

Marriage Trends in Korea:
Changing Composition of the Domestic Marriage Market and Growth in International Marriage

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Trends in Marriage among Korean Men:
Changing Composition of the Domestic Marriage Market and Growth in International Marriage

Abstract

We advance research on pronounced declines in marriage in gender-inegalitarian countries by decomposing the decline in marriage among Korean women and men into changes in educational composition of the marriage market and changes in the likelihood of specific pairings. We also consider the role of international marriages in offsetting the posited implications of changing marriage market composition. Rapid expansion of women's education and increase in marriages between Korean grooms with low levels of education and foreign brides make Korea a particularly relevant setting in which to address the limitations of previous research on marriage in East Asia. Using individual records from two censuses, we show that changes in the availability of potential spouses offset rapid decline in the marriage propensities of women with a high school education or less, but accounted for between 10-30% of the decline in marriage among women with tertiary education. Among men with a high school education or less, changes in marriage market composition accounted for between one-fifth and one-fourth of the decline in marriage between 1985-89 and 2005-09. We also show that growth in international marriages played a role in preventing even more dramatic decline in marriage among low educated men. These findings have potentially important implications for inequality in a society like Korea where marriage is remains a symbol of social success and is closely related to women's economic well-being and men's health and subjective well-being.

The trend toward later and less marriage is common to industrialized countries and has been the focus of numerous demographic studies. The implications of changing marriage behavior are of particular concern in societies where the link between marriage and childbearing remains strong. In East Asia, where non-marital childbearing remains uncommon, very low fertility rates are largely due to trends in marriage (Raymo, Park, Xie, and Yeung 2015). Researchers have examined a number of possible explanations for declining marriage rates, including increasing economic independence for women, changing gender attitudes, increasing job insecurity among young people, the emergence of alternative lifestyles, and the lack of an effective dating market (Becker 1981; Oppenheimer, Kalmijn, and Lim 1997; Park and Lee 2017; Raymo 2003; Raymo and Iwasawa 2005; Thornton 2001).

While many of these explanations focus on the declining desirability of marriage, there is relatively little evidence that young men and women are actively rejecting marriage (Billari and Liefbroer 2016; Raymo et al. 2105). In the absence of an active, widespread retreat from marriage, an alternative explanation for declining marriage rates emphasizes the role of marriage market mismatches generated by rapid relative improvements in women's educational attainment and limited change in the normative desires and expectations regarding educational homogamy and female educational hypergamy. As women's educational attainment increasingly comes to resemble that of men, norms of female hypergamy/male hypogamy make it numerically more difficult for highly educated women (and less educated men) to find a partner.

Raymo and Iwasawa (2005) developed this argument and empirically evaluated its hypothesized implications using data on Japanese women (and their spouses). They concluded that one-fourth to one-third of the decline in proportions of highly-educated women (between 1980 and 1995) can be accounted for by changes in marriage market composition. Raymo and

Iwasawa (2005) argued that this marriage market mismatch reflects the gender inegalitarian nature of Japanese marriages and the associated centrality of men's economic prospects as a spouse selection criterion. They suggested that a similar market mismatch may be relevant for understanding trends in marriage in other gender inegalitarian settings in which women's educational attainment has increased rapidly. Our primary goal in this paper is to evaluate this claim of generality by evaluating the role of changing marriage market composition (with respect to education) in explaining declining rates of marriage in South Korea (Korea, hereafter).

Korea is a particularly interesting case in that it has experienced rapid decline in marriage (and associated decline in TFR) (Park and Lee 2017; Park, Lee, and Jo 2013), women's relative educational attainment has increased rapidly in recent years (Park 2007), and historical patterns and norms of spouse pairing highlight a strong tendency for marriages to be educationally homogamous or female hypergamous (Park and Smits 2005; Smits and Park 2009). Evidence of a similar marriage market mismatch in Korea would bolster Raymo and Iwasawa's (2005) claim that this pattern of change may be a product of gender inegalitarian social arrangements and highly asymmetric division of work and family roles. Finding no evidence for a marriage market mismatch in Korea would call into question Raymo and Iwasawa's claims of generality and suggest that their findings may be idiosyncratic to the Japanese case.

In addressing the role of marriage market mismatch for declining marriage rates, we focus on both women and men, thus complementing Raymo and Iwasawa's (2005) study of marriage patterns among Japanese women. Although they alluded to the possibility that a marriage market mismatch due to rapid increase of women's education should prevail for two groups – the most educated women and the least educated men, Raymo and Iwasawa's exclusive focus on women did not allow them to evaluate the relevance of a marriage market mismatch for men at the lower

end of the educational distribution. Our examination of Korean men's marriage patterns thus provides an additional test of the marriage market mismatch hypothesis.

Focusing on Korean men offers another advantage as it also allows us to address an important, related question about contextual conditions that may mitigate the impact of marriage market mismatches detrimental to low-educated men. In particular, we focus on the role of marriage-based immigration to examine the extent to which the impact of marriage market mismatches may be offset by a rise in international marriages. Korea has, to a much greater degree than Japan, experienced a rise in international marriage: the proportion of all marriages involving a Korean native and a foreign-born spouse was less than 5 percent during the 1990s but increased from the early 2000s, peaking at 13.5 percent in 2005 before stabilizing at around 10 percent in 2010) (Kim 2017). The large majority of international marriages involve a Korean groom and a foreign bride and these marriages, particularly first marriages, are more common for men at the lower end of the educational distribution (Kim 2017; Lee 2006).

The three major contributions of this study are thus (a) to provide evidence on the generality of a marriage market mismatch described by Raymo and Iwasawa (2005) for Japanese women by assessing marriage patterns of Korean women, (b) to examine the posited implications of marriage market mismatch for Korean men, and (c) to evaluate the role of international marriage between Korean men and foreign women in offsetting the impact of rapid shifts in the educational composition of the marriage market.

Background

Women's educational attainment and marriage in East Asian countries

A trend toward later and less marriage has been observed in all wealthy countries, but the pace and magnitude of this change has been particularly pronounced in the East Asian countries of

Japan, Korea, and Taiwan (Raymo 2013; Raymo et al., 2015). As shown in Figure 1, mean ages at first marriage have substantially increased over time for both men and women in East Asia: from about 27 for men in 1980 to about 31 in 2010 in all three East Asian countries and from less than 25 for women in 1980 to 29 in 2010. In contrast to the U.S. and many European countries where childbearing outside of marriage is common, the continued strength of the relationship between marriage and fertility in East Asia heightens the demographic importance of trends in marriage. All three countries are characterized by period fertility rates that are well below replacement and it is clear that much of the decline in TFR is due to reductions in the proportion of women who are married. Recognizing the importance of extended periods of ultra-low fertility for population aging and economic growth, promotion of family formation has emerged as a major policy focus in these countries.

FIGURE 1 ABOUT HERE

Efforts to understand declining marriage rates in East Asian countries have often focused on the role of women's growing economic independence. As increasing educational attainment results in increased employment opportunities while the gender division of domestic work within families remains highly asymmetric, women use their newfound economic independence to "buy out" of marriage (or at least to postpone entry into to the "onerous status of wife and mother" -- Tsuya and Mason 1995:156). This research, much of which focuses on Japan, finds that, in contrast to recent research on the U.S. and other Western countries, women's educational attainment and earnings are associated with later and less marriage (Raymo 2003; Ono 2003; Park, Lee, and Jo 2013). These findings are consistent with expectations of both the "specialization and trading model of marriage" (Oppenheimer 1997) and explanations for very low fertility in gender inequalitarian societies (McDonald 2000a). Standard economic models of

marriage are built on the assumption that, because the gains to marriage derive from spouses' pooling of complementary specializations in market and domestic labor, growing economic independence for women should make marriage less attractive (Becker 1981; Oppenheimer 1997). Gender equity theories of lowest-low fertility argue that declining gender inequality in the public sphere (i.e., education, labor market), coupled with limited change in the gender inequalitarian private sphere, presents women with an either-or choice between family and individual pursuits (including, but not limited to, career) (McDonald 2000a, 2000b, 2013). Fertility trends in gender inequalitarian countries are thus thought to reflect an increasing tendency for women to not choose family (McDonald 2009).

Marriage market mismatches

While empirical support for the role of women's economic independence is clear, this framework does not provide a complete explanation of trends in marriage. An analysis of marriage market composition, spouse pairing preferences, and marriage in Japan demonstrated how relative improvements in women's educational attainment have generated a "marriage market mismatch" that results in lower rates of marriage for highly educated women (Raymo and Iwasawa 2005). The basic idea is that, in societies like Japan where norms and expectations support status homogamy and female status hypergamy, convergence in men's and women's educational attainment makes it numerically more difficult for highly-educated women to find a suitable partner. All else equal, a convergence in men's and women's educational distributions will result in highly-educated women competing for a relatively smaller pool of well-educated men. This focus on the implications of shifting marriage market composition is not novel – it is a straightforward extension of a long line of research on the ways in which changes in the relative prevalence of men and women of different ages (or other characteristics) can result in marriage

squeezes (e.g., Crowder and Tolnay 2000; Schoen 1983). The main contribution of Raymo and Iwasawa's (2005) study was to demonstrate how widely observed trends in women's educational attainment (in both absolute and relative terms) can play a critical role in shaping patterns of family formation in gender-inegalitarian societies characterized by firmly established expectations of status homogamy and female status hypergamy. Their findings suggest that the substantive role of marriage market mismatches is not small, with shifting marriage market composition due to changes in educational attainment accounting for up to one-quarter of the decline in the proportion married among female junior college and university graduates.

Response to marriage market mismatches

Assuming that marriage markets are geographically bounded, marriage market mismatches generated by shifting market composition will result in a decline in marriage rates unless those who are increasingly disadvantaged choose to "cast a wider net." For example, in classic depictions of marriage squeezes generated by a baby boom, numerically disadvantaged women can respond by increasing their willingness to marry younger men. Similarly, women faced with a "shortage of marriageable men" generated by high levels of unemployment and/or incarceration (Wilson 1987) might respond by marrying men of lower status than they might choose in a more favorable marriage market. Related research in the U.S. finds little evidence that women are willing to alter their pairing preferences in response to unfavorable marriage markets (e.g., Lichter, Anderson, and Hayward 1995). However, a recent follow-up to the Raymo and Iwasawa (2005) study provides some evidence that Japanese women may be responding to marriage market mismatches generated by relative improvements in women's education. Fukuda and Raymo (2016) find that the negative educational gradient in marriage has

disappeared and that this is partially attributable to a slight increase in the likelihood of educational hypogamy among highly-educated women.

Past research rarely considers an alternative solution to marriage squeezes or mismatches – expansion of the marriage market. Just as online dating increasingly expands marriage markets beyond relatively narrow geographical boundaries, international marriage can shift the composition of marriage markets at the national level. This may be particularly important in East Asia where international marriages are increasingly common. Marriages involving one native spouse and one foreign born spouse have been around 5% of all marriages in Japan, over 10% in Korea, and about 20% in Taiwan (Raymo 2013). A good deal of anecdotal and empirical evidence describes the role of international marriage in offsetting marriage squeezes detrimental to men, particularly those living in rural areas of Japan and Korea (Lee 2008; Liaw, Ochiai, and Ishikawa 2010). The growth in marriage among low educated native-born men to women from other East and Southeast Asian countries helps to offset the shrinking pool of low-educated women who might pair with similarly educated men. To our knowledge, however, there has been no rigorous empirical evaluation of the extent to which growth in international marriage has offset the impact of shifting domestic marriage market composition with respect to educational attainment in gender-inegalitarian societies in East Asia.

The Korean context

The first two columns in Table 1 present the distribution of educational attainment among (Korea-born) men and women aged 25 to 44 in 1990 and 2010 Korean Census, respectively. The marked expansion of higher education during the two periods is immediately clear. In 1990, 26 percent of Korean men aged 25 to 44 did not even attend high school, while the corresponding share in 2010 was merely 3 percent. Meanwhile, the percentage of 25- to 44-year-old men who

attended post-secondary education increased from 5 to 22 percent for junior college and from 24 to 42 for university education. Educational expansion between 1990 and 2010 is even more substantial among Korean women. In 1990, a little less than half of Korean women aged 25 to 44 did not attend high school. Two decades later, women who did not attend high school accounted for only 3 percent of all women aged 25 to 44. The percentage of women who attended a junior college increased from 3 to 23 percent, while the share of women who attended a university increased more than three times from 11 to 35 percent. The relatively more substantial increase of education among women than men has resulted in changes in the gender ratio in each educational category. In 1990, there were only 6 men per 10 women in the lowest level of education but 22 men per 10 women in the highest level of education. Two decades later, the ratio of men over women in the lowest level of education increased to 0.9, while the gender ratio in the highest level of education was reduced to 1.2. As in the Japanese context (Raymo and Iwasawa 2005), it is clear that rapid relative improvements in women's educational attainment, combined with established spouse pairing norms, have substantially reduced the availability of potential mates for highly-educated women and low-educated men.

TABLE 1 ABOUT HERE

Data and Method

Marriage Rates from the Census

In order to examine changes over time in marriage rates for each education and age group, we use 1 percent micro-sample data from Korean 1990 and 2010 Census. In both census years, ever-married men and women were asked the ages of first marriage as well as the educational level. Using information on relationship with household head, we identified couples who resided in a household. Since there is no information in the census with which to identify whether the current

marriage is the first marriage, we identified first marriages as those in which the reported year of first marriage (which can be calculated from the information on age at first marriage and census year) is the same for husband and wife. Considering that the age of first marriage was asked in the census, instead of the exact year and month, we also treated as first marriages those marriages in which the years of first marriage are different between couples by one year.

We focus on two five-year periods from 1985 to 1989, and from 2005 to 2009 to examine change in marriage rates over two decades. For each five-year period, we constructed person-year data containing information on whether a person got married at a specific age. We classified individuals into six five-year age groups: 15-19, 20-24, 25-29, 30-34, 35-39, and 40-44.

However, since the number of marriages that reported for 15-19 year-olds is fairly small, and even zero for some age-education combinations, we do not report marriage rates for this age group. In the person-year data, one person can contribute up to five years: for instance, if a man was 25 years old and never married in the 1990 census, he contributes five years: 20 years old in 1985, 21 in 1986, 22 in 1987, 23 in 1988, and 24 in 1989, with no experience of marriage. If a man was 26 years old and currently married in the 1990 census and reported his age at first marriage as 23, he contributes three years: never married at 21 years old in 1985, never married at 22 in 1986, and married at 23 in 1987. Marriage is a censoring event, so this man is not observed in the data after 1987. In calculating marriage rates, we assume that marriages occur in the middle of the year.

It is worth noting an important difference with respect to individuals' nationality in the 1990 and 2010 Korean Census. Korea did not receive a substantial influx of immigrants until the early 2000s. Reflecting this demographic trend, the 1 percent micro-sample data in 1990 do not include information on nationality, motivating our assumption that everyone included in the 1

percent sample is a native Korean. But in 2010, 1 percent micro-sample data do include a variable on nationality. Therefore, we included only Korea-born men in 2010 census to be comparable with 1990 census. To calculate observed marriage rates in 2005-09, we assumed that foreign women married with a Korean man entered Korean marriage market at the time of marriage. This assumption is based on evidence that many foreign women who married a Korean man did not live in Korea long before marriage, but rather left their country of origin for Korea for the purpose of marriage, often arranged by brokers (Onishi 2007). Importantly, this means that foreign-born women have zero exposure to the domestic Korean marriage market in our analyses.

We classified individuals into four groups according their education: 1) less than high school; 2) high school attendance, but no post-secondary education; 3) junior college attendance; and 4) university attendance. Our decision to use the highest level of education attended, rather than completed, reflects the fact that we examine relatively young ages at which people may still be enrolled in post-secondary education. However, because the number of students who drop out from a secondary or post-secondary educational institution is small in Korea (Byun and Park 2017), this decision should not substantially affect the results. In the end, we calculated marriage rates for each combination of six five-year age groups and four educational groups. As mentioned before, however, we do not report the result for the age group of 15-19, resulting in a total of 20 age-education groups for which marriage rates were calculated in each census.

Method

We replicate Raymo and Iwasawa's (2005) use of Schoen (1998)'s harmonic mean model to decompose changes in marriage rates between two periods into changes in the force of attraction – the propensity to marry independent of marriage market composition, and changes in the

availability ratio – a measure of marriage market composition. Following Raymo and Iwasawa (2005), marriage rates in period t involving men of age i and education k and women of age j and education l are expressed as follows:

$$\text{Male marriage rate: } MR_{ijkl}^t = \frac{N_{ijkl}^t}{M_{ik}^t} = a_{ijkl}^t \times \frac{F_{jl}^t}{M_{ik}^t + F_{jl}^t} \quad (1a)$$

$$\text{Female marriage rate: } MR_{ijkl}^t = \frac{N_{ijkl}^t}{F_{jl}^t} = a_{ijkl}^t \times \frac{M_{ik}^t}{M_{ik}^t + F_{jl}^t} \quad (1b)$$

where N_{ijkl}^t refers to the number of marriages between men in the combination of age i and education k and women in the combination of age j and education l . M_{ik}^t indicates the number of men exposed to the risk of marriage: unmarried men in the combination of age i and education k plus 0.5 times the number of marriages (assuming that marriages occurred in the midpoint of a year). F_{jl}^t is the corresponding figure for women, a_{ijkl}^t is the force of attraction, and $\frac{F_{jl}^t}{M_{ik}^t + F_{jl}^t}$ and $\frac{M_{ik}^t}{M_{ik}^t + F_{jl}^t}$ are the availability ratios for men and women, respectively. The fact that the marriage rates in equations 1a and 1b are the product of two elements – the force of attraction and the availability ratio – facilitates evaluation of the relative importance of each.

Counterfactual marriage rates 1 (availability ratios constant)

We calculate counterfactual marriage rates for 2005-09 by first fixing the availability ratios in Equations 1a and 1b at their 1985-89 values. The following equations allow us observe what marriage rates would have been in 2005-09 if marriage market composition had remained constant at its 1985-89 values for men and women, respectively:

$$\text{Counterfactual MR}_{ijkl}^{2005-09} = a_{ijkl}^{2005-09} \times \frac{F_{jl}^{1985-89}}{M_{ik}^{1985-89} + F_{jl}^{1985-89}} \quad (2a)$$

$$\text{Counterfactual MR1}_{ijkl}^{2005-09} = a_{ijkl}^{2005-09} \times \frac{M_{ik}^{1985-89}}{M_{ik}^{1985-89} + F_{jl}^{1985-89}} \quad (2b)$$

Counterfactual marriage rates 2 (forces of attraction constant)

We then calculate another set of counterfactual marriage rates for 2005-09 by fixing the forces of attraction at their 1985-89 values. By doing so, we can see what marriage rates would have been if availability ratios were the only thing that changed between the two periods:

$$\text{Counterfactual MR2}_{ijkl}^{2005-09} = a_{ijkl}^{1985-89} \times \frac{F_{jl}^{2005-09}}{M_{ik}^{2005-09} + F_{jl}^{2005-09}} \quad (3a)$$

$$\text{Counterfactual MR2}_{ijkl}^{2005-09} = a_{ijkl}^{1985-89} \times \frac{M_{ik}^{2005-09}}{M_{ik}^{2005-09} + F_{jl}^{2005-09}} \quad (3b)$$

Counterfactual marriage rates 3 (assume no international marriages)

The third set of counterfactual marriage rates refer to rates that would exist if all of Korean men who married a foreign woman had remained unmarried. In other words, we ask what the marriage rates of Korean men would be in 2005-09 if international marriages had not occurred. To calculate these counterfactual marriage rates, we treated Korean men who married a foreign woman as never married, allowing them to contribute to the person-year data of exposure to marriage until they exited the data because of censoring. Therefore, in comparison with the observed marriage rates for 2005-09, these counterfactual rates will have a smaller number of marriages in the numerator and a larger number of person-years of never-married life in the denominator. These differences from the observed 2005-09 values are indicated by an asterisk in equation (4). The number of women exposed to marriage does not change given our assumption that foreign brides do not spend any time in the Korean marriage market.

$$\begin{aligned} \text{Counterfactual MR3}_{ijkl}^{2005-09} &= \frac{N_{ijkl}^{*2005-09}}{M_{ik}^{*2005-09}} \\ &= a_{ijkl}^{*2005-09} \times \frac{F_{jl}^{2005-09}}{M_{ik}^{*2005-09} + F_{jl}^{2005-09}} \end{aligned} \quad (4)$$

Changes in Marriage Rates

Tables 2 and 3 present ratios of both observed marriage rates in the two periods and ratios of counterfactual marriage rates in 2005-09 to observed marriage rates in 1985-89 for women and men, respectively. The first column, “Observed Ratio,” shows the ratios between two observed marriage rates in 1985-89 and 2005-09. Ratios less than 1.0 indicate that the observed marriage rate in 2005-09 was lower than the observed marriage rate in 1985-89, while ratios greater than 1.0 indicate the opposite. For women (Table 2), ratios are well below 1.0 at younger ages, but greater than 1.0 in some cases for the oldest two age groups. Marked decline in women’s marriage at younger ages is thus offset, to some extent, by a shift in marriage to older ages. For men (Table 3), ratios are less than 1.0 with one exception, reflecting the large decline in marriage rates for men of all ages. Some declines are particularly pronounced, especially among men and women with lower levels of education. For example, the marriage rates of 20-29 year-old women with less than a high school education are 80 percent lower in 2005-09 than in 1985-89. Similarly the marriage rates of 30-39 year-old men with less than high school education are 79-87 percent lower in 2005-09 than in 1985-89.

TABLES 2-3 ABOUT HERE

The second column, “AR Constant,” presents the ratios of counterfactual marriage rates in 2005-09 to observed marriage rates in 1985-89. Counterfactual marriage rates here indicate what marriage rates would have been in 2005-09 if availability ratios remained constant at their 1985-89 values (i.e., if forces of attraction were the only factor that changed). In most cases, these ratios are similar, and somewhat smaller, than the observed ratios indicating that the observed decline in marriage is explained almost fully by reduction in the propensity to marry. This pattern is not surprising and is similar to that in Raymo and Iwasawa’s (2005) study of Japan.

The fact that these ratios are, in many cases, lower than the observed ratios indicates that changes in marriage market composition have been conducive to marriage. This is especially true for women with lower levels of education, a pattern that we will demonstrate more clearly below. The general pattern for men (Table 3) is similar that of women with one important exception. The fact that these counterfactual ratios are less than one but often slightly higher than the observed ratios indicate that reductions in marriage rates are attributable to both declining forces of attraction and changing marriage market composition. Moreover, in some cases counterfactual ratios are greater than 1.0, but observed ratios are less than 1.0 (ages 40-44 for men with less than high school education and ages 35-44 men with high school education only), indicating a substantial role for changing marriage market composition in the decline in marriage rates.

The role of changing marriage market composition can be also seen clearly in column 3, which shows the ratio of marriage rates for 2005-09 calculated by holding forces of attraction constant at their 1985-89 values to the observed 1985-89 rates. For women (Table 2), these ratios are all above 1.0 for women with a high school education or less, indicating improvement in the availability of potential mates driven by marked improvements in women's education relative to men. For women who attended junior college or university, the ratios are, for the most part, slightly lower than 1.0 indicating a reduction in the availability of mates for these women. Again, this pattern (as well as the actual values) is similar to that described for Japanese women by Raymo and Iwasawa (2005). For men (Table 3), these ratios are almost all below 1.0 and in some cases are well below 1.0. Young men (ages 20-29) who attended college experienced an improvement in marriage market conditions, but all other groups saw a decline in the availability of potential mates. This shift in marriage market composition was particularly pronounced for men who did not attend university, especially at older ages. In contrast, ratios for men who

attended university are mostly close to 1, indicating a relatively weak role of changes in availability ratios for changes in marriage rates.

The last column in Table 3, “No Immigrant Women,” presents ratios of counterfactual marriage rates in 2005-09 to observed marriage rates in 1985-89 with counterfactual marriage rates in 2005-09 calculated on the assumption that international marriage was not an option and that those Korean men who married a foreign woman remained unmarried. Comparison of these ratios with ratios of observed marriage rates in the first column reveals an interesting pattern. With a few systematic exceptions, these ratios are almost identical to the observed ratios, indicating little or no role for international marriage in boosting men’s marriage rates. The exceptions are for relatively older, less educated men. For example, the counterfactual ratios in the last column for 35-39 and 40-44 year-old men with less than high school education were 0.08 and 0.17, respectively. This means that the 2005-09 marriage rates for these men would be only 8 and 17 percent of the observed marriage rate in 1985-89 if there were no immigrant women, much greater decline than the observed ratios of 0.21 and 0.40 in the first column.. A similar pattern is observed for 35-44-year-old men with a high school education. These counterfactual ratios are also smaller than observed ratios for older men who attended junior college or university, but the differences in ratios are much smaller, suggesting that the influx of immigrant women did not substantially affect marriage rates of highly-educated men.

Cumulative First Marriage Probability for Synthetic Cohorts

In order to facilitate our understanding of the impact of changes in marriage market composition (i.e., availability ratios) on marriage rates, we use the marriage rates summarized in Tables 2 and 3 to calculate cumulative probabilities of first marriage (i.e., age-specific percentages who have ever married) for synthetic cohorts of women and men, by educational level. For instance,

figures calculated from observed marriage rates in 1985-89 and 2005-09 show how the cumulative probability of marriage changed for women and men (of a given level of education) in synthetic cohorts assumed to follow the observed rates across the age range of interest (20-44). Similarly, we can calculate counterfactual cumulative probabilities of first marriage for synthetic cohorts who experience the counterfactual age-specific marriage rates constructed by sequentially holding availability ratios and forces of attraction constant at their 1985-89 values. Finally, we calculate cumulative probabilities of first marriage using rates that counterfactually eliminate the possibility of Korean men's marriage to a foreign bride. To convert age-specific marriage rates to age-specific probabilities, we assume that marriage rates are constant during five-year periods (Preston, Heuveline, and Guillot 2001: 46).

Figures 2-5 show cumulative probabilities of first marriage by age for four different synthetic cohorts of Korean women at each level of education. Looking first at women who did not attend high school (Figure 2), comparisons of marriage trajectories for two synthetic cohorts based on observed marriage rates in 1985-89 (orange line) and 2005-09 (dark blue line) show the large decline in marriage rates. The cumulative proportion married by exact age 45 in 2005-09 (0.71) is well below the corresponding value for 1985-89 (0.98), clearly showing that marriage is no longer universal for Korean women with the lowest level of education. The marriage trajectory based on the counterfactual assumption that availability ratios remained fixed at their 1985-89 values (gray line) shows that changes in the force of attraction are of paramount importance. This counterfactual marriage curve is well below the observed curve for 2005-09, showing that the cumulative proportion married by exact age 45 would be roughly half (0.54) of the observed value for 1985-89 if marriage market composition had not changed (e.g., if only forces of attraction changed). The role of changes in marriage market composition can be seen

more directly by looking at the counterfactual marriage curve calculated by holding forces of attraction constant at their 1985-89 values. If marriage market composition was the only thing to change, the cumulative proportion married would have reached 0.80 by age 25 and nearly 1.00 by age 30.

The pattern of change for women who attended high school (Figure 3) is qualitatively similar. The observed decline in marriage is less than for women who did not attend high school, but the contributions of changing forces of attraction and changing marriage market composition are the same. Cumulative proportions ever married would have been much lower at all ages if marriage market composition had not changed in a way that was conducive to marriage. Holding availability ratios constant (gray line), the cumulative proportion married by exact age 45 is only 0.62, but almost all women are married by age 30 if we hold forces of attraction constant and allow only the availability ratios to change as observed.

The patterns for women who attended junior college (Figure 4) and university (Figure 5) are quite different from the less educated counterparts, but are quite similar to those of the highly educated Japanese women examined by Raymo and Iwasawa (2005). For both groups, we see that changes in forces of attraction (holding availability ratios constant) account for most, but not all, of the relatively small observed decline in marriage. The facts that the gray curve (holding availability ratios constant) is slightly higher than the observed marriage curve for 2005-09 and the light blue curve (holding forces of attraction constant) is slightly lower than the observed marriage curve for 1985-89 indicate that both factors contributed to the decline in marriage. Beyond age 30, the counterfactual decline in age-specific proportions ever married (orange line - gray line) is 20-30% lower than the observed decline (orange line - dark blue line) for women

who attended junior college and 8-17% lower for women attended university. These values are very similar to those found for highly-educated Japanese women.

FIGURES 2-5 ABOUT HERE

Figures 6-9 show cumulative probabilities of first marriage by age for four different synthetic cohorts of Korean men at each level of education. Figure 6 shows cumulative probabilities of first marriage by age for five different synthetic cohorts of Korean men with less than high school education. First, comparisons of marriage trajectories for two synthetic cohorts based on observed marriage rates in 1985-89 (orange line) and 2005-09 (dark blue line) show the massive decline in marriage rates. The proportion of men with less than high school education who married by their 45th birthday fell by more than half, from .92 in the earlier period to 0.44 in the later period. The marriage trajectory based on the counterfactual assumption that forces of attraction remained fixed at their 1985-89 values (light blue line) shows that changes in forces of attraction account for all of the decline in marriage through age 35, but not beyond. At ages 40 and 45, the light blue and gray counterfactual marriage curves both lie between the two observed curves, indicating that both changes in marriage propensity and changes in marriage market composition contributed to the large decline in marriage. The cumulative probability of marriage based on the assumption of no change in forces of attraction is somewhat lower after age 30 relative to the trajectory based observed marriage rates for 1985-89. This difference reflects the impact of changes in marriage market composition after age 30. However, the fact that these two marriage trajectories are similar indicates that change in forces of attraction is the major source of declining marriage rates (as reflected in the much lower cumulative probabilities of marriage for the 2005-09 synthetic cohort relative to light blue counterfactual trajectory). The contribution of changing marriage market composition (see gray line) is larger than that for highly educated

women, with the counterfactual decline in marriage (holding availability ratios constant) 17% and 40% smaller than the observed change by ages 40 and 45, respectively. Finally, the marriage trajectory based on counterfactual marriage rates assuming no immigrant women (yellow line) shows that the cumulative percentage of men married by exact age 45 would be 10 percentage points lower than the observed percentage in 2005-09. Stated differently, the rise in international marriage has worked to marriage among men at the lower end of the educational distribution older ages from falling even further than it would have if potential mates were restricted to native-born Korean women.

The pattern for men who attended high school (Figure 7) is similar to that for the least educated group. Through age 35, declining forces of attraction account for most of the reduction in cumulative proportions married, but changes in marriage market composition play a major role at older ages. Indeed, the counterfactual decline in proportions married based on the assumption of no change in availability ratios is 73% and 86% smaller than the observed change by ages 40 and 45. Again, we see that international marriage has kept the proportion of older high-school educated men from falling further than it might otherwise have. The observed cumulative percentages married beyond age 40 (dark blue line) are 6-8 percentage points higher than the values calculated by counterfactually assuming that no international marriages took place (yellow line).

A similar, but less extreme, pattern holds for men who attended junior college. Beyond age 30, changes in marriage market composition account for a non-trivial proportion of the decline in marriage, with the counterfactual decline proportions married (orange line - gray line) being 27% and 45% smaller than the observed decline in marriage (orange line – dark blue line). A small role for international marriage is seen only at the ages, where the observed marriage curve is

slightly higher than the counterfactual curve based on the assumption of no international marriage.

For men who attended university, the pattern is quite different. There is no evidence that changes in marriage market composition have contributed to reductions in the proportion married. If anything, changes in marriage market composition have contributed to slightly higher levels of marriage as indicated by the fact that the counterfactual marriage trajectory (holding forces of attraction constant) is somewhat lower than the observed marriage trajectory for 1985-89. There is also no evidence that international marriage has played a role in the marriage behavior of highly educated men. The counterfactual marriage curve calculated by assuming no international marriage is identical to the observed marriage curve for 2005-09 (dark blue line).

FIGURES 6-9 ABOUT HERE

Summary

Extending Raymo and Iwasawa's (2005) work on the role of changing marriage market composition in the decline in marriage among highly-educated Japanese women, we have examined the contribution of changing marriage market composition to changes in marriage rates in Korea, another gender-inegalitarian country. We decomposed the decline in Korean women's and men's marriage rates between 1985-89 and 2005-09 into changes in marriage market composition and changes in the likelihood of specific pairings. We also considered the role of international marriages in offsetting the posited implications of changing marriage market composition for men.

Using individual records from two Korean censuses, we first showed that marriage rates declined between 1985-89 and 2005-09 for women and men at all levels of education. For women, there is some evidence that large reductions in marriage rates at younger ages are offset

by increasing rates of marriage beyond age 35. However, the rates of marriage at these older ages are low. For men, the decline in marriage was particularly pronounced among those with lower levels of education. For example, the synthetic cohort percent of men who married by age 45 (based on marriage rates in 2005-09), was only 44 percent among those with less than high school, 48 percentage points lower than 92 percent calculated using marriage rates for 1985-89. Among men who attended high school, the percentage of ever-married men by age 45 declined from 98 percent in 1985-89 to 70 percent in 2005-09. Although the magnitude was relatively smaller than that for men with high school or less, marriage rates for men who attended a junior college or university also declined substantially between the two periods.

To what extent does changing marriage market composition explain these profound declines in marriage in Korea? Our comparisons of counterfactual marriage rates with observed rates showed that the major driving factor for declining marriage between 1985-89 and 2005-09 is change in forces of attraction. However, our results also showed that the change in marriage market composition accounts for 10-30% of the overall decline in marriage for women with more than a high school education and 20-40% of the decline in marriage for men with a high school or less education. We also found that the growth in international marriages between Korean grooms and foreign brides played a role in preventing even more dramatic decline in marriage among low educated men. Specifically, our counterfactual models assuming no international marriage indicated that the cumulative probability of marriage for Korean men with less than high school would be 10 percentage points lower than that calculated based on observed marriage rates. The corresponding difference among men with a high school education was 8 percentage points. International marriages, however, were largely unrelated to university-educated men's marriage rates.

Taken as a whole, our results provide empirical support for the generality of role for marriage market mismatches in declining marriage rates in gender-inegalitarian countries. Not only do we find that the relationship between changing marriage market composition and the marriage behavior of highly-educated Korean women is very similar that observed for Japanese women, we also find strong support for the posited implications of marriage market mismatches for the marriage outcomes of men with lower levels of education. These findings have important implications for our understanding of family formation and social/economic inequality in gender-inegalitarian societies. Increasingly tenuous economic circumstances for those with limited education contribute to growing inequality in marriage prospects (especially for men). This is exacerbated by the marriage market mismatches generated by a combination of rapid relative improvements in women's educational attainment and entrenched norms of status homogamy and female status hypergamy. To the extent that marriage is associated with well-being (e.g., social status, economic security, and health and emotional well-being), these marriage market mismatches are playing an underappreciated role in shaping patterns of inequality in countries like Korea and Japan. Further effort to develop a broader theoretical and empirical understanding of linkages between rapid relative improvements in women's educational attainment and processes of stratification and inequality is a potentially valuable direction for subsequent research.

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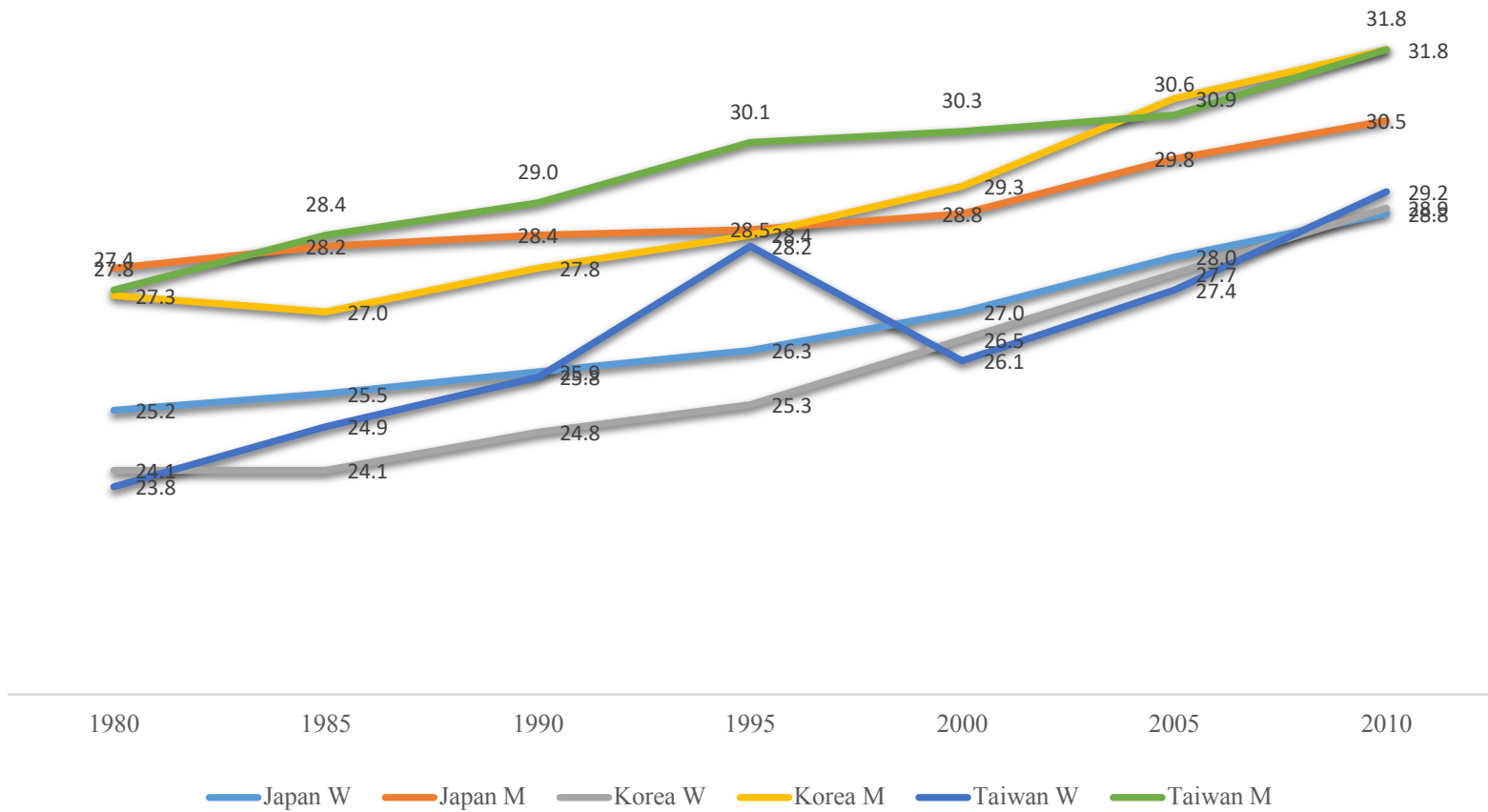
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Figure 1. Mean Age at First Marriage by Gender and Year in East Asia



Sources: Table 1 in Raymo et al. (2015)

Figure 2. Observed and Counterfactual Cumulative Percentages of First Marriage By Age for Korean Women with Less than High School

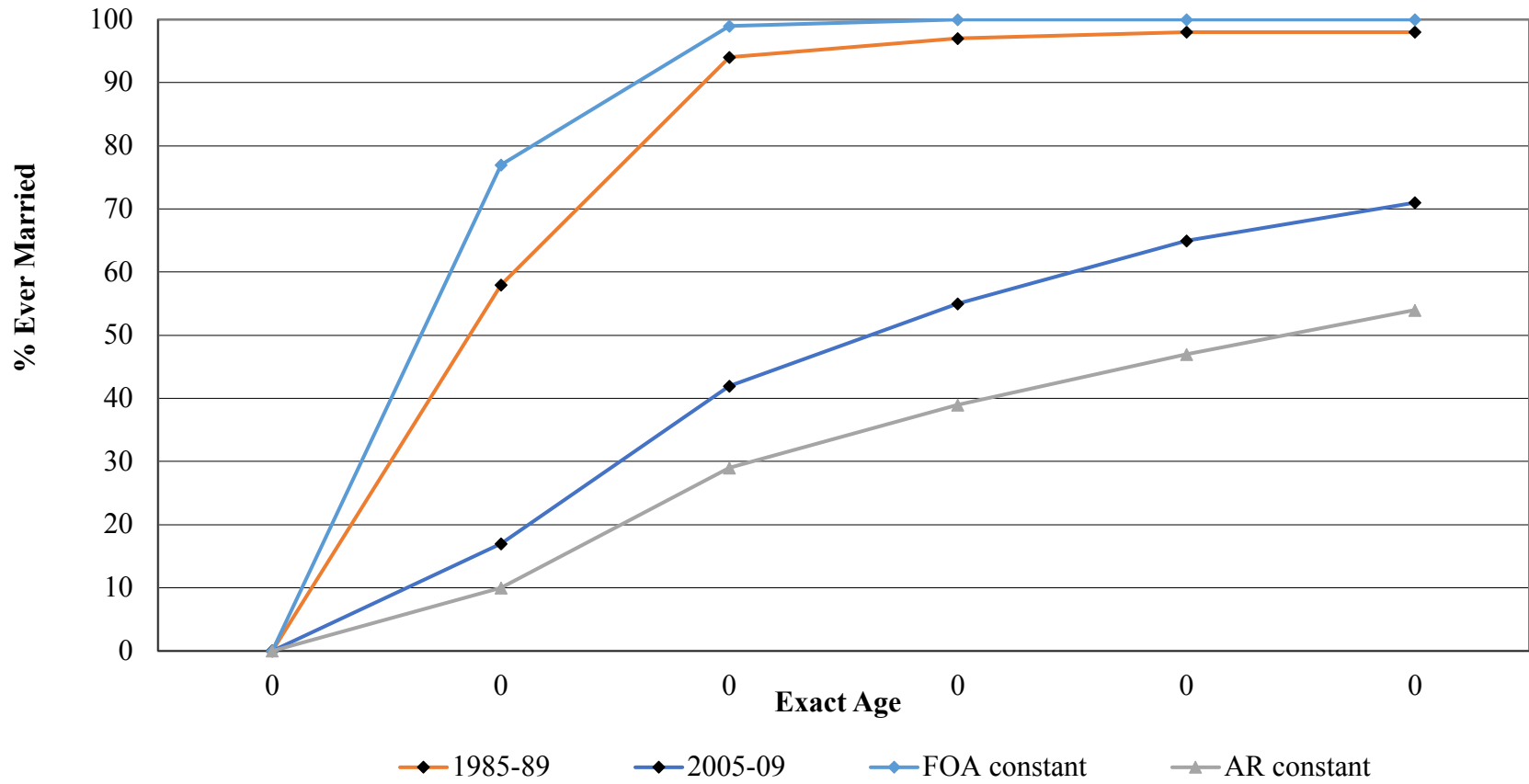


Figure 3. Observed and Counterfactual Cumulative Percentages First Marriage By Age for Korean Women with High School Education Only

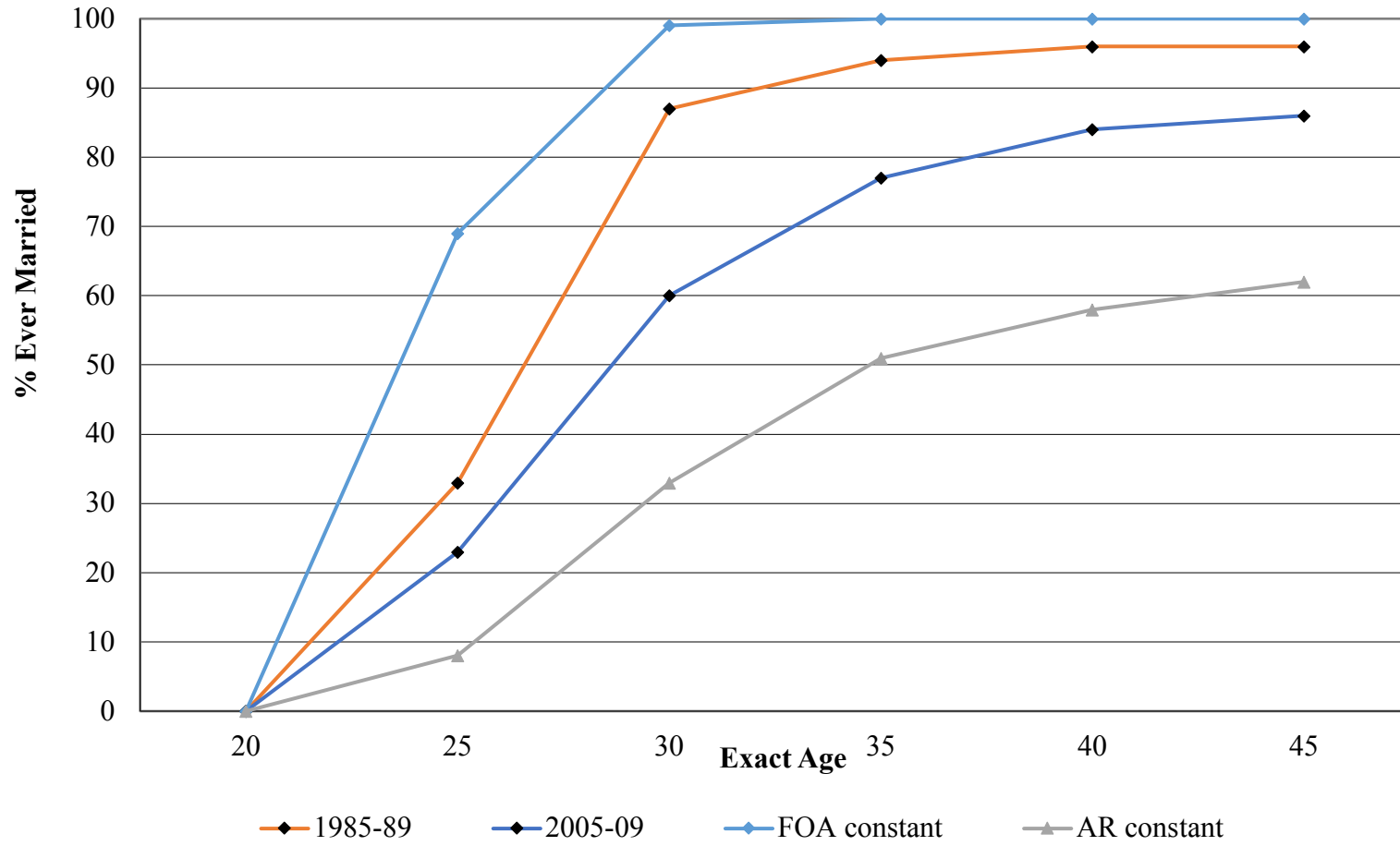


Figure 4. Observed and Counterfactual Cumulative Percentages of First Marriage By Age for Korean Women with Junior College

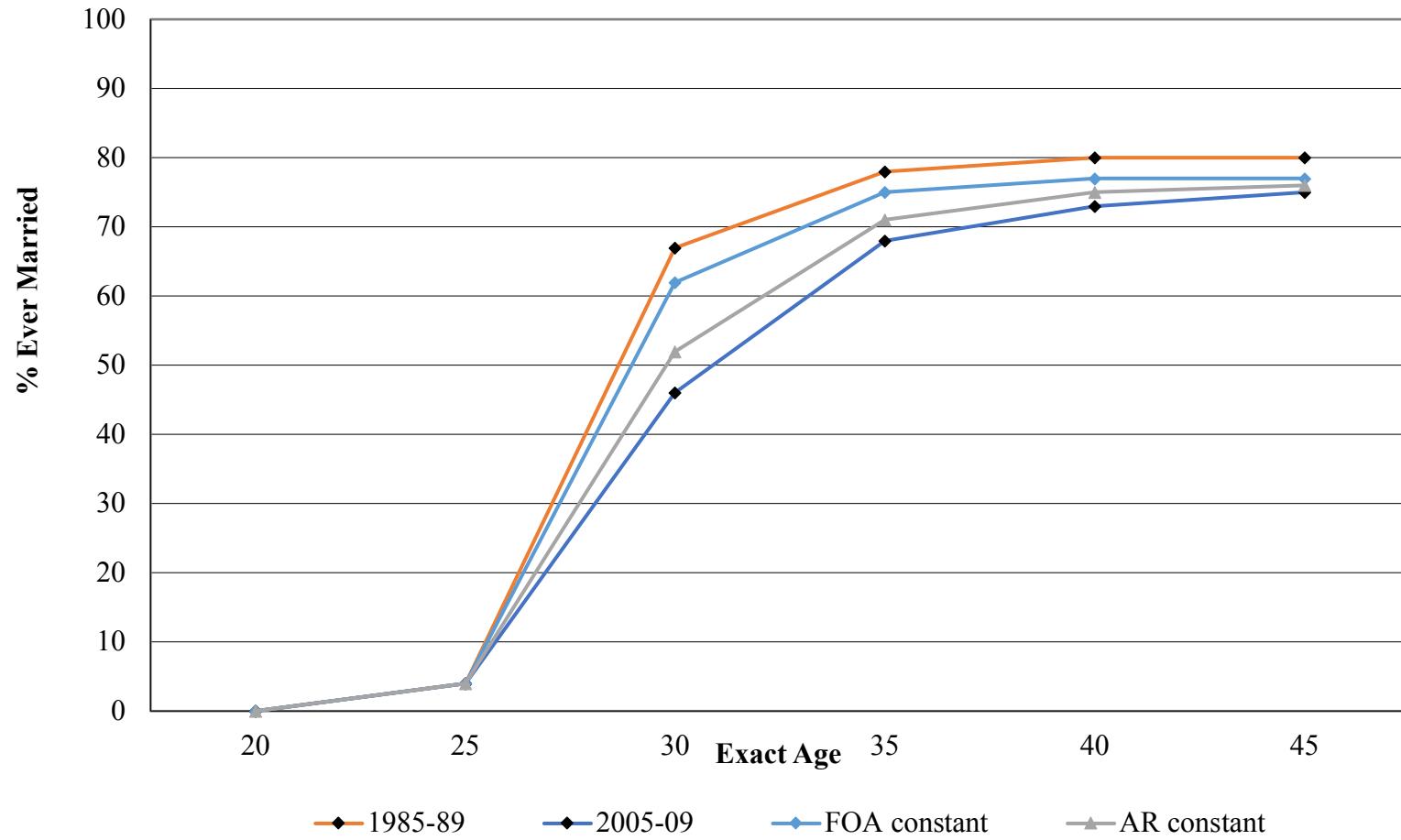


Figure 5. Observed and Counterfactual Cumulative First Marriage By Age for Korean Women with University

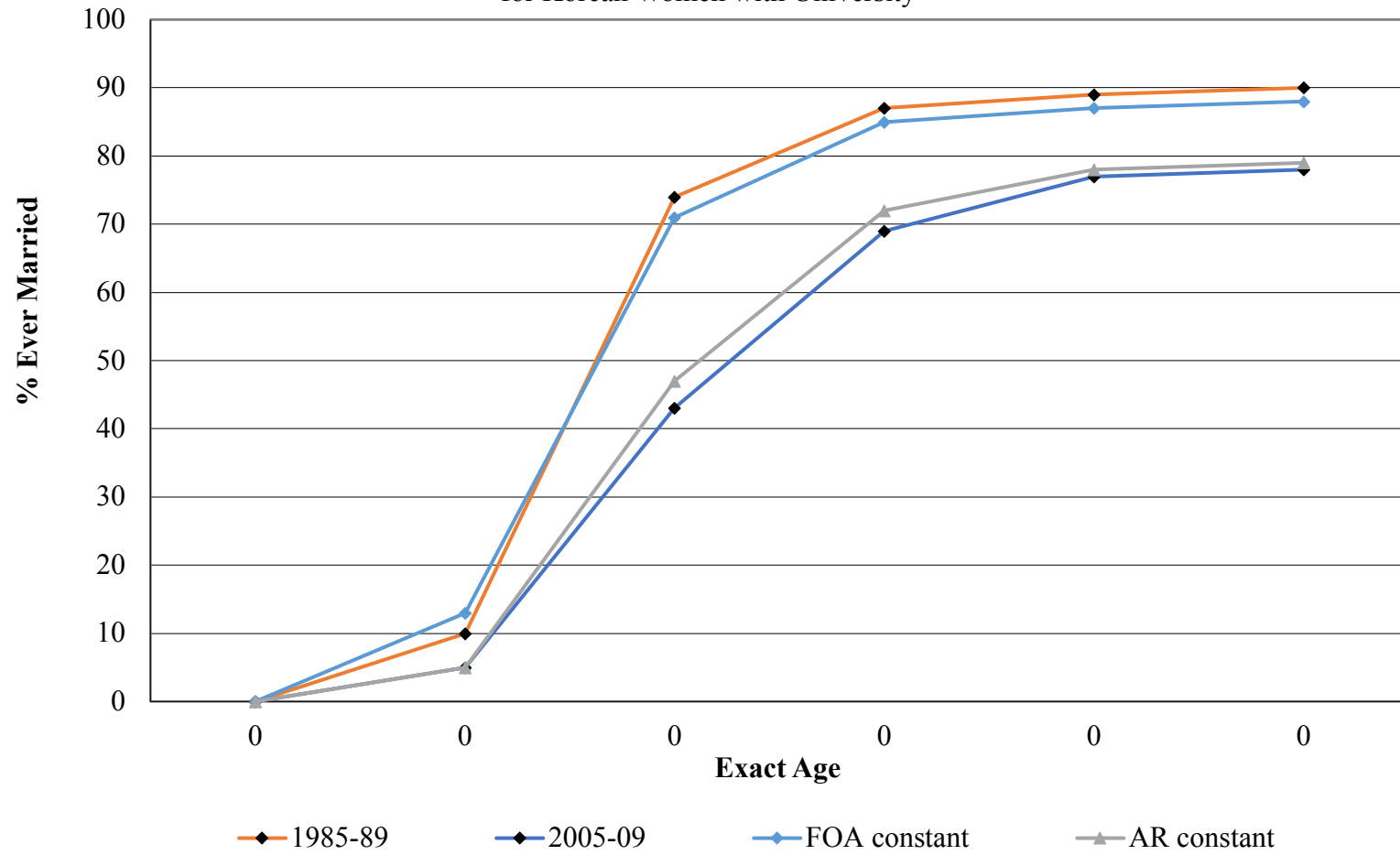


Figure 6. Observed and Counterfactual Cumulative Percentages of First Marriage By Age for Korean Men with Less than High School

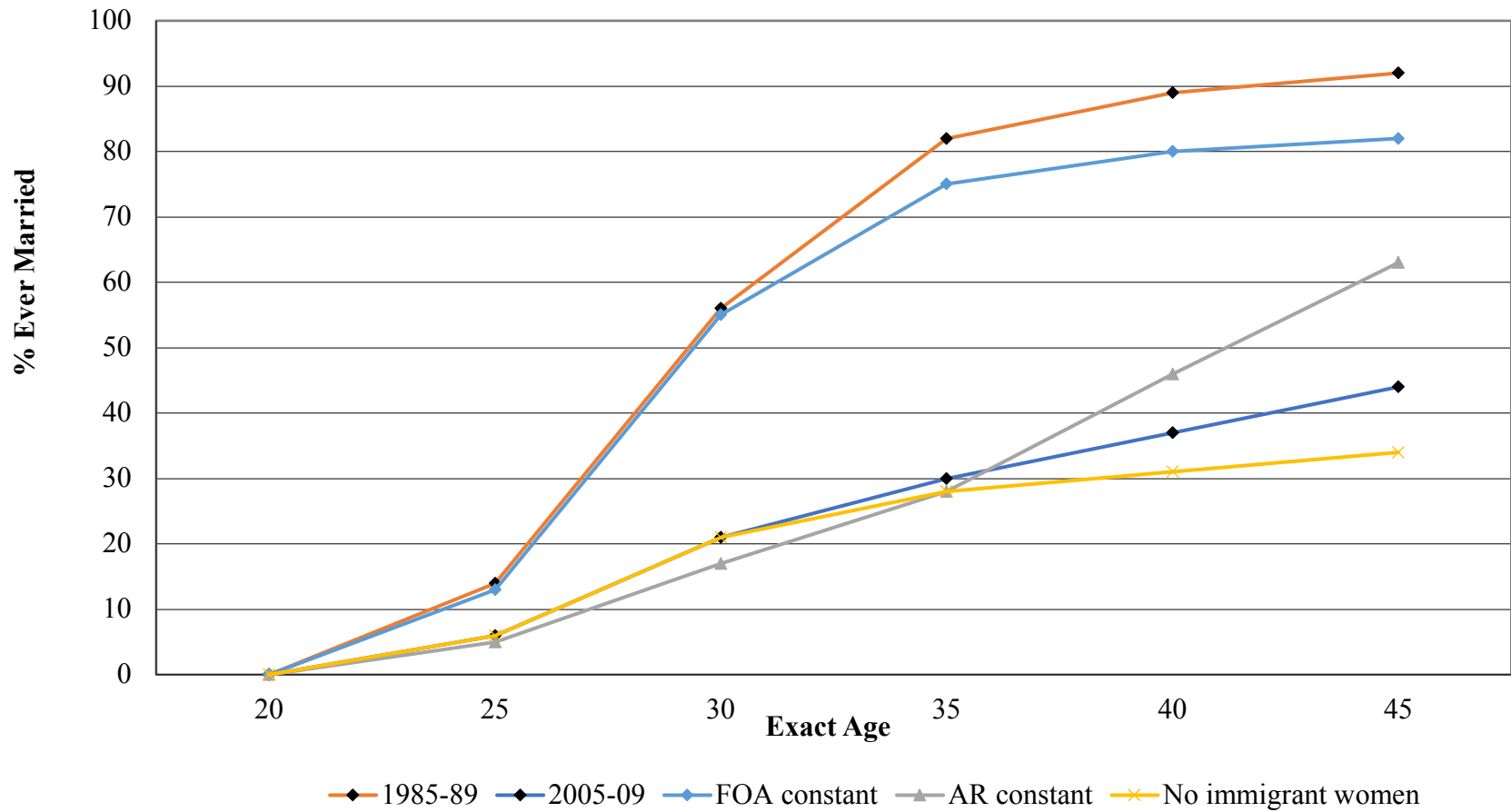


Figure 7. Observed and Counterfactual Cumulative Percentages First Marriage By Age for Korean Men with High School Education Only

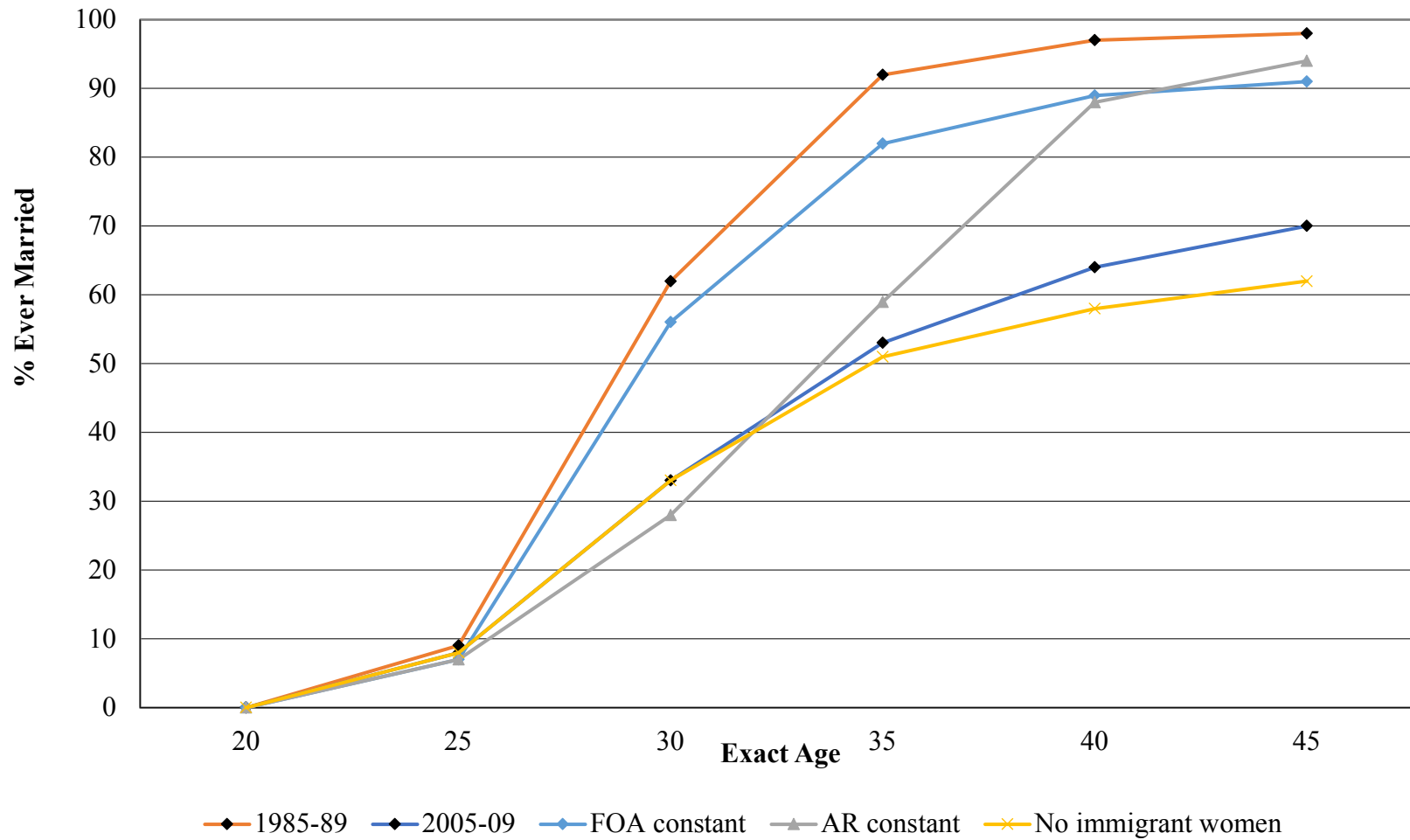


Figure 8. Observed and Counterfactual Cumulative Percentages of First Marriage By Age for Korean Men with Junior College

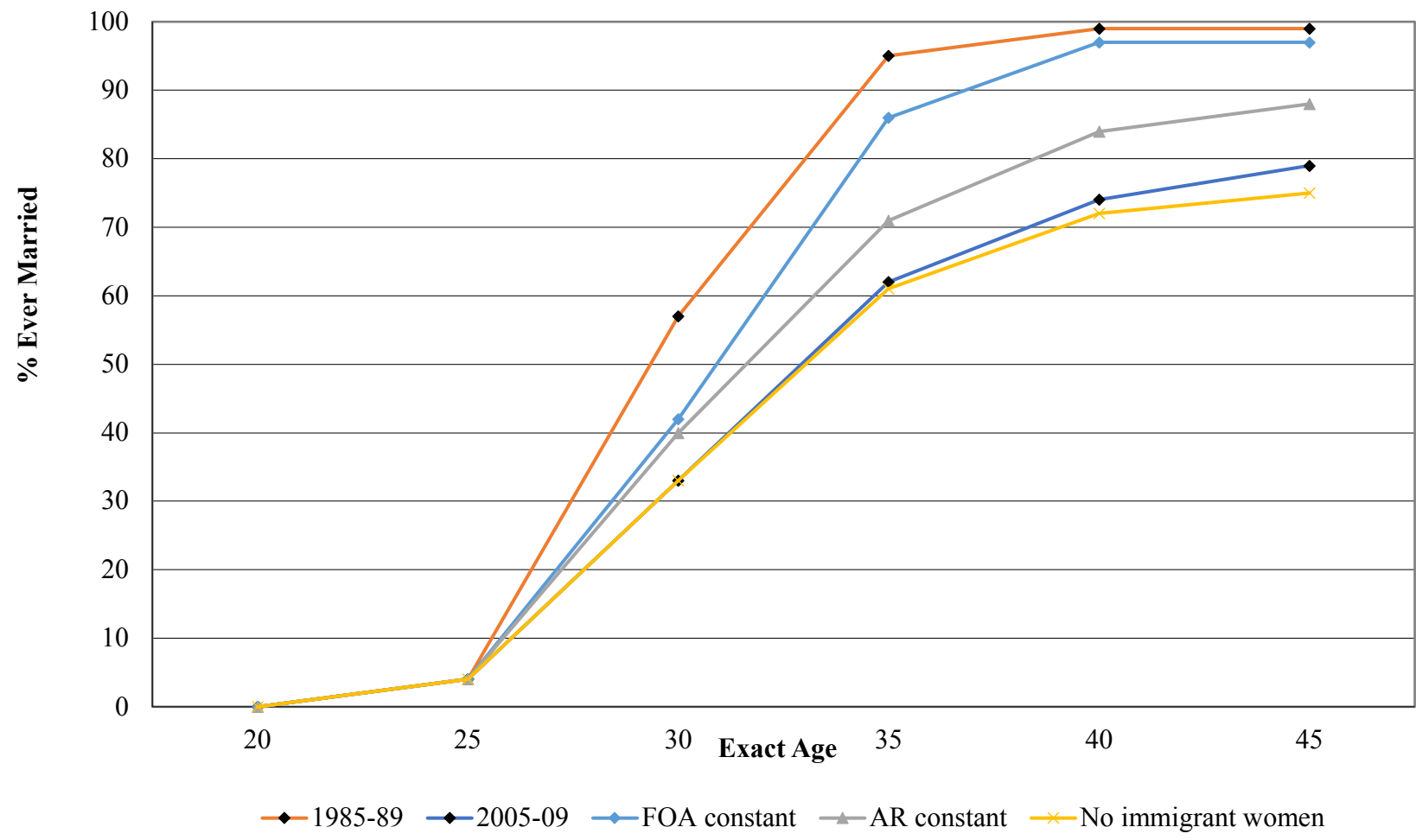


Figure 9. Observed and Counterfactual Cumulative First Marriage By Age for Korean Men with University

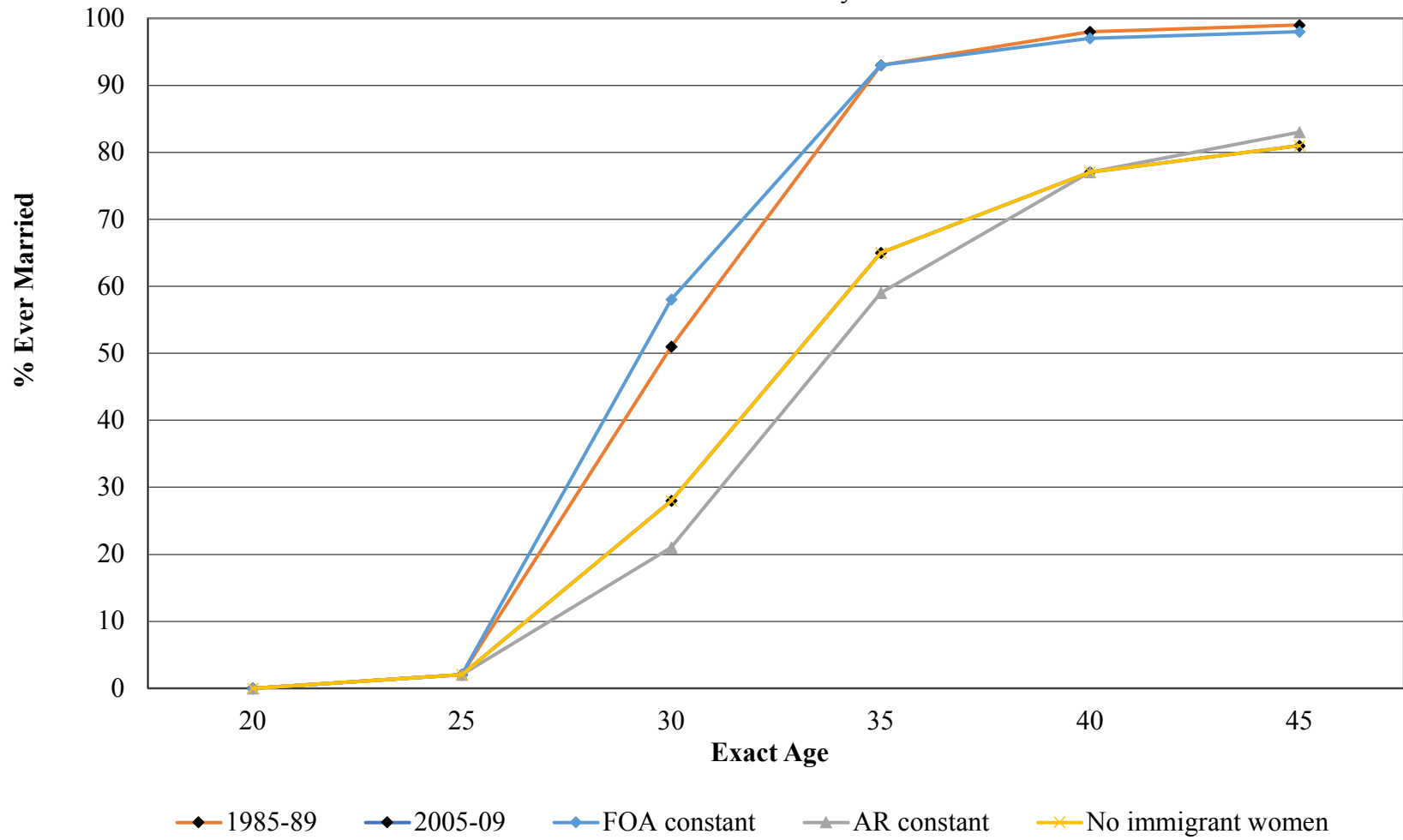


Table 1. Distribution of Educational Attainment Among Korean Men and Women Aged 25-44 and Its Gender Ratio

	Men		Women		Ratio: #Men/#Women	
	1990	2010	1990	2010	1990	2010
Less than High School	0.26	0.03	0.44	0.03	0.60	0.92
High School	0.45	0.33	0.42	0.39	1.08	0.85
Junior College	0.05	0.22	0.03	0.23	1.67	0.99
University	0.24	0.42	0.11	0.35	2.21	1.22
Total	1.00	1.00	1.00	1.00		

Table 2. Ratios of Observed and Counterfactual Marriage Rates in 2005-9 to Observed Marriage Rate in 1985-89 (Women)

	Observed Ratio	Counterfactual Ratio	
	(MR 2005-09 / MR 1985-89)	AR Constant	FOA Constant
Less than High School			
20-24	0.22	0.12	1.70
25-29	0.19	0.13	1.51
30-34	0.33	0.19	1.57
35-39	0.64	0.36	1.46
40-44	1.78	1.36	1.39
High School			
20-24	0.67	0.32	2.99
25-29	0.40	0.25	2.02
30-34	0.64	0.45	1.72
35-39	1.21	0.96	1.47
40-44	4.18	3.43	1.28
Junior College			
20-24	0.89	1.09	0.89
25-29	0.50	0.64	0.82
30-34	1.02	1.15	0.92
35-39	1.65	1.72	0.91
40-44	N.A.	N.A.	N.A.
University			
20-24	0.44	0.45	1.26
25-29	0.41	0.47	0.88
30-34	0.85	0.90	0.91
35-39	1.79	1.56	1.04
40-44	0.61	0.53	0.98

N.A.: There was no marriage recorded in the data for the period of 1985 to 1989 among 40-44 women with junior college

Table 3. Ratios of Observed and Counterfactual Marriage Rates in 2005-9 to Observed Marriage Rate in 1985-89 (Men)

		Observed Ratio	Counterfactual Ratio		
		(MR 2005-09 / MR 1985-89)	AR Constant	FOA Constant	No Immigrant Women
Less than High School					
	20-24	0.40	0.34	0.94	0.40
	25-29	0.26	0.19	0.96	0.26
	30-34	0.13	0.17	0.65	0.10
	35-39	0.21	0.54	0.43	0.08
	40-44	0.40	1.25	0.30	0.17
High School					
	20-24	0.89	0.80	0.86	0.88
	25-29	0.36	0.28	0.86	0.35
	30-34	0.22	0.35	0.56	0.20
	35-39	0.25	1.20	0.45	0.16
	40-44	0.29	1.19	0.39	0.15
Junior College					
	20-24	1.15	1.67	0.51	1.13
	25-29	0.45	0.60	0.60	0.45
	30-34	0.25	0.34	0.60	0.24
	35-39	0.23	0.41	0.68	0.19
	40-44	N.A.	N.A.	N.A.	N.A.
University					
	20-24	0.73	0.70	1.00	0.73
	25-29	0.44	0.30	1.22	0.44
	30-34	0.36	0.33	0.88	0.36
	35-39	0.34	0.44	0.73	0.32
	40-44	0.28	0.39	0.76	0.24

N.A.: There was no marriage recorded in the data for the period of 1985 to 1989 among 40-44 men with junior college