle-School	46%	Elementary	2.00
High-School	54%	High-School	1.96
Some College	61%	Some College	2.09
College+	51%	College+	2.09
Age30–34		Age30–34	
Middle-School	58%	Elementary	1.88
High-School	54%	High-School	1.93
Some College	47%	Some College	1.95
College+	45%	College+	1.90

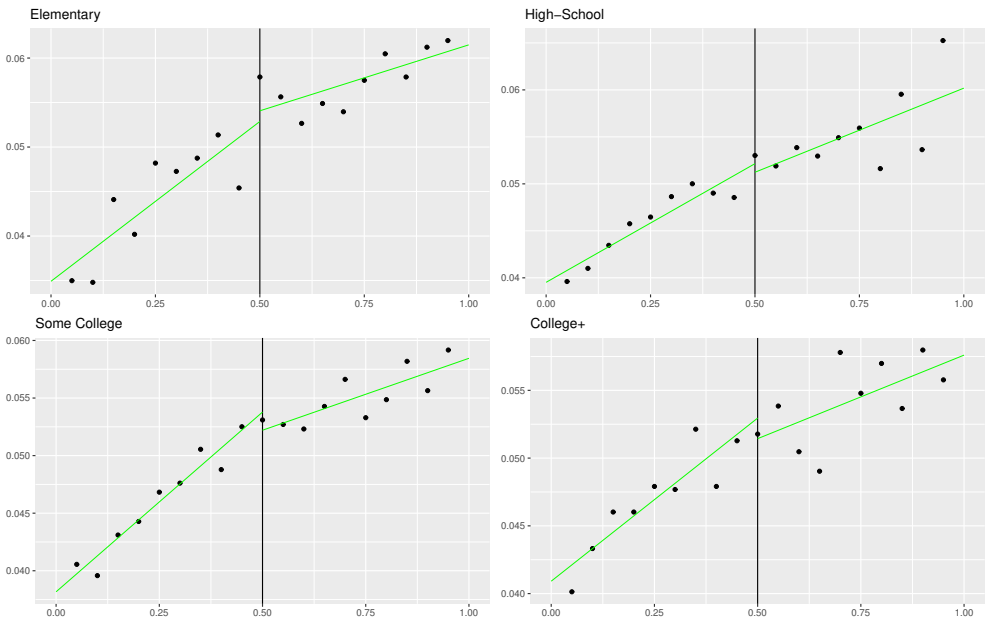

Figure 2: The share of males who have ever been married, by reference group income percentile

This study contributes to the growing body of literature on the link between relative income and behavior, because it is the first to focus on the relation between relative income and marriage decisions and to analyze

3 Literature

Several previous studies examine the relation between income and marriage, and identify a positive relation between an increase in a male's income and the probability of getting married. Becker (1981) provides a classic economic model of marriage that hinges on specialization in home production. The benefit of specialization might be particularly important to those in the lower income groups. However, for the same group, if a male's income is lower than that of a female at the bottom of the distribution, the gains from specialization decrease and marriage becomes less likely. Based on their qualitative work, Gibson-Davis et al. (2005) suggest that couples' financial status affects their marriage decisions even when they have children. Edin (2000) also points to the importance of financial stability as a precursor to marriage.

However, few studies have examined male marriage activity in Japan, with most of them focusing on the income distribution of females. Those studies are based on the marriage search model and focuse on the opposite gender's income distribution. Based on data taken from the Employment Status Survey, Sasaki (2017) suggests that the poor employment environment decreases the number of attractive partners. However, there has been a slight increase in the proportion of single males as a result of the decrease in the female regular employment rate. Sasaki (2017) further shows that an increase in the regular employment rate of males has a positive effect on the marriage probability of both genders in Japan.

Studies on the relationship between marriage and financial norms are not new. Easterlin (1980) suggests that a person's own standard of living is related to marriage and childbearing. Similarly, Akerlof and Kranton (2000) propose a theoretical model to identity decisions based on social characteristics. Akerlof and Kranton (2000) suggest that people's characteristics and the social groups to which they belong affect their personal identity and decisions.

Bertrand et al. (2015) explain a strange phenomenon observed in the United States, where the distribution of the share of wife's income exhibits a sharp drop when her income exceeds that of her husband. They analyze this discontinuity pattern using the findings of Akerlof and Kranton (2000) and explain it in terms of a US-specific behavioral prescription of gender that "a man should earn more than his wife."

Watson and Mclanahan (2011) test Akerlof and Kranton's (2000) theoretical framework using an empirical approach. They show that the ratio of

fully employed males' median income to own income in each local reference group explains a man's marital status successfully in the case of the United States. They also show that a 10 percent higher reference group median income is associated while a 2 percent reduction in the rate of marriage.

Several studies examine relative income and childbirth in Japan. Matsuura (2011) suggests that an increase in income increases the number of births only in those households in which the household income is lower than the average income of their reference group (who have the same social characteristics). Matsuura (2011) also confirms differences in income elasticity according to the educational investment by each reference group. Therefore, for relatively rich individuals, an increase in income level increases their educational investment for children they already have. However, having a greater number of children is effective for those with a relatively low income. Although prior studies have shown that income level is an important factor affecting individuals' decision-making, their relative income level is more important and, in Japan, affects decisions related to numbers of births. This study investigates the effect of relative income on marriage decisions, which precede decisions on how many children to have.

This study adopts the empirical method of Watson and Mclanahan (2011) to estimate the effect of relative income on marriage using Japanese data. We investigate whether low-income males are affected by the median income of their own reference groups, defined for the same gender, and whether the reference group median is a good predictor of marriage decisions. To the best of our knowledge, this is the first study to investigate the effect of relative income on marital status in Japan.

4 Model

The proposed model is based on that of Watson and Mclanahan (2011), which is based on the theoretical framework of Akerlof and Kranton (2000). Akerlof and Kranton (2000) suggest that there is a difference in social prescriptions by group. An individual's identity is created in relation to reality and the social prescriptions of the group to which he/she belongs. This, in turn, affects people's decision-making.

Watson and Mclanahan (2011) construct a model in which there are differences in the income level thresholds that people consider necessary for marriage, as per their social characteristics. Suppose a locality has an equal number of men and women in the marriage market. Each person is endowed with income drawn from the same distribution. Suppose further that the desirability of men and women is represented by their income Y_i. In the matching process, we assume that men and women are matched by the levels of their income, such that within each couple, the man and the woman have equal levels of income. The men decide whether or not to

marry. The value of marrying is determined by background characteristics (e.g., education, living place, income), which, in turn, affect the financial returns and personal returns to marriage.

Following the model in Akerlof and Kranton (2000), I describe "married people" as a group c in a set of social categories C with which men and women may choose to identify. The prescriptions P describe the ideal characteristics and behavior for each category. For example, although individuals may earn a high income in absolute terms, the gap between own income and prescription might become large if they belong to the reference group c such that highly educated, old age, living in an urban area. Then, they may not feel rich and so might hesitate to marry. And we assume that the category "unmarried people" is assumed to have no set of prescriptions and the financial cost of not marrying is much lower than that for marriage.

An individual's self-image, represented by I_i, depends on the match between his or her behavior and characteristics and the prescription of ideals for his or her category. This simple model focuses on the prescription that married people have a certain minimum level of income. It also includes a random error term ϵ_i with zero mean that affects an individual's self-image for any category. Thus, an individual's utility is described by

$$U_i = U_i(Y_i, I_i) \quad where \quad I_i = I_i(Y_i, c_i, P, \epsilon_i) \tag{1}$$

$$\frac{\partial U_i}{\partial Y_i} > 0, \frac{\partial U_i}{\partial I_i} > 0, \tag{2}$$

That is, in general, an individual's utility depends on his income and self-image. Self-image, in turn, is a function of the interactions between an individual's income, the category with which he identifies, the prescriptions for that category, and a random error term. Suppose that the financial prescription P for a married person is at least Y_{ideal} in a given reference group. Then, the identity payoff for a married person is

$$I_i = I_{marry} - \theta\{max(0, 1 - \frac{Y_i}{Y_{ideal}})\} + \epsilon_{marry}, \tag{3}$$

where θ is a positive scalar describing the identity loss associated with falling below the "marriage ideal." The identity payoff of not marrying is

$$I_i = I_{not-marry} + \epsilon_{not-marry}, \tag{4}$$

and assumes $I_{not-marry} < I_{marry}$, In other words, on average, a married person who meets the necessary ideal has a higher self-image than a similar person who is not married. In making the decision on whether to marry, an individual compares the utility of marriage and being unmarried. A person

will marry when the following condition holds:

$$I_i = (I_{marry} - I_{not-marry}) - \theta\{max(0, 1 - \frac{Y_i}{Y_{ideal}})\} > \epsilon_{not-marry} - \epsilon_{marry}, \tag{5}$$

The gains to self-image through marriage tend to increase with the average gain in self-image from marriage and the individual's income. The gains decrease with a higher "marriage ideal" and a higher penalty θ for deviating from the norm. This framework provides some simple comparative statics. The gain to marriage is increasing in Y_i for $Y_i < Y_{ideal}$:

$$\frac{\partial U_i}{\partial Y_i} = \frac{\theta}{\partial Y_i}, \tag{6}$$

Similarly, an increase in the marriage ideal Y_{ideal} is associated with a Y_i decrease in the gain to marriage for low values of Y_i:

$$\frac{\partial U_i}{\partial Y_{ideal}} = -\frac{\theta}{\partial Y_i^2}, \tag{7}$$

but there is no change in the gain for high values of Y_i:

$$\frac{\partial Y_i}{\partial Y_{ideal}} = 0, \tag{8}$$

The model assumes that Y_{ideal} is the ideal income required for marriage. However, the real level of income people perceive to be required for marriage is unobservable.

5 Empirical method

As noted above, the main analysis assumes that a man sets the median income of his reference group to the minimum income required for marriage. According to the theoretical model, the ratio of a male's own income to the marriage ideal should affect the marriage decision, but only for those below the ideal. This study uses these two values to estimate the probability of whether a male is married. In order to interpret the effect simply, the following regression is used with a linear probability model. The baseline specification is as follows:

$$\begin{aligned} Married_{ieact} = \beta_0 + \beta_1 \cdot under_i \cdot \frac{Y_i}{\hat{Y}_{eact}} + \beta_2 \cdot (1 - under_i) \cdot \frac{Y_i}{\hat{Y}_{eact}} \\ + \beta_3 \cdot under_3 + \beta_4 \cdot X_3 + \sigma_y + \epsilon_{ieact}, \end{aligned} \tag{9}$$

Here, $Married_{ieact}$ indicates whether individual i in education group e, age group a, city group c, and year t has ever married, and Y_i denotes individual

income. Then, $\hat{Y}_{eact}$ is the ideal income for marriage in each category and is considered the median income of the reference group. In this model, $\hat{Y}_{eact}$ is a proxy variable for $\hat{Y}_{ideal} \cdot under_i$ as an indicator of when i's income is below that of the reference group median, and takes the value one when $\hat{Y}_{ideal} - Y_i \geq 0$. Furthermore, $\frac{Y_i}{\hat{Y}_{eact}}$ is the rate of i's income to the reference group median, representing the relative income scale, and X_i is a vector of individual characteristics including age, education, and living place. Lastly, α and σ_y represent an intercept and a year dummy, respectively.

In this analysis, β_1 is the coefficient of interest and shows the effect of relative income for those below the median on the probability of being married, and β_2 represents the effect of relative income for those above the median on the probability of being married. The parameters are a reduced form of θ from the theoretical model described in Section 4. Based on the theoretical framework and the findings of previous studies, we expect that β_1 will be positive and that β_2 will be close to zero. This would mean that males are more likely to marry when their income approaches the reference group's median income. As noted earlier, males consider the median income as the target income to succeed in marriage.

6 Data

The data are micro data taken from the Employment Status Survey covering the period 1992–2002. The Japanese government surveyed people's employment status, including individual characteristics, every five years. The survey employs the two-stage stratified extraction method, and is not a census. This study uses a sample of males aged 20 to 39 years who currently work because this period is generally believed to be when most people get married in Japan.

The advantage of these data is the large sample size, with close to 300,000 observations. The large sample size allows the data to be divided into reference groups with sufficiently large dimensions of characteristics. In addition, the survey provides detailed data on employment status, such as the company size, length of service, and system of employment, as well as data on the individuals, including educational background, age, whether living in one of the three biggest metropolitan areas, and so on.

However, there are two limitations of the data. First, the survey is not a census of repeated cross-sectional data. Therefore, we do not know the actual income level at the time of the marriage decision, and cannot judge the timing of the marriage decision. This study analyzes the effect of relative income on the probability of a male getting married. The second limitation is that the income data are represented as interval data. This is problematic, given that we are concerned with how much someone earns compared with similar individuals in order to determine the effect of relative

income. Therefore, we know only a range of income for each individual, rather than an accurate income.

Table 2: Descriptive Statistics for income

	Reference Group Median			Fraction Under Median		
	1992	1997	2002	1992	1997	2002
Age20–24						
Elementary	246.692	247.601	221.753	0.594	0.538	0.61
High-school	248.749	272.043	223.318	0.521	0.542	0.579
Some college	231.684	248.85	223.396	0.564	0.511	0.57
College+	249.391	225.886	223.838	0.532	0.499	0.513
All	244.129	248.595	223.076	0.556	0.477	0.554
Age25–29						
Elementary	306.657	308.9	272.958	0.573	0.493	0.568
High-school	342.815	344.89	308.526	0.553	0.547	0.537
Some college	344.816	345.867	309.587	0.559	0.528	0.526
College+	349.129	351.007	347.712	0.529	0.516	0.553
All	335.854	337.666	309.695	0.393	0.338	0.49
Age30–34						
Elementary	312.637	348.878	311.031	0.505	0.565	0.484
High-school	397.321	400.86	394.376	0.603	0.49	0.632
Some college	399.312	446.316	396.926	0.512	0.54	0.574
College+	449.137	514.696	449.375	0.576	0.534	0.569
All	389.602	427.687	387.927	0.52	0.411	0.547
Age35–40						
Elementary	392.501	396.601	349.505	0.707	0.627	0.587
High-school	505.873	510.15	447.323	0.687	0.631	0.568
Some college	511.551	515.586	494.948	0.618	0.519	0.611
College+	519.815	592.142	596.715	0.461	0.552	0.571
All	482.435	503.62	472.123	0.638	0.525	0.582

To mitigate the second limitation, we estimate the parameters for the income distribution using an interval regression, and use the expected values of the estimated parameters to denote income. An interval regression is a parametric statistical method that supposes a distribution for data. We assume that the Japanese income distribution follows a log-logistic distribution, in general.[2] in general. The goodness of fit test suggests a log-logistic

[2]Several studies examine functional forms for the income distribution in Japan. Atoda et al. (1988) and Tachibanaki et al. (1997) estimate the income distribution in Japan,

Table 3: Descriptive Statistics

	Reference Group Median			
	Total	1992	1997	2002
	$N = 292900$	$n = 106756$	$n = 101677$	$n = 85467$
Ever married	0.51	0.53	0.5	0.49
Live in 3 metropolitan	0.34	0.34	0.36	0.32
Age20–24	0.2	0.21	0.21	0.17
Age25–29	0.26	0.21	0.21	0.17
Age30–34	0.26	0.26	0.25	0.29
Age35–39	0.28	0.29	0.26	0.27
Elementary	0.08	0.09	0.07	0.07
High-school	0.51	0.52	0.51	0.49
Some college	0.11	0.09	0.11	0.14
College+	0.3	0.29	0.31	0.3
Employed full-time	0.84	0.85	0.87	0.8

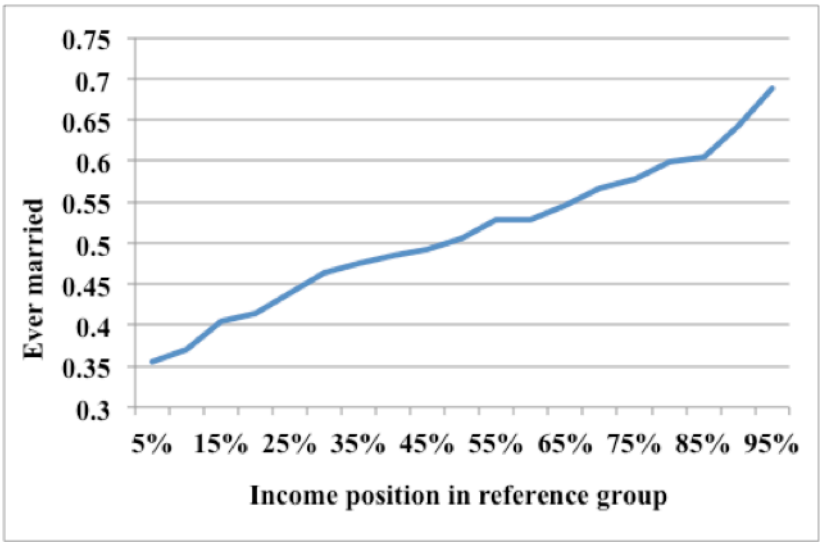

Figure 3: the proportion of the sample who are married

distribution is a significantly good fit, and the regression results show that each parameter is significant. Thus, we use the estimated values to calculate the expected value of each individual's income. Using these values, we calculate the median income for each social group. Table 2 shows the descriptive statistics. Table 2 shows that there were no major changes to income during the sample period.

Then, we regard these medians as the levels of ideals people are concerned about, and define the ratio of individual income to the group median as the individual's relative income. Lastly, I exclude the bottom and top intervals of the income range samples, which account for less than one percent of the total. Figure 3 shows the proportion of the sample who are married samples after dividing the samples by income percentile category in the reference group. From Figure 3, as in the case of absolute income, an increase in relative income has a positive correlation with marriage probability.

7 Results

The results for the overall sample are shown in Table 4. Column 1 shows that the log of absolute income has a positive effect on marriage probability at a 1 percent level of significance. Furthermore, the magnitude is relatively large. These results are consistent with those of previous studies (e.g., Sasaki, 2017; Watson and Mclanahan, 2011).

and suggest that it follows a log-logistic or Singh–Maddala distribution. Nishino (2012) also propose the log-logistic distribution.

Column 2 indicates that even though the log of own income is added as an explanatory variable, the effect of improving one's position within the group on marriage probability is positive and significant. This result is that the same as that of the simple case in which the value one is substitute for all values $under_i$ in Eq (9). The marginal effect of a man becoming relatively richer within the reference group on his marriage probability does not change and, thus, is a linear probability model. The coefficients are also positive and significant at the one percent level. This means that an increase in relative income raises the probability of getting married in this simple linear model. Additional income raises the probability of being married by 4.9 percentage points, reflecting the relative increase in wealth. This coefficient also shows how much the marriage probability rises when the median income of a person's group declines, even if his income is constant.

Column 3 displays the estimation results for the equation, controlling for the logarithm of own income, that includes only β_3, denoting whether the income exceeds the median value of the group. Because β_3 is a negative value at the one percent level of significance, a man is 2.9 percentage points less likely to be married if his income falls below the reference group median.

Columns 4 and 5 show main results from the specification in Eq (9) discussed in the previous section. In addition, Column 4 shows the estimation results for subsamples of neighborhoods around a cut-off point within five percent bandwidths. Then, all coefficients are consistent with the implications of the theoretical model in Eq (6) and Eq (7). Moreover, β_1 is positive at the 10 percent significance level and β_2 is statistically sufficiently smaller than β_1 and is not statistically significant. Column 5, taking advantage of the huge sample size, contains a large dummy matrix controlling for absolute income ranks. Column 5 shows a slightly better fit. The adjusted R-squared is slightly larger than that of the other models. Thus, we treat this model as the baseline model.

The findings are consistent with those of the theoretical model, with β_1 positive at the one percent level of significance. Using this model, we test the null hypotheses $\beta_1 = \beta_2 = 0$ and $\beta_1 = \beta_2$, both of which are significantly rejected by the F-test at one percent significance. Therefore, it can be considered that the effect of an increase in relative income changes across percentile points. From this result, in the Japanese data, the median value of income is an important index for a male's marriage probability. Furthermore, people tend not to marry unless they have sufficient income relative to their reference group.

These results suggest that the median income of each reference group is not appropriate as a proxy variable for the threshold income level for the marriage decision. To find a more appropriate proxy, we use various percentile points instead of the median as $\hat{Y}_{eact}$, as discussed in detail later.[3]

[3]Similarly to Watson and Mclanahan(2011), we use the median income of full-time

Table 4: The impact of relative income

			all		
	(1)	(2)	(3)	(4)	(5)
Relative income if under $\hat{Y}_{eact}$: β_1				0.092*	0.118***
				(0.049)	(0.013)
Ratio income/ideal if over $\hat{Y}_{eact}$: β_2				0.056	0.023***
				(0.088)	(0.006)
if under $\hat{Y}_{eact}$: β_3			−0.029***	−0.017	−0.079***
			(0.002)	(0.096)	(0.011)
Ratio income/ideal		0.048***			
		(0.005)			
Log of income	0.257***	0.215***	0.231***	0.541***	
	(0.002)	(0.005)	(0.003)	(0.029)	
Income dummy					✓
N	293,900	293,900	293,900	30,486	293,900
Adjusted R^2	0.322	0.322	0.322	0.325	0.328

Notes: ***,** and * indicate significance at the 1, 5 and 10 percent level.

Table 5: Estimation using poor subsamples (bottom of 50% in national distribution)

	poor				
	(1)	(2)	(3)	(4)	(5)
Ratio income/ideal if under $\hat{Y}_{eact}$: β_1				0.120^{***} (0.017)	0.194^{***} (0.017)
Ratio income/ideal if over $\hat{Y}_{eact}$: β_2				0.055^{***} (0.014)	0.041^{***} (0.014)
if under $\hat{Y}_{eact}$: β_3			-0.014^{***} (0.003)	-0.071^{***} (0.017)	-0.139^{***} (0.018)
Ratio income/ideal		0.082^{***} (0.011)			
Log of income	0.168^{***} (0.003)	0.112^{***} (0.008)	0.159^{***} (0.004)	0.091^{***} (0.010)	
Income dummy					✓
N	158,607	158,607	158,607	158,607	158,607
Adjusted R^2	0.223	0.224	0.224	0.224	0.228

Notes: ***,** and * indicate significance at the 1, 5 and 10 percent level.

Table 6: Estimation using rich subsamples (top of 50% in national distribution)

	rich				
	(1)	(2)	(3)	(4)	(5)
Ratio income/ideal if under $\hat{Y}_{eact}$: β_1				-0.116^{***} (0.022)	0.038^{*} (0.022)
Ratio income/ideal if over $\hat{Y}_{eact}$: β_2				-0.154^{***} (0.010)	0.012 (0.009)
if under $\hat{Y}_{eact}$: β_3			0.004 (0.004)	-0.019 (0.017)	-0.007 (0.018)
Ratio income/ideal		-0.148^{***} (0.009)			
Log of income	0.316^{***} (0.005)	0.501^{***} (0.013)	0.320^{***} (0.006)	0.522^{***} (0.015)	
Income dummy					✓
N	135,293	135,293	135,293	135,293	135,293
Adjusted R^2	0.151	0.153	0.151	0.153	0.152

Notes: ***,** and * indicate significance at the 1, 5 and 10 percent level.

Next, we analyze the impact of relative income on the lowest income class, that is, those who are in the bottom 50 percent of the national income distribution. In the same way as above, Column 1 of Table 4 shows the relation between the logarithm of absolute income and marital status. An additional logarithm of absolute income raises the probability of being married by 16.8 percentage points. Column 2 suggests that the marginal effect of an increase in income is decomposed into a direct effect of increasing log of income (11.1 percent) and the effect of becoming relatively richer within the reference group (8.2 percent). Column 3 suggests that a man is less likely to be married by 1.4 percentage points if his income falls below the reference group median.

In the main estimation equation, Column 4 is consistent with the implications from the theoretical model. An increase in the ratio of a man's income to his reference group's median income significantly raise the probability of marriage below the group median, but not above it.

Column 5 use a large dummy matrix to control for absolute income ranks.

This is the baseline model. Using this model, we test the null hypotheses $\beta_1 = \beta_2 = 0$ and $\beta_1 = \beta_2$, both of which are rejected by the F-test at the one percent level of significance. We find that there is a statistically large change between β_1 and β_2.

The results for the higher income group (i.e., the top 50 percent of the national income distribution) is shown in Table 5. The results are similar to the previous results.

8 Discussion

Our results imply that the median income of each reference group seems to be appropriate as a Y_{ideal} proxy variable for the threshold income level for marriage decisions nationally, as in Watson and Mclanahan (2011). But why does the median make sense? One possibility is the following. In these data, the value of median income is similar to the earnings by the regular employed. As mentioned earlier, an increase in young males' non-regular employment rates has been widely discussed in Japan. Some previous studies (e.g., Sasaki 2016, 2017) suggests that an increase in young male non-regular employment rates is a cause of the rising single rates in Japan. Furthermore, regular employment is an important social signal for Japanese men, in general, to be considered an independent members of society. Thus, Japanese young males may be concerned about regular employees' income levels as a reference point and part of their marriage decisions.

employees in the reference groups as a prescription. In this case, the coefficient values are nearly the same.

To test this hypothesis and to find an accurate proxy value, we use various percentile points instead of the median, as in Table 7. First, Columns 1 and 2 show the results of a placebo test when the reference percentile points Y_{ideal} are randomly generated by group. In that case, no coefficients are significant values or very close to zero, have no meaning, and the model fits are not good.

On the other hand, Column 3 and 4 use the mean for regular employment worker's income as $\hat{Y}_{eact}$ instead of the median. For low-income males, the differences between the median value and mean income for regular employment workers is only 1,500–2,000 US dollars,[4] on average. However, the coefficients are very sensitive to change in this range. We find a better fit and a clearer interpretation of the theoretical model in Column 3 compared with the previous results. β_1 is significant and large relative to β_2, and β_3 is negative and large, all at the one percent significance level. From this result, the income level that low-income males set for marriage may be close to the mean earnings for regular employment.[5] In addition, they tend not to marry unless they have sufficient income, based on the reference group.

Furthermore, Column 4 shows the results for the overall sample. The results are similar to those of the low-income group. Does this answer the question as to why high-income people not marry? In general, it is known that income follows a distribution in which a longer right tail means a higher upper limit of income. Thus, the mean and median values diverge in reference groups with a high upper limit of income because, similarly to education level, a few very high values can raise the group mean.[6] Therefore, richer people tend to hesitate to get married because there are more rich people in their social group.

Although we have discussed males' postponement of marriage timing, based on a males' marital decision model, it is natural that females' decisions and action will also have an effect. A theory states that females tend to marry males whose income exceeds that of the average regular employment worker. Relatively high-income males may be more attractive and selected by females. However, we cannot determine whether the result is driven from the male or female side. To take this into partial consideration, we estimate the parameters while controlling for female income information.

Columns 5 and 6 consider the mean income of a working female in the same marriage market as Y_{eact}, which partially solves the problem. Many studies propose that females who wish to have children after marriage require a partner with sufficient economic status because pregnancy and child care temporarily decrease their supply of labor. If this hypothesis is correct, income levels of females who belong to the same marriage market are

[4]This is equal to approximately 200,000 Japanese yen.

[5]This value is close to the median value of the own group.

[6]Matsuura (2011) shows there are differences in the income elasticities of the educational investment for each group, defined by parents' educational level in Japan.

Table 7: Estimation using various percentile points as $\hat{Y}_{eact}$

	Marrytype					
	(1)	(2)	(3)	(4)	(5)	(6)
Ratio income/ideal	0.015**	0.005	0.331***	0.165***	0.218***	0.029***
if under $\hat{Y}_{eact}$: β_1	(0.006)	(0.005)	(0.025)	(0.018)	(0.009)	(0.006)
Ratio income/ideal	0.001	0.0004	−0.005	0.025***	0.242***	−0.014***
if over $\hat{Y}_{eact}$: β_2	(0.004)	(0.001)	(0.028)	(0.009)	(0.010)	(0.003)
Under $\hat{Y}_{eact}$: β_3	−0.008	−0.002	−0.350***	−0.145***	0.064***	−0.055***
	(0.007)	(0.004)	(0.029)	(0.014)	(0.013)	(0.007)
N	158,607	293,900	158,607	293,900	158,607	293,900
Adjusted R^2	0.227	0.327	0.228	0.328	0.231	0.328

Notes: ***,** and * indicate significance at the 1, 5 and 10 percent level.

(1) use $\hat{Y}_{eact}$ generated from uniform random distribution by group. (2) use poor subsamples and $\hat{Y}_{eact}$ generated from uniform random distribution. (3) use the mean for regular employment worker's income of as $\hat{Y}_{eact}$.(4) use poor subsamples and the mean for regular employment worker's income (5) use the mean income of a working female in the same marriage market as $\hat{Y}_{eact}$.

very important to the males' marriage situation, and the tendency of estimated parameters should be similar to the main result. However, there is no difference between β_1 and β_2, which is inconsistent with the theoretical implication. This result implies that female income is not suitable as a reference point. From these results, we conclude that Japanese males, especially low-income males, are concerned about other males' income distribution, and so hesitate to get married.

9 Conclusion

In this research, we conduct an empirical analysis of relative income and marriage using Japanese data. The results show that in Japan, as in Watson and McLanahan (2011), among others, an increase in the relative income level has a positive effect on males' marital status. For males in the lower income group (and in a group of people with the same social characteristics as his own), an increase in income greatly increases the probability of getting married. However, this effect drops significantly after a threshold value. The above result is consistent with the implications from Akerlof and Kranton's (2000) theoretical model on behavior selection. Furthermore, in Japan, the kink point at which the effect of relative income changes sharply is around the mean income of regular employment within each reference group.

From the above results, we conclude that Japanese males refer to other people's income when making a marriage decision. This behavior is particularly evident in the low-income group. For Japanese males, the income levels of the regular employed within the same social status are the reference points for marriage decisions. This conclusion is consistent with those of preceding studies on people's behavior.

In addition, the reference income level people consider to be necessary for marriage differs for each reference group. This leads to the hypothesis that people who have high social status and high income tend to be more reluctant to get married because there are more rich people around them. These results explain today's Japanese late marriage trend very well.

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