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Marital age homogamy in China: A reversal of trend in the reform era?

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ABSTRACT

This paper reports on a study of trends in marital age homogamy in China from 1960 to 2005 that uses data from the China 2005 1% Population Inter-census Survey. Instead of a consistent increase in age homogamy, results show an inverted U-shaped trend. One plausible explanation is that intensified economic pressure, rising consumerism, and a shrinking gender gap in education during the post-1990s reform era have acted to increase women's desire to marry men who are more economically established, and thus usually older, than less financially secure men. We argue that age hypergamy maintains status hypergamy, a deeply rooted norm for couples in China. An auxiliary analysis based on the human capital model for earnings supports this interpretation. A continued trend in age hypergamy implies a future "marriage squeeze" for men of low socioeconomic status.

1. Introduction

Social homogamy, or marriage between individuals with similar social characteristics (Burgess and Wallin, 1943), is a common practice in many societies. In the literature on marriage and social stratification, an increase in homogamy based on such attributes as socioeconomic status, education, and race/ethnicity is generally considered an indicator of declining social openness and increasing social inequality (Harris and Ono, 2005; Kalmijn, 1991, 1998; Mare, 1991; Mare and Schwartz, 2006; Raymo and Xie, 2000; Schwartz, 2010; Schwartz and Mare, 2005; Smits et al., 1998; Torche, 2010; Zijdeman and Maas, 2010).

Another form of homogamy is age homogamy, or marriage between individuals of similar ages. The level of age homogamy is also an important indicator of social closure and gender inequality, as large age differences between spouses have been associated with more patriarchal family systems and less spousal intimacy (Blossfeld, 2009; Shorter, 1977; Van de Putte et al., 2009; Van Poppel et al., 2001). However, this type of homogamy has received less attention among researchers than social homogamy based on the aforementioned attributes. While the literature includes several studies of age homogamy (e.g., Atkinson and Glass, 1985; Esteve et al., 2009; Van de Putte et al., 2009; Van Poppel et al., 2001), none deals with a long-term trend in contemporary China, particularly reform-era China.

This study analyzes trends in age homogamy in China between 1960 and 2005, using indicators based on Schoen's forces of attraction (Esteve et al., 2009; Qian and Preston, 1993; Schoen, 1981, 1988) and data from the nationally representative China 2005 1% Population Inter-census Survey (or the 2005 mini-census). Instead of a consistent increase in age homogamy, as one might expect from the literature, we found an inverted U-shaped trend over the period. One plausible explanation is

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that intensified economic pressure, rising consumerism, and a shrinking gender gap in education during the post-1990s reform era have acted to increase women's desire to marry men who are more economically established, and thus often older than their less financially secure counterparts. Age hypergamy acts to maintain status hypergamy, a deeply rooted value for couples in China.

2. Background

2.1. Age homogamy and economic development

A large literature in sociology has explored trends in social homogamy (Atkinson and Glass, 1985; Esteve et al., 2009; Han, 2010; Kalmijn, 1991, 1993, 1998; Mare, 1991; Qian, 1997; Qian and Lichter, 2007; Raymo and Xie, 2000; Schwartz and Mare, 2005; Song, 2009; Van de Putte et al., 2009; Van Poppel et al., 2001; Zijdeman and Maas, 2010). Whereas homogamy in other social attributes reveals inequality and social closure, age homogamy is indicative of gender equality and social openness (Casterline et al., 1986; Shorter, 1977; Van Poppel et al., 2001; Wheeler and Gunter, 1987). A few studies have found either an increase or no clear trend in age homogamy with economic development (Atkinson and Glass, 1985; Casterline et al., 2010; Esteve et al., 2009; Qian, 1998; Van de Putte et al., 2009; Van Poppel et al., 2001).[1]

Age homogamy may increase with economic development for several reasons. While practices have varied across populations and periods, the traditional family in pre-industrial societies is characterized by a relatively large age gap between an older breadwinner husband and a younger wife with limited nondomestic labor participation (Van Poppel et al., 2001). This pattern of large age gap supports the patriarchal family system by reinforcing the husband's authority and impeding spousal intimacy (Barbieri et al., 2005; Cain, 1993; Van Poppel et al., 2001). However, with greater industrialization comes an expansion in women's economic roles outside the home and generally a narrowing of the age gap between husbands and wives. In this context, increasing age homogamy is taken to indicate a concomitant rise in gender equality and love-based (as opposed to necessity-based) marriages (Bozon, 1991; Van de Putte et al., 2009; Van Poppel et al., 2001).

Kalmijn's (1991, 1998) general framework for explaining social homogamy offers a rationale for why the spousal age gap is affected by social development. Within Kalmijn's framework there are three sets of explanatory factors : (1) the preferences of marriage candidates, (2) the impact of "third parties" (e.g., marriage candidates' parents), and (3) the interaction structures of the marriage market. All three factors are affected in favor of age homogamy by the process of economic development (Raymo and Iwasawa, 2005; Smits et al., 1998; Song, 2009).

By "preference," social researchers commonly mean individuals' choices free of structural constraints and motivated by their own social values and beliefs. Marriage is a social institution that binds two persons together in an intimate living relationship. Of course, people may get married for different reasons: some to complete an economic exchange, some out of family or even national interests, and some for romantic love. As a society changes from agricultural to industrial, however, romance becomes increasingly the accepted and even predominant basis for marriage due to the less necessity and desire for economic-exchange marriages and also due to more opportunities for the young adults to interact (Blossfeld and Timm, 2003; Thornton and Lin, 1994; Xu and Whyte, 1990). Admittedly, persons of different ages can and do form strong bonds based on romantic love, but romance is most likely to develop when partners interact directly and are similar in such characteristics as age, culture, tastes and physical conditions (Bhrolcháin, 1992; Van Poppel et al., 2001). Thus, a shift to a love-based mate-selection norm is more likely to lead to smaller age differences (Bozon, 1991; Van Poppel et al., 2001; Wheeler and Gunter, 1987).

Regarding the second set of factors, it is well established that as a society becomes industrialized, individuals depend less on parents or other authority figures ("third parties") in their decisions about family-related behaviors – including marriage (Barbieri et al., 2005; Goode, 1970; Thornton, 2001; Thornton et al., 2007; Thornton and Lin, 1994; Xu and Whyte, 1990). When young adults are left on their own to choose potential spouses, they select from those whom they know best – most likely age peers – and these marriages reduce the overall spousal age gap (Bozon, 1991; Casterline et al., 1986; Van Poppel et al., 2001; Wheeler and Gunter, 1987).

Along with personal preference and the impact of the third parties, age homogamy can also be affected by the structure of the marriage market, which itself may be affected by economic development (Atkinson and Glass, 1985; Bhrolcháin, 1992; Bytheway, 1981; Kalmijn, 1991, 1998; Lichter et al., 1995; Stier and Shavit, 1994; Todd et al., 2005; Vera et al., 1985). With development, educational attainment generally increases. As a result, youths spend an increasingly large fraction of their pre-marital years in school, resulting in a much higher probability of individuals finding spouses among their schoolmates. This may be especially true for those receiving higher education, as the timing for pursuing postsecondary education usually parallels that for selecting marriage partners. Therefore, lengthened education completion may transform postsecondary institutions into important marriage markets and thus may increase the incidence of age homogamy (Blossfeld and Timm, 2003; Mare, 1991).

For the reasons above, a consensus has emerged in the literature that economic development generally leads to a rise in age homogamy. This prevailing theoretical view is supported by empirical evidence from a variety of countries. For example,

[1] We are aware that there are some empirical literatures showing no clear trend in age homogamy. However, we will make no further discussion on this finding. The reasons are two-folds: first, literatures of this kind are highly limited in number and are subject to very restrictive social or temporal contexts. Therefore, findings of no clear trend are mostly made as auxiliary results aside from the main findings. Secondly, none of the literatures provide theoretical explanations on this kind of findings and most of them left them as empirical inconsistencies.

Casterline et al. (2010) report that during the past three decades 17 of 24 low-income countries under study experienced an increase in low-age-gap marriages with a gap of 0–5 years (0 and 5 included). The increases ranged from 0.2% for Peru between 1977 and 2004 to 20.5% for Ghana between 1979 and 2008. Wealthier countries experienced similar increases in low-age-gap marriages with growing development. For example, US marriages with 0–4-year spousal age gaps (4 included) increased from 37.1% in 1900 to 63.3% in 1960 and 69.9% in 1980 (Atkinson and Glass, 1985). The percentage of marriages with age gaps of less than two years (two excluded) rose by 7–20% for the Dutch regions between 1812 and 1913 (Van de Putte et al., 2009). The proportion of marriages with 0–5-year age gaps (5 included) increased from 35% in the mid-nineteenth century to more than 50% in the 1970s and early 1980s for the Netherlands (Van Poppel et al., 2001), and from 36% to 49% in Spain, 1944–2000 (Esteve et al., 2009).

Thus, previous studies all indicate a decline in the age gap between spouses, particularly during periods of development. Is this generalization universal? Specifically, does it hold true for China in its recent past? We will answer these questions in the remainder of our paper.

2.2. The Chinese context

The People's Republic of China was founded in 1949 after the Communist Revolution. For the first 30 years, employment opportunities, consumption, and even family life in China were largely regulated by the state, and the Communist ideology regarding equality prevailed (Meisner, 1999; Parish, 1981; Whyte, 2010; Yu and Xie, 2013). In 1978, China began its economic reform, leading to dramatic improvements in economic and educational outcomes (Hauser and Xie, 2005; Qian, 2000; Whyte, 2010; Xie and Hannum, 1996). For example, from 1978 to 2005, China's per capita GDP grew from 381 yuan to 2062 inflation-adjusted yuan, averaging an annual growth rate of 6.45% (China Statistics Press, 2006: Table 3-1, 3-17). In terms of education, from 1978 to 2005, the proportion of population enrolled in postsecondary institutions grew from 0.09% to 1.19% (China Statistics Press, 2006: Table 4-1, 21-6),[2] while from 1982 to 2005, the illiteracy rate dropped tremendously from 31.87% to 11.04%[3] (China Statistics Press, 1985: Table 6 of the Third Census Document; 2006: Table 4-13). For persons aged 25–29, the age range in which marriage usually occurs, the percentage completing postsecondary education grew dramatically from 1.04% in 1982 to 12.66% in 2005 (China Data Center, 1982: Table 5-48; 2005: Table 4-1).

Since the Communist Revolution in 1949, women's social standing in China has improved significantly (Hannum, 2005; Lavely et al., 1990; Song, 2009; Zhang et al., 2008). The 1950 Marriage Law formally legalized free-choice marriages and explicitly protected wives' rights and interests, making them equal to those of husbands (China Administration Council, 1950: Item 5). Women's educational attainment has gradually caught up with that of men (Treiman, 2013; Wu and Song, 2010: Table 2; Wu and Zhang, 2010). For instance, in 1982, 1.24% of men and 0.64% of women had postsecondary education – rates that grew respectively to 6.72% and 5.63% in 2005, narrowing men's advantage from about 100% to only about 20% (China Data Center, 1982: Table 5-46; 2005: Table 4-1).

In general, increases in women's social status have challenged status hypergamy – the tendency of women to marry men of higher social status – which is an indigenous practice in China and other East Asian countries (Baker, 1979; Croll, 1981; Dasgupta et al., 2010; Fan and Li, 2002; Freedman, 1970; Meijer, 1971; Raymo, 2003; Raymo and Iwasawa, 2005; Watson and Ebrey, 1991; Xu et al., 2000; Yang, 1959). Chinese society has historically maintained a patriarchal and patrilineal family system (Thornton and Lin, 1994; Xu et al., 2000). Since women had limited access to work outside their households, a woman's social status was determined by that of her parents before marriage and by that of her husband after marriage. Under this rigid patriarchal system, the man customarily assumed the role of primary breadwinner, which meant that his socioeconomic status was higher than that of his wife. Thus, status hypergamy has long been a prevalent cultural norm in Chinese society. Along with women's improved social status, the practice of status hypergamy may have been eroded to some extent.

These recent and dramatic social changes in China – increasingly free choice in mate selection, improved economic well-being, and women's rising social status – provide a highly relevant context in which to analyze trends in age homogamy. The literature suggests that these social changes should all have led to increasing age homogamy for contemporary China. But has this been the case? We will answer this empirical question in the remainder of our paper.

3. Data and methods

This study uses both descriptive statistics and homogamy indicators based on "forces of attraction" (Esteve et al., 2009; Qian and Preston, 1993) to analyze age homogamy trends. To examine the robustness of the descriptive results, we also apply log-multiplicative layer effect models using year of marriage as the layer variable. Due to space limitation, we do not report all the results.[4] We use data from China 1% Population Inter-census (or the 2005 mini-census).

[2] All percentages completing postsecondary education in this sentence and in the next paragraph were computed as ratio of population completing postsecondary education over that receiving any education, due to data availability.

[3] The base for the 1982 illiteracy rate is population 12 years and older, and that for the 2005 illiteracy rate is population 15 years and older. This comparison gives us a conservative evaluation of the drop in illiteracy.

[4] Results using log-multiplicative layer effect models are posted on the author's website.

3.1. Analytical samples

We first restrict our analyses to individuals aged 15 and older to exclude those ineligible for marriage. Next, to compute forces of attraction, we construct for each study year two subsamples: one of single individuals who have never been married, and the other of couples. Constructing these subsamples retrospectively from 2005 data, we must account for women's lower mortality than men's (Yaukey et al., 2007), which could result in significant underestimation of spousal age gaps for earlier marriage cohorts. Hence, we restrict our analyses of both singles and couples subsamples to the period 1960–2005, rather than the period 1929–2005, the years covered in the original dataset.

For the singles subsample, we set the marriageable age range at 15 to 50 for each marriage cohort. Note that we need to construct for each marriage cohort a pool of single persons at risk for marrying, including those who were married later. Therefore, this reconstructed subsample of "singles" includes all persons aged 15–95 in 2005 who were either married at some point after 1960 or still single in 2005. These restrictions leave us with a total of 1,880,015 in the singles subsample: 947,324 males and 932,691 females.

For the couples subsample, we restrict the data to couples in which both partners were married for the first time that year, forming the marriage cohorts. These restrictions result in a total of 459,721 couples in marriage cohorts between 1960 and 2005. We use this larger couples sample for descriptive analyses and log-multiplicative layer effect models. However, to compute homogamy indicators based on forces of attraction, we further restrict the sample to couples in which both spouses were 15 to 50 years of age, the assumed marriageable age range, reducing the total to 459,291 couples.

We are aware that the actual mate-selection process cannot be determined by a single person but requires the cooperation of two marriage partners and often their families as well. That is, individual partners must be jointly involved in making a decision to get married. As described above, our analytical sample is based on observed marriages. For this reason, our data pertain to actually contracted marriages and thus cannot reveal individuals' latent preferences or processes that led to the marriages. However, to achieve our objective of understanding trends in age homogamy in China's recent past, observed information about husbands and wives in contracted marriages is actually what we want. One advantage of our reduced-form approach is that our indicators of homogamy can be easily constructed from retrospective data and are comparable over time.

From the 2005 mini-census data, we reconstruct, retrospectively, the experiences of marriage cohorts. Because only age at first marriage is included in the dataset, we restrict our analyses to first marriages, which may introduce a bias into our study. Past studies on trends in homogamy have relied on repeated cross-sectional data of recently contracted marriages or newlyweds to avoid bias from selective marital dissolution or remarriage (e.g., Kalmijn, 1994; Mare, 1991; Qian, 1998; Qian and Preston, 1993; Raymo and Xie, 2000; Schwartz and Mare, 2005). However, given the very low divorce rates in China throughout this period,[5] we do not anticipate a severe problem in our sample, though it is still useful to speculate on the direction of such biases. As many scholars of marriage have argued, larger spousal age differences often predicts higher risks of divorce (Bumpass and Sweet, 1972; Day, 1964; Levinger, 1976; Wilson and Smallwood, 2008), and marriages of higher parity tend to have larger spousal age gaps (Atkinson and Glass, 1985; Bhrolcháin, 1992; Dean and Gurak, 1978; Vera et al., 1985). Given the rise in divorce rates during the study period, our focus on first marriages is likely to exert an upward bias on trends in age homogamy, especially for more recent periods.

Our exclusion of couples in which one or both partners is a remarried widow/widower may also affect the results. Although widows used to be discouraged from remarriage due to China's traditional emphasis on female chastity (Campbell and Lee, 2002; Marriage and Family Encyclopedia, 2009), widow remarriage has become more common in contemporary China with advancements in women's social status and individual rights. This change, combined with the positive link between marriage parity and spousal age gaps, means the exclusion of remarried widows should also lead to an increasing upward bias in age homogamy.

Additionally, given the cross-sectional nature of the 2005 mini-census dataset, a majority of the younger individuals in 2005 may not yet have completed their mate selection process, suggesting our couples sample of the recent marriage cohort may have a disproportionately high proportion of younger-age marriages. According to the literature, younger-age marriages are characterized by smaller age gaps than later-age marriages (Qian, 1998; Van Poppel et al., 2001). Hence, we may find an overestimation for age homogamy in more recent marriage cohorts. In a later section, we will discuss these potential influences with regard to specific results.

3.2. Homogamy indicators

The concept of force of attraction was first introduced by Schoen (1981, 1988). It is a special type of marriage rate based on the harmonic mean of single males and females – that is, those at risk for marriage – for each spousal age combination. The mathematical formula of force of attraction is:

$$\alpha_{ij} = \frac{m_{ij}}{\frac{H_i W_j}{(H_i n)+(W_j n)}} \tag{1}$$

[5] Divorce rates range from as low as 0.035% in 1980 to as high as 0.137% in 2005 (China Statistics Press, 2006).

in which m_{ij} indicates the number of marriages between males aged i and females aged j; i and j are both age intervals; n is length of the intervals and varies with the definition of age homogamy; H_i and W_j respectively identify the number of eligible males at age i and that of eligible females at age j. In this formula, the number of marriages that are actually contracted is considered along with the amount of potential exposure between eligible males aged i and females aged j. Thus, the entire population at risk for marriage is taken into account (Blossfeld and Timm, 2003). Compared to investigations of only prevailing marriages, our analysis controls for changes in age-sex composition of the marriage market.

For each marriage cohort, we calculate a homogamy indicator based on forces of attraction (Esteve et al., 2009), which is the ratio of sum of forces of attraction (α_{ij} as defined in Eq. (1)) where i equals j, over the sum of all forces of attraction. This indicator reflects the strength of preferences for age homogamy over the overall distribution of couples. It ranges from 0 to 1, with higher values indicating stronger preferences for age homogamy.

We construct forces of attraction and homogamy indicators respectively with single-year, three-year, and five-year age-gap groups. As Van Poppel et al. (2001) demonstrated, dividing age at marriage into groups with mandatorily determined boundaries and widths can only identify level of heterogamy with relatively large spousal age gaps and thus may produce inaccurate results. Furthermore, this approach may classify some marriages with a small age gap (e.g., husband marrying at 35 and wife at 34) as heterogamy, while classifying others with a large age gap (husband marrying at 34 and wife at 30) as homogamy. Therefore, experimenting with changing age groupings enables us to mitigate the negative impact of categorization by observing robustness of the results. These different groupings can also provide levels of age homogamy based on definitions of varying strictness. While homogamy indicators with single-year age groups define age homogamy in the most conservative sense, those with five-year age groups provide a much more liberal definition.

3.3. Marriage cohorts and birth cohorts

Globally, the distribution of average age at marriage by gender differs by marriage cohorts and birth cohorts. In the Chinese case, the average age at marriage increased from 1960 to 2005. This trend and related confounding factors may distort trends in age homogamy over marriage cohorts. To confirm our results based on marriage cohorts, we examine patterns in age homogamy by birth cohort and gender.[6] A methodological difficulty is that some of the single persons in the most recent birth cohorts had yet to enter marriage by 2005. Analyses of married couples in these birth cohorts are likely to underestimate not only average age at marriage, but also spousal age gaps, considering earlier marriages tend to be more age homogamous (Qian, 1998; Van Poppel et al., 2001).

Our solution in addressing this censoring problem is to find, for each birth cohort and for men and women respectively, the median age at first marriage – in this case, the age at which half of the birth cohort population married. We then compute descriptive measures of age homogamy for each birth cohort, separately by gender, for those individuals who married for the first time at the median age. By focusing on the trends in age homogamy for persons married at the birth-cohort-specific median ages, we are able to observe patterns in age homogamy that are representative of different birth cohorts. Moreover, due to the mortality attrition of the older population, patterns for those older birth cohorts may not be reliable. Therefore, we present trends of birth cohorts only for 1940 or later for men, and 1941 or later for women. Initial analyses showed that the median ages of first marriage steadily increased in our sample, from 24 for men and 20 for women in the 1940 birth cohort to 25 for men and 23 for women in the 1980 birth cohort.

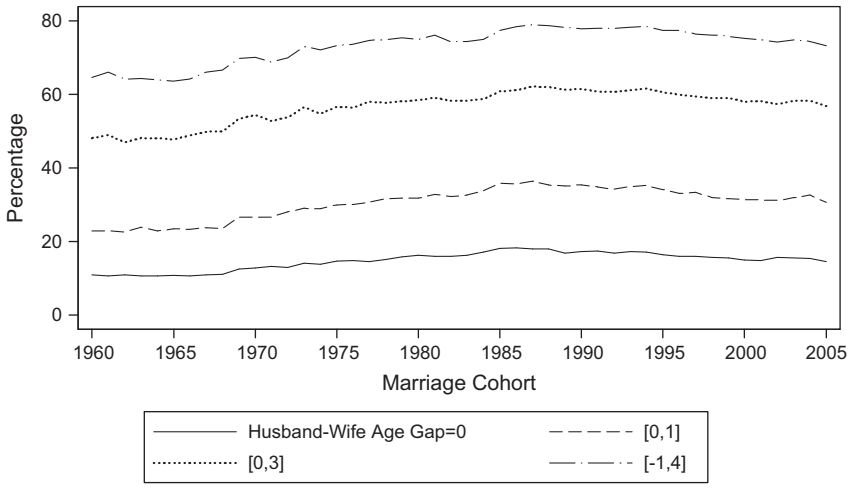
4. Results

4.1. Trend in marital age homogamy

Fig. 1 presents results on trends in age homogamy using measures of 0, 1, 3, and 5-year spousal age gaps (husband's age minus wife's age), by marriage cohorts. The bottom line shows proportions of couples with no age gap – the most conservative definition of age homogamy. The next three lines above show proportions of couples with an age gap of, respectively, 0–1 year, 0–3 years, and −1 to 4 years. The four lines depict a very similar trend: rather than a consistent increase in age homogamy, as expected from the literature, all four lines show increases in homogamy for marriage cohorts prior to 1990 and decreases thereafter.

We obtain a similar inverted U-shaped trend in our analyses using homogamy indicators by forces of attraction. This analysis is not a repetition of those shown in Fig. 1. By using homogamy indicators, we can evaluate underlying preferences for age homogamy while controlling for the confounding influence of the age-sex composition of the marriage market. Appendix Tables A1–A3 provide homogamy indicators based on age groupings of a single year (e.g., ages 20 and 21), 3 years (e.g., ages 20–22 and 23–25), and 5 years (e.g., ages 20–24 and 25–29), respectively. As can be seen from these results, the inverted U-shaped trend in age homogamy holds true for all three age groupings and for varying methods of computing moving averages. This analysis also shows increasing age homogamy among marriage cohorts up until the early 1990s, and decreases thereafter.

[6] We thank an anonymous reviewer for making this suggestion.



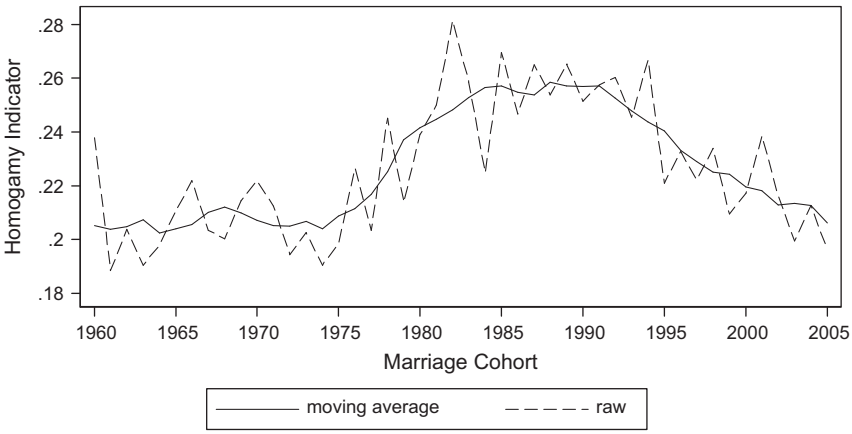
Note: Percentages are calculated by dividing number of couples with the given age gap by the total number of couples of the marriage cohort.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Fig. 1. Percentage of different levels of age homogamy 1960–2005.

To observe the trends more clearly, we computed moving averages for the three age groupings of homogamy indicators, with equal and varying weights for the adjacent three, five, seven, nine and eleven marriage cohorts. Among the three sets of homogamy indicators, the trend based on the three-year age groups is especially sharp, and Fig. 2 presents two trends for this set – one for raw homogamy indicators and one for moving averages for the adjacent seven marriage cohorts with equal weights. As can be seen, the two trends are generally consistent with each other in spite of short-term fluctuations shown in the raw indicators. The trend based on moving averages is clear: From 1960 to the mid-1960s, age homogamy increased slightly; the trend was unstable between 1967 and 1976, around the period of the Cultural Revolution; it increased steadily from the mid- to late-1970s until the early 1990s, and then it began to decrease.

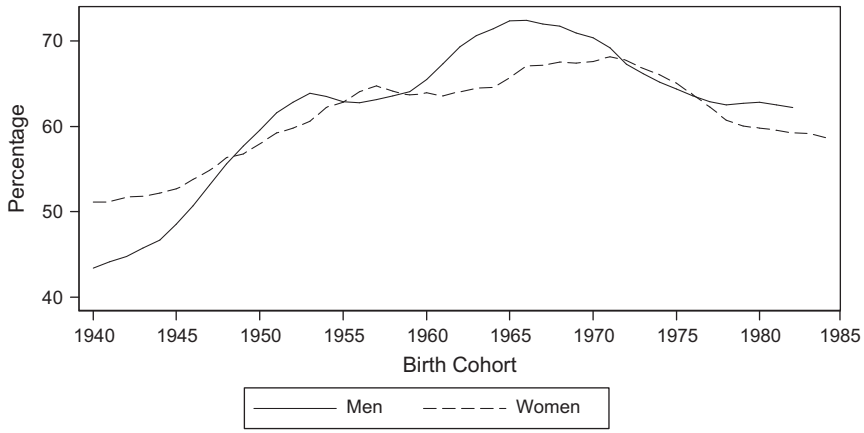
To further check our results, we also conduct analyses based on log-multiplicative layer effect models (Raymo and Xie, 2000) with varying design matrices. An inverted U-shaped trend is found for all the models used.

Do we find similar inverted U trends in age homogamy if we examine birth cohorts instead of marriage cohorts? In Fig. 3, we show trends in age homogamy by birth cohorts for men and women who got married at the birth-cohort-specific median age at first marriage. For this figure, age homogamy is operationalized as a spousal age gap of 0 to 3 years (0 and 3 included). As discussed above, this homogamy measure for those married at the median first-marriage age obviates the methodological



Note: Raw homogamy indicators are constructed as the ratio of sum of forces of attraction (as defined in Eq.(1)) where the husband's age equals the wife's, over the sum of all forces of attraction for marriage cohorts 1960-2005, with age in three-year groups. Their moving averages are constructed by averaging the raw homogamy indicators for the adjacent seven marriage cohorts with equal weights. Larger indicators reflect higher levels of marital age homogamy.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Fig. 2. Levels of age homogamy by force of attraction with moving average 1960–2005.



Note: Age homogamy is defined as marriages with husband-minus-wife age gaps lying between [0,3] years. For this figure, percentages of age homogamy are calculated only for those who got married at median age of first marriage within each birth cohort from 1940 to 1984, respectively for men and women. To observe the trends more clearly, we constructed moving averages for the adjacent seven birth cohorts with equal weights.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Fig. 3. Percentage of age homogamy with moving averages for marriages with birth cohort median age at marriage, by gender.

problems of the "right censoring" for the most recent birth cohorts. To make the trends smoother, we presented moving averages for the adjacent seven birth cohorts with equal weights. Here also we see inverted U-shaped trends for both men and women, with peaks occurring around the times suggested by results using marriage cohorts. Specifically, for men, the peak in age homogamy occurs at 74.97% for the 1968 birth cohort in 1991 with a birth-cohort-specific median first-marriage age of 23; for women, the peak occurs at 70.34% for the 1973 birth cohort in 1995 with a birth-cohort-specific median first-marriage age of 22. While men and women reached peaks in age homogamy in different years, the peaks both belonged to marriage cohorts post 1990, which was earlier shown by analyses based on marriage cohorts. Note that the trend for women lags behind that for men, reflecting the fact that women on average marry at a younger age than men do.

Because, as discussed, our sample construction and restriction methods should lead to overestimation of age homogamy for more recent marriage/birth cohorts, we consider the observed reversal of the upward trend in age homogamy after the early 1990s to be a conservative finding. That is, we expect the actual reversal to be even more pronounced.

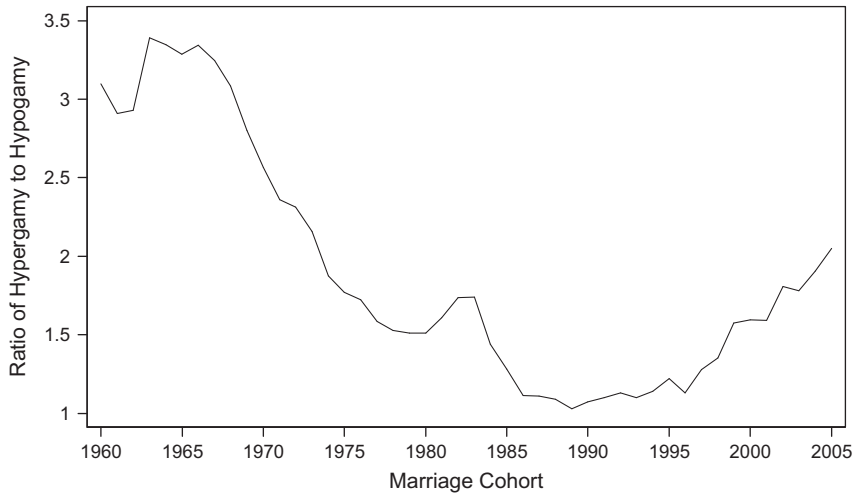
4.2. Hypogamy or hypergamy?

The decline in age homogamy after the early 1990s may indicate a recent increase in age hypogamy (older women marrying younger men) and/or age hypergamy (younger women marrying older men). However, the theoretical implications of these two potential increases are quite different. While an increase in age hypogamy may indicate growth in liberal attitudes on gender relations and marriage, a rise in age hypergamy may reflect a shift toward conservative marriage values in which husbands have authority over wives. Therefore, distinguishing changes in either age hypogamy or age hypergamy could shed light on the underlying causes of the recent dip.

Accordingly, we took the ratio of age hypergamy (percent of couples with a husband-minus-wife age gap larger than three years, three excluded) to age hypogamy (percent of couples with a husband-minus-wife age gap smaller than zero years, zero excluded) for each marriage cohort. Fig. 4 presents this trend in relative hypergamy prevalence for men and women by marriage cohort – depicting trend lines that look like a horizontal flip of those shown in Figs. 1 and 2. That is, the relative prevalence of age hypergamy to hypogamy decreased from 1960 to the late 1980s, and increased from the early 1990s on. This result reveals the importance of age hypergamy in the recent decline in age homogamy in the post-1990s reform era.

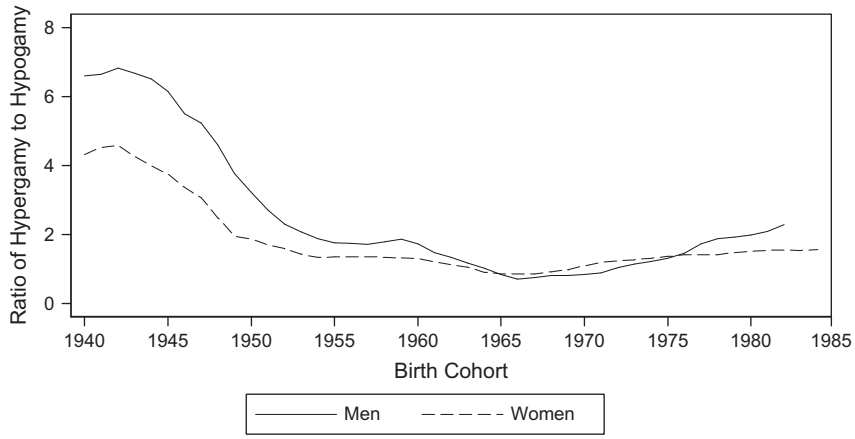
Fig. 5 shows trends in the relative hypergamy prevalence by birth cohort for men and women who got married at the birth-cohort-specific median age at first marriage. The trends presented are moving averages for the adjacent seven birth cohorts with equal weights, the same analytic approach used for results presented in Fig. 3. The birth cohort trends in hypergamy depicted in Fig. 5 reflect those for marriage cohorts in Fig. 4, with declines among birth cohorts before 1965 and increases thereafter. Specifically, the bottom of trend for men occurs at 0.55 for the 1968 birth cohort in 1991 with a birth-cohort-specific median age at first marriage of 23; and the bottom for women occurs at 0.71 for the 1966 birth cohort in 1988 with a birth-cohort-specific median age at first marriage of 22. Both of these lows occur in marriage cohorts around 1990.

Confirming our interpretation of earlier results presented in Figs. 1–3, the pattern shown in Figs. 4 and 5 indicates a decrease in age homogamy and a related increase in relative age hypergamy since the early 1990s. What has driven this spousal age gap increase in post-1990s reform era China? The next section discusses a possible explanation.



Note: As shown are ratios of age hypergamy (percent couples with husband-minus-wife age gap larger than three years) to hypogamy (percent couples with husband-minus-wife age gap smaller than zero) for each marraige cohort of 1960-2005.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Fig. 4. Relative prevalence of hypergamy to hypogamy, 1960–2005.



Note: As shown are ratios of age hypergamy (percent couples with husband-minus-wife age gaps larger than three years) to hypogamy (percent couples with husband-minus-wife age gaps smaller than zero) for those who got married at median age of first marriage within each birth cohort from 1940 to 1984, respectively for men and women. To observe the trends more clearly, we constructed moving averages for the adjacent seven birth cohorts with equal weights.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Fig. 5. Relative prevalence of hypergamy to hypogamy with moving averages for marriages with birth cohort median age at marriage, by gender.

4.3. Economic pressure: an explanation for the reversal

At first glance, the recent decreases in age homogamy, and corresponding increases in age hypergamy, are surprising given the widely held belief in a positive relationship between age homogamy and development. However, China's reform era is a complex historical period characterized by shifting social processes, rapid economic growth, a sharp increase in standard of living, and, important to this analysis, a tremendous rise in consumer aspirations accompanied by increasingly severe market competition (Yu and Xie, 2013). In the pre-reform regime, almost all domains of life, including employment, consumption, housing, and even family life, were largely regulated by the state in order to operationalize Communist egalitarian ideology. Consequently, inequality was low and economic expectations were highly limited. However, the reform has dramatically altered the context. In the course of economic growth, consumer aspirations have soared, leading to unrealistically high expectations regarding living standards and extremely strong economic pressures to realize these expectations (Davis, 2005). China's gigantic population and limited resources have intensified these pressures. A particularly salient example can

be found in the skyrocketing housing prices, especially in those more prosperous cities where more and better employment opportunities are available. For instance, for all of urban China, the average housing price increased from 315 Yuan per square meter in 1991 to 2628 Yuan per square meter in 2008 (Yu and Xie, 2013). During the same period, Beijing, China's capital, experienced an increase from 602 to 12418 Yuan per square meter. As housing is often considered a prerequisite for household establishment, such rising housing prices have heightened economic expectations from marriage candidates and exerted increasing economic pressure on them (Yu and Xie, 2013) – pressure that may have affected age homogamy through several mechanisms.

First, from the bride's standpoint, increasingly severe competition within the labor market during the post-1990s reform era may have brought women back to a disadvantaged economic position. Some researchers (Summerfield, 1994; Zhang et al., 2008) have found that a narrow emphasis on short-term efficiency and profit-making among many companies during the most recent reform era have led to greater discrimination against women within the labor market. In recent years, women's unemployment increased significantly (Summerfield, 1994; Wu and Song, 2010: Table 2). Facing this new unfavorable labor market environment, many women may be involuntarily forced back into homemaker roles. In light of their downgraded role in the labor market and the fast-rising cost of living, marrying an affluent, socially successful husband has once again become an attractive channel for achieving a higher social status. Since older men are more likely than younger men to possess higher social status and greater economic potential, this may make the prospect of an older husband more appealing (Bozon, 1991).

Second, from the groom's standpoint, men now face increasingly fierce market competition and higher costs in establishing households in reform-era China. In addition, women's lower economic potential and their concomitant higher interest in the economic prospects of men may increase pressure on men to act as breadwinners. Women's enhanced educational profiles may further raise the pressure (Raymo and Iwasawa, 2005). That is, men have to compete in both the labor and the marriage markets, with competition ever more intense on both fronts. To become more attractive to women, then, men may need to wait longer to marry while accumulating resources (Smock and Manning, 1997; Thornton et al., 1995; Xie et al., 2003).

In short, while women may want to marry older men in response to their occupational downgrades, men may want to settle down later given the labor and marriage market competition they face. Thus, the same processes of reform that helped narrow spousal age gaps in the early years – by raising women's socioeconomic status and promoting individual rights – may have contributed, since the early 1990s, to widening spousal age gaps via increased market competition and economic pressure. For convenience, we call this the "economic pressure" explanation of decreasing age homogamy.

Status hypergamy is a component of the economic pressure explanation. As discussed, the roots of status hypergamy lie very deep in China, where it was practiced nearly universally for many centuries (Thornton and Lin, 1994). Although improved economic well-being and greater individualism during the initial stages of China's development may have weakened this practice, heightened economic pressure could have revived it. Theoretically speaking, status hypergamy can be attained through a variety of channels. Women can marry up in terms of achieved traits such as education or occupation, or ascribed traits such as age, family origins, or race/ethnicity. Among these domains, age and education are especially important to status. Age is highly related to overall socioeconomic status, since older individuals are likely to have accumulated more and better cultural and social resources (Van Poppel et al., 2001). And education is well established as a predictor of status via its connection to socioeconomic positions (Hauser and Xie, 2005; Mare, 1991; Mincer, 1974; Schwartz and Mare, 2005; Xie and Hannum, 1996; Xu et al., 2000) and to family origins (Blossfeld and Timm, 2003; Lucas, 2001; Mare, 1991; Raftery and Hout, 1993). Hence, women wanting to improve their social status through marriage are likely to prefer men who are older and better educated than themselves. The increase in women's educational attainment in the last half of the 20th century (Lavely et al., 1990) led to a rapidly narrowing educational gender gap in China (Hannum, 2005; Wu and Zhang, 2010). Specifically, the ratio of spousal educational gap (husband's minus wife's years of schooling) to wives' years of schooling has decreased from 0.28 in 1960 to 0.16 in 1980, 0.10 in 1990 and 0.04 in 2005. Because the narrowing gender gap in education has made it increasingly difficult to practice status hypergamy with respect to education,[7] couples may elect to achieve status hypergamy by means of age, whereby the older husband still maintains an economic advantage over his similarly educated but younger wife. Therefore, during the post-1990s reform era, the notion of "marrying up" may have reemerged with a different meaning: the husband tending to be older and economically better off than the wife, though not necessarily better educated.

Given these marriage market processes, women on the "high-end" and men on the "low-end" socioeconomically may find it particularly difficult to find suitable marriage partners (Raymo, 2003; Raymo and Iwasawa, 2005). However, given the overwhelming norm of universal marriage in China, these social pressures are likely to lead to delays in marriage, rather than non-marriages. Based on the 1982, 1990, 2000 and 2010 China census data, as well as the 1995 and 2005 China mini-census data, the proportion never married by age 30 has been consistently low. Specifically, from 1982 to 2010, percentages never married by age 30 are respectively 5.17%, 4.89%, 4.34%, 4.51%, 4.49% and 4.99% for men, and 0.33%, 0.31%, 0.34%, 0.48%, 0.57% and 1.21% for women (China Data Center, 1982: Table 7-71; 1990: Table 7-5; 1995: Table 4-4; 2000: Table L5-03; 2005: Table 6-1; China Statistics Press, 2010: Table L5-05). Thus, the poor men are likely to delay marriage to accumulate enough

[7] Although the educational gap also greatly narrowed in the pre-reform era, especially during the Cultural Revolution, it did not reach parity (Hannum and Xie, 1994). Status hypergamy is difficult to maintain only when the educational gap disappears. In addition, economic factors became important for entry to marriage only in the post-reform period (Yu and Xie, 2013).

economic resources to attract a wife, and the highly educated and economically well off women are likely to marry significantly older men who would be better established than themselves – both of which result in even greater spousal age gaps.

To test the economic pressure explanation, we conduct an auxiliary analysis based on a revised version of Mincer's (1974) human capital model. In this analysis, we consider what possible role the narrowing gender gap in education may have played as a concrete causal mechanism for the economic pressure explanation. Because we do not have perfect data for this part, this analysis is intended mainly to demonstrate the relevance of this causal mechanism. The key idea is that, during the later stage of the economic reform and in the face of a decreasing educational gap by gender,[8] age may have begun to substitute for education as a proxy for men's higher status. To examine the effects of educational and age gaps on status hypergamy, we compare husbands' earnings premiums by holding average educational attainment and average age at first marriage at different levels for each marriage cohort. Lacking historical data on couples' earnings at the time of marriage, we instead use an estimation of their potential earnings through a revised version of Mincer's (1974) human capital model, in which the estimated earnings of the year of marriage are based on the average educational attainment and years of work experience for each marriage cohort. Specifically, we use the following equation for each gender:

$$\ln Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon, \tag{2}$$

where Y is earnings, X_1 years of schooling, and X_2 years of work experience. All β's are unknown parameters, and ε is the residual unexplained by the model. Eq. (2) deviates from Mincer's model in that it does not include the quadratic term of years of work experience. This is reasonable given that we restrict the analysis to individuals 20–30 years old, the age range in which most marriages occur and work experience increases earnings steadily. Thus, inclusion of the quadratic term is not theoretically compelling and may result in a loss of precision and predictive power of the model.

We use data from Chinese Household Income Project (CHIP) 1988, 1995 and 2002 to estimate β's in Eq. (2), respectively for marriage cohorts 1985–1991, 1992–1998 and 1999–2005. We use data only for urban workers because personal earnings are ambiguous for rural residents in CHIP. Again, because our main objective here is illustrative, a systematic bias in the auxiliary analysis resulted from the restriction to urban workers should not invalidate the substantive conclusion. Given our specific purpose to estimate husbands' earnings premiums, as well as the gender differential in returns to education and experience, we estimate Eq. (2) separately for men and women. Combined with other criteria for excluding observations with missing or incomplete data, this procedure yields samples of 2052 men and 2321 women from CHIP 1988, 1013 men and 1060 women from CHIP 1995, and 640 men and 709 women from CHIP 2002. We capture all forms of income, including the provision of cash bonuses and subsidies. Earnings in 1995 and 2002 are adjusted by the appropriate price indices so that all analyses are comparable in 1988 Yuan (China Statistics Press, 2006). Following Xie and Hannum (1996), we recode education into years of schooling[9] and calculate work experience as the difference between current age and age at first year of experience, which varies with education.[10]

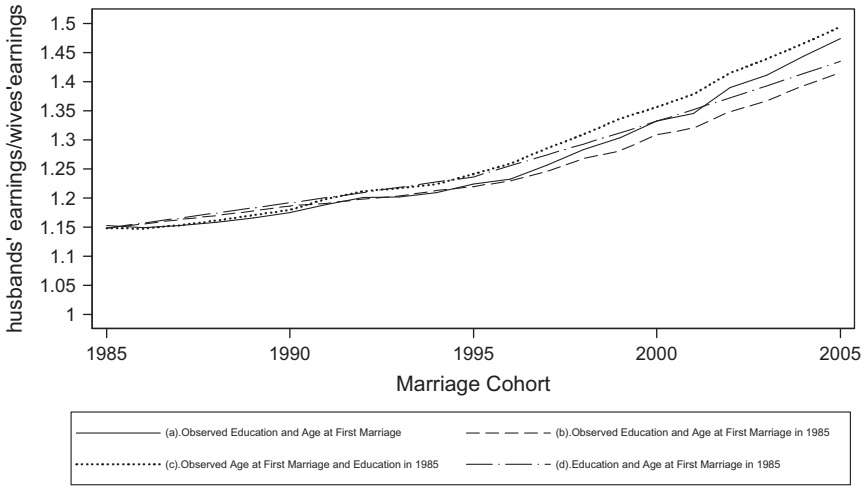
Once we obtain estimated β's, we apply average years of schooling and average age at first marriage for each marriage cohort using 2005 mini-census data to the regression equations to estimate earnings at the time of marriage. Here we extrapolate years of work experience from years of schooling and age at first marriage. We then estimate husbands' earnings premiums as the ratio of husbands' to wives' earnings, by marriage cohort. To explicitly illustrate the role of increases in the spousal age gap in compensating for decreases in the educational gender gap, we construct four trends according to (1) whether education was fixed to the 1985 level or was allowed to change as it actually did, and (2) whether age at first marriage was fixed to the 1985 level or was allowed to change as it actually did. The combination of these two specifications yields four trends for husbands' earnings premiums, one observed and three hypothetical, which are based on: (a) observed average educational attainment and average age at first marriage; (b) observed average educational attainment, with average age at first marriage held at the 1985 level; (c) observed average age at first marriage, with average educational attainment held at the 1985 level; and (d) average educational attainment and age at first marriage both held at the 1985 levels. The results are shown in Fig. 6.

As can be seen in Fig. 6, trend (a) is interlaced with (b) until around 1995 and starts to diverge upward from (b) with increasing gaps thereafter. Meanwhile, trend (a) is interlaced with (c) briefly during the earlier stages of the reform and then diverges downward around 1987, with increasing gaps. Both divergences point to the plausibility of spousal age gaps substituting for spousal educational gaps in status hypergamy. Specifically, with the shrinkage of educational gaps without a corresponding increase in age gaps between husbands and wives, status hypergamy, as reflected in husbands' earnings premiums, cannot keep up with hypergamy based on the actual age and educational gaps, as shown by the comparison between (a) and (b). By the same respect, if female education had not increased as it has, the manner in which spousal age gap increases may lead to even higher husbands' earnings premiums than those based on actual age and educational gaps, as shown by the comparison between (a) and (c). Furthermore, the husband's earnings premiums shown in (d), which fixes

[8] We are also aware that as higher education becomes more prevalent, postsecondary institutions may play an increasingly important role as locations for mate selection. Conducting the mate selection process in schools may lead to both educational and age homogamy. Under this circumstance, if the level of age homogamy still decreases in the post-1990s reform era, we can claim stronger evidence for the increasing expectation for men's economic potential in mate selection.

[9] Less than three years of schooling = 1; three years of schooling but less than primary school = 4; primary school = 6; junior high = 9; senior high = 12; trade school = 13; community/technical college = 15; college and graduate school = 17.

[10] Specifically, the ages at first year of experience for each educational level are: primary school and lower = 14; junior high = 16; senior high = 19; trade school = 20; community/technical college = 22; college and graduate school = 24.



Note: Husbands' earnings premiums are calculated as the ratio of husbands' to wives' earnings. Earnings are estimated by Mincer's human capital model based on years of schooling and age at first marriage of each marriage cohort.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey. Chinese Household Income Project 1988, 1995, 2002 (Urban Sample).

Fig. 6. Husbands' earnings premium, 1985–2005.

both schooling and age at first marriage to 1985 averages, are generally lower than those in (c) but higher than those in (b). This result further demonstrates the overriding importance of spousal age gap relative to educational gap in the impact on status hypergamy.

5. Conclusions and discussion

This analysis of marital age homogamy in China from 1960 to 2005 reveals an inverted U-shaped trend, whereby age homogamy increased until the early 1990s and then began to decline. The shrinking spousal age gap trend is not surprising in the period, given reform-era social, economic, and political developments. However, the recent trend toward increasing spousal age differences is unexpected and invites explanation.

We tested the plausible "economic pressure" explanation that the post-1990s reform era environment – with its intensified labor market pressure, rising consumerism, and skyrocketing costs of living – acted to promote marriages of older men to younger women on the basis of a need or preference for status hypergamy. Simply put, a renewed interest in status hypergamy is thought to be driven by men's increasing economic pressures to support family consumption and women's downgraded labor market prospects. In particular, given women's educational advances in reform-era China, status hypergamy is more difficult to achieve among like-aged men and women, who may have similar educational attainment and be at similar career points. Our tests of the relative impact of age and education on status hypergamy support the premise that age has begun to substitute for education as a proxy for men's higher status. In this sense, our analysis found the closing of the gender gap in educational attainment to also be a plausible causal mechanism of the reversal in age homogamy in the post-1990s reform era.

Our findings challenge the widely claimed positive relationship between economic development and age homogamy, or more generally, the link between development and family changes. This reminds us that although relationships between economic development and family changes are commonly observed, they are neither necessary nor universal. Actual social processes are much more complicated and may be unique in specific social contexts (Thornton, 2005). For example, historians Stone (1977) and Macfarlane (1979) have shown with data from Britain that individual freedom in mate selection emerged before the onset of the industrial revolution, rather than being produced by it. In this sense, the reversal of the trend in age homogamy in China's post-reform era provides another interesting, historically and contextually specific case that defies a prediction based on economic development alone.

We recognize that some important pieces are still missing from this puzzle. First, as a number of researchers have argued, remarriage, cohabitation, and delays in marriage may all have a large influence on spousal age gaps (Atkinson and Glass, 1985; Bhrolcháin, 1992; Bytheway, 1981; Qian, 1998; Stier and Shavit, 1994; Todd et al., 2005; Van Poppel et al., 2001; Vera et al., 1985; Wu et al., 2000). These three phenomena may be particularly relevant in this context given their increasingly greater prevalence in reform-era China (Jiang, 2002; Jin et al., 2005; Shi, 2010; Wang and Zhou, 2010; Xu et al., 2003). It is unfortunate that our dataset does not include sufficient information on any of these phenomena, but this limitation should serve as a good starting point for future research.

Second, due to the highly differential processes of social and economic development in rural versus urban China (Hauser and Xie, 2005; Xie and Hannum, 1996), our estimation of returns to education and work experience based on the CHIP urban samples is limited. Although we expect that only the levels of husbands' earnings premiums – not the trends in age or status hypergamy – will change across the rural–urban divide, separate analyses using rural and urban samples will establish more accurate conclusions.

Third, Mare and Schwartz (2006) and Torche (2010)'s works have shown fruitfulness in directly incorporating measures of husbands' earnings premiums into models of educational homogamy. Although this approach would be a more straightforward way to test our "economic pressure" explanation, the required information on spouses' educational attainment and earnings at the time of marriage is unavailable in the dataset we used.

Table A1
Homogamy indicators based on forces of attraction with age group of one, 1960–2005. *Source:* China 2005 1% Population Inter-census Survey.

Marriage cohort	Raw	Equal weights					Varying weights				
		Adjacent 3 cohorts	5 Cohorts	7 Cohorts	9 Cohorts	11 Cohorts	Adjacent 3 cohorts	5 Cohorts	7 Cohorts	9 Cohorts	11 Cohorts
1960	0.0959	0.0891	0.0863	0.0864	0.0881	0.0898	0.0914	0.0888	0.0879	0.0879	0.0885
1961	0.0823	0.0863	0.0864	0.0881	0.0898	0.0955	0.0853	0.0859	0.0867	0.0877	0.0898
1962	0.0806	0.0833	0.0881	0.0898	0.0955	0.0942	0.0826	0.0856	0.0873	0.0899	0.0911
1963	0.0868	0.0874	0.0885	0.0955	0.0942	0.0933	0.0872	0.0880	0.0913	0.0923	0.0925
1964	0.0947	0.0933	0.0981	0.0940	0.0933	0.0934	0.0936	0.0961	0.0952	0.0945	0.0942
1965	0.0983	0.1077	0.0990	0.0944	0.0931	0.0954	0.1053	0.1018	0.0986	0.0966	0.0962
1966	0.1300	0.1044	0.0987	0.0965	0.0968	0.0970	0.1108	0.1041	0.1008	0.0993	0.0986
1967	0.0851	0.1002	0.0988	0.1005	0.1005	0.0997	0.0965	0.0977	0.0989	0.0995	0.0996
1968	0.0856	0.0885	0.1021	0.1033	0.1032	0.1003	0.0878	0.0958	0.0991	0.1006	0.1005
1969	0.0948	0.0985	0.0990	0.1052	0.1024	0.1031	0.0976	0.0983	0.1013	0.1017	0.1021
1970	0.1150	0.1080	0.1042	0.0990	0.1046	0.1047	0.1098	0.1067	0.1033	0.1038	0.1041
1971	0.1142	0.1135	0.1045	0.1037	0.1026	0.1092	0.1137	0.1086	0.1065	0.1051	0.1063
1972	0.1113	0.1042	0.1091	0.1075	0.1096	0.1097	0.1060	0.1077	0.1076	0.1083	0.1087
1973	0.0870	0.1054	0.1086	0.1152	0.1151	0.1139	0.1008	0.1051	0.1095	0.1115	0.1122
1974	0.1179	0.1057	0.1154	0.1180	0.1191	0.1186	0.1088	0.1124	0.1148	0.1164	0.1171
1975	0.1123	0.1261	0.1200	0.1204	0.1217	0.1229	0.1227	0.1212	0.1208	0.1211	0.1217
1976	0.1483	0.1317	0.1289	0.1242	0.1247	0.1240	0.1359	0.1320	0.1286	0.1272	0.1262
1977	0.1347	0.1380	0.1329	0.1320	0.1264	0.1275	0.1372	0.1348	0.1336	0.1310	0.1299
1978	0.1312	0.1347	0.1388	0.1333	0.1337	0.1304	0.1338	0.1366	0.1351	0.1346	0.1334
1979	0.1382	0.1370	0.1345	0.1391	0.1366	0.1348	0.1373	0.1358	0.1372	0.1370	0.1363
1980	0.1416	0.1355	0.1381	0.1384	0.1392	0.1382	0.1371	0.1377	0.1380	0.1384	0.1384
1981	0.1268	0.1404	0.1407	0.1386	0.1399	0.1407	0.1370	0.1390	0.1388	0.1392	0.1397
1982	0.1528	0.1411	0.1401	0.1419	0.1405	0.1410	0.1441	0.1419	0.1419	0.1414	0.1413
1983	0.1438	0.1440	0.1427	0.1422	0.1427	0.1428	0.1440	0.1433	0.1428	0.1428	0.1428
1984	0.1355	0.1447	0.1454	0.1435	0.1446	0.1434	0.1424	0.1441	0.1438	0.1441	0.1439
1985	0.1547	0.1435	0.1450	0.1475	0.1442	0.1429	0.1463	0.1456	0.1464	0.1456	0.1448
1986	0.1403	0.1486	0.1472	0.1455	0.1448	0.1438	0.1465	0.1469	0.1463	0.1457	0.1451
1987	0.1509	0.1486	0.1478	0.1438	0.1447	0.1450	0.1492	0.1484	0.1464	0.1458	0.1455
1988	0.1546	0.1480	0.1433	0.1461	0.1443	0.1444	0.1497	0.1461	0.1461	0.1454	0.1451
1989	0.1385	0.1417	0.1455	0.1441	0.1454	0.1448	0.1409	0.1435	0.1437	0.1444	0.1445
1990	0.1320	0.1407	0.1434	0.1449	0.1447	0.1449	0.1385	0.1413	0.1428	0.1435	0.1439
1991	0.1517	0.1414	0.1417	0.1445	0.1443	0.1447	0.1439	0.1427	0.1435	0.1438	0.1441
1992	0.1404	0.1460	0.1436	0.1419	0.1445	0.1457	0.1446	0.1441	0.1431	0.1436	0.1443
1993	0.1460	0.1448	0.1445	0.1440	0.1442	0.1444	0.1451	0.1448	0.1444	0.1443	0.1444
1994	0.1481	0.1435	0.1448	0.1467	0.1439	0.1438	0.1447	0.1447	0.1456	0.1450	0.1446
1995	0.1364	0.1459	0.1470	0.1445	0.1457	0.1451	0.1435	0.1454	0.1450	0.1453	0.1452
1996	0.1533	0.1469	0.1451	0.1456	0.1459	0.1459	0.1485	0.1466	0.1462	0.1461	0.1460
1997	0.1511	0.1469	0.1450	0.1467	0.1459	0.1456	0.1480	0.1463	0.1465	0.1463	0.1461
1998	0.1365	0.1452	0.1484	0.1456	0.1461	0.1448	0.1430	0.1460	0.1458	0.1459	0.1456
1999	0.1479	0.1459	0.1459	0.1472	0.1443	0.1446	0.1464	0.1461	0.1466	0.1458	0.1454
2000	0.1533	0.1473	0.1452	0.1442	0.1451	0.1421	0.1488	0.1468	0.1457	0.1455	0.1444
2001	0.1407	0.1473	0.1443	0.1431	0.1415	0.1427	0.1456	0.1449	0.1441	0.1432	0.1430
2002	0.1477	0.1401	0.1435	0.1408	0.1403	0.1415	0.1420	0.1428	0.1420	0.1414	0.1414
2003	0.1318	0.1411	0.1369	0.1396	0.1408	0.1403	0.1388	0.1377	0.1385	0.1392	0.1395
2004	0.1438	0.1320	0.1359	0.1369	0.1396	0.1408	0.1350	0.1354	0.1360	0.1372	0.1381
2005	0.1203	0.1321	0.1320	0.1359	0.1369	0.1396	0.1282	0.1301	0.1324	0.1339	0.1355

Note: Homogamy indicators are constructed by the forces of attraction based on age groups of one year. Specifically, the groups are the single ages for those aged between 20 and 35 and we combine those under age 20 as a group 15–19 and those above age 35 as two groups 36–40 and 41–50. Moving averages are calculated to smooth the trend, and are computed respectively with equal and varying weights for the adjacent 3, 5, 7, 9 and 11 marriage cohorts. For those with three adjacent cohorts, weights applied are respectively ¼, ½ and ¼; for those with five adjacent cohorts, weights applied are respectively 1/9, 2/9, 1/3, 2/9 and 1/9; for those with seven adjacent cohorts, weights applied are respectively 1/16, 1/8, 3/16, 1/4, 3/16, 1/8 and 1/16; for those with nine adjacent cohorts, weights applied are respectively 1/25, 2/25, 3/25, 4/25, 1/5, 4/25, 3/25, 2/25 and 1/25; for those with eleven adjacent cohorts, weights applied are respectively 1/36, 1/18, 1/12, 1/9, 5/36, 1/6, 5/36, 1/9, 1/12, 1/18 and 1/36.

In terms of this study's ability to project future trends in age hypergamy, we recognize that social, economic, and political events may generate new influences on marriage behaviors in post-reform era China. For example, in the face of rising social instabilities due to the skyrocketing costs of household establishments, the Chinese government may implement new regulations to control and reduce housing prices, thereby weakening the influence of economic pressure on mate choice. It is also possible that gender inequality in the labor market may change, and/or the norm of status hypergamy may fade with time. For the near future, however, we expect the conditions driving the most recent increases in age hypergamy to continue.

Finally, the one-child policy could have an influence on spousal age gaps through its effect on the sex ratio at birth and the subsequent structure of the marriage market (Banister, 2004; Zeng et al., 1993). However, the policy's impact on the sex ratio has been mainly driven by prenatal sex detection technology, which became available in remote rural areas in the late-1980s

Table A2
homogamy indicators based on forces of attraction with age group of three, 1960–2005 (Fig. 2). *Source:* China 2005 1% population inter-census survey.

Marriage cohort	Raw	Equal weights					Varying weights				
		Adjacent 3 cohorts	5 Cohorts	7 Cohorts	9 Cohorts	11 Cohorts	Adjacent 3 cohorts	5 Cohorts	7 Cohorts	9 Cohorts	11 Cohorts
1960	0.2379	0.2131	0.2100	0.2051	0.2037	0.2048	0.2214	0.2157	0.2115	0.2089	0.2077
1961	0.1884	0.2100	0.2051	0.2037	0.2048	0.2073	0.2046	0.2049	0.2044	0.2045	0.2053
1962	0.2038	0.1942	0.2037	0.2048	0.2073	0.2068	0.1966	0.2005	0.2023	0.2038	0.2046
1963	0.1905	0.1974	0.1982	0.2073	0.2068	0.2061	0.1957	0.1971	0.2015	0.2033	0.2040
1964	0.1979	0.1996	0.2049	0.2023	0.2061	0.2069	0.1992	0.2024	0.2024	0.2037	0.2046
1965	0.2105	0.2101	0.2048	0.2040	0.2034	0.2083	0.2102	0.2072	0.2058	0.2050	0.2060
1966	0.2219	0.2119	0.2068	0.2056	0.2072	0.2059	0.2144	0.2102	0.2082	0.2078	0.2072
1967	0.2034	0.2085	0.2101	0.2100	0.2081	0.2065	0.2072	0.2088	0.2094	0.2089	0.2082
1968	0.2002	0.2060	0.2124	0.2121	0.2086	0.2064	0.2046	0.2089	0.2103	0.2097	0.2087
1969	0.2145	0.2122	0.2105	0.2098	0.2091	0.2064	0.2128	0.2115	0.2108	0.2102	0.2090
1970	0.2219	0.2163	0.2087	0.2071	0.2069	0.2064	0.2177	0.2127	0.2102	0.2090	0.2082
1971	0.2124	0.2096	0.2092	0.2052	0.2043	0.2079	0.2103	0.2096	0.2077	0.2065	0.2069
1972	0.1944	0.2031	0.2043	0.2050	0.2068	0.2062	0.2009	0.2028	0.2038	0.2049	0.2053
1973	0.2026	0.1958	0.1997	0.2067	0.2072	0.2100	0.1975	0.1987	0.2022	0.2040	0.2058
1974	0.1904	0.1972	0.2025	0.2040	0.2106	0.2112	0.1955	0.1994	0.2014	0.2047	0.2067
1975	0.1985	0.2052	0.2043	0.2087	0.2097	0.2135	0.2035	0.2039	0.2060	0.2073	0.2092
1976	0.2265	0.2095	0.2128	0.2115	0.2127	0.2160	0.2137	0.2132	0.2125	0.2125	0.2136
1977	0.2034	0.2250	0.2175	0.2167	0.2188	0.2223	0.2196	0.2184	0.2177	0.2181	0.2194
1978	0.2452	0.2208	0.2256	0.2252	0.2276	0.2281	0.2269	0.2262	0.2257	0.2264	0.2269
1979	0.2138	0.2327	0.2303	0.2371	0.2352	0.2302	0.2280	0.2293	0.2327	0.2336	0.2325
1980	0.2391	0.2343	0.2459	0.2416	0.2381	0.2374	0.2355	0.2413	0.2414	0.2402	0.2393
1981	0.2500	0.2568	0.2486	0.2447	0.2429	0.2417	0.2551	0.2515	0.2485	0.2465	0.2450
1982	0.2814	0.2633	0.2508	0.2482	0.2477	0.2452	0.2678	0.2584	0.2539	0.2517	0.2497
1983	0.2586	0.2550	0.2569	0.2529	0.2499	0.2498	0.2559	0.2564	0.2549	0.2531	0.2521
1984	0.2249	0.2510	0.2562	0.2566	0.2543	0.2516	0.2445	0.2510	0.2535	0.2538	0.2531
1985	0.2696	0.2471	0.2530	0.2571	0.2572	0.2551	0.2527	0.2528	0.2547	0.2556	0.2555
1986	0.2467	0.2604	0.2520	0.2548	0.2574	0.2568	0.2570	0.2542	0.2545	0.2555	0.2559
1987	0.2650	0.2552	0.2601	0.2538	0.2548	0.2577	0.2576	0.2590	0.2567	0.2560	0.2565
1988	0.2537	0.2614	0.2564	0.2585	0.2550	0.2544	0.2594	0.2578	0.2581	0.2570	0.2562
1989	0.2653	0.2568	0.2586	0.2572	0.2572	0.2552	0.2589	0.2588	0.2581	0.2578	0.2570
1990	0.2515	0.2581	0.2577	0.2570	0.2569	0.2548	0.2565	0.2571	0.2571	0.2570	0.2563
1991	0.2576	0.2564	0.2560	0.2572	0.2541	0.2514	0.2567	0.2563	0.2567	0.2558	0.2544
1992	0.2603	0.2544	0.2563	0.2525	0.2505	0.2492	0.2559	0.2561	0.2546	0.2531	0.2519
1993	0.2454	0.2575	0.2502	0.2479	0.2470	0.2464	0.2545	0.2521	0.2503	0.2491	0.2483
1994	0.2668	0.2444	0.2452	0.2437	0.2435	0.2424	0.2500	0.2473	0.2457	0.2449	0.2441
1995	0.2209	0.2401	0.2376	0.2403	0.2388	0.2380	0.2353	0.2366	0.2382	0.2384	0.2383
1996	0.2326	0.2253	0.2353	0.2331	0.2343	0.2368	0.2271	0.2317	0.2323	0.2330	0.2342
1997	0.2223	0.2296	0.2238	0.2290	0.2319	0.2330	0.2278	0.2256	0.2271	0.2288	0.2301
1998	0.2339	0.2219	0.2231	0.2250	0.2286	0.2275	0.2249	0.2239	0.2244	0.2259	0.2264
1999	0.2094	0.2202	0.2242	0.2243	0.2211	0.2245	0.2175	0.2212	0.2226	0.2220	0.2228
2000	0.2172	0.2217	0.2230	0.2195	0.2202	0.2181	0.2205	0.2219	0.2209	0.2206	0.2199
2001	0.2384	0.2239	0.2161	0.2181	0.2162	0.2178	0.2275	0.2212	0.2198	0.2185	0.2183
2002	0.2161	0.2180	0.2167	0.2128	0.2154	0.2162	0.2175	0.2171	0.2152	0.2153	0.2155
2003	0.1994	0.2094	0.2126	0.2133	0.2128	0.2154	0.2069	0.2100	0.2114	0.2118	0.2128
2004	0.2126	0.2028	0.2061	0.2126	0.2133	0.2128	0.2053	0.2057	0.2083	0.2099	0.2107
2005	0.1964	0.2045	0.2028	0.2061	0.2126	0.2133	0.2018	0.2023	0.2038	0.2067	0.2086

Note: Homogamy indicators are constructed by the forces of attraction based on age groups of three years. Specifically, we divide individuals into age groups 15–19, 20–22, 23–25, 26–28, 29–31, 32–35, 36–40, and 41–50. Moving averages are calculated to smooth the trend, and are computed respectively with equal and varying weights for the adjacent 3, 5, 7, 9 and 11 marriage cohorts. For those with three adjacent cohorts, weights applied are respectively ¼, ½ and ¼; for those with five adjacent cohorts, weights applied are respectively 1/9, 2/9, 1/3, 2/9 and 1/9; for those with seven adjacent cohorts, weights applied are respectively 1/16, 1/8, 3/16, 1/4, 3/16, 1/8 and 1/16; for those with nine adjacent cohorts, weights applied are respectively 1/25, 2/25, 3/25, 4/25, 1/5, 4/25, 3/25, 2/25 and 1/25; for those with eleven adjacent cohorts, weights applied are respectively 1/36, 1/18, 1/12, 1/9, 5/36, 1/6, 5/36, 1/9, 1/12, 1/18 and 1/36.

(Chu, 2001). Thus, the imbalanced sex ratio did not affect persons covered in our analyses. For more recent cohorts it did affect, the sex ratio may benefit women by providing them with a wider range of prospective husbands. In this newer regime, men may need even more time to accumulate economic resources to become attractive to young women on the marriage market. That is, the trend in age hypergamy discovered in this paper may be further perpetuated by rising masculine sex ratios at birth since the late 1980s.

These remaining questions, the study's research limitations, and the unique context of post-reform era China all serve as stimuli for future research on marital age homogamy and on other crucial social changes taking place in contemporary China. Given our unanticipated findings, further research on age homogamy in other countries is also of great interest. Research on these topics will shed new light on the changing patterns of gender norms, gender stratification, and family behaviors across the world.

Table A3
Homogamy indicators based on forces of attraction with age group of five, 1960–2005. *Source:* China 2005 1% population inter-census survey.

Marriage cohort	Raw	Equal weights					Varying weights				
		Adjacent 3 cohorts	5 Cohorts	7 Cohorts	9 Cohorts	11 Cohorts	Adjacent 3 cohorts	5 Cohorts	7 Cohorts	9 Cohorts	11 Cohorts
1960	0.3727	0.3633	0.3716	0.3742	0.3758	0.3814	0.3664	0.3690	0.3711	0.3726	0.3751
1961	0.3538	0.3716	0.3742	0.3758	0.3814	0.3862	0.3671	0.3707	0.3726	0.3754	0.3783
1962	0.3882	0.3747	0.3758	0.3814	0.3862	0.3888	0.3780	0.3768	0.3786	0.3810	0.3831
1963	0.3820	0.3841	0.3831	0.3862	0.3888	0.3900	0.3836	0.3833	0.3846	0.3860	0.3871
1964	0.3822	0.3912	0.3953	0.3910	0.3900	0.3966	0.3890	0.3925	0.3919	0.3912	0.3927
1965	0.4095	0.4022	0.3991	0.3976	0.3992	0.4003	0.4040	0.4013	0.3997	0.3995	0.3998
1966	0.4148	0.4104	0.4026	0.4073	0.4086	0.4073	0.4115	0.4066	0.4069	0.4075	0.4074
1967	0.4068	0.4071	0.4174	0.4153	0.4154	0.4169	0.4070	0.4128	0.4139	0.4144	0.4152
1968	0.3997	0.4208	0.4230	0.4249	0.4239	0.4213	0.4156	0.4197	0.4220	0.4227	0.4223
1969	0.4560	0.4312	0.4301	0.4320	0.4300	0.4301	0.4374	0.4333	0.4327	0.4317	0.4312
1970	0.4379	0.4479	0.4404	0.4351	0.4377	0.4376	0.4454	0.4426	0.4393	0.4387	0.4384
1971	0.4499	0.4488	0.4478	0.4454	0.4432	0.4455	0.4491	0.4484	0.4471	0.4457	0.4456
1972	0.4587	0.4484	0.4524	0.4546	0.4533	0.4512	0.4510	0.4518	0.4530	0.4531	0.4525
1973	0.4366	0.4581	0.4577	0.4605	0.4619	0.4608	0.4527	0.4555	0.4577	0.4592	0.4597
1974	0.4788	0.4599	0.4672	0.4662	0.4682	0.4712	0.4646	0.4660	0.4661	0.4669	0.4682
1975	0.4643	0.4802	0.4709	0.4751	0.4766	0.4755	0.4762	0.4733	0.4741	0.4750	0.4751
1976	0.4973	0.4798	0.4861	0.4829	0.4826	0.4829	0.4842	0.4852	0.4842	0.4836	0.4834
1977	0.4777	0.4958	0.4930	0.4926	0.4892	0.4921	0.4912	0.4922	0.4924	0.4912	0.4915
1978	0.5123	0.5011	0.5010	0.4982	0.5019	0.4993	0.5039	0.5023	0.5005	0.5010	0.5005
1979	0.5134	0.5099	0.5052	0.5106	0.5085	0.5069	0.5108	0.5077	0.5090	0.5088	0.5082
1980	0.5040	0.5120	0.5198	0.5164	0.5148	0.5118	0.5100	0.5155	0.5159	0.5155	0.5144
1981	0.5186	0.5245	0.5250	0.5226	0.5186	0.5139	0.5230	0.5241	0.5235	0.5217	0.5193
1982	0.5509	0.5359	0.5265	0.5254	0.5197	0.5165	0.5396	0.5323	0.5293	0.5258	0.5230
1983	0.5382	0.5366	0.5321	0.5217	0.5213	0.5214	0.5370	0.5343	0.5288	0.5261	0.5246
1984	0.5207	0.5303	0.5258	0.5248	0.5233	0.5232	0.5279	0.5268	0.5259	0.5250	0.5244
1985	0.5321	0.5134	0.5209	0.5268	0.5264	0.5234	0.5180	0.5196	0.5228	0.5241	0.5239
1986	0.4873	0.5152	0.5197	0.5240	0.5261	0.5252	0.5082	0.5146	0.5187	0.5214	0.5225
1987	0.5262	0.5152	0.5219	0.5209	0.5230	0.5237	0.5180	0.5201	0.5205	0.5214	0.5221
1988	0.5322	0.5300	0.5187	0.5212	0.5191	0.5202	0.5305	0.5240	0.5228	0.5214	0.5211
1989	0.5316	0.5267	0.5258	0.5170	0.5182	0.5180	0.5279	0.5267	0.5225	0.5209	0.5200
1990	0.5162	0.5235	0.5211	0.5206	0.5162	0.5163	0.5217	0.5214	0.5210	0.5193	0.5184
1991	0.5229	0.5139	0.5172	0.5188	0.5178	0.5154	0.5162	0.5167	0.5177	0.5177	0.5170
1992	0.5028	0.5127	0.5136	0.5145	0.5173	0.5186	0.5102	0.5121	0.5132	0.5147	0.5159
1993	0.5126	0.5097	0.5108	0.5132	0.5162	0.5185	0.5104	0.5106	0.5117	0.5133	0.5149
1994	0.5137	0.5094	0.5106	0.5140	0.5155	0.5174	0.5105	0.5106	0.5121	0.5133	0.5146
1995	0.5019	0.5126	0.5145	0.5144	0.5160	0.5163	0.5099	0.5125	0.5133	0.5143	0.5149
1996	0.5222	0.5154	0.5171	0.5169	0.5156	0.5148	0.5171	0.5171	0.5170	0.5165	0.5160
1997	0.5220	0.5233	0.5183	0.5179	0.5153	0.5134	0.5230	0.5204	0.5193	0.5179	0.5165
1998	0.5255	0.5225	0.5219	0.5159	0.5147	0.5133	0.5233	0.5225	0.5196	0.5179	0.5165
1999	0.5201	0.5218	0.5174	0.5167	0.5133	0.5141	0.5214	0.5192	0.5181	0.5164	0.5157
2000	0.5199	0.5132	0.5145	0.5136	0.5155	0.5113	0.5148	0.5147	0.5142	0.5147	0.5136
2001	0.4996	0.5090	0.5096	0.5136	0.5111	0.5122	0.5067	0.5083	0.5106	0.5108	0.5112
2002	0.5076	0.5027	0.5100	0.5075	0.5097	0.5111	0.5039	0.5073	0.5074	0.5081	0.5089
2003	0.5009	0.5101	0.5025	0.5054	0.5075	0.5097	0.5078	0.5048	0.5050	0.5058	0.5069
2004	0.5219	0.5017	0.5032	0.5025	0.5054	0.5075	0.5068	0.5050	0.5040	0.5044	0.5052
2005	0.4823	0.5021	0.5017	0.5032	0.5025	0.5054	0.4955	0.4986	0.5004	0.5011	0.5023

Note: Homogamy indicators are constructed by the forces of attraction based on age groups of five years. Specifically, we divide individuals into age groups 15–19, 20–24, 25–29, 30–35, 36–40 and 41–50. Moving averages are calculated to smooth the trend, and are computed respectively with equal and varying weights for the adjacent 3, 5, 7, 9 and 11 marriage cohorts. For those with three adjacent cohorts, weights applied are respectively ¼, ½ and ¼; for those with five adjacent cohorts, weights applied are respectively 1/9, 2/9, 1/3, 2/9 and 1/9; for those with seven adjacent cohorts, weights applied are respectively 1/16, 1/8, 3/16, 1/4, 3/16, 1/8 and 1/16; for those with nine adjacent cohorts, weights applied are respectively 1/25, 2/25, 3/25, 4/25, 1/5, 4/25, 3/25, 2/25 and 1/25; for those with eleven adjacent cohorts, weights applied are respectively 1/36, 1/18, 1/12, 1/9, 5/36, 1/6, 5/36, 1/9, 1/12, 1/18 and 1/36.

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Appendix A.

Tables A1–A3.

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