On Changing Factors of Marriage Transformation in Japan: A Decomposition of Delay in Women's First Marriage Process[1]

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Abstract

This paper presents an attempt to clarify the factors and mechanisms affecting the delay in union formation (marriage) observed amongst Japanese women in recent decades. Using cohort data from nationally representative surveys, the rise in age at first marriage is decomposed into contributions by several socially recognizable factors. First, timing trends in the marriage process components, age at first encounter with spouse, and duration of premarital association are separately examined to identify behavioral changes in relation to theories of marriage timing determination. Following this, the rise in age at first marriage caused by changes in the components is disaggregated into contributions from compositional changes in the type of encounter, changes in socioeconomic characteristics, and shifts in individual values regarding marriage and family. The results indicate that there is significant dynamism of the process components and compositional changes of the factors underlying the monotonic rise in age at first marriage which even vary according to transformation phases of marriage behavior.

Introduction

Marriage behavior in Japan has undergone rapid transformation since the mid-1970s. Demographic measures indicate a continuing delay of marriage and an associated decline of the married population in reproductive ages. A consequence of this delay is the massive fertility decline in Japan, which has brought fertility far below replacement level. The causal connection between the change in marriage behavior and the decline in fertility rates is much more direct in Japan than other developed countries, since union formation is almost exclusively linked to legal marriage and births out of wedlock are still uncommon in this society. Postponement of first marriage has been the most distinct feature of the behavioral transformation until now, although a future rise in the proportion of Japanese women who never marry has been predicted (Kaneko 2003, NIPSSR 2002).

Several previous studies have identified determinants of the timing of marriage in Japan (Kaneko 1991, Kojima 1994, Raymo 2002). The nature of the first meeting of the couple (e.g. most notably non-arranged and arranged meetings) and educational attainment of the individuals are repeatedly identified as the most influential determinants of marriage timing, and sizeable compositional changes in the distribution of these determinants have been witnessed in the past decades. Therefore it seems highly likely that the compositional changes in such factors have been responsible for the rise in age at first marriage among Japanese women. However, quantitative evaluation of the contribution of compositional change of these factors to the overall marriage delay has been inadequately explored.

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[1] This is a revised version of a preliminary report of the study as of 11/2/2003 for submission to the annual meeting of the Population Association of America. Further revised version is forthcoming.

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In this paper, I describe efforts to measure those contributions as part of a search for causes and mechanisms of the transformation of marriage behavior. By extension this yields explanations for the consequent decline in fertility. In order to clarify the factors and mechanisms of the marriage delay, I decomposed the increase in the mean age at first marriage into a sum of the mean age at first encounter with the future spouse and the mean duration of premarital association. Each term of the sum is then analyzed to infer contributions from compositional changes in the type of encounter, socioeconomic individual characteristics such as educational attainment, and values toward marriage and family. In other words, simultaneous decomposition of the cohort changes is carried out via multiple regression not only for the mean age at first marriage but also the components of marriage process, i.e. the mean age at first meeting with prospective spouse and the mean duration of premarital association. The marriage delay is quantitatively attributed to each of the process components.

Examination of the changes in age at first meeting and duration of premarital association revealed that the former is largely unchanged and thus that prolongation of the association period is solely responsible for the marriage delay of cohorts born prior to the early 1960s. Since age at first meeting reflects timing of entry into the marriageable state or of participation in the marriage market and corresponds to end point of spouse search as well, it is an important indicator of those behaviors. Our result suggest that the marriage delay in Japan is not attributable to extension of the search period, contradicting the theory that the marriage delay is caused by a longer search period resulting from a rise in the quality demanded for a suitable marriage partner as a result of the greater economic and social independence of women (Oppenheimer 1988). In the marriage transformation in Japan, there are at least some periods in which the delay is entirely the result of individual choices to put off marriage after getting acquainted with future spouse.

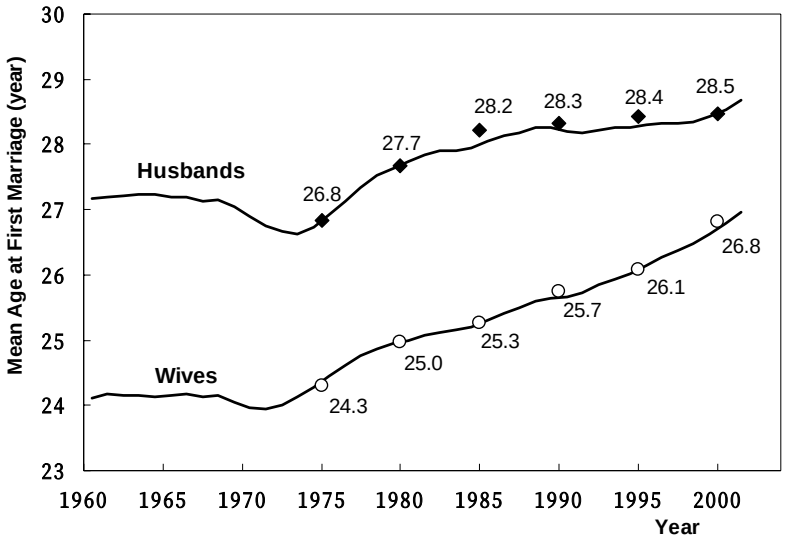
Among the early cohorts studied, decomposition of the increase of the mean age at first marriage into the contributions of compositional changes in the covariates revealed significant influences of those observable variables, notably type of first meeting, educational attainment, and values toward marriage and family. However, there are discrepancies in the forces and mechanism of marriage delay between those early cohorts and those born after early-1960's. Kaneko (2003) found through observation and estimation with vital statistics that some phases are sorted among cohort transformation of first marriage behavior of Japanese women who are relevant to the current low nuptiality and fertility settings. The present study indicates that there are some correspondences between the discontinuities in the mechanism of marriage delay and the phases found from aggregated measures in the previous study.

Background: Trends of the mean age at first marriage in Japan

Figure 1 shows the trends of the mean age at first marriage, which indicates steep rises since early 1970s for females and mid-1970s for males. This delay in the marriage timing is predominantly responsible for the massive fertility decline in Japan (to a level far below replacement level) through a reduction in the married population of child-bearing ages, since cohabitations and births out of wedlock have been uncommon in Japan. A recent statistic indicates that the proportions of men and women currently cohabiting in the age range 25-29 are estimated as 2.3% and 1.9% of the respective population (NIPSSR 2003a). Illegitimate birth is 1.74% of all births (the Vital Statistics) in Japan. The proportion of divorced and widowed individuals in the age range 25 to 34 amounted to 1.5% for male and to 3.4% for female in the year 2000. Though all these figures have been slowly but steadily increasing, the

proportion of never married individuals among the reproductive population has been mainly dictated by the timing of the legal first marriages. The proportion of never married women aged 25 to 29 has doubled from 20.9% in 1975 to 54.0 % in 2000.

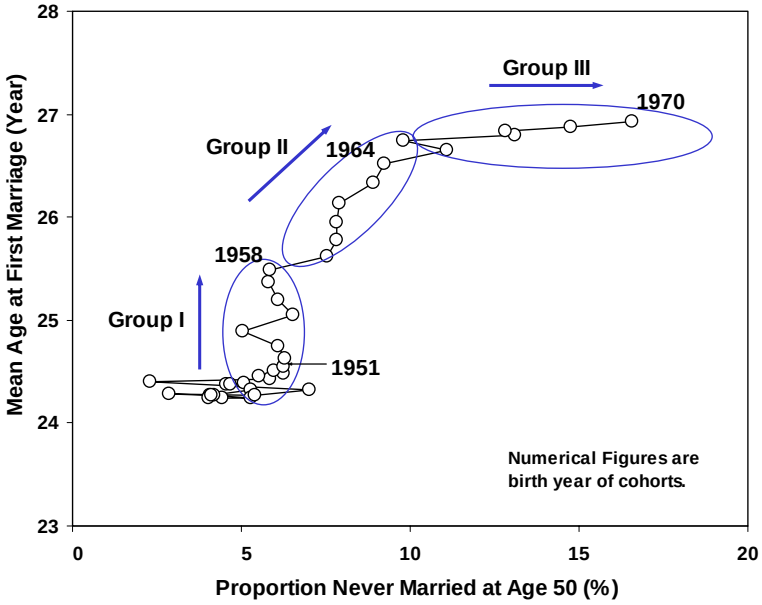
Figure 1. Trends of Mean age at First Marriage in Japan: 1960-2002



Note: Solid line – The mean age at first marriage from the Vital Statistics (for first marriage couples), Marks – The mean age at first marriage from the Seventh through Twelfth NFS. Numerical Figures are for NFS.

Although the proportion of never married individuals in reproductive ages has risen dramatically, it is not clear if it has resulted from a postponement of marriage or from a growing population which never marries over their lifetime. Kaneko (2003) estimated lifetime measures of first marriage for contemporary cohorts which have not completed the marriage process by applying a modified Coale-McNeil nuptiality schedule model. Three distinct phases were found in relation to the timing and prevalence of first marriage. In Figure 2, the changing trajectory of the marriage process as a relationship between the mean age at first marriage and the estimated proportion never married is indicated.

Figure 2. Relationship between Estimated Proportion Never Married and Mean age at First Marriage of Japanese Female Cohorts



Note: Three phases are distinguished in female cohort changes in marriage behavior in the course of the marriage transformation in Japan (Kaneko 2003).

The transformation began with a delay in marriage by the cohort born in 1952, followed by a diffusion of never-marrying in cohorts born after 1959 along with prolonged delaying. Then there emerges a new phase in which the timing shift is gradually ending in the cohorts born after 1965, while the diffusion of never-marrying is accelerated. Close examination of hazard rates revealed that the diffusion of never-marrying in the second phase is related to the delaying behavior since marriage propensity in later ages seems to have an upper boundary, and some of postponed marriages have been foregone. In contrast to the first two phases, the diffusion of never-marrying in the third phase is caused by a decline in the propensity to marry even in higher ages as well as early ages (Kaneko 2003).

In this study, the timing changes in first marriages of the cohorts born in 1944 through 1964(the Groups I and II from the previous study with some earlier cohorts) are examined in relation to compositional changes of marriage process, as well as socio-economic and attitudinal shifts in individual characteristics. Correspondence between these results and the phases identified in the previous study is of special interest.

Data: National Fertility Surveys

The dataset that I used in this analysis is built from four surveys in the National Fertility Survey (NFS) series, which have been conducted by National Institute of Social Security and Population Research every five years (NIPSSR 2003a, Takahashi et al. 2003a). Data for wife cohorts of first marriage couples born during 1938 through 1959 are employed from The Ninth (1987), Tenth (1992), Eleventh (1997) and Twelfth (2002) Survey (Detailed descriptions of the survey and the data are

presented in Appendix). To ensure precise comparisons between cohorts, the samples are limited to wives who got married prior to the age of 37.42 years, which is the age of the youngest cohort at the time of the latest survey in the dataset.

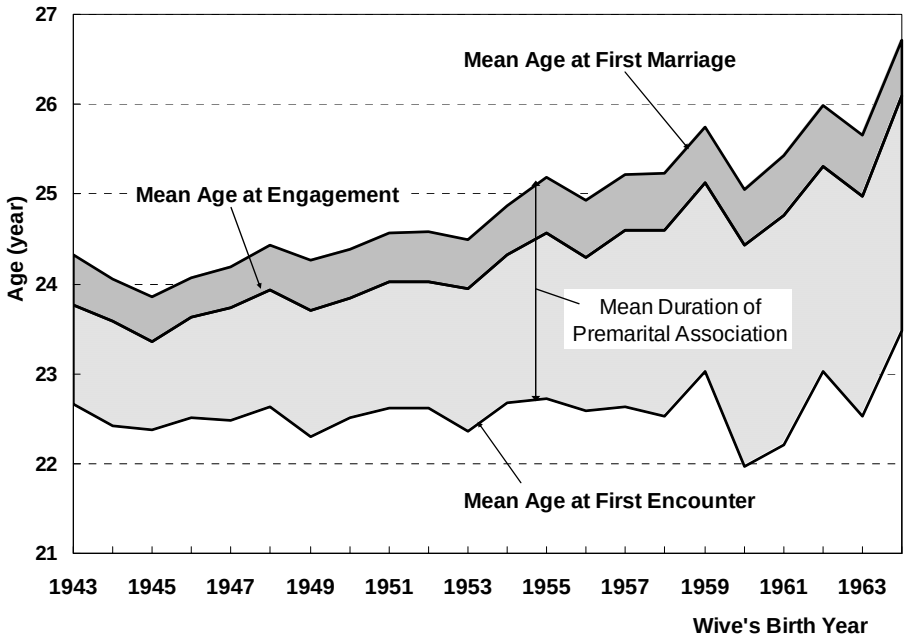
One drawback in using multiple surveys is a limitation of covariates that can be used for decomposition, since only common variables over the surveys (which are not many) can be utilized in the analysis. To cope with this limitation, we conducted several separate analyses for a part of the survey series depending on availability of variables. However, in this report only results from the latest three surveys with minimum common variables are presented. These results are most relevant to the current situation. In addition, the observations on all results indicate that covariates other than a few significant ones (used in the presented results) such as type of meeting, educational attainment, and values do not have a significant impact on the general conclusion.

Descriptive Results

Observation of Average First Marriage Process

Here we briefly describe the changes in the first marriage process of Japanese women. Figure 3 indicates cohort changes in the average first marriage process of Japanese women by single year of birth cohort. The mean age increased throughout the cohorts born after World War II. Nevertheless the mean age at first meeting does not show any distinct rising pattern except fluctuations seen in the youngest cohorts. However, the mean duration of premarital relationship increased in cohorts born after the War, accounting for much of the rise in mean age of first marriage.

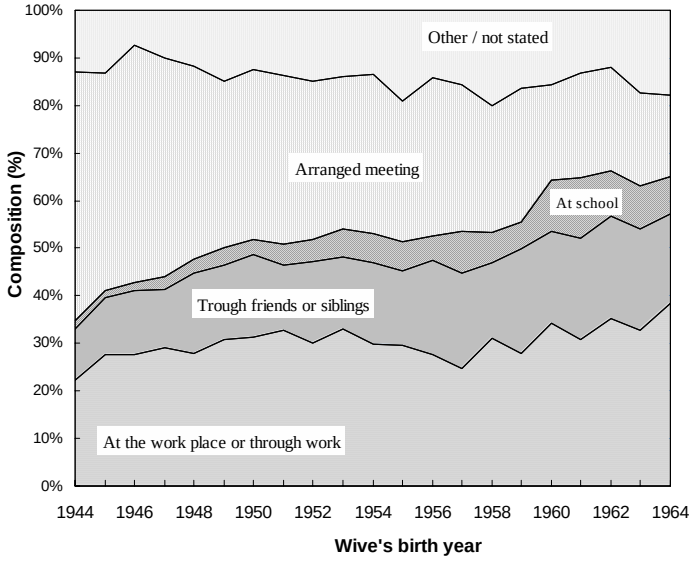
Figure 3. Cohort Change in Average First Marriage Process



Observation of Compositional Changes of Covariates

The changes in the marriage process are accompanied by other socio-economic changes. Compositional changes of the two typical and relevant covariates are described here. Figure 4 shows cohort changes in composition of the manner that couples meet for the first time (type of first meeting). The most obvious trend throughout the cohorts is the decrease in the arranged meeting[2]. Instead, other forms of meeting, especially "through friends or siblings" and "at school" increased in the younger cohorts.

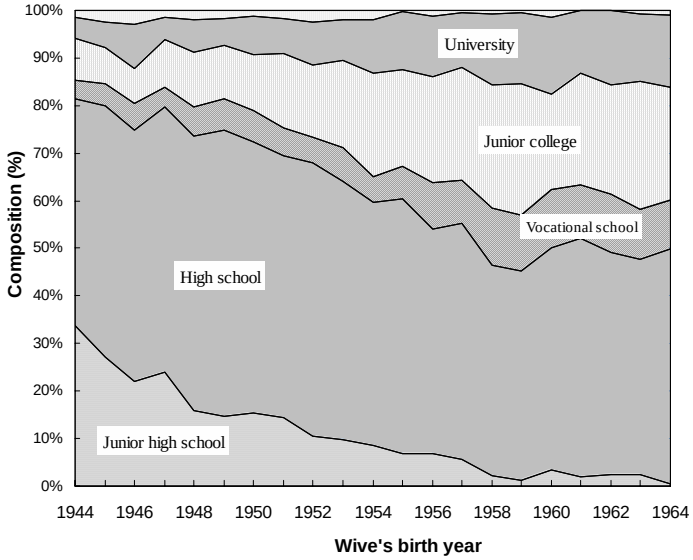
Figure 4. Compositional Changes in Type of Meeting by Birth Cohort of Wives



The compositional changes in the educational attainment of Japanese women are visualized in Figure 5. A decrease in the share of "Junior high school" among the younger cohorts is apparent, while "Junior college" and "University" increase instead. One would expect that these compositional shifts toward increased higher education in female cohorts should have significant impact on the timing of marriage and childbearing due tolonger enrollment in school and enhanced socioeconomic independence. As is quantitatively clarified later, the substantial educational changes for cohorts born until late-1950s have indeed had sizable impacts on marriage timing. However, the compositional shifts toward higher education have ceased among cohorts born since late 1950s, while the marriage delay continued all the way through. Thus we must find other forces to explain the postponement of marriage in these cohorts.

[2] Arranged marriages in contemporary Japan are no longer like the ones that were arranged and governed by parents in the premodern society of Japan, although some formalities in first meeting set by matchmaker remains. Arranged meetings provide only opportunities for prospective spouses to meet each other, and further decisions regarding dating and marriage are up to the couple.

Figure 5. Compositional Changes in Educational Attainment by Birth Cohort of Wives

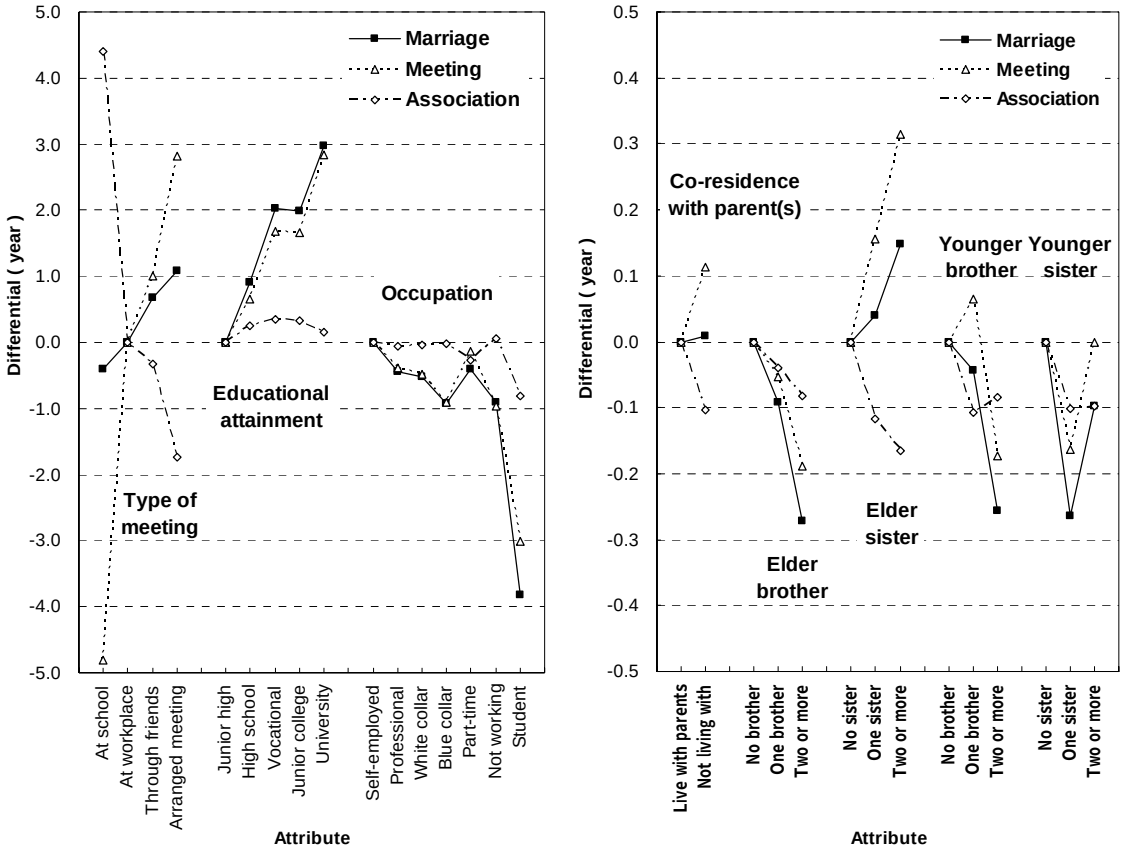


Observation of Differentials in Timing of Marriage Process by Individual Attribute

The compositional changes of covariates affect the marriage timing through differentials of those attributes. The larger the differential is, the greater the impact, if the same compositional change takes place. Figure 6 indicates the differentials of marriage timing by the factors under consideration in this study. Differentials of age at first meeting and duration of premarital association are indicated as well. These are the coefficients of the multiple regression for all cohorts of 1943-64 taking account of all covariates at the same time, including attitudes toward marriage and family whose results are not presented here (see Figure A-3 in Appendix). In the decomposition analysis carried out later, the differentials in each cohort of single year are evaluated separately as described in the following section.

Figure 6. Categorical Differential of Marriage Process Timing: For Female Cohort Born in 1943-64

(1) Major scale factors (2) Minor scale factors



Note: These are the regression coefficients of the multiple regression taking account of all covariates at the same time, including attitudes toward marriage and family whose results are not presented here (see Figure A-3 in Appendix). The scale of the vertical axis for the major scale factors is ten times larger than that for the minor scale factors.

Among those factors examined, the type of meeting has the most effect on the timing variation of marriage process. Married couples who met at school for the first time spend a much longer period dating prior to marriage than couples who met in other ways. Another exceptional category, though acting in the opposite direction, is the arranged marriage. Here the meeting is very late while the duration of premarital association is very short. Since the compositional changes in the types of meeting (mostly reduction of the arranged marriage) have been occurring as described in the previous section, one expects substantial impact on marriage timing. Among other covariates, relatively large differentials are observed in the level of educational attainment, which one would also expect to contribute to the delay in first marriage. The scale of differentials associated to the occupation before marriage is intermediate.

Method: Decomposition of Increase in Cohort Mean at First Marriage

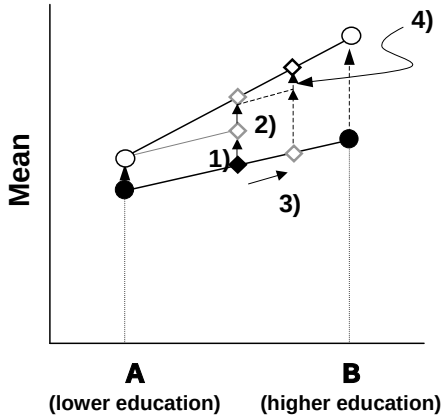
In this section the method used to decompose the change in the mean age at first marriage into

contributions from compositional change in covariates is described. Consider educational attainment as an example of a covariate. Marriage delay may be associated with changes in the educational situation in the population in the following different ways: 1) the delay occurs simultaneously in every education category, 2) the delay is induced by changes in certain educational categories only, and 3) no change takes place in marriage timing in any educational category but the share of those with higher levels of education, who tend to marry late, increases. These possibilities are depicted in Figure 7.

In the figure, the filled circles stand for the mean age by educational category (divided into only two groups of lower (A) and higher (B) in this example) at the beginning of the period under concern. In case (1) the means increased uniformly over categories to the points depicted by the empty circles resulting in an increase of the population mean (diamond shapes) by the same amount. In case (2), the mean increased only in the higher educational group B, resulting in an increase of the population mean by an increase in B times the proportion of B in the population. In case (3), no change of the mean age is observed for any educational group, but the composition of the groups changes resulting in an increase of the population mean by the difference of the means between A and B times the gain in share of B. In case (1), the increase in the population mean is considered to be caused by some external factor that does not depend on the level of educational attainment. In case (2), the increase of the population mean is also caused by an additional external factor that interacts with educational categories. Only in case (3) can one safely conclude that the increase of the population means is caused by changes in educational condition. Only in this case, the cause of the change in the mean is fully explained without considering any external factors.

In reality, these three types of change take place at the same time. But the total change can still be decomposed into three paths with an additional factor, i.e. a so-called interaction term ((4) in Figure 7). In this study, I decomposed changes in the mean age at first marriage across Japanese female cohorts to identify “causes” of the total change in terms of case (3) (described above).

Figure 7. Decomposition of Change in Population Mean in Relation to Education



In order to incorporate multiple factors as candidates for the causes, I employed the multiple regression technique for the decomposition. An outline of statistical procedure is as follows[3].

[3] Some decomposition methods for change in rates between two time points are widely used in demographic field (Kitagawa, 1955, Das Gupta, 1978). The similar method can be applied for change in

Y_i : Age at first marriage of individual *i*

T : Dummy index of cohort (= 0, 1)

$X_{i,j}$: Dummy variable for category *j* of individual *i* (=1 if *i* is in the category *j*, =0 otherwise)

p_j : Component ratio of population in category *j*

Categories of multiple factors are denoted by single series of variable $X_{i,j}$. Let's consider the following regression model for determination of age at first marriage of individual *i* in a cohort.

$$Y_i = \alpha + \sum_j \beta_j X_{i,j} + \varepsilon_i$$

where α and β are two regression coefficients (we omit the hat for simplicity), ε_i is error whose mean is zero, and Σ stands for summation over categories (*j*) of entire factors[4]. Applying this equation for two successive cohorts (*T*=0,1), the mean age at first marriage of each cohort is:

$$\bar{Y}^{\mathrm{T=t}} = \alpha^{\mathrm{T=t}} + \sum_j \beta_j^{\mathrm{T=t}} \bar{X}_j^{\mathrm{T=t}} + \bar{\varepsilon}^{\mathrm{T=t}} = \alpha^{\mathrm{T=t}} + \sum_j \beta_j^{\mathrm{T=t}} p_j^{\mathrm{T=t}}, \quad t = 0, 1$$

where the bars over variables indicate that the quantities are the averages over two cohorts, and superscripts T=t indicate that the variables belong to cohort t. Let Δ denote difference of values between successive cohorts (e.g. $\Delta\bar{Y} = \bar{Y}^{T=1} - \bar{Y}^{T=0}$). Then,

$$\begin{aligned}\Delta\bar{Y} &= \Delta\alpha + \sum_j \Delta\beta_j p_j^{\mathrm{T=0}} + \sum_j \beta_j^{\mathrm{T=0}} \Delta p_j + \sum_j \Delta\beta_j \Delta p_j \\ &= \Delta\alpha + \sum_j \Delta\beta_j p_j^* + \sum_j \beta_j^* \Delta p_j\end{aligned}$$

where $\beta_j^* = \left(\beta_j^{\mathrm{T=0}} + \beta_j^{\mathrm{T=1}}\right)/2, \quad p_j^* = \left(p_j^{\mathrm{T=0}} + p_j^{\mathrm{T=1}}\right)/2$.

This calculation shows that the cohort difference of the mean, $\Delta\bar{Y}$, can be decomposed into three components corresponding to the three terms of the last equation. Each component corresponds to one of the three kinds of changes 1), 2), and 3) discussed above; 1) $\Delta\alpha$, 2) $\sum_j \Delta\beta_j p^*$, and 3) $\sum_j \beta_j^* \Delta p$. The interaction effect (4) is absorbed evenly into the terms describing 2) and 3). The difference of the mean age at first marriage between successive cohorts is decomposed in relation to the compositional changes Δp of various factors such as educational background according to this formula.

In this study, the decompositions are applied to successive cohorts by single year, and the decomposed effects over distant cohorts are obtained by summing the results in a single year. This is valid due to the additive structure of the model. The focus is on the effect of 3), and so 1) and 2) are not

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mean and higher moments as well (Clogg and Eliason, 1986).

[4] The coefficients of the reference categories are set as zeros.

examined separately. They are treated as aggregate residuals, since the separation of effects of 1) and 2) cannot be efficiently separated by this method.

The decomposition procedure can be applied to cohort changes of the mean age at first meeting ($\Delta\bar{M}$) and the mean duration of premarital relationships ($\Delta\bar{D}$) as well as the mean age at first marriage ($\Delta\bar{Y}$). The relationships of these variables are represented by:

$$\Delta\bar{Y} = \Delta\bar{M} + \Delta\bar{D}$$

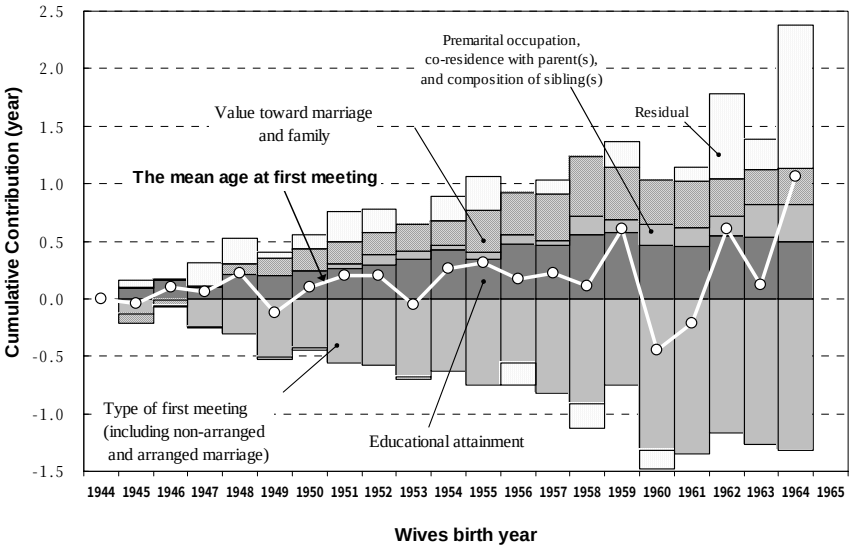
The changes in the mean age at first marriage are decomposed into changes of these components of the marriage process as well as into effects of multiple factors.

Results

Through the multiple decomposition technique described above, contributions of the compositional changes in several determinants of marriage timing are measured. The determinants used are type of meeting, educational attainment, premarital occupation, premarital co-residence with parent(s), presence of brothers and/or sisters, and personal values about marriage and family. The cumulative contributions of compositional changes of these covariates to the marriage delay of cohorts born since 1944 are visualized separately in Figure 8 and 9 according to the working channel, i.e. the mean age at first meeting and the mean duration of premarital association. As is seen in the figures, the contribution of the covariates are both positive and negative.

In Figure 8, the cumulative changes of the mean age at first meeting (line graph) does not show clear increase except some fluctuations. But behind the constancy of the mean age, there are significant compositional changes in the background factors. The observed constancy of the mean stems from a cancellation of the effects of these changes (as they contribute to opposing changes in the mean). For example, the effect of compositional changes in the type of first meeting (mostly reduction in arranged marriage) is negative and the largest in absolute value, while compositional changes in other factors such as educational attainment have contributed to an increase in the mean age at first meeting. The results indicate that the mean age at first meeting would have substantially increased cohort by cohort from 1944 through 1964 if it were not for the effect of the arranged marriage reduction. This is an important observation because the age at first meeting with the future spouse represents a time point at which the spouse-search process is ended, and therefore is a touchstone to test the spouse-search theory in relation to delay in age at first marriage. We discuss this issue further in a subsequent section. The results also indicate that trends toward higher educational attainment, value changes, and some economic and familial factors have substantially contributed to a prolongation of the search process of Japanese female cohorts. Effects of the residuals is interpreted as an amount of delay in the mean age at meeting if it is not accounted for by the effects of the covariates considered here The residual should be explained by other unknown factors (including the sampling errors).

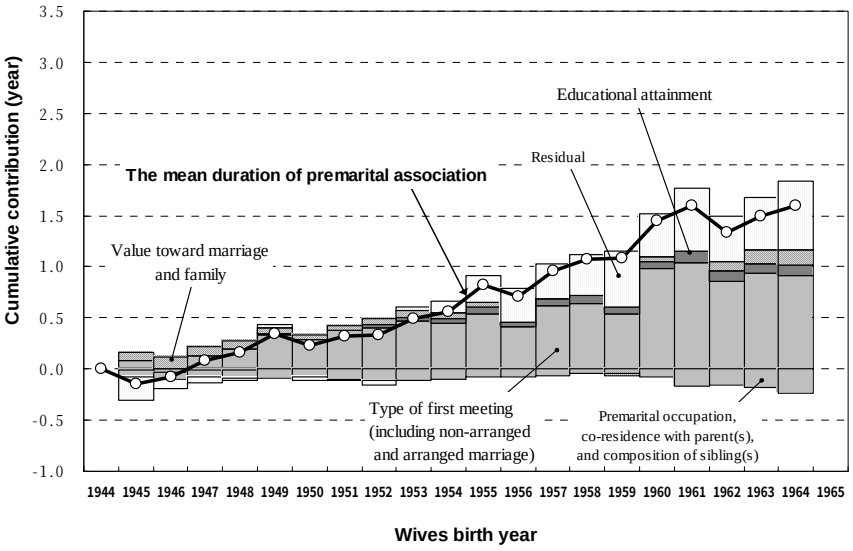
Figure 8 Cohort Changes in Mean age at First Encounter of Female and Contribution of Effects of Compositional Changes



Note: The cumulative changes in the mean age at first meeting and the cumulative contribution of compositional changes of covariates since cohort born in 1944 are shown.

Figure 9 indicates the cohort changes in the mean duration of premarital association and the contributions of the various factors to that change with the same scale as Figure 8. The mean duration has basically increased consistently over cohorts born since 1944, and most changes of the covariates have positively contributed to the increase of the duration with the exception of insignificant effects from the three covariates (premarital occupation, co-residence with parent(s), and composition of sibling(s)). Contributions from the compositional changes in the type of meeting again have the largest effects on the change in the mean duration, although it is positive in this case. The effects of the other covariates are relatively small, though a constant contribution of educational change is observed. The increasing duration of premarital relationships possibly indicates growing unwillingness to marry. Since marriage is signifies the onset of the irreversible long term commitments, it is likely to be postponed even in the presence of a prospective partner when the merit of getting married is uncertain or a strong disincentive against being single is missing.

Figure 9 Cohort Changes in Mean Duration of Premarital Association and Contribution of Effects of Compositional Changes



Note: The cumulative changes in the mean duration of premarital association and the cumulative contribution of compositional changes of covariates since the cohort born in 1944 are shown.

Again the effect of the residual is interpreted as an extension in the mean duration of premarital association if it was not accounted for by the effects of the covariates considered here. It seems that the unexplained extension of the association period constantly increased after the cohort born in mid-1950s.

Numerical results of the decomposition for three cohort groups are presented in Table 1 (the detailed results for the effects through the mean age at meeting and the mean duration of premarital association are given in Table A-2 in Appendix). The groupings of cohorts used in Table 1 correspond to those proposed by Kaneko (2003) as distinct phases of marriage change in the study of cohort development of aggregated measures from the vital statistics (see Figure 2). Cohorts born in 1944-51, 1952-58, 1959-64 are classified respectively as Group B, Group I, and Group II[5].

[5] Here the target ranges of cohorts under study are overlapped at the end of the groups so that the changes in marriage timing over the cohort groups should be measured.

Table 1. Contributions of Compositional Changes of the Covariates to Increase in the Mean Age at First Marriage within Three Cohort Groups

		Cohorts of wives by birth year			
		1944-64	1944-51 Group B	1951-58 Group I	1958-64 Group II
Increase of the mean age at first marriage (average change per year)		2.66 years (0.13 years)	0.52 years (0.07 years)	0.66 years (0.09 years)	1.48 years (0.25 years)
		100.0 %	100.0 %	100.0 %	100.0 %
	Increase of the mean age at first meeting	40.1 %	39.3 %	-15.0 %	64.9 %
	Increase of the mean duration of premarital association	59.9	60.7	115.0	35.1
Compositional change of	Type of meeting	-15.0 %	-34.6 %	-14.2 %	- 8.4 %
	Educational attainment	22.3	50.0	56.5	- 2.8
	Premarital occupation	- 0.8	-20.0	13.5	- 0.4
	Premarital co-residence with parent(s)	2.0	3.1	1.9	1.6
	Composition of sibling(s)	1.8	5.4	11.3	- 3.6
	Value toward marriage and family	17.5	45.6	42.1	- 3.3
	Residual	72.2 %	50.5 %	-11.1 %	117.0 %

Note: The cumulative contributions of compositional changes of the covariates over cohorts in the distinct groups are indicated.

For Group B, increase in age at first marriage is relatively small. The contributions of increase in the mean age at meeting and the mean duration of premarital association to the increase in the age at first marriage are 39.3% and 60.7% respectively. Compositional changes in type of meeting and premarital occupation acted against the increase of the mean age, while changes in educational attainment and values toward marriage and family contributed positively, canceling the negative effects of the formers.

For Group II, the increase in the mean age at first marriage started to accelerate even though the mean age at meeting slightly decreased. Consequently the prolongation of premarital period of association is solely responsible for the delay in first marriage timing in this period. The contributions of compositional changes of covariates are much the same as the previous cohort group except the sign of effect of the premarital occupation. In particular, the effect of educational change contributes about half of the delay in the mean age at first marriage over the two groups of cohorts. These results imply that the compositional changes of socioeconomic and value factors were certainly driving forces of the delay in first marriage, and that this mechanism had been fairy stable until cohorts born in 1958.

In Group II, the rise in the mean age at first marriage accelerated further, and the contribution of the increase in the mean age at meeting went up to 64.9%. The contribution of the compositional changes of the covariates evenly decreased in absolute values. The effect of compositional change in type of meeting remained negative, but the absolute value was considerably reduced. The compositional change in levels of educational attainment and of personal values respectively contributed about half of the delay in first marriage in the previous cohorts (Group B and Group I). But to the contrary they had almost no effect on delay in first marriage of this group of cohorts (Group II). The effects of the other variables are also negligible. These reductions in the contributions are mainly caused by stagnation in compositional changes of variables (see section of Observation of Compositional Changes of Covariates, in Descriptive Results). This result implies that the driving force of delay in first marriage of Japanese women changed from the compositional shifts in the variables examined here to some other factors,

which may not be based on differentials in marriage timing by individual attributes.

Discussion and Conclusion

Major demographic developments, most notably the widespread decline in fertility to levels below replacement level, that have been universally witnessed in the developed world during the last quarter of the Twentieth century have been driven by changing partnership patterns (UN 2002). The changes in partnership include postponement of marriage, increasing avoidance of marriage (celibacy), increasing disruption of marriage (divorce), and increasing prevalence of alternative forms of marriage (cohabitation). Although Japan is among the lowest fertility countries, the demographic changes in partnership have been mainly limited to the postponement of marriage to date.[6] Therefore, it provides a unique opportunity to examine the changing patterns of union formation via a solid measure such as the mean age at first marriage without dispersing attention to many dimensions[7].

In this paper, I focused on the age at first marriage of Japanese women and attempted to decompose the cohort delay of the timing into contributions from changes in the process components (age at first meeting with present spouse and duration of premarital association) and compositional changes of some surrounding covariates (type of meeting, socioeconomic attributes such as educational attainment, values toward marriage and family).

The results of analysis on the marriage process of female cohorts born during 1944-64 indicate that the mean age at first meeting has been fairly stable and most of cohort delays are attributed to prolongation of premarital association (at least for these cohorts born prior to the early 1960s). This provides important information on the mechanism of the marriage delay in Japanese women, since age at first meeting can be regarded as the end point of spouse search. Oppenheimer (1988) argued that the greater economic and social independence of women and reducing importance of marriage for their financial stability led to a rise in the quality demanded in a suitable marriage partner and therefore led to a longer search period. Stability in age at meeting observed in the Japanese female cohorts implies that the mechanism does not apply for these cohorts[8]. Instead the delay in marriage was attributable to a prevailing unwillingness to marry in the presence of a partner, as is indicated by the prolonging duration of premarital association[9]. In the marriage transformation in Japan, there are at least initial phases in which some forces work to put off marriage after getting acquainted with future spouse. These results correspond to the diminishing merits of marriage as conceived of by unmarried Japanese youth due to the externalization of the practical functions of marriage (NIPSSR 2003b, Takahashi et al. 2003b).

The results of the decomposition of marriage delay into contributions of compositional changes of the covariates indicate that some variables such as the type of meeting, educational attainment, and values may play crucial roles in marriage delay, and the paths of those influences through either age at

[6] It seems that all aspects of the partnership changes are about to commence in Japan. The proportion of never married men at age 50 jumped up to 12.6% from 5.6% in 1990, although the proportion for women remains low at 5.8% in 2000. For other signs of the change, see footnote 2.

[7] The other important aspect of the change besides the timing of union formation is the prevalence of permanent celibacy. However, there is no observable measure for cohorts relevant to the current changes.

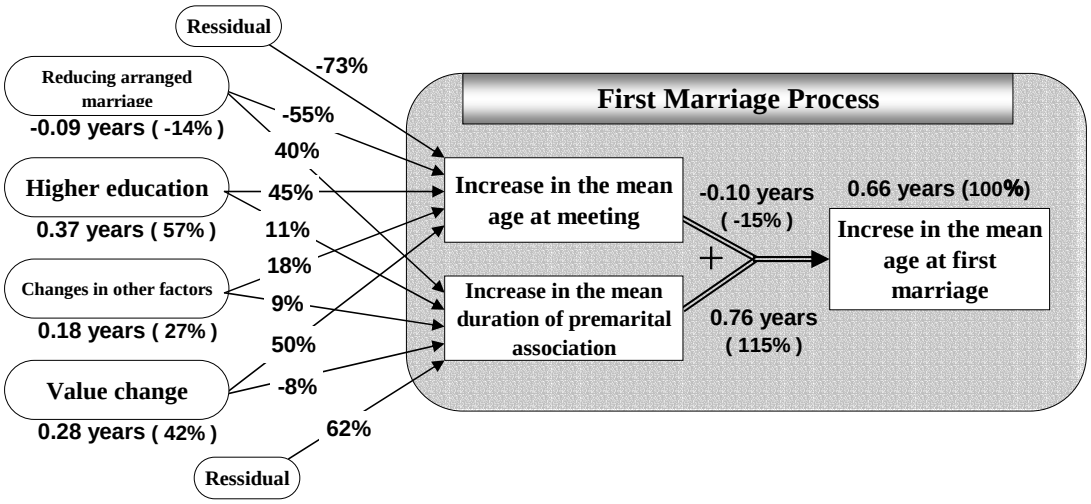
[8] A mild rise in the age at meeting, although not very clear, is seen in the recent female cohorts born after mid-1960s, while no sign of rise has been seen in male.

[9] It is possible that the mechanism of marriage delay by seeking the most wanted partner suggested by Oppenheimer should work even in the presence of a partner, resulting in the prolongation of premarital association period.

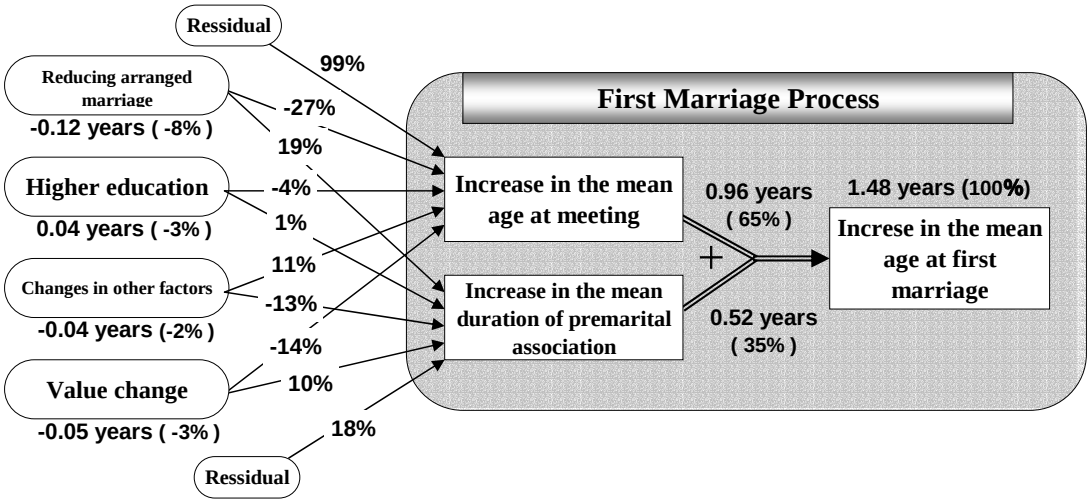
meeting or duration of association differ by variable. Figure 10 shows, as a summary, the results of decomposition analysis with the most influential paths. The first chart for the cohorts born in 1951-58 indicates that active changes of the related factors had been taking place behind the monotonic rise in the mean age at first marriage, although some of effects were canceling each other. Noticeably, the compositional change of the cohorts toward higher education raised the mean age at first marriage by 57% of total rise through raising the mean age at meeting by 45%, and prolonging the mean duration of premarital association by 11%. Value changes also contributed roughly 42% mostly through raising the mean age at meeting. These cohorts are classified by Kaneko (2003) as a group (called Group I) in which the perceptible delay in first marriage started, while the proportion of permanent celibacy does not rise (therefore disturbance from the selection effect for married should be minimal). In this group of cohorts, having later marriage was associated to a transition between socioeconomic groups such as educational levels towards groups correlated with late marriage. According to the results summarized by Figure 10 (1), younger women tend to have later marriages because of receiving higher education and of appreciating a more advanced type of values mostly through delaying age at first meeting, though the effects are cancelled by the rejuvenation effect on marriage timing of the compositional change of the type of meeting (mainly reduction of arranged marriage).

Figure 10. Decomposition Chart of Cohort Changes in the Mean Age at First Marriage by Compositional Factors through Marriage Process Components

(1) Cohorts born in 1951-58 (Group I)



(2) Cohorts born in 1958-64 (Group II)



Note: The years and percentages denote year and percent contribution of each path to increase in the mean age at first marriage.

In Figure 10 (2), the results for the younger cohorts born in 1958-64 are shown. The cohorts are classified by Kaneko (2003) as a group (called Group II) in which the rise in the proportion of permanent celibacy has finally set in, and marriage delay has continued. The contribution of the compositional changes of the covariates evenly decreased. They had little effect on the delay in first marriage in this group of cohorts. These reductions in the contributions are mainly from stagnation in compositional changes of variables (see section on Observation of Compositional Changes of Covariates, in Descriptive Results).It is puzzling to observe the continuing marriage delay among these cohorts without the compositional changes in these factors. The driving forces behind the marriage delay of Japanese women appears to have shifted from the compositional changes of the socioeconomic factors to some other currently unknown determinants. For example, women in younger cohorts postpone first marriage longer than the previous cohorts even if they are at the same level of educational attainment. These effects are present in the previous cohorts, but are much larger and in fact dominant in these cohorts of Group II[10]. These results also suggest that the mechanism of timing determination of union formation may not be constant even among cohorts of the same society. In the case of Japanese women, the marriage delay was initiated by compositional changes in individual characteristics among early cohorts shifting toward categories characterized by late marriage. Cohorts born in 1952-58 (Group I) corresponds to this stage. However, then the delay continued to increase in the following cohorts without compositional changes of relevant covariates to marriage timing. In other words, the unanimous delay took place in these cohorts. Cohort born in 1959-64 (Group II) corresponds to this stage. In this group of cohorts, the other behavioral change, namely a growing proportion of permanent celibacy, is predicted (Kaneko 2003). Are these sequences of transformation in union formation behavior, factors and mechanisms of timing determination unique to the Japanese society or based on rather universal factors?

[10] Since it is suggested that the proportion celibacy would be rising in these cohorts, some selection effects may have influences on this issue.

This study including data on even younger generations of Japanese women sheds some light on this question.

Increasing higher educational enrollment has been identified as one of the main underlying forces leading to the postponement of marriage (Blossfeld 1995). Raymo (2003) found that the later marriage for highly educated women in Japan primarily reflect a longer enrollment in school. Our results for cohorts born 1951-1958 support his findings since the differential in first marriage timing is mostly attributable to the increase in age at first meeting (see Figure 6), and the age at meeting reflects the effect of school enrollment. Furthermore, the change in education of these cohorts has affected the marriage delay through age at meeting by 45% out of 57% of increase in the mean age at first marriage (Figure 10 (1)). Therefore, our results provide further evidence for the claim that the human capital accumulation is the predominant cause of changes in marriage timing at least for the early cohorts of marriage transformation.

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Appendix

Detailed Description of Data

The present study is based on data from four waves of the National Fertility Survey (NFS) conducted by The National Institute of Population and Social Security Research in Japan every five years, using the ninth survey in 1987 through the twelfth in 2002. NFS aims to determine the current situation and backgrounds (which cannot be found from other public statistics) of marriage and/or fertility of married couples and to obtain the data necessary for any related measures and future population projections. This first (prewar) Survey was carried out in 1940, followed by the second one (postwar) in 1952. After that, it has been taken every five years. Since the 8th Survey (in 1982), a survey on unmarried persons has been taken simultaneously with the survey on married couples. The present study employs data from the Survey on married couples. NFS is a nationally representative sampling survey of wives under the age of 50 in Japan, as of June 1.

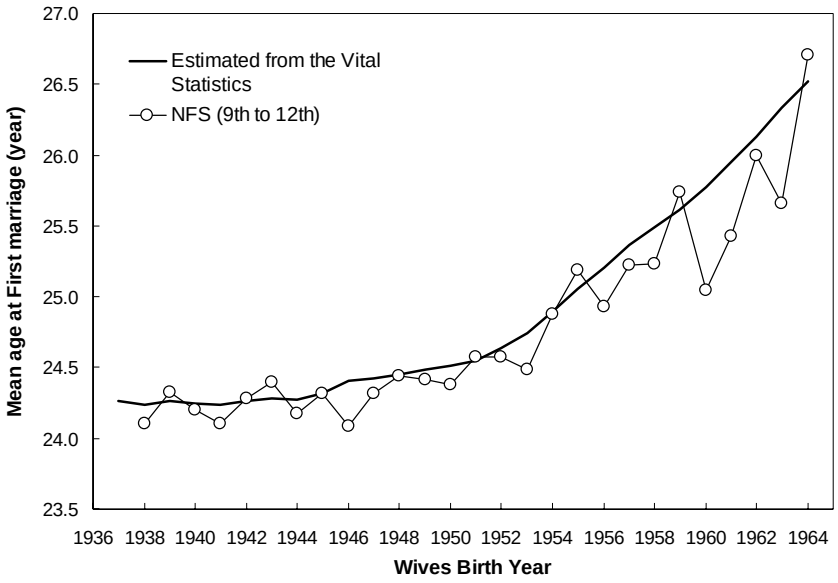
As data from multiple surveys are used, relative cohort sizes of this sample are different from those of population. Table A-1 indicates sample sizes by wives cohort.

Table A-1. Number of Samples by Wives Birth Year

Wives birth year	Total	Round of survey			
		Ninth 1987	Tenth 1992	Eleventh 1997	Twelfth 2002
1938	186	186	-	-	-
1939	208	208	-	-	-
1940	259	259	-	-	-
1941	256	256	-	-	-
1942	262	262	-	-	-
1943	537	273	264	-	-
1944	540	280	260	-	-
1945	441	227	214	-	-
1946	496	250	246	-	-
1947	690	343	347	-	-
1948	1,014	371	386	257	-
1949	1,065	383	359	323	-
1950	632	-	358	274	-
1951	630	-	353	277	-
1952	600	-	317	283	-
1953	831	-	296	281	254
1954	753	-	311	244	198
1955	443	-	-	227	216
1956	490	-	-	242	248
1957	417	-	-	224	193
1958	480	-	-	244	236
1959	435	-	-	214	221
1960	205	-	-	-	205
1961	205	-	-	-	205
1962	210	-	-	-	210
1963	235	-	-	-	235
1964	229	-	-	-	229
Total	12,749	3,298	3,711	3,090	2,650

Treatment of samples with variable with missing values is critical. Kaneko (1995) employed an implementation with the proportional distribution to save other information from samples with missing values, since the sample size was limited in his analysis. As long as missing values are assumedto occur independently of the marriage process, this implementation is appropriate. However, close examination of the present data revealed that the assumption of independence was not necessarily valid with variables with small sample categories. Therefore the category of “unknown” is simply treated as another category in the present analysis. To see the representative adequacy of the sample, the series of the mean age at first marriage of our sample are compared with those from the vital statistics (Figure A-1). Though there aresome fluctuations for cohorts born after 1960 mainly due to the small sample size of the non-overlapping single survey, they follow basically the same trend.

Figure A-1. Comparison of the Mean Age at First Marriage from the Surveys and the Vital Statistics (including Estimates)



Note: Time series of the mean age at first marriage from the surveys is compared with those estimated from the Vital Statistics via the Coale-McNeil nuptiality model with some modification (Kaneko 2003).

The questionnaire and categories of type of first meeting are described in Table A-2. The questionnaires on values toward marriage and family are reproduced in Table A-3.

Table A-2. Type of First Meeting

Q.	In what kind of occasion did you get to know each other? Choose one of the followings. At school At the workplace or through work A Childhood friend/neighbor In clubs, hobbies, or other activities outside school Through friends or siblings Arranged meeting (including through a matrimonial agency) While doutown or traveling Through a part-time jop Other/not known

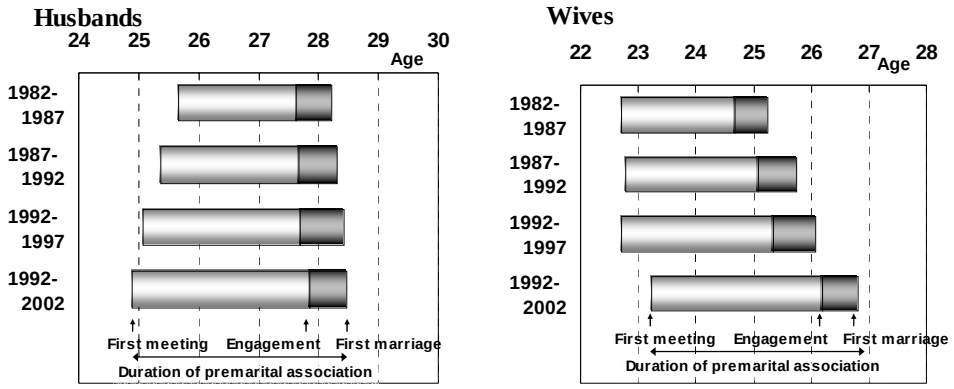
Table A-3. Questionnaires on Values toward Marriage and Family

Q.	What do you think about the following statement? Mark on your choice for each statement. (choices: 1 completely agree, 2 rather agree, 3rather disagree, 4 completely disagree
a	Living ones life all the way in being single is not desirable.
b	Couple living together should get married.
c	It is OK for premarital men and women to have sex when love is involved.
d	Even after get married, we should have own life time goal that may be different from that of spouse or family.
e	It should be taken for granted to make a sacrifice of half of ones personality or way of life for family once get married.
f	After married, husband should work outside and wife keep household.
g	One should have a child, once get married at all.
h	Once you got married, you should not divorce merely because of something like personality differences.

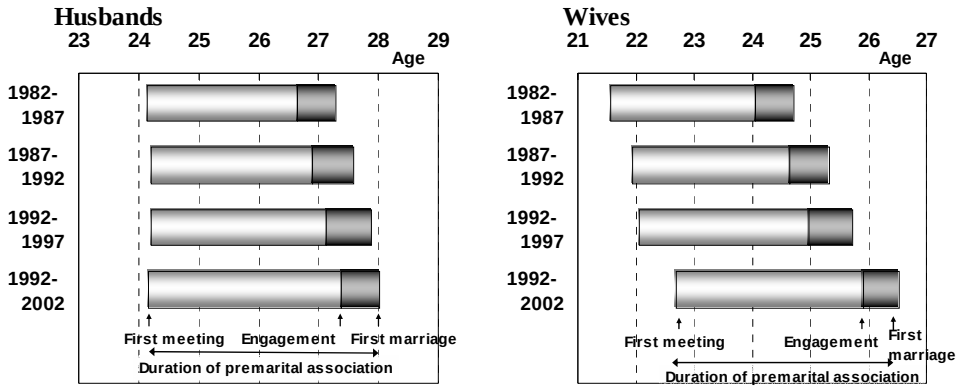
The timing changes in the first marriage process by year of marriage are shown in Figure A-2 separately by type of marriage.

Figure A-2. Timing Changes in the First Marriage Process by Year of Marriage

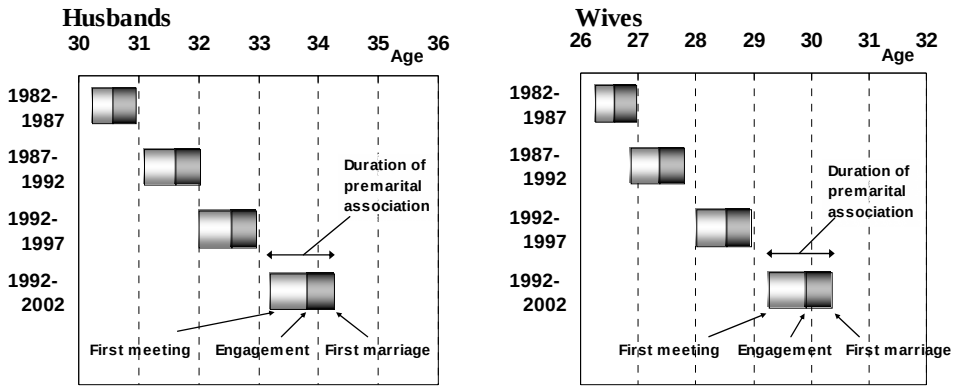
(1) Type of First Meeting: All



(2) Type of First Meeting: Love Match

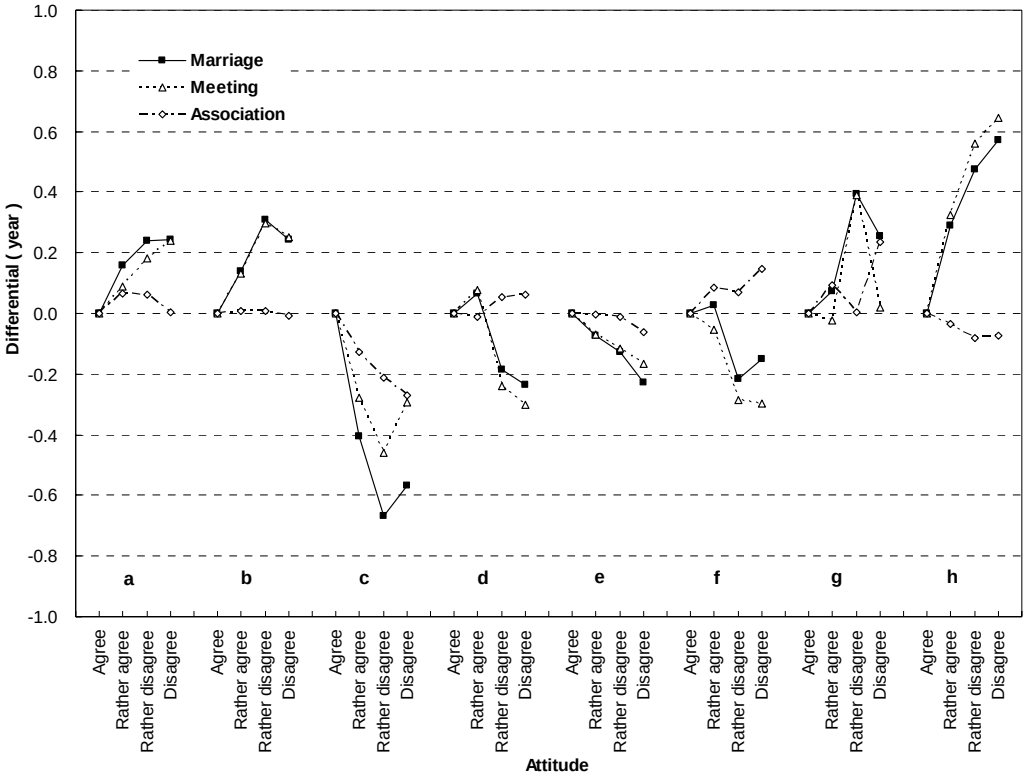


(2) Type of First Meeting: Arranged Marriage



The categorical differentials of timing of the marriage process for each attitude toward marriage and family is presented in Figure A-3. The corresponding questionnaires are described in Table A-3 above. This figure is a supplement for the explanation in the section "Observation of Differentials in Timing of Marriage Process by Individual Attribute," in Descriptive Results in the text.

Figure A-3. Categorical Differential of Marriage Process Timing by Questionnaire of Values: For Female Cohort Born in 1943-64



Note: For the questionnaires of values toward marriage and family, see Table A-3.

Detailed Results of Decomposing of the Mean Age at First Marriage

Detailed results of the decomposition of the mean age at first marriage into the contributions of the compositional changes of covariate are presented in Table A-4 separately by group of cohorts.

Table A-4 Cohort Changes in Mean Age at First Marriage
and Contribution of Effects of Compositional Changes

(1) Cohorts born in 1944-51

Factors	Contributions			Contribution ratio (%)		
	Age at first marriage	Age at first meeting	duration of premarital association	Age at first marriage	Age at first meeting	duration of premarital association
Increase of the mean age at first marriage (average change per year)	**0.52 years** (0.07 years)	**0.21** (0.03)	**0.32** (0.05)	**100 %**	**39.3**	**60.7**
Type of first meeting	**-0.18**	**-0.56**	**0.37**	**-34.6**	**-106.3**	**71.7**
Soci-economic factors: Total	**0.20**	**0.30**	**-0.10**	**38.5**	**57.9**	**-19.4**
Educational attainment	*0.26*	*0.26*	*0.00*	*50.0*	*49.5*	*0.5*
Premarital occupation	*-0.10*	*0.02*	*-0.13*	*-20.0*	*4.0*	*-24.0*
Premarital co-residence with parent(s)	*0.02*	*0.01*	*0.01*	*3.1*	*1.2*	*2.0*
Composition of sibling(s)	*0.03*	*0.02*	*0.01*	*5.4*	*3.3*	*2.1*
Value toward marriage and family: Total	**0.24**	**0.19**	**0.05**	**45.6**	**36.2**	**9.5**
a Living ones life all the way in being single is not desirable.	*0.09*	*0.06*	*0.04*	*17.7*	*10.9*	*6.8*
b Couple living together should get married.	*-0.01*	*0.01*	*-0.03*	*-2.8*	*2.9*	*-5.6*
c It is OK for premarital men and women to have sex when love is involved.	*0.07*	*0.02*	*0.04*	*12.5*	*4.1*	*8.3*
d Even after get married, we should have own life time goal that may be different from that of spouse or family.	*-0.06*	*-0.07*	*0.01*	*-11.4*	*-13.6*	*2.2*
e It should be taken for granted to make a sacrifice of half of ones personality or way of life for family once get married.	*0.00*	*0.05*	*-0.05*	*0.0*	*8.8*	*-8.8*
f After married, husband should work outside and wife keep household.	*-0.06*	*-0.10*	*0.04*	*-11.0*	*-18.8*	*7.8*
g One should have a child, once get married at all.	*0.08*	*0.10*	*-0.03*	*14.5*	*19.7*	*-5.3*
h Once you got married, you should not divorce merely because of something like personality differences.	*0.14*	*0.12*	*0.02*	*26.1*	*22.1*	*4.0*
Residual	**0.26**	**0.27**	**-0.01**	**50.5**	**51.6**	**-1.1**

(2) Cohorts born in 1951-58

Factors	Contributions			Contribution ratio (%)		
	Age at first marriage	Age at first meeting	duration of premarital association	Age at first marriage	Age at first meeting	duration of premarital association
Increase of the mean age at first marriage (average change per year)	**0.66 years** (0.09 years)	**-0.10** (-0.01)	**0.76** (0.11)	**100 %**	**-15.0**	**115.0**
Type of first meeting	**-0.09**	**-0.36**	**0.27**	**-14.2**	**-54.5**	**40.4**
Soci-economic factors: Total	**0.55**	**0.42**	**0.13**	**83.2**	**63.1**	**20.1**
Educational attainment	*0.37*	*0.30*	*0.07*	*56.5*	*45.2*	*11.3*
Premarital occupation	*0.09*	*0.07*	*0.02*	*13.5*	*10.9*	*2.6*
Premarital co-residence with parent(s)	*0.01*	*0.02*	*-0.01*	*1.9*	*3.3*	*-1.4*
Composition of sibling(s)	*0.07*	*0.02*	*0.05*	*11.3*	*3.7*	*7.6*
Value toward marriage and family: Total	**0.28**	**0.33**	**-0.05**	**42.1**	**49.7**	**-7.7**
a Living ones life all the way in being single is not desirable.	*0.01*	*0.00*	*0.01*	*1.2*	*0.1*	*1.1*
b Couple living together should get married.	*0.12*	*0.14*	*-0.03*	*17.7*	*21.9*	*-4.1*
c It is OK for premarital men and women to have sex when love is involved.	*0.01*	*0.04*	*-0.03*	*2.0*	*6.1*	*-4.1*
d Even after get married, we should have own life time goal that may be different from that of spouse or family.	*0.09*	*0.11*	*-0.02*	*14.1*	*17.3*	*-3.1*
e It should be taken for granted to make a sacrifice of half of ones personality or way of life for family once get married.	*0.01*	*-0.01*	*0.03*	*2.1*	*-2.2*	*4.3*
f After married, husband should work outside and wife keep household.	*-0.03*	*-0.02*	*-0.01*	*-5.2*	*-3.1*	*-2.1*
g One should have a child, once get married at all.	*0.01*	*0.01*	*0.00*	*1.6*	*1.6*	*0.1*
h Once you got married, you should not divorce merely because of something like personality differences.	*0.06*	*0.05*	*0.00*	*8.5*	*8.2*	*0.3*
Residual	**-0.07**	**-0.48**	**0.41**	**-11.1**	**-73.3**	**62.2**

(3) Cohorts born in 1958-64

Factors	Contributions			Contribution ratio (%)		
	Age at first marriage	Age at first meeting	duration of premarital association	Age at first marriage	Age at first meeting	duration of premarital association
Increase of the mean age at first marriage (average change per year)	**1.48 years** (0.25 years)	**0.96** (0.16)	**0.52** (0.09)	**100 %**	**64.9**	**35.1**
Type of first meeting	**-0.12**	**-0.40**	**0.28**	**-8.4**	**-27.1**	**18.7**
Soci-economic factors: Total	**-0.08**	**0.10**	**-0.18**	**-5.2**	**6.7**	**-11.9**
Educational attainment	*-0.04*	*-0.06*	*0.02*	*-2.8*	*-4.0*	*1.2*
Premarital occupation	*-0.01*	*0.05*	*-0.05*	*-0.4*	*3.3*	*-3.7*
Premarital co-residence with parent(s)	*0.02*	*0.07*	*-0.05*	*1.6*	*4.7*	*-3.1*
Composition of sibling(s)	*-0.05*	*0.04*	*-0.09*	*-3.6*	*2.7*	*-6.4*
Value toward marriage and family: Total	**-0.05**	**-0.20**	**0.15**	**-3.3**	**-13.8**	**10.4**
a Living ones life all the way in being single is not desirable.	*-0.04*	*-0.14*	*0.10*	*-2.5*	*-9.5*	*7.1*
b Couple living together should get married.	*-0.07*	*-0.08*	*0.00*	*-5.1*	*-5.1*	*0.0*
c It is OK for premarital men and women to have sex when love is involved.	*0.08*	*0.05*	*0.02*	*5.2*	*3.7*	*1.6*
d Even after get married, we should have own life time goal that may be different from that of spouse or family.	*-0.16*	*-0.13*	*-0.03*	*-11.2*	*-8.8*	*-2.3*
e It should be taken for granted to make a sacrifice of half of ones personality or way of life for family once get married.	*-0.03*	*0.00*	*-0.03*	*-2.0*	*0.0*	*-2.0*
f After married, husband should work outside and wife keep household.	*0.03*	*0.06*	*-0.04*	*1.9*	*4.3*	*-2.4*
g One should have a child, once get married at all.	*0.09*	*0.05*	*0.04*	*6.4*	*3.7*	*2.7*
h Once you got married, you should not divorce merely because of something like personality differences.	*0.06*	*-0.03*	*0.09*	*3.9*	*-1.9*	*5.8*
Residual	**1.73**	**1.46**	**0.27**	**117.0**	**99.0**	**17.9**