Trends in educational assortative mating among first married and remarried women in Japan

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1. Introduction and Research Questions

The study of assortative mating has been paid a great attention among family demographers (Kalmijn 1998; Schwartz 2013). Although spouse pairing is strongly constrained by opportunity structures (Lichter and Qian 2019), past studies also argued that homogamous couples are thought to have similar values (Kalmijn 1991), and they are less likely to divorce (Tzeng 1992). In contrast, hypogamous couples (women marrying down) are considered not only to have cultural dissimilarity, but also to be a non-normative pairing pattern. Therefore, they are more likely to have higher risk of divorce (Tzeng 1992), although the relationship has changed in recent decades in the United States (Schwartz and Han 2014). In this context, couple's (dis)similarity depending on their socio-economic status has been considered as a determinant of their relationship stability.

Relatively few literatures fully considered the fact that the couple's similarity, defined as their socio-economic or demographic characteristics, varies by their marital history. Specifically, compared with first marriages, second or higher order marriages have been less homogamous in terms of their age, education, race/ethnicity, income, and occupation (Dean and Gurak 1978; Qian and Lichter 2018; Theunis et al. 2015).

The difference in the degree of assortative mating between first and higher order marriages, however, may change in recent cohorts. Two theories could explain the patterns of assortative mating depending on marital status and its trends. First, a theory on relative group size assumes that a quantitative minority is more likely to form a union with a spouse from the same group, while this is not necessarily the case for majorities, since people with smaller groups size have less

chances to find a spouse from different status in the marriage market (Blau et al. 1982; Kalmijn 1998). This theory is particularly relevant to an analysis of spouse pairing in different marriage markets between first and higher order marriages. Compared with the marriage market among never married population, formerly-married men and women are expected to find considerably difficult to meet a suitable partner in their marriage market, because the supply of potential spouse is limited by its smaller size. Therefore, on the one hand, never-married men and women are expected to be able to find a preferred partner in the marriage market, and thus the marriage tends to be homogamous in terms of socio-economic traits. In contrast, on the other hand, since the marriage market among divorced and widowed individuals are more segregated than that of the never-married population, they are less likely to form a normative type of union formation, i.e., educational homogamy or hypergamy (women marrying up).

Another theory, which focuses on status exchange between agents, suggests that heterogamous patterns of mating occurs in higher order marriages because divorced or widowed individuals may exchange their relatively advantaged social status (such as higher income) with their relatively disadvantaged status (being once married). As of the never-married population, they form a marital relationship with these formerly-married men or women in order to exchange their lower social status with higher marital status (i.e., being never married). If the theory of status exchange is correct, women with divorced or widowed status are more likely to exchange their higher social status and form a new marital status with a partner with lower social status.

Although both theories could explain why remarried couples are less

homogamous in terms of education or occupation, we posit that their prediction towards trends in assortative mating is different. On the one hand, the theory of relative group size argues that as the size of minority group increases, formerly-married men and women are more likely to be exposed to more opportunities to interact with never-married population. Therefore, we expect that a relative increase in remarriages may change the different spouse pairing patterns by marital status, predicting relatively less hypogamy among the formerly-married population. On the other hand, the theory of status exchange predicts that the patterns of status exchange do not depend on its relative size. Therefore, the status exchange theory suggests that the heterogamous patterns of assortative mating among formerly-married individuals should not change.

In order to test these hypotheses, we aim to examine whether the degree of educational hypogamy among remarried women has declined and been comparable to that of first-married women, through an increase in opportunities to marry the never-married population. Considering educational assortative mating patterns has been paid an attention among inequality literature as a source of rising economic inequality (Schwartz 2013), it is worth examining the trend and patterns of educational homogamy between first and higher order marriages.

Examining educational assortative mating between first marriage and higher order marriages might be particularly important in countries characterized as persistent gender inequality regime, such as Japan. As stated, if couple's similarity is thought to indicate the relationship stability, remarried couples would have higher risk of divorce than first-married couples do. Experiencing a

divorce accompanies a huge decline in household income among women (Tach and Eads 2015), which is also the case in Japan (Murakami 2011) where gender pay gap between men and women strongly remains in spite of the women's better access to higher education and labor market (Ministry of Health, Labour, and Welfare 2017). Therefore, remarried women, who married a spouse of different social status, are expected to be exposed to a larger risk of economic deprivation.

Based on the research interests, we aim to ask the following question, using the National Fertility Survey, which has been rich retrospective survey which captures women's marital history in Japan. First, we examine whether women are increasingly more likely to marry never-married men in recent cohorts as the theory of relative size expected. Second, we examine, based on the increase in remarried women's propensity to marry never married men, whether these women's propensity of marrying down has declined, and thus the gap in propensity of hypogamy between first married and remarried women has weakened.

Data and Methods

In this study, we use pooled data across the 8th through 15th National Fertility Survey (JNFS), which were conducted in 1982, 1987, 1992, 1997, 2002, 2005, 2010, and 2015. These surveys provide rich retrospective information of marital history among married women aged 18-49. Pooling data from the eight surveys results in a total sample of 64,509 women who married between 1960 and 2010[1]. Using marital history status information, we classified individuals into (1) never-

[1] The sample includes not only legally married couples but also cohabiting couples, if women recognize their partner as a spouse.

married and (2) formerly-married, which includes both divorced and widowed individuals. Also, we classified educational attainment into (1) junior high school (JHS: ISCED level 2), (2) high school (HS: ISCED level 3), (3) two-year junior college (JC/VS: ISCED level 4/5), and (4) university and more (UNI: ISCED level 6+).

To examine the prevalence of different educational pairings net of changes in marriage market composition, our preliminary analysis used a log-linear and log-multiplicative model approaches. First, we examine whether formerly-married women are more likely to marry never-married women in recent cohorts starting from the following equation:

$$\ln F_{ijk} = \lambda + \lambda_i^W + \lambda_j^H + \lambda_k^C + \lambda_{ik}^{WC} + \lambda_{jk}^{HC}$$

where i is 1 if wife (W) is never-married, and 2 if they are formerly-married. Similarly, j is 1 if husband (H) is never-married, and 2 if they are formerly-married.

In addition, we used a design matrix for, where γ_{ij}^{WH} is 1 if wife is formerly-married and husband is never married. We only include this parameter to the design matrix because wife's and husband's pairing patters is represented by 2-by-2 matrix and adding other parameter to the design matrix produce an un-identification problem.

$$\ln F_{ijk} = \lambda + \lambda_i^W + \lambda_j^H + \lambda_k^C + \lambda_{ik}^{WC} + \lambda_{jk}^{HC} + \gamma_{ij}^{WH}$$

We also examine whether the marriage between formerly-married women

and never-married men has increased in recent cohorts using the following log-multiplicative layer effect model (Xie 1992), where δ_k^C denotes the log-multiplicative parameter. These log-multiplicative layer effect models allow us to capture and interpret changes in the strength of the WH association in a parsimonious way. The δ of the oldest cohort is set to be 1, and if δ of a given cohort is less (or more) than 1, this indicates that the association in the cohort is weaker (or stronger) than that of the oldest cohort. Because of lack of degree of freedom, we condition δ as $1 + \beta x$, assuming that the cohort change shows a linear trend.

$$\ln F_{ijk} = \lambda + \lambda_i^W + \lambda_j^H + \lambda_k^C + \lambda_{ik}^{WC} + \lambda_{jk}^{HC} + \gamma_{ij}^{WH} + \delta_k^C \gamma_{ij}^{WH}$$

Secondly, we examine whether remarried women's propensity to marry down (hypogamy) has relatively been common in recent cohorts, applying the following log-linear model to the three way table of the wife's educational attainment $W(i = 1, \dots, 4)$, and the husband's educational attainment, $H(j = 1, \dots, 4)$, and the wife's marriage cohort $C(k = 1, \dots, 5)$. For comparative purpose, we also estimated the same model for first married couples.

$$\ln F_{ijk} = \lambda + \lambda_i^W + \lambda_j^H + \lambda_k^C + \lambda_{ik}^{WC} + \lambda_{jk}^{HC} + \gamma_{ij}^{WH}$$

Where γ_{ij}^{WH}=1 if i>j.

In addition to the basic model, we applied two log-multiplicative layer effect models to examine a cohort change. One model assumes unconditional

uniform change, i.e., UNIDIFF model, while the other model assumes that the cohort changes show a linear trend.

$$\ln F_{ijk} = \lambda + \lambda_i^W + \lambda_j^H + \lambda_k^C + \lambda_{ik}^{WC} + \lambda_{jk}^{HC} + \delta_{ij}^{WH} + \delta_k^C \gamma_{ij}^{WH}$$

Where γ_{ij}^{WH}=1 if i>j.

Distribution of each variable is shown in the Table 1. Although most of cases in our sample are first married women (62,075), and the prevalence of remarried couples is small (2,434), the proportion of remarried couples are larger in recent marriage cohorts.

[Table 1 about here]

Preliminary Results and Discussion

First, Table 2 presents goodness of fit statistics for the models of spouse pairing by marital status: the degree of freedom (df), the log-likelihood ratio chi-square statistic (G^2), and the Bayesian information criterion ($BIC = G^2 - \log n \times \text{df}$). More negative BIC statistics mean a better model in terms of model fit and parsimony. While Model 1, which assumes independence between wife's and husband's marital status conditional on marginal distributions, does not fit the data well, Models 2 and 3 show much better fits. Model 3 particularly shows a better fit than Model 2, and we thus use this model to illustrate the patterns of assortative mating by marital status.

[Table 2 about here]

Figure 1 presents estimated coefficients of remarried women to marry never-married. The figure clearly shows that remarried women's likelihood to marry never-married men is negative, which means that the spouse pairing is less likely to occur, but the negative association gradually declined. This result suggests that although still formerly-married women are less likely to marry never-married men, the likelihood is increasingly lowered, supporting the relative group size theory.

[Figure 1 about here]

Table 3 presents goodness of fit statistics for the models of spouse pairing by education between first married and remarried women. Among the first married women (Panel A), both Model 2 and 3 show a relatively better fit than the Model 1, while the BIC statistics are still positive, suggesting that these Model did not fully capture the observed distribution of spouse pairing patterns. However, for the purpose of this study, we accept these models to compare the trend with that of remarried sample. Panel B shows the model comparison of remarried sample, indicating that Model 1 and 3 fit with the distribution well. In particular, BIC statistics show that the Model 1, assuming the trend of hypogamy is constant, is more preferable than other models.

[Table 3 about here]

Figure 2 presents the likelihood to marry down (hypogamy) among women depending on their marital status (first married or remarried). We show results of two models both for first married (Model 2 and 3) and remarried sample (Model 1 and 3), in which the BIC statistics are relatively better.

In contrast to the theory of relative size, the likelihood of remarried women to marry down has been constant, or slightly decreased in recent cohorts. Results of first married sample, however, show that the hypogamy parameters significantly decrease in recent cohorts. Therefore, the gap in the likelihood to marry down between first married and remarried women has declined.

Although it depends on each model, in 1960-69, the hypogamy coefficient was -1.30 to -1.60 for remarried women, while it was -2.71 to -2.89 for first married women. However, in the latest cohort, the gap declined, and the hypogamy coefficient for first married women was -1.34 to -1.56. The decline in gap is not explained by a decrease in hypogamy coefficients among remarried women, but an increase in the coefficient among never married women. These results partially support the hypothesis deriving from the theory of relative group size.

[Figure 2 about here]

Future Steps

In the presentation, we will employ more applied statistical techniques, such as log-multiplicative models to capture the best fitted model of educational assortative mating between first marriage and remarried population. Also, for the robustness check, we will attempt different statistical models, such as harmonic

mean models and conditional logit models (Lichter and Qian 2019) to provide more reliable results of the trend.

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Table 1: Descriptive statistics

	Wife first-married	Wife remarried
Wife-JHS	0.129	0.263
Wife-HS	0.484	0.492
Wife-JC	0.281	0.195
Wife-UNIV	0.105	0.050
Husband-JHS	0.149	0.291
Husband-HS	0.427	0.442
Husband-JC	0.110	0.097
Husband-UNIV	0.314	0.170
Year at marriage: 1960-1969	0.162	0.110
Year at marriage: 1970-1979	0.278	0.189
Year at marriage: 1980-1989	0.234	0.200
Year at marriage: 1990-1999	0.212	0.229
Year at marriage: 2000-2010	0.114	0.272
N	62,075	2,434

Table 2 Model comparison of log-linear and multiplicative models (couple's marital status)

	Models	G2	df	BIC
1	Conditional independence	3184.964	5	3129.592
2	Wife-Husband interaction	112.959	4	68.661
3	Wife-Husband interaction with cohort change (linear)	5.290	3	-27.933

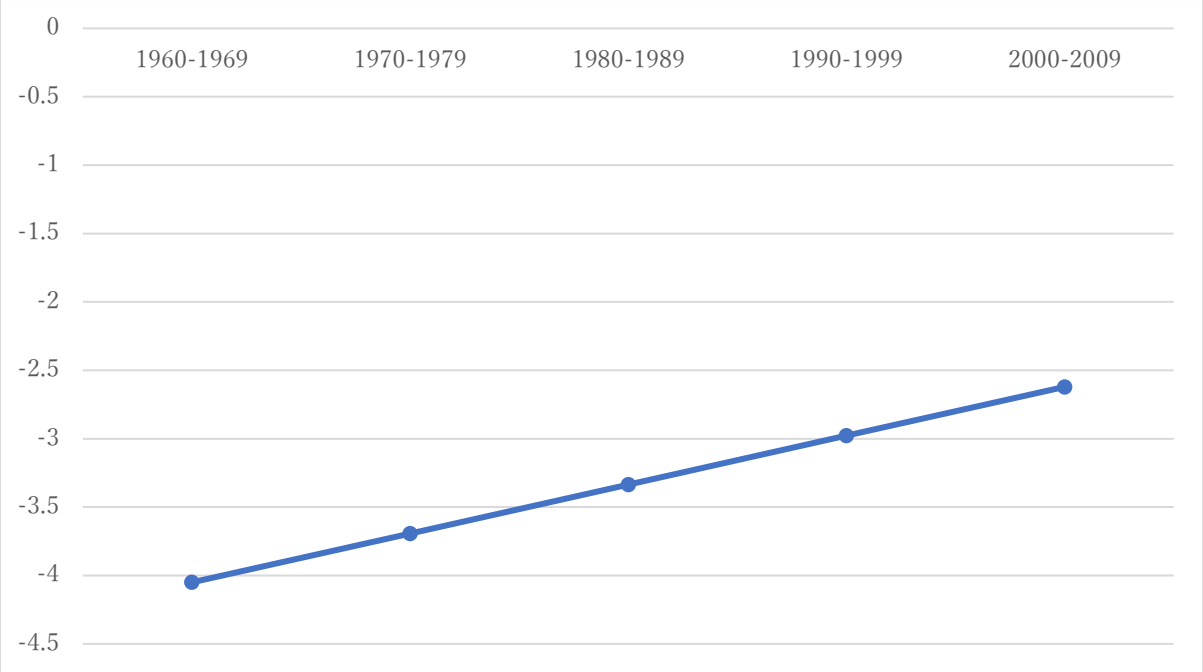

Figure 1. Estimated coefficients of marrying never or formerly-married men among remarried women.

Table 3 Model comparison of log-linear and multiplicative models (couple's marital status)

A. First marriage

	Models	G2	df	BIC
1	Hypogamy cohort constant	7692.759	44	7207.170
2	Hypogamy cohort change (UNIDIFF)	7066.729	40	6625.285
3	Hypogamy cohort change (linear)	7110.070	43	6635.518

B. Remarriage

	Models	G2	df	BIC
1	Hypogamy cohort constant	236.792	44	-106.175
2	Hypogamy cohort change (UNIDIFF)	231.812	40	-79.976
3	Hypogamy cohort change (linear)	234.806	43	-100.366

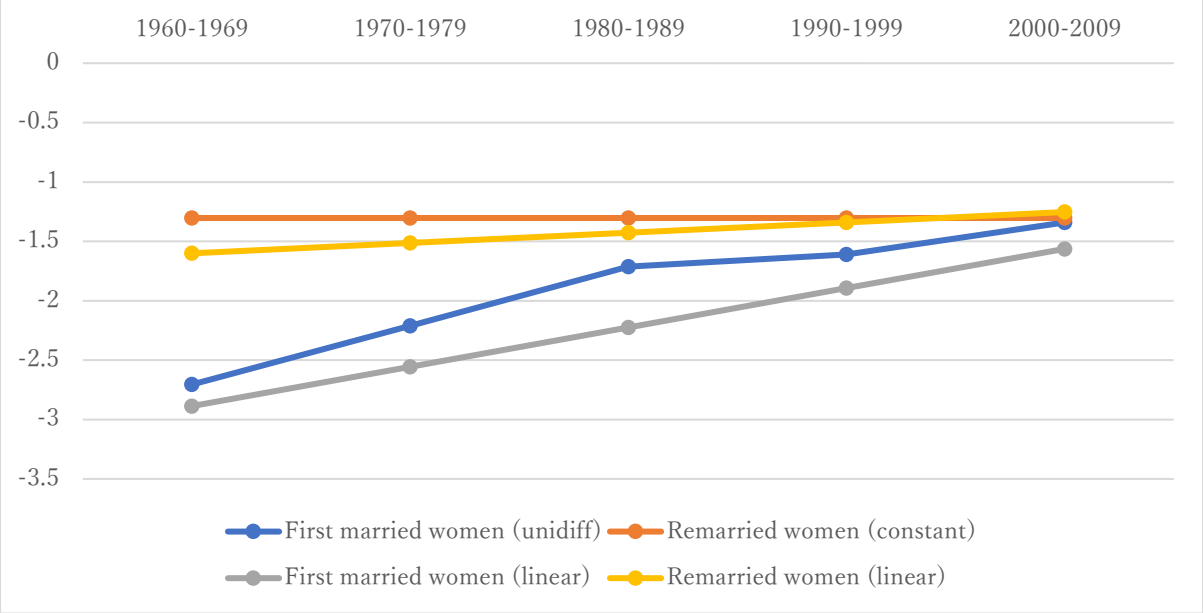

Figure 2. Estimated coefficients of marrying down (hypogamy) among women