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Abstract

The Chinese urban society in recent years has shown rising age at first marriage and declining marriage rates, especially among professional females with at least college degrees in their late 20s or their 30s. We exploit two nationally representative datasets over the period 2008-2012 and investigate the determinants of forming marriage for urban women aged 27 or above who are termed “leftover”. We estimate a recursive and dynamic mixed-equation model to describe women’s joint decisions on career, education and marriage. This considers various traits including demographic characteristics, wealth, work-related indicators, personality, attitudes and expectation, physical and facial attractiveness, leisure activities, personal and parental social status, local gender identity norms and marriage market conditions. We find “marital college-discount”: college education reduces the probability of marriage by 2.88%-3.6% and a postgraduate degree further oppresses it by 8.4%-10.4%. Counterfactual analysis indicates monotonicity, complementarity and substitution in multidimensional matching patterns. Patriarchy still appears to prevail.

Keywords: marriage, gender, education, earnings, China

JEL classification: J12, J16, O53

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Mediocrity is the virtue of women.

Admonitions for Women (80 CE), by BAN Zhao (45-116 CE, China)

1. Introduction

After more than three decades of economic reform, marriage remains universal and early in China (Ji and Yeung, 2014; Jones and Gubhaju, 2009). Yet, as with the other spheres of modern Chinese life, the marriage market has been evolving as part of the rapid, and, sometimes radical, socioeconomic transitions. Among the changes, the most visible features include two seemingly paradoxical phenomena: While the urban population of every province of the country reports higher-than-one sex ratio of unmarried men over unmarried women, urban women in their late 20s or 30s show decreasing rates of marriage formation. The 2010 Census suggests that three in ten urban women aged 25-29, long the most common age for urban women’s first marriage in the Chinese tradition, had never been married, although there were 1.19 million more men than women in cities, contradicting the positive impact of sex ratio on the likelihood of women’s marriage widely found in other countries (e.g., U.S. in Angrist, 2002 and Abramitzky *et al.*, 2011).

Researchers from various disciplinary backgrounds have documented the different situations Chinese men and women may face in the future. On the one hand, men of lower social status and less education will confront a deteriorating marital squeeze, with the rate of male bachelorhood predicted to peak around 2050 (Guilmoto, 2012; Huang, 2014; Jiang, 2014); on the other, urban women, typically the well-educated, have to weigh the chance of marriage formation against their personal development in the public sphere (Ji, 2015; Tian, 2013; Yu and Xie, 2015).

While the issue of “surplus men” is clearly linked to the heavily skewed sex ratio, the term “leftover women”¹ has been disseminated by the state media ever since 2007 to label women who are aged 27 or above but remain single. The “age threshold” then was reasserted by the All-China Women’s Federation in their official report of the 2010 *National Marriage Survey*.² As the gender-specific label grows into a social issue, concern about their daughters’ marital plight has led anxious parents to make frequent visits to dating markets (Sun, 2012). Meanwhile, the constructed phenomenon of “leftover women” has been widely covered in mass media both within China and overseas.³

Despite intense interest in the issue, serious academic research that directly addresses the phenomenon is limited. A few sociologists have approached the issue using qualitative interviews and revealed the struggle of “leftover” between modernity and tradition, along with their multiple sources of pressure connected with parents, the labour market, and potential male partners (Fincher, 2014; Gaetano, 2009; Ji, 2015; To, 2013). In comparison, quantitative studies tend (rather than treating it as an independent event) to describe marriage as an optimal decision maximising individuals’ utility and to cover the issue of “leftover” women in analysis of marriage timing or examine the relationship between education and marriage formation (Yu and Xie, 2015). Comparing men and women born respectively in the 1960s and 1970s, Tian (2013) found that the effect of education on marriage timing had been stable in a path-dependent marriage market where non-marriage receives social penalty. Qian and Qian (2014) and Wu and Liu (2014), respectively from a sociologist’s and economist’s view point, approached the issue in a more straightforward fashion, yet the discussion is still limited to the effect of education on marriage formation. The issue of “leftover women” is in need of a comprehensive investigation in order to provide both a more systematic description

¹ Or “leftover ladies” (both meaning *shengnv* in Chinese). We use them interchangeably throughout the text.

² According to the 2010 *National Marriage Survey* conducted in 31 provinces by the All-China Women’s Federation (a government-sponsored mass organisation), 90% of men thought women should marry before 27; 6% considered the ideal time at 25-27; only 1% believed the best marital age for a woman was 31-35.

³ For example, *BBC News Magazine* on 21st February 2013, the *Economist* on 3rd May, 2014, and the *Guardian* on 5th June 2014.

of the so-called “leftover women” in urban China, and a more nuanced understanding of how their educational background, career, and marriage formation are intertwined under the Chinese “modern-traditional mosaic” (Ji, 2015a).

Capitalising data from three of the Chinese General Social Surveys (2008, 2010, and 2011) and two waves of the China Family Panel Survey (2010 and 2012), this paper explores the inter-dependent relationship between three changes for Chinese urban women, namely career, education, and marriage decisions. It is worth noting that the existing literature predicts either negative or positive two-way associations among the three. We answer the following questions: 1) what are the likely causes of the quickly growing number of female singles in urban China, many of whom are college or post-college educated with decent earnings?; 2) is China different from other countries where similar trends are also observed, such as the U.S. (Isen and Stevenson, 2010) and East Asian countries sharing similar traditional gender ideology as China (e.g., Japan and South Korea in Hwang, 2016)?; 3) do declining female marriage rates in urban China, especially among the college and post-college educated, reflect long-standing gender inequality or signal rising feminism as women’s education might lead to more progressive attitudes on career and/or life?; and, 4) is marriage delayed or forgone for the so-called “leftover women” while acquiring more educational attainments?

The remainder of this paper is scheduled as follows. The next section reviews past relevant studies in order to provide an introduction of the demographic and socioeconomic changes facing urban women in China and to tease out possible explanations of women’s marriage formation. Section 3 describes datasets and variables. Section 4 sets up the analytical framework, with the results are to be presented in Section 5. Section 6 concludes.

2. Background and previous studies

A. The socioeconomic vicissitudes for women in urban China

To fully understand women's marriage entry in urban China, it is essential to consider the major contextual changes that may have an impact on both women's marriage decisions and their pursuit of education and career development. Briefly, the past decades have witnessed not only an increase in skewed sex ratio of unmarried men over unmarried women, but the revival of traditional gender norms during the process of modernisation.

In the public sphere, women have become substantially better educated and earned an increase in absolute wage income (Appleton *et al.*, 2014). As shown in Figure 1, the real annual wage for women tripled between 2002 (16,652 yuan) and 2013 (51,483 yuan), which has been due to improved female education. As shown in Figure 1(a), in urban sectors, the share of female workers completing junior high school increased by 5 percentage points between 2002 and 2013 (from 34% to 39%), followed by 4 percentage increases in those completing senior high school. The largest proportionate increase was in college education or above: its proportion was 1.75 times higher in 2013 (11%) than in 2002 (4%). However, there has been evidence of deterioration in income for women relative to men for various reasons.⁴ Further, because of occupational gender segregation, women are more likely to be found in low-paying occupations or unpaid work. Women are faced with gender discrimination in income and have less chance of job mobility than men due to discrimination in the labour market (Cao and Hu, 2007; Wu and Wu, 2008, 2009; Zhang, 2002; Zhang *et al.*, 2008; Zhang and Hannum, 2015).

[Figure 1]

In the meantime, urban women are increasingly a heterogeneous population. Different datasets all point to fewer disadvantages for women of higher socioeconomic status than those from less advantaged backgrounds. Analysis based on the mid-1990s national survey

⁴ For example, gender-differentiated educational returns (Gao and Smyth, 2015) and the retreat of the state sector in market transition (Zhang and Hannum, 2015),

data shows smaller pay gaps at the top than at the bottom of the pay distribution (Xiu and Gunderson, 2014). Added to that, urban women have become more likely than before to face a motherhood penalty in the labour market. In employment rate and income, urban single women are even outpacing single men, whereas married women, with particular reference to mothers, are subject to a substantial gender gap in wages (Zhang and Hannum, 2015). By the turn of the millennium, the impact of marriage and household socioeconomic status has become a significant predictor of women's likelihood of employment, whereas the positive effect of education has become less important (Wu, 2010). It has also been found that married women with higher household income are more likely to leave the labour market.

The changing situation for women in the labour market echoes changes in the public gender discourse. As the pre-reform Marxist gender ideology, on which the gender revolution in China was based, gradually gave place to market efficiency, sexuality and gender identities have been reconstructed (Sun and Chen, 2015). The gender reform under the centrally planned economy was limited to the workplace and did not alter the traditional gender norms and gendered division of household labour (Parish and Farrer, 2000; Sun and Chen, 2015; Zuo, 2003). Nevertheless, domestic labour was "embedded" in the production system, by means of which the state was involved in family reproduction and endorsed women's labour force participation (Song, 2011). As the state retreated and social service was gradually privatised, and, given their relatively low "time value" in the labour market, women are increasingly pushed to take on family care responsibilities (Cook and Dong, 2011; Harrell, 2000). Since the early 1980s, there has been debate on whether "home" is where married women truly belong. At the same time, a neoliberal rhetoric has emerged in the mass media, which, in alliance with the traditional patriarchal gender ideology, tends to attribute various gender issues to individual choices and solutions rather than institutional and structural reasons (Sun and Chen, 2015). In sum, the gender revolution, as Ji (2015) indicates, is

incomplete and asymmetric.

B. Marriage patterns, demographic change, and “leftover” women

As a result of increased opportunity in labour markets and higher educational attainment for urban women, it is not surprising to see declining fertility rates for the '20 cohort and slightly increased fertility rates for the '30 cohort in Figure 1(b). The census data in Figure 2 reaffirm increases in non-marriage rates for urban women in all ages from 16 and a similar trend for unmarried urban men aged between 15 and 39. Although men experienced higher non-marriage rates in both 2000 and 2010 than females did, the increases were larger among the latter, especially for females aged between 19 and 26 because of expanding higher education.⁵ Correspondingly, urban women's average age at their first marriage was postponed from 24 to 25 over the last two decades (Figure 3). The reduction in labour force participation rates was larger for college educated women aged below 40 (-0.6 percentage points per annum) than for college educated men (-0.3 percentage points per annum) in the same age group over the period 2002-2009, according to Feng *et al.*'s (2015) calculation.

[Figures 2 and 3]

Overall, as shown in Figure 4, urban women have become on average 5% less likely to marry over the past decade when experiencing consistent, and fast, income growth and massive urbanisation. Figure 4 also indicates that the increasingly high non-marriage rate is driven by proportionately larger increases in western provinces possibly because of the internal migration of numerous male workers from inland to coastal regions.

[Figure 4]

The most recent census conducted in 2010 points to notable differences in marriage rates across different levels of educational attainment. Figure 5 shows that, at all ages from 15

⁵ The increases in non-marriage rates were 1.5-14.6 percentage higher for females than for males in these cohorts.

regardless of gender, the higher the individual's educational attainment, the higher the likelihood of remaining unmarried. For individuals of all educational levels, the increases in this likelihood are larger for women than for men. Two cohorts seem to be least likely to get married older – the least educated men (with primary education) and well-educated women (with postgraduate degrees), and the non-marriage rate is even higher for the former than for the latter in their 40s. Interestingly, the 2010 census points to a “turning point” for the well-educated: even though men in general face higher non-marriage rates of non-marriage than women of most educational levels, women with postgraduate degrees are even less likely to marry after 35 than men of the same level of education and age. In this sense, marriage may not simply be delayed, but may be forgone for post-college educated female singles (Cf. Wu and Liu, 2014).

[Figure 5]

Those changes in marriage patterns also accompany mate selection. They not only are natural consequences of social development, but also reflect the aforementioned gendered dichotomy between the public sphere and private sphere in urban China. Over the decades, apart from delaying marriage, single men and women in urban China also adjusted their criteria for mate selection. Using the survey data of two major cities, Xu (2000) showed that urban young people were paying more attention to the socioeconomic and material circumstances of their potential partners. Later, Li (2008, 2011) found that educational homogamy had become more pervasive since the 1980s. While the match between family socioeconomic background apparently becomes less important, the pressure of uncertainty in a market society has pushed marriage searchers to prioritise their future partner's career and financial achievement as well as the potential. These results were reconfirmed by more recent data (Ma, 2015; Qi and Niu, 2015). Ma's (2015) analysis of the national data shows that more than half Chinese marriages feature husband and wife in similar tiers of education, social

class, and income. That said, the common phenomenon of women “marrying up” indicates the persistence of patriarchal gender norms in the Chinese marriage market.

Despite their improved achievement in education and career, single women often have to cope with pressure from multiple sources in the “traditional-modern mosaic” (Ji, 2015). As revealed by Ji’s qualitative interview data, it is not uncommon for single women to have parents who invested for years into their daughter’s education and so are reluctant to lower their expectations of a future son-in-law. Meanwhile, however, such single women may also be subject to discrimination in the marriage market if they do not seem willing to take on the Chinese traditional wifely role (To, 2013). Constrained by the “gendered double standard of ageing” (England and McClintock, 2009; Ji, 2015), well-educated single women who are keen to achieve career advancement have to achieve a delicate balance between timing their marriage at the proper age and pursuing a career while they are still considered “able” female employees.

To gain a comprehensive understanding of the phenomenon of “leftover women”, it is also essential to frame the issue in the overall social context in which urban Chinese women live. In addition to the possibility of encountering “discriminatory” and “controlling” suitors in the marriage market, single women are also faced with the changing public discourse concerning married women and mothers, which extends the aforementioned traditional family-centered role of Chinese women. In contrast to the image of “degendered” “Iron Girl” mothers, working mothers in the modern Chinese market society are expected to practice “intense motherhood” and be versatile enough to meet new demands ranging from earning a high income (long been supposed to be shouldered by men) to being a perfect family educator for their children (Jin and Yang, 2015; Murphy, 2000). As urban mothers are constantly reminded of the importance of giving their family and children unquestioned priority, another dimension of gender essentialism, has emerged in the apparent discourse of

individualism (Tao, 2015). “Super-hot moms” (“*lama*” in Chinese) can meet the various family obligations while maintaining femininity in terms of physical appearance (Shen, 2014).

C. Explaining marriage entry: Literature review

In this study, we answer our research questions by exploring the inter-dependent relationship between three dimensions of Chinese urban women’s life, namely, career, education, and marriage decisions, in the context of social changes in women’s role. Thus, this subsection reviews theories, from both economist and sociological perspectives, that have been built to explain women’s marriage formation. Yet, as mentioned in our introduction, instead of incorporating the three in a coordinated decision-making process, the existing literature points to either negative or positive two-way associations among education, income, and marriage formation.

First, rational agents, regardless of their gender, may optimally choose to substitute away from marriage as alternatives become more attractive, typically increasing wages to higher education. This is termed “standard market college premium” by Chiappori *et al.* (2015b) and found in the U.S. (Becker *et al.*, 2010). Higher income may, in turn, affect matchmaking as wage rates are the main determinant of bargaining power in marriage (Beck, 1973). By estimating the impact of Civil War pension income in the 19th Century US on the behaviour of Union Army widows, Salisbury (2014) finds that receipt of pension income lowered the marriage rate by 40%.

Second, economic agents also behave strategically prior to household formation if they foresee certain premarital decisions may influence the share of marital surplus obtained in bargaining. The bargaining power model predicts premarital investment and labour supply in order to augment future income (Nick and Walsh, 2007) and human capital acquisition in

anticipation of advantages in allocation/bargaining in marriage over surplus, be it private or public goods, as women can be self-sufficient and better off when not married. Marriage market frictions and endogeneity of the marital sharing rule further push women's premarital human capital investment beyond what is Pareto-efficient in order to protect their marital surplus (Iyigun and Walsh, 2007; Peters, 2007). Women overinvesting in premarital schooling effectively pre-commit to spending less time on childbearing in marriage (Iyigun and Walsh, 2007), which may in turn reduce their chance of a match where potential partners have preferences about children (as commonly seen in traditional communities). Moreover, the increased number of women who have developed marketable rather than domestic skills has caused relative scarcity in marriage markets of those specialising in less marketable but more domestic skills (Vagstad, 2001). This has increased their bargaining power and reduced marriage prospect for those over-specialising in market skills through human capital acquisition, i.e., "the career choice problem" in Baker and Jacobsen (2007). It is, however, worth noting that if a rising return to female education also increases fathers' concern about the rights of their daughters, finding well-educated spouses for one's children is rationalised (Doepke and Tertilt, 2009).

Further, sociologists note that premarital human capital entails women's "unalienable assets" which not only raises their bargaining power in marriage but is also "portable" if she leaves the relationship (England and Kilbourne, 1990). In this sense, premarital human capital investment intensifies the threat point in marriage, making marriage formation difficult for well-educated women. Blossfeld and Huinink's (1991) event history analysis supports the hypothesis of "standard market college premium" where career resources delay timing of first marriage, but rejects the above economic models. Timing of first marriage does not depend on women's premarital education, but rather the supposition that young women in school are not ready for marriage and motherhood.

A recent strand of literature extends strategic incentives before marriage to individual's life-time inter-temporal utility maximisation and points to positive marriage responses to education. Caucutt *et al.* (2002) study women's marital timing and labour supply decisions: returns to fertility related negatively to the dependence of women's wages on labour market experience. They document that U.S. women in the highest wage quintile have 64% of their children at age 27 or older. Further, Chiappori *et al.* (2015a) frames marriage in a three-stage life-cycle model with transferable utility, namely investment in premarital human capital, matchmaking in the marriage market and post-marriage labour supply and savings. The model predicts that matching is driven by demand for public goods and by expectation of risk sharing. Their empirical analysis finds that women's human capital is a stronger determinant of marital surplus (defined as the sum of mates' respective expected utility as singles) than men's, because of higher returns of females' education on their earnings conditional on employment. Sociologists also recognise the dynamic mate choices within the entire lifetime and attribute this to the dynamic interplay of opportunity structures to meet potential partners in a specific context such as education and work (Blossfeld, 2009).

Inspired by the above implications, particularly Blossfeld (2009) and Chiappori *et al.* (2015a; b), we consider women's coordinated multidimensional livelihood arrangements and estimate empirically their static and dynamic inter-related decisions on earnings, educational attainments and marriage by exploiting two nation-wide surveys in urban China over the period 2008-2012. The present study brings contributions to the literature in three ways.

First, we propose a recursive mixed-equation model to describe women's coordinated livelihood arrangements in career, education and marriage. As reviewed above, education and earnings are important assortative criteria selecting individuals into marriage, while there are "feedbacks" of marriage and other socioeconomic factors on women's career and educational choices. Our empirical framework considers this (observed) recursive inter-dependence

between career (approximated by earnings), educational attainments and marital status as well as jointly distributed unobserved heterogeneity underlying the individual's three decisions and approximating endogenous tastes (preferences, values) of different choices. Respective instruments to three decisions are also used to improve identification. Further, the panel dataset allows us to extend the static model to a dynamic one, testing for contemporaneous and time-lagged impact of each one of the decisions on the other.

Second, the mixed-equation model for women's coordinated multidimensional decision making differentiates between the "labour market premium" and "marital premium" of education on marriage and thus. In particular, we provide evidence from urban China where traditional ideology interweaves thriving westernised life styles on "marital college-plus premium" (Chiappori *et al.*, 2015b) for female postgraduate degree holders. The estimate of educational returns to marriage formation helps understand the demand for female schooling, especially tertiary education. It also adds new evidence of association between education and marriage, which is at variance with socioeconomic contexts (see a review in Blossfeld, 2009), as schooling also changes multidimensional skills and preferences (Oreopoulos and Salvanes, 2011). For example, one unit increase in the sex ratio in the U.S. leads men to invest 0.5 additional years in schooling and women to decrease it by 0.05 years on anticipation of their respective positional changes in marriage markets (Lafortune, 2013). Bruze (2015) and Chiappori *et al.* (2015b) document women's substantial marriage returns to schooling (measured by increases in wage rates) in Denmark and the U.S., explaining increasing demand for higher education and educational homogamy (Siow, 2015). In comparison, Anderberg and Zhu (2014) find that holding relatively low academic qualifications caused exogenously by birth within the first 5 months of the academic year – a historical school exit rule in England and Wales – does not affect the probability of marriage for women aged 25 or above, but improves "matching quality" (i.e., their husbands' academic and economic

positions). Experiments in social psychology with mediational analyses further show that both genders may not adopt strategic behaviour as predicted by theoretical models: men perceive a potential partner with high educational level as less likeable and less faithful, and thus report less likelihood of romantic contact (Greitemeyer, 2007); women select long-term partners according to their attractiveness and ambition (Wilbur and Campbell, 2010).

Third, we exploit two datasets including both individuals and their original families' information when aged between 12 and 14, and take into account a variety of factors that have been found in the literature to affect matchmaking. This allows us to test for various hypotheses and mechanisms underlying marriage formation, such as anthropometric conditions (Dupuy and Galichon, 2014), facial attractiveness (Bjerk, 2009), personality (Lundberg, 2012), social identity (e.g., household registration in the Chinese context as Han *et al.*, 2015), social origin (e.g., occupation, wealth and families' background in Grusky, 2008), parents' traits to account for parents' matchmaking given old age support in Chinese communities (Huang *et al.*, 2015), various gender identity norms in terms of men's traits relative to women's as men tend to avoid women whose traits such as intelligence or ambition exceed their own (Fisman *et al.*, 2006), and local marriage market conditions (e.g., sex ratios in Abramitzky *et al.*, 2011). More importantly, our recursive and dynamic model in three dimensional decision making can pick up, if any, monotonicity, substitution and/or complementation between various factors in forming a marriage relationship. Counterfactual analysis posterior to estimation further reveals the patterns of multidimensional matchmaking, i.e., monotonicity, complementation (Legros and Newman, 2007) and/or substitution (Chiappori *et al.*, 2012) between different dimensions.

3. Data

3.1. Construction of datasets and variables

We employ two nation-wide datasets – the China General Social Survey (CGSS) in 2008, 2010 and 2011, and the China Family Panel Survey (CFPS) in 2010 and 2012. Both adopted face-to-face interviews under similar sampling procedures. Since the questions relating to our interest appeared in either or both of the datasets, we are able to explore the mechanism of the marriage decision comprehensively and robustly by using both datasets as complements to each other.

The CGSS has been conducted by the National Survey Research Center at Renmin University of China since 2003 as cross sections at an interval of 2-3 years (and annually since 2010). It implemented Probability-Proportional-to-Size Sampling (PPS). The subsamples in each wave were obtained through the following three stages. The wave in 2008 selected 100 administrative counties as the first-stage Primary Sampling Units (PSU), 600 administrative communities as the second-stage Sampling Units (SSU) and 6,000 individuals as the Ultimate Sampling Units (TSU). Each one of the waves in 2010 and 2011 selected 100 administrative counties and 5 mega cities (Beijing, Tianjin, Shanghai, Guangzhou and Shenzhen) as the PSU, 480 communities as the SSU and 12,000 individuals as the TSU. All individuals came from different households, i.e., only one individual from each household.

The CFPS is a national longitudinal general social survey conducted by the Institute of Social Science Survey at Peking University and supported by the Chinese National Population and Family Planning Commission. Similar to the PSID in the US, the CFPS is nationally representative and interviews multidimensional aspects of life-style. It also implemented PPS with implicit stratification. Administrative units and socioeconomic status (SES) are used as the main stratification variables. Within the administrative unit, local GDP per capita was used as the ordering index for SES. If the GDP per capita in the administrative unit is not available, the proportion of non-agricultural population or population density is used. The sample of CFPS is drawn from 25 provinces excluding Hong Kong, Macao,

Taiwan, Xinjiang, Qinghai, Inner Mongolia, Ningxia, and Hainan, covering 95% of Chinese total population. The sample provinces were first classified as large (5) and small (20) ones according to their population and regional representativeness. Then, the subsamples were obtained through the three stages within each of the two groups. In total, the CFPS selected 144 administrative counties and 32 towns as the first-stage PSU, 640 administrative communities as the second-stage SSU, and 19,986 households as the third-stage TSU. The first wave in 2010 interviewed 33,600 individuals from 14,960 households.

We further selected female individuals aged at 27 or above for empirical analyses given the Chinese tradition reviewed in Section 1.⁶ Table 1 lists our selected samples in two datasets after excluding missing values. They still cover all sample provinces. Table 2 shows broadly equal age distribution of selected samples in a 5-year interval. The definition of variables and their descriptive statistics are reported in Table A.1 in Appendix.

[Tables 1-2]

3.2. Descriptive statistics

About 17.6% (9.7%) of sample females received higher education (college or above) in the CGSS (CFPS), as shown in Figure 6. Not surprisingly, the older the age, the lower their income (Figure 7) and educational attainment (Figure 8) in both surveys. It seems that the share of never married women is not large – 2.29% and 1.53% in the CGSS and CFPS respectively – as opposed to about 85% of women in their first marriage (Table 3).⁷ There seems to be age effects in marriage and its-related attitudes and lifestyles. Marriage is likely to be driven by those above 45 years old, while those aged between 27 and 35 suggest high non-marriage rates (between 4% to 17% in Figure 9). The overall pattern of declining

⁶ We also raised it to 30 for robustness checks. Cross-refer to Footnote 13.

⁷ Partnership is also classified as marriage given a formal relationship, while simply having boy/girlfriends without partnership or marital relationship is classified as being unmarried. In this sense, the magnitude of our estimates of various determinants of marriage would better be understood as a higher bound.

non-marriage rates with increasing age at first marriage is consistent with the Census in Figure 5, but with different magnitude – lower non-marriage rates in our dataset than in the Census. Throughout the empirical analyses, we used weighted regressions with the weights being the inverse probability of the individual being sampled in the CGSS or CFPS as calculated by the survey teams in order to correct for possible sampling bias and the limited sample size of singles. The age at first marriage varies between 23 and 24 (Figure 10), which is similar to the Census (Figure 3), and decreases for the elderly as they married in a more conservative period. The exception is those aged between 50 and 60, i.e., those who were born in the 1950s. They married older because the government offered benefits for late marriage (above 23 for females) in 1980 such as extended marital leave from 3 days to one week, extended maternal leave from 56 days to 90 days, 15-day paternal leave and subsidies.

[Figures 6-10]

[Table 3]

Comparing married and never-married women in Table 4, differences exist in demographics, socioeconomic status, traits, attitudes and lifestyle. The unmarried women are younger than the married – consistent with the age distribution in Figure 10 – and obtained higher educational attainment as a result of this age effect. They also suggest higher (self-rated) health status, better fitness and, interestingly, (interviewer-reported) good-looks, which could also be due to an age effect or less enclosure in the daily grind of housework. Unmarried women are those who live downtown (rather than in the suburbs) with local urban household registration (*Hukou*) (entitling them to social protection schemes and social welfare services such as education, medical care and housing), earn more income, and have more decent jobs and thus these determined (EGP) social classes. They are also satisfied with their wages and expect to achieve even higher social status in future. Better performance in labour markets and education may be due to high self-efficacy and strong aspiration – 2 and

1.6 times respectively higher than those for the married women. However, the unmarried women are not necessarily workaholic – the extent of their agreement for the importance of hard work for personal achievement is 4%-8% less than that of the married women – and do not hold significantly different views on the importance of marriage in personal life. The differences in their views of marriage boil down to the evolving gender roles in a quickly westernised society: the unmarried women are more open in terms of sex relationships before and during marriage and less concordant with the traditional role assigned to women, i.e., “men for work and women for family”. Despite less trust in strangers, the unmarried women appear to be more sociable in terms of both (subjectively) self-assessed interpersonal relationships and (objective) activities such as interacting with friends at social websites, reading, enjoying refined food, using mobile phones, studying and travelling. It is also worth noting family influences in shaping the above personal characteristics and marriage decisions. Both surveys point to higher parental educational attainment for unmarried women than for married ones. The CFPS further reveals higher social status for the former’s family in her childhood. Another important factor in marriage status is living arrangements. 52.1%-74.7% of unmarried women lived with their parents, in sharp contrast to 5.2%-5.8% for married ones. This is plausible in a sense that females live with their husbands’ parents (or form separate households) after marriage. However, two-way causality between living with parents and remaining unmarried may cause endogeneity. We will return to this point with estimators in Section 4.

[Table 4]

Besides women’s own characteristics and parental influences, gender identity in terms of relative comparison between men and women is un-negligible in forming a marriage relationship, especially in marriage markets where patriarchal ideology still prevails. At the city level, Figure 11 plots the proportion of unmarried sample women in all sample females

aged between 27 and 60 against the ratio of the sample men's average socioeconomic status against sample women's. Perfect assortative matching (homogamy) should point to a U-shaped relationship between non-marriage rates and sorting criteria (super-modularity), while perfect negative assortative matching (hypergammy) should reveal an L-relationship between non-marriage rates and sorting criteria (sub-modularity). In other words, marriage is most likely between men and women sharing similar characteristics (ratio=1). The L-shaped smoothing lines in Figures 11(a) and (b) indicate that the more advantaged women are in education and earnings compared with men the less likely are they to marry. The more similarities between men and women (i.e., an increasing ratio to 1), the more likely they are to marry, consistent with the assortative matching in Chinese marriage markets (e.g., Huang *et al.*, 2015). This trend of declining non-marriage rates extends to the situation where men are more advantaged than women (i.e., a continuously increasing ratio above 1). This is not only consistent with the traditional ideology that the husband in typical Chinese marriage is expected to have higher socioeconomic status in terms of income and education than the wife, but also indicates that traditional perception of gender identity still dominates urban China. Interestingly, housing, the value of which constitutes 74% (in the CFPS 2012 by Xie and Jin, 2015) and 83.6% (in the China Household Finance Survey 2011 by You *et al.*, 2015) of family wealth in urban China, manifests a U shape between non-marriage rates and the gender ratio, indicating stronger assortative matching behaviour based on wealth than on education or income. Physical appearance in terms of BMI only shows a slight U-shape in the CGSS.

[Figure 11]

To sum up, common beliefs may not hold as explanations for being unmarried for urban Chinese women who are aged 27 or above, such as working too hard, being introverted and holding different views towards life or marriage. In fact, they appear to have better

socioeconomic status, enjoy a diversified as well as open life, and perceive marriage similarly to those who do marry. The original family matters. Further, gender identity still prevails in urban marriage markets. More advantaged women compared with men in the same city are less likely to marry. These observations are consistent with persistence of traditional patriarchal gender norms reviewed in Section 2 and motivate our selection of covariates in the empirical model in the next section.

4. Methodology

The sample woman is indexed by i at time t . She earns an annual income y_{it} and has educational attainment e_{it} which is a categorical variable. Her marriage status is denoted by m_{it} which is a binary variable with the value of 1 for singles and zero otherwise. This individual's income, education and marriage status is described by the following system:

$$\ln y_{it} = \alpha_1 + \mathbf{x}'_i \beta_{11} + \mathbf{x}'_h \beta_{12} + \mathbf{x}'_p \beta_{13} + \mathbf{z}'_1 \beta_{14} + \theta_{11} e_{it} + \theta_{12} m_{it} + \varepsilon_{1it} \quad (1)$$

$$e_{it} = \begin{cases} 1, & \text{if } c_0 < e_{it}^* \leq c_1 \\ 2, & \text{if } c_1 < e_{it}^* \leq c_2 \\ \dots & \\ 7, & \text{if } c_6 < e_{it}^* \leq c_7 \end{cases} \quad (2)$$

$$e_{it}^* = \alpha_2 + \mathbf{x}'_i \beta_{21} + \mathbf{x}'_h \beta_{22} + \mathbf{x}'_p \beta_{23} + \mathbf{z}'_2 \beta_{24} + \theta_{21} \ln y_{it} + \theta_{22} m_{it} + \varepsilon_{2it} \quad (3)$$

$$m_{it} = \mathbf{1}(m_{it}^* > 0) \quad (4)$$

$$m_{it}^* = \alpha_3 + \mathbf{x}'_i \beta_{31} + \mathbf{x}'_h \beta_{32} + \mathbf{x}'_p \beta_{33} + \mathbf{z}'_3 \beta_{34} + \theta_{31} \ln y_{it} + \theta_{32} e_{it} + \varepsilon_{3it} \quad (5)$$

where $\boldsymbol{\alpha} = (\alpha_1, \alpha_2, \alpha_3)'$ are constants; the vectors \mathbf{x}'_i , \mathbf{x}'_h and \mathbf{x}'_p control for factors at the individual, household and provincial levels separately which are supposed to affect all three outcomes. Specifically, \mathbf{x}'_i includes individual demographics such as age, ethnicity, religious belief, self-reported health status, labour supply measured by working hours per day, and

social identity (i.e., local urban household registration (*Hukou*) when she was 14 years old which has been attached with various social protection schemes exclusively for local urban residents). \mathbf{x}'_h includes her original family's social status when she was 14 years old. \mathbf{x}'_p captures macro socioeconomic transition at the provincial level such as natural logarithmic provincial GDP per capita, urbanisation in terms of the share of urban population, the sex ratio (i.e., competition or frictions in the marriage market) in terms of the number of unmarried men over that of unmarried women in urban areas, and provincial and year dummies controlling for other macro-level unobservables. To strengthen identification, $\mathbf{z} = (\mathbf{z}'_1, \mathbf{z}'_2, \mathbf{z}'_3)$ further includes correlates that are considered to be most relevant to i 's income, education and marriage, respectively, but less relevant to the other two outcome variables.⁸ Specifically, \mathbf{z}'_1 includes the ownership of firms where i was working (i.e., state-owned, private or foreign enterprises) given the wage differences between them. \mathbf{z}'_2 includes parents' educational attainments considering strong intergenerational persistence of education in urban China (You *et al.*, 2015) and adult sibling's average educational attainment when it is available in the CFPS given peer effects and family environment in child education. \mathbf{z}'_3 includes the share of married adult siblings in all adult siblings,⁹ individual height and weight representing physical attractiveness, facial attractiveness,¹⁰ house ownership representing wealth and thus potential sorting in marriage markets,¹¹ the ownership of firms where she was working, livelihood arrangement in terms of whether

⁸ \mathbf{z}'_1 , \mathbf{z}'_2 and \mathbf{z}'_3 are similar to excluded instruments to income, education and marriage, respectively. According to Roodman (2011), the entire system (Eqs. 1-5) can be identified without excluded instruments, while including them, which could even be weak instruments, helps improve identification and efficiency.

⁹ We also checked other possible instruments given gender and age differentiated peer effects among siblings, i.e., whether there are older and younger brothers (sisters) separately in Columns 4-6 of Table 5. They turn out to be statistically insignificant albeit with predictable signs, and do not affect our findings.

¹⁰ These are interviewer-rated scores according to comparison between the respondent and others at similar age. This measure helps mitigate women's overestimation of their facial attractiveness.

¹¹ To avoid endogeneity, the house ownership is measured as individual obtaining her (residential) property 3 years prior to the interview.

living with parents,¹² personality traits (“grit” and academic self-efficacy), attitudes (trust and sociability), various leisure activities, and parents’ educational attainments which could also help transmit preferences and attitudes towards work. $\boldsymbol{\varepsilon} = (\boldsymbol{\varepsilon}_1, \boldsymbol{\varepsilon}_2, \boldsymbol{\varepsilon}_3)'$ includes the disturbances for three equations. In particular, they are jointly and non-identically normally distributed $\boldsymbol{\varepsilon} | \mathbf{x}, \mathbf{z} \sim NID(0, \boldsymbol{\Sigma})$, reflecting individual indivisible decision making in marriage and labour markets. The variance-covariance matrix is expressed by

$$\boldsymbol{\Sigma} = \begin{bmatrix} \sigma_{11}^2 & \sigma_{12} & \sigma_{13} \\ \sigma_{12} & 1 & \sigma_{22} \\ \sigma_{13} & \sigma_{23} & 1 \end{bmatrix}$$

where unit diagonal entries of $\boldsymbol{\Sigma}$ are to facilitate a normalised scale for each equation; the correlation coefficients are thus written by $\rho_{ij} = \text{cov}(\boldsymbol{\varepsilon}_i, \boldsymbol{\varepsilon}_j | \mathbf{x}, \mathbf{z}) = \sigma_{ij} \neq 0$ for $i \neq j$.

The likelihood function for the above system can be written by the product of the probability of observing income y_{it} in Eq. (1) and all 14 possible observed combinations of education and marriage outcomes in Eqs. (2)-(5):

$$L(\boldsymbol{\alpha}, \boldsymbol{\beta}, \boldsymbol{\theta}, \boldsymbol{\rho}; \mathbf{y} | \mathbf{x}, \mathbf{z}) = \prod_{t=1}^7 \prod_{i=1}^N \int_{h^{-1}(\mathbf{y}_{it})} \phi(\boldsymbol{\varepsilon}) d\boldsymbol{\varepsilon} \quad (6)$$

where $h^{-1}(\mathbf{y}_{it})$ denotes the combination plane including all observed outcomes of $\mathbf{y} = (y_{it}, e_{it}, m_{it})'$ in each wave; $\phi(\boldsymbol{\varepsilon})$ is the joint three dimensional normal density function for all equations. As $\phi(\boldsymbol{\varepsilon})$ involves double and triple integrals over the probability region of $\boldsymbol{\varepsilon}$, we evaluated numerically the likelihood function Eq. (6) by using the GHK agglomeration (i.e., maximum simulated likelihood (MSL)), yielding consistent estimators (Roodman, 2011).

¹² Considering potential endogeneity in livelihood arrangement and marital status, we instrumented this variable by a binary variable indicating whether there are siblings living with parents considering the peer effects among siblings (Fenoll and Oppedisano, 2014) and estimated the livelihood arrangement regression in a linear probability specification together with Eqs. (1-5) with jointly distributed disturbances. As such, $\boldsymbol{\Sigma}$ is estimated effectively as a 4 by 4 matrix.

To facilitate interpretation of the magnitude of the impact on the probability of being unmarried, we also calculate the average marginal effects after estimation. That is, we first calculate the marginal effect for each individual and then average them across all individuals to obtain the average marginal effect. The average effects calculated in this way can acknowledge heterogeneous influence of the same explanatory variable across individuals, as oppose to the marginal effect calculated at the mean individual (i.e., a hypothetical female with all independent variables at their own averages). Specifically, the calculation for a continuous variable x_s in the latent education or non-marriage equations (Eqs. 3 or 5) for N individuals is conducted according to:

$$\frac{\partial \Pr(m=1)}{\partial x_s} = \frac{\hat{\beta}_s}{N} \sum_{i=1}^N \phi(\mathbf{x}'_i \hat{\boldsymbol{\beta}}) \quad (7)$$

where $\mathbf{x}'_i \hat{\boldsymbol{\beta}}$ is the linear combination of all independent variables in Eqs. (3) or (5); $\phi(\cdot)$ denotes the normal density distribution function. The formula for the average marginal effect should x_s be a dichotomous or categorical variable with unit interval is written as:

$$\frac{\partial \Pr(m=1)}{\partial x_s} = \frac{1}{N} \sum_{i=1}^N \left[\Phi(\tilde{\mathbf{x}}'_{-s} \hat{\boldsymbol{\beta}}_{-s} + \hat{\beta}_s) - \Phi(\tilde{\mathbf{x}}'_{-s} \hat{\boldsymbol{\beta}}_{-s}) \right] \quad (8)$$

where $\tilde{\mathbf{x}}'_{-s} \hat{\boldsymbol{\beta}}_{-s}$ denotes the linear combination of the remaining independent variables except x_s ; $\Phi(\cdot)$ denotes the cumulative normal distribution function. The average marginal effects in the uncensored regression (Eq. 1) are shown straightforwardly by the estimated coefficients.

4. Estimation results

4.1. The determinants of remaining unmarried

Table 5 reports benchmark regression results in terms of variables commonly observed in both surveys. Columns 1-6 report results of static models for two surveys and Columns 7-9

report the dynamic estimation results for the CFPS.

[Table 5]

There are age effects in women's lives. In particular, consistent with both the census data (Figure 5) and descriptive statistics of our data (Figure 9), both surveys point to the age effect: marrying older but with a slightly U-shaped relationship as age increases (Columns 3 and 6 of Table 5). A woman is more likely to marry if she is healthier (in the CFPS) or belongs to an ethnic minority (in the CGSS).

The positive impact of urban registration (*Hukou*) on income and education is predictable (Columns 1-2 and 4-5 of Table 5), given that various privileges attached to it may lead to better bargaining power in marriage and that children can inherit this advantageous social status. Surprisingly, an urban *Hukou* substantially increases the chance of remaining single by percentage points in the CGSS and CFPS (Columns 3 and 6 of Table 5), although in the latter the estimator lacks statistical significance. One may suspect "external" (e.g., better socioeconomic conditions for those women with urban *Hukou* making matching more difficult) and/or "internal" reasons (e.g., higher matching criteria in terms of higher expectations/requirements of partners). Our data lend support to the former by the recursive process: higher educational attainment brought about by urban *Hukou* (Columns 2 and 5 of Table 5) reduces the chance of marriage (Columns 3 and 6 of Table 5). For the latter, there are no statistically significant differences in various attitudes towards marriage or life between those with and without urban *Hukou*. Han *et al.* (2015) also document local women's deteriorated position in urban marriage markets as opposed to local men's, because of a policy change in 1998 – men were granted the right to pass *Hukou* to their children regardless of their spouse's *Hukou*, while the right had previously been exclusively to women. The impact of urban *Hukou* remains positive (0.94) at the 1% significance level even after controlling traits, attitudes and leisure activities listed in Table 8.

Working one additional hour per day adds robustly 0.1-2.4 percentages to the annual growth rate of wages in both surveys. Interestingly, working one more hour per week gives women a 2.5% increase in likelihood of marriage in the CGSS (Column 3 of Table 5 and according to Eq. 7) and the magnitude of this average marginal effect is much larger (on average 9.7%) in the CFPS although still lacking significance. This seems to contrast a time trade-off between working and dating and a traditional view in China that “mediocrity is the virtue of women” (*Admonitions for Women* (80 CE), by BAN Zhao (45-116 CE)) – that is, women should take care of household chore and children rather than working outside the home or having academic ambition. Our data reveal some evidence from the perspective of time use, while we will return to gender identity later. Table 6 lists how women met their first partner. 10.8% of married women met their first partner at work and this proportion increased to 12% in 2012, in comparison with a drop of 32 percentages for those relying on relatives’ or friends’ introduction. Facing increasing career pressure in modern society and fast-paced urban life, longer working time appears to create a “win-win” environment for women – providing opportunities for women to meet their potential partners and at the same time, earn more. Where they work also matters. Working in a state-owned enterprise brings not only 31.3% higher income growth rate (Columns 1 and 4 of Table 5), but also (at most) 11.2% of reduction in the likelihood of non-marriage (Column 3 of Table 5 and on average 1.7% according to Eq. 8). Columns 1-6 of Table 7 use occupation, which is classified into EGP social classes (Erikson and Goldhorpe, 1992), to check further how jobs affect marriage. Compared with agricultural workers who have been dropped as the reference group, all other “higher” categories from perspectives of education, income and social recognition associate positively with non-marriage, especially skilled employees or supervisors (in the CGSS) and entrepreneurs (in the CFPS). We also replaced occupation categories with a dummy variable reflecting whether a woman’s occupation scores calculated as the reputation points (Treiman,

1977) for each occupation are higher than the men's median scores in the same city. A decent job in the sense of higher occupation scores than the men's median means 8.5 and 11 percentage points to the women's annual income growth rate respectively in the CGSS and CFPS, relates positively to every educational level, and adds 2.5 percentage points on average, calculated as Eq. (8), to her probability of remaining unmarried in the CGSS at the 1% significance level. The above tests consistently point to traditional matching selection criteria along the "social ladder" with bias towards females who are socially more advanced than males.

[Table 6]

It seems that families' social status and parents' education are only relevant to women's income and educational attainment rather than to marriage. Columns 7-9 of Table 7 check the robustness of these findings by using a few alternative proxies parents' other characteristics, at the expense of a reduced sample size only in the CGSS given data limitations. A woman earns more and achieves higher educational attainment when her parents worked full-time during her teenage years and, interestingly, she is also more likely to remain single after 27 years old if her mother worked full-time in those years. This could imply a mother-daughter transmission of unobserved attitudes or preferences that may lead to effective precommitment of less time devoted to childbearing, higher ambition and/or intra-marriage bargaining power¹³ and this would in turn hamper matchmaking.

[Table 7]

Living arrangement suggests strong association with non-marriage (Columns 3 and 6 of Table 5). Based on Eq. (8), living with parents means on average 15% and 22.5% of higher likelihood of being single in the CGSS and the CFPS, respectively. This result looks counterintuitive as it is common in China that, as shown in Table 6, parents directly arrange

¹³ These unobserved characteristics are beyond grit or self-control as the estimated coefficients of parents' working during filial teenage remain similar (0.486 for mother and -0.54 for father at 1% significance levels) after re-estimating the model by further specifying some of the traits and attitudes as Column 3 of Table 8.

and/or consult relatives to introduce “appropriate” men (in the parents’ eyes) to “date” their unmarried daughters (i.e., arranged dating). It may also be possible that the transmission of traditional ideology may be stronger when living with parents, resulting in earlier marriage. Alternatively, for a positive estimator like ours, one may think that conservative parents, especially those living with their children, tend to oversee their daughters, specifying the time to return home or questioning the daughter’s social situation. Our dataset cannot allow us to check the first two reasons underlying a negative sign, but the CFPS does rebut the third reason for a positive sign. Females living with their parents appear to be even more open and social than those not living with parents. We compare various attitudes towards life and marriage between two sub-groups such as acceptance of sex before marriage and homosexual relationships, the importance of marriage for women compared with work and the importance of taking care of families for women. Those living with parents are more tolerant and deem marriage and taking care of families more important compared to those living independently. Nevertheless, the former spent more time visiting relatives with their parents, which may limit time spent searching the marriage market. 51% of them stayed away from home for at least one day over the past year to visit relatives with parents as opposed to 41% of the latter; and 2.5% of the former spent more than 50 days, which is twice as many as the latter.

A two-way association between education and income is predictable (Columns 1-2 and 4-5 of Table 5). Ironically, despite the “premium” on economic life, education relates positively to being single (Columns 3 and 6 of Table 5). This appears to be very robust when using several alternative specifications in Tables 7 and 8. Based on the benchmark results (Columns 1-6 of Table 5) and Eq. (8), we calculated the individual marginal effects of education on non-marriage and then averaged them at each educational level in Table 8. Both surveys consistently point to increasing difficulties in getting married with higher educational attainment: 5% ($\approx 2.143\% + 2.88\%$) to 6.3% ($\approx 2.696\% + 3.602\%$) greater likelihood of being

single if moving from secondary education to undergraduate education and 8.4% ($\approx 3.734\% + 4.661\%$) to 10.4% ($\approx 4.638\% + 5.741\%$) if moving from undergraduate to postgraduate levels. The largest marginal effects in both surveys have even approached 12% between adjacent educational levels. This indicates at most 24% higher likelihood of being single if moving either from secondary to undergraduate education or from undergraduate to doctoral education.¹⁴

[Table 8]

Income does not exhibit a robust association with the probability of getting married. This does not match Caucutt *et al.*'s (2002) hypothesis of incentives of fertility delay driven by returns to experience in the labour market, which has been found for U.S. women. Using a 2000 national survey of 8,300 individuals across 178 Chinese cities, Shu *et al.* (2013) also find that wives fail to use their relative income to bargain for more power, but would rather use their specialisation in housework for stronger bargaining power. Columns 7-9 of Table 5 further included lagged income, education and marital status. Income and education suggest strong persistence as the estimated coefficients of their lagged terms are strongly positive, while marital status was dropped from estimation due to few variations within a short time (2-year) period between waves. Both current and previous educational attainment suggests positive estimated impact on the probability of being single, but losing statistical significance. There is a long-term stimulus on income of being single, while in the short-time non-marriage deters income growth. We calculated a “net” effect of being single in both waves – a drop of 5.3 percentage points in the growth rate of annual wage income.

Besides the above observed individual and family characteristics, the unobservables may also play a role in determining women's coordinated decisions on labour, education and

¹⁴ If raising the age threshold defining “leftover” women from 27 to 30, the estimated coefficients of education in the marriage equation remain statistically significant. However, the marginal effects reduce to 2.4% (CFPS) - 2.6% (CGSS) higher likelihood of being single if moving from secondary education to undergraduate education and to 4.7% (CFPS) - 5.3% (CGSS) if moving from undergraduate to postgraduate levels. The negative impact of education on marriage formation seems to give way to other characteristics attached to older ages. Nevertheless, this does not imply easier matching at older ages. Section 4.2 will counterfactually simulate marriage formation at different ages.

marriage, namely, as shown partly in Table 4, traits and attitudes towards life and marriage, expectation of future life, leisure activities and (relative) gender identity in local surroundings. We further inserted those variables in the marriage equation and re-estimated the whole system in Table 9.

[Table 9]

“Grit”, measured by three qualities, self-discipline, passion and perseverance when the woman was 14 years old, leads not only to higher educational attainment as predicted (Duckworth *et al.*, 2007), but also to a smaller chance of being single in adulthood, possibly because the gradients of grit overlap Chinese traditional (Confucian) perception and expectation of housewives. By contrast, female academic self-efficacy deters marriage, which is predictable under a negative effect of education. We applied Eq. (8) to Columns 1-9 of Table 9 to calculate average marginal effects at each level of academic self-efficacy. The marginal reduction in the probability of marriage increases from 1.3% to 4% when moving from the lowest to the highest self-efficacy with the step of one category. The largest marginal reduction is 26.1%. Personal interests and activities in leisure time also matter.¹⁵ Interestingly, Column 9 of Table 9 shows that sociability reduces the likelihood of non-marriage while the average marginal effect (in absolute terms) reduces from 5.7% when sociability increases from 1 (the bottom) to 2, to 0.9% when sociability increases from 4 to 5 (the top). Column 9 also indicates that women had better not behave socially like men – being more social than men strongly deters marriage by an average marginal effect of 6.6%, while the largest effect reaches 60.8%. It appears that women are still “selected” under men’s traditional view that “women were born for family” and those women who suggest strong physical or spiritual ambition in terms of going to a gym frequently and holding high academic self-efficacy are “leftover”. That having been said, women also tend to sort, but

¹⁵ We also checked other activities such as studying, going to movies or concerts. They appear to be irrelevant.

according to different criteria – higher expectation of future social status than the men’s median in the same city makes them on average less 2.3% (at most 18.7%) more likely to marry (Column 12 of Table 9). Among those holding higher expectation of future social status than the men’s median, the married females’ educational attainment (2.8) is only 61% of singles’ (4.6). Moreover, 71.6% of the former have lower educational attainment than men’s median education, as opposed to only 23.2% for the latter. These indicate women’s propensity to hypergamy driven by their expectation of future social status and they use education to sort and make marital choices.¹⁶

Our data provide a unique opportunity to check the role of beauty in correlated income, education and marriage markets in both objective and subjective ways.¹⁷ We did not find significant impact of BMI, but rather separate effects of anthropometric conditions and comparison with men’s. Taller women are likely to stay single, although without statistical significance because women’s positive sorting occurs on men’s height (Weitzman and Conley, 2014). Higher weight appears to put forward marriage, although based on Eq. (7), the magnitude of average marginal reduction in the probability of being single of a 1% increase in weight is trivial (0.081% (0.141%) in the CGSS (CFPS)). We also replaced height and weight by dummies indicating a different range of BMI separately, namely underweight ($BMI < 18.5$), fitness ($18.5 \leq BMI < 25$), overweight ($25 \leq BMI < 28$), fat ($28 \leq BMI < 32$) and obesity ($BMI \geq 32$). In the CGSS, overweight correlates to 3.76% less likelihood of non-marriage, while underweight correlates to 2.55%-6.97% higher likelihood of non-marriage in two datasets, all of which are at 1% significance levels. Moreover, gender identity norms matter – higher BMI than the men’s median in the city clearly results in

¹⁶ We also checked income, but the differences between two groups are not as much as those in education. Among those holding higher expectation than men’s, the married women’s annual wage income is 42.7% (9,604 *yuan*) of their unmarried counterparts’ (22,494 *yuan*). 53% of the former have lower income than the median income of the men in the same city, as opposed to only 58% for the latter.

¹⁷ See Table A.1 in Appendix for detailed definition. In particular, our subjective indicator of beauty is less biased than a self-reported one. This latter type of subjective indicator is commonly seen, but it may be exacerbated in the context of asking a woman about her assessment of her looks. Our indicator of beauty also mitigates the bias caused by aging effects given that the question was framed to ask interviewers to compare respondents within her age cohort.

remaining single (Column 12 of Table 9). All the above findings strongly conform to Chinese men's traditional aesthetics of women's (anthropometric) appearance.

Compared with (objective) anthropometric conditions, (subjective) facial attractiveness appears to be a more “effective weapon”. We dropped height and weight and inserted interviewer-rated facial attractiveness (within respondents' age cohorts) in the CFPS to all equations. Columns 1-6 of Table 10 point to a substantial “premium” on beauty in every aspect of life – not only higher income as reviewed by Liu and Sierminska (2014), but also better education and lower likelihood of being single. Based on Column 3 of Table 10, the average marginal effect of beauty is 6.7% reduction in the probability of being single, while this marginal effect decreases as the woman is considered more charming (Table 11). As sociability, gender identity matters. Marriage is less likely when females are more charming than males (Column 3 of Table 10). Consistent with our previous findings on education, for women who are equally beautiful and after controlling for their physical conditions, higher educational attainment makes marriage harder (Columns 6 and 9 of Table 10). Echoing the experimental result in social psychology (Greitemeyer, 2007), despite the above (unconditional) premium of beauty, better appearance than men suppresses the average “premium” of beauty on marriage (i.e., negative marginal effects) from -6.7% to -2.9% and higher educational attainment further pulls it to -2% (Table 11). In contrast to the U.S. where weight is substituted for (women's) education and (men's) wage in matching (Chiappori *et al.*, 2012), beauty rather than fitness substitutes women's education in family formation – the latter seems to be an unconditional good in reducing the likelihood of being single (Column 9 of Table 10). Dynamically, beauty brings about higher income growth in the long-term, while it may not affect education or marital outcomes (Columns 7-9 of Table 10). Overall, beauty tends to be a “conditional normal good” – it only makes marriage more likely when the female is not more charming than the male and it acts as a complement to female

education in deterring marriage.

[Tables 10-11]

4.2. Counterfactual simulations of women's marital profiles

Utilising females' inter-dependent performance in labour, education and marriage markets, we simulated the following scenarios, in order to better demonstrate heterogeneous influences of the main marital determinants found in Section 4.1, namely education, traits, attitudes, and appearance,¹⁸ and how they jointly determine marriage.

We used the estimates of Columns 7-9 of Table 9, including all control variables in the CGSS, to predict the probability of non-marriage as the solid black line in Figure 12(a) against women's observed educational attainment. There is a clearly increasing trend of being unmarried at higher educational levels. We then assume separately all sample women possess the highest value of grit, sociability and self-efficacy,¹⁹ but hold all other characteristics as they are in the dataset. Based on these "simulated sample women" and the estimates of Columns 7-9 of Table 9, we simulated their probabilities of non-marriage and drew simulation results against women's real educational attainment in Figure 12(a). Consistent with the signs of estimators in Columns 7-9 of Table 9, grit and sociability reduces the likelihood of non-marriage, while self-efficacy substantially pushes it up. The magnitude of reduction or increases is larger for women receiving higher education than for those without. Assuming college education for all women clearly increases the probability of remaining single for those receiving secondary education or below. Further assuming the highest self-efficacy for those simulated college-educated women raises the likelihood of non-marriage for everyone and again, proportionately more for those whose actual

¹⁸ We also simulated women earning the highest income. However, given largely insignificant estimates of income in both datasets, our simulated probabilities suggest wide and divergent confidence intervals, especially for women receiving postgraduate education. We thus focus on selected determinants suggesting statistical significance and large magnitude of estimates.

¹⁹ We did not assume these values, but obtained them from our dataset, i.e., the highest values among all sample women.

educational attainment is at college level or above.

[Figure 12]

In Figure 12(a), we also cross-compared those who are simulated to have the highest self-efficacy only and those who supposedly have both the highest self-efficacy and undergraduate degrees. Interestingly, conditional on the same high level of self-efficacy, college education raises the probability of non-marriage by about 60% (from 5% to 8%) for those whose actual educational attainment is secondary education or below, but suppresses the probability of being single, even only to a small extent, for those whose actual educational attainment is at university and postgraduate levels. It is higher education *per se* that discourages men's marriage proposals, regardless of women's traits.²⁰ Further assuming highest sociability (which is also higher than the men's medians in all cities) reduces substantially the probability of non-marriage for all women and proportionately more for those who are (actually) post-college educated. Note that these simulated probabilities are even smaller than the predicted ones based on real data, indicating huge "off-set" impact of sociability on non-marriage caused by higher education.

In Figure 12(b), we used estimates in Columns 7-9 of Table 10 to predict the probability of non-marriage based on the CFPS and then, simulated women by assuming separately the highest level of beauty and fitness measured by BMI. Facial attractiveness and fitness reduces the probability of non-marriage most for the least-educated women. For university and postgraduate degree holders, however, the former even pushes up the probability of remaining single and anthropometric advantages do not help. Assuming college education for all women doubles the likelihood of being single for those below higher education and reduces this likelihood for the post-college educated by roughly one third on average (from 30% to 20%). Alternatively, assigning postgraduate degrees to all women, the probability of

²⁰ Reasons can be found from experimental social psychology as reviewed in Section 1. Also this reflects that, as reviewed in Section 2, Chinese traditional norms of women's role and merits still dominate urban marriage markets.

being single increases everywhere compared to the predicted likelihood, and proportionately more for those actually without higher education – the curve becomes flatter. These exercises echo our findings from Figure 12(a): education *per se* again seems to be the main obstacle to marriage for well-educated women.

We also cross-compared women who are simulated to have undergraduate degrees, those who have both undergraduate degrees and the highest level of beauty, and those who are supposed to have fitness as well. Conditional on a higher education degree, beauty raises the likelihood of being single for all women, regardless of their other (real) characteristics. This reaffirms the deterrent role of higher education in urban marriage markets for women. Interestingly, fitness oppresses the likelihood of being single for those whose actual educational attainments are at the postgraduate level but heightens that of those whose actual educational attainments are below undergraduate levels, while the magnitude of these “add-in” effects brought about by fitness is not large. Further assuming postgraduate degrees, together with the highest facial attractiveness and fitness, all women’s non-marriage rates jump and the least-educated even seem to have a higher non-marriage rate than the post-college educated. If human capital relates positively to other characteristics, we can infer that women possessing good socioeconomic conditions are more likely to get married than those without, when they show equivalently “negative signals” (i.e., same tertiary education and beauty). Overall, education seems to be the first and most significant “criterion” to sort Chinese urban women aged 27 or above, followed by other characteristics.

Finally, we checked whether marriage was simply delayed for urban women as the Census shows (Figures 2 and 5 in Section 2). We focus on those aged below 40 at the time of interview in order to exclude the elderly whose marriage may be heavily affected by institution or tradition. Figures 12(c)-(d) assume, *ceteris paribus*, women’s age to vary from 27 to 41 by a 2-year step. The probability of remaining single declines as age rises.

Nevertheless, for college and post-college educated women, this reduction shrinks at higher ages. Marriage seems to be forgone. The probability of remaining single at 45 would be as high as 25% in the CFPS.

5. Conclusion

Despite the fact that there are more unmarried men than unmarried women in China, marriage is being delayed for the latter, especially for those who have attained higher education. This study exploited two recent nation-wide surveys in urban China over the period 2008-2012 and investigated the effects of a number of determinants of marriage for urban women aged 27 or above, including demographic characteristics, wealth, work-related indicators, personality, attitudes and expectation, physical and facial attractiveness, leisure activities, personal and parents' social status, local gender identity norms and marriage market conditions. We estimated a recursive and dynamic mixed-equation model, framing women's marital decisions within their choices in educational and labour markets.

There is no solid evidence that apparent delay in women's marriage is driven by income or "pro-female" marriage markets, which are measured by higher-than-one sex ratios of men over women. Significant factors include women's living arrangement, personality, leisure activities, and anthropometric as well as facial attractiveness. Whereas previous studies indicate a negative association between education and marriage formation for women (e.g. Tian, 2013; Wu and Liu, 2014), our analysis shows that education is likely to be "double-edged". We find standard "market college premium", while also documenting strong "marital college-discount": college education reduces the probability of marriage by 2.88%-3.6% and a postgraduate degree further oppresses it by 8.4%-10.4%, which contradicts the "marital college-plus premium" in developed countries such as the U.S. This is less likely to be driven by rising feminism as extended education might lead women to hold

more progressive attitudes on career and/or life. Men's traditional ideology about women's "merits" in household and gender identity norms matter: women's higher education and certain better-than-men's traits, such as sociability, anthropometric and facial attractiveness, still convey strong "negative signals" for future household production.

Counterfactual analysis indicates a multidimensional matching pattern with both complementarity and substitutability between criteria. There is monotonicity of women's education and academic self-efficacy in reducing marriage probability and of grit in promoting family formation. There is complementarity between women's educational attainment and anthropometric conditions and personality (grit and sociability) in marriage formation, and substitutability between women's post-college education and facial attractiveness in increasing the probability of remaining single. Moreover, post-college educated women tend to forego marriage at least until 45.

Despite the seemingly common trends of women's decreasing marriage rate and improved educational and labour market performance in China and western developed countries, factors driving these trends differ because of substantial differences in gender ideology. Patriarchy still appears to prevail in China. Given the deteriorating gender inequality in the labour market and state-endorsed revival of traditional ideology, it is highly likely that urban Chinese women find themselves facing an agonizing dilemma: to lower their expectations of education and labour market outcomes to fit the traditional wifely role, or to persevere in their educational and career pursuit.

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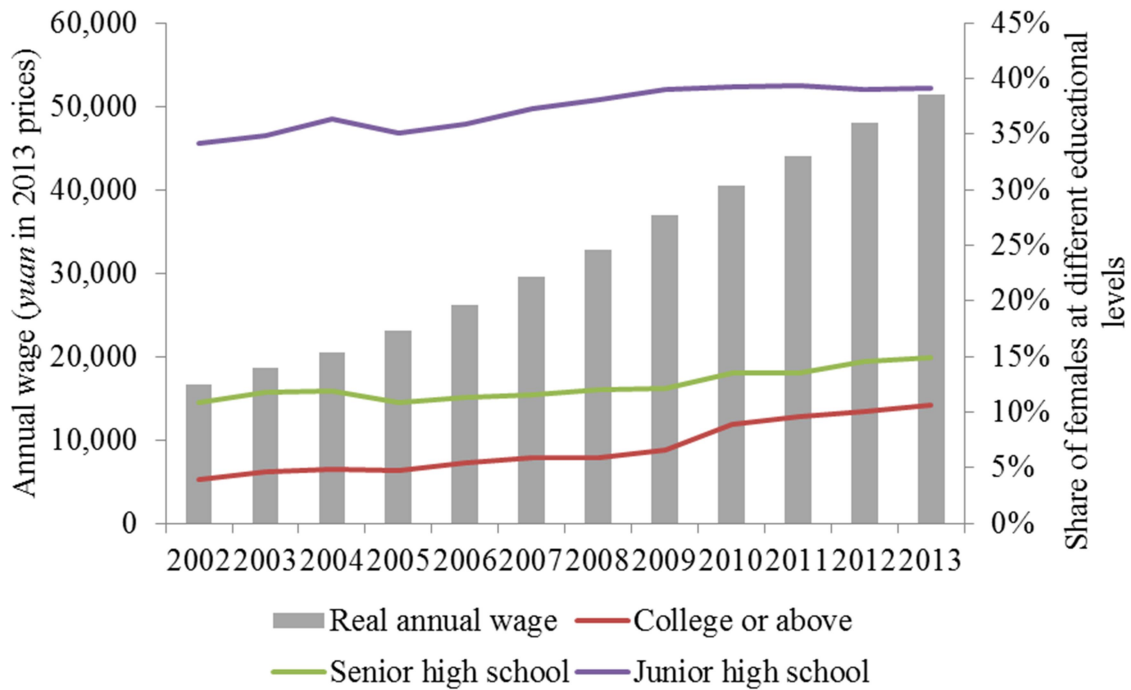
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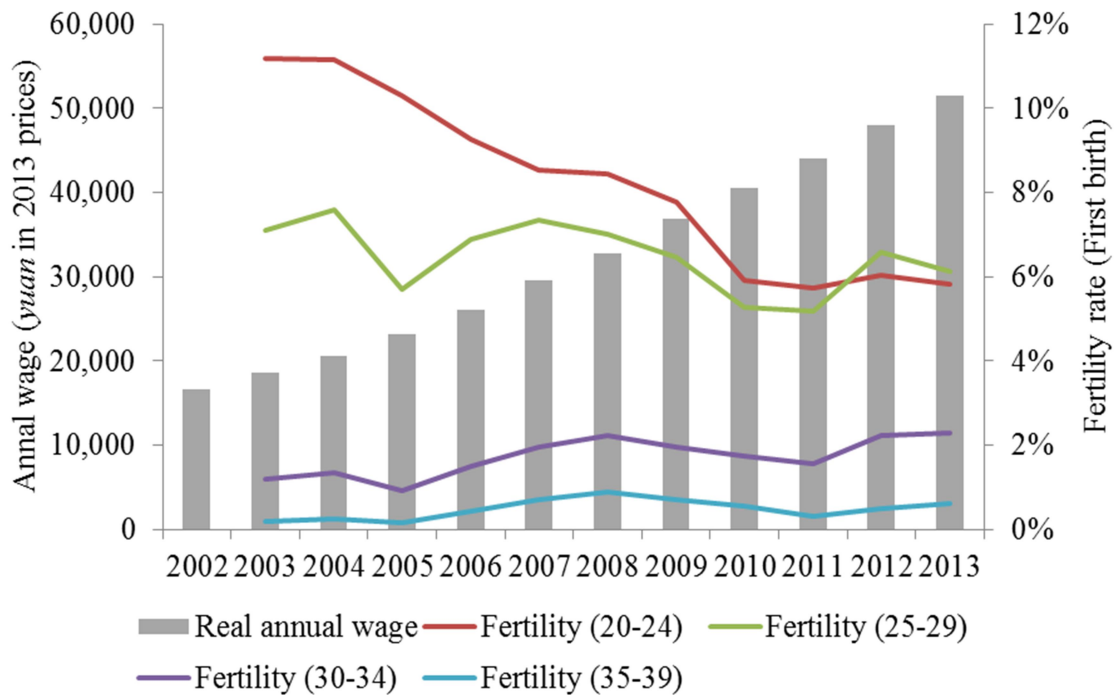
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Figure 1 Female income, education and fertility

(a) Income vs. education

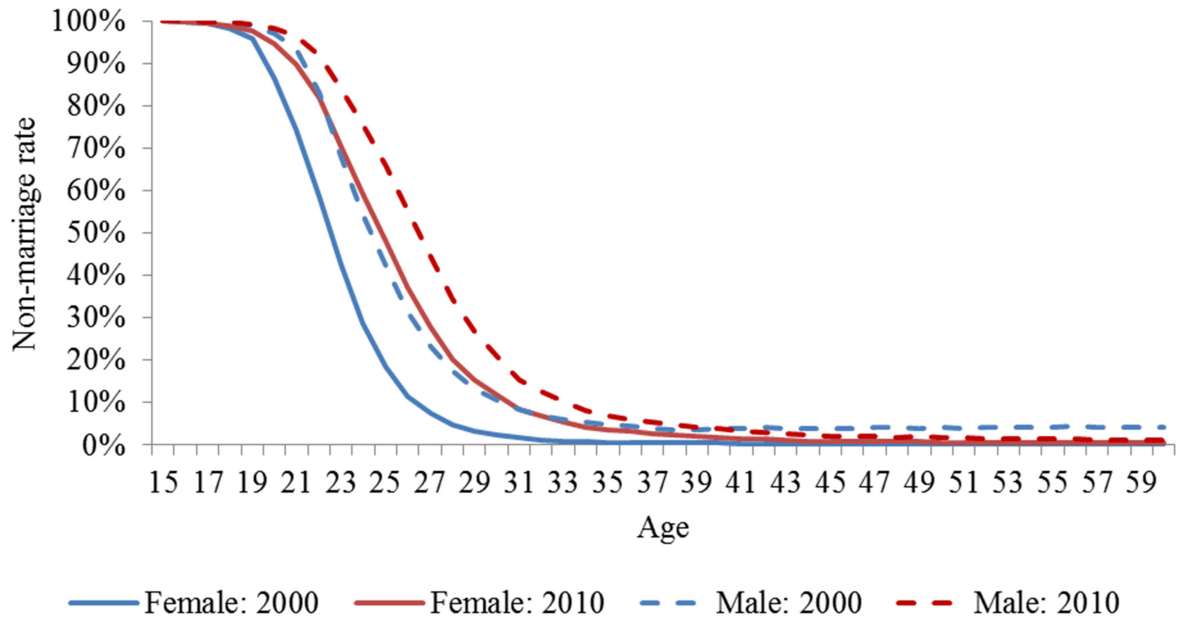


(b) Income vs. fertility



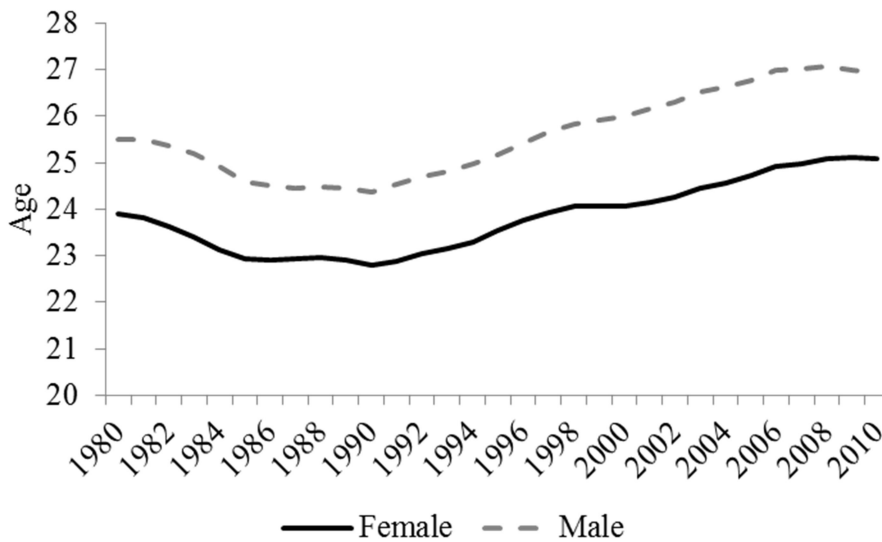
Source: Educational indicators are calculated as the ratio of the number of women aged 6 or above with different educational attainments over the total number of women aged 6 or above. Fertility and real wages are also authors' calculations. Data come from the report of the 2010 Census and China Statistical Yearbooks published by the NBS.

Figure 2 Non-marriage rates in urban China (by gender and age)



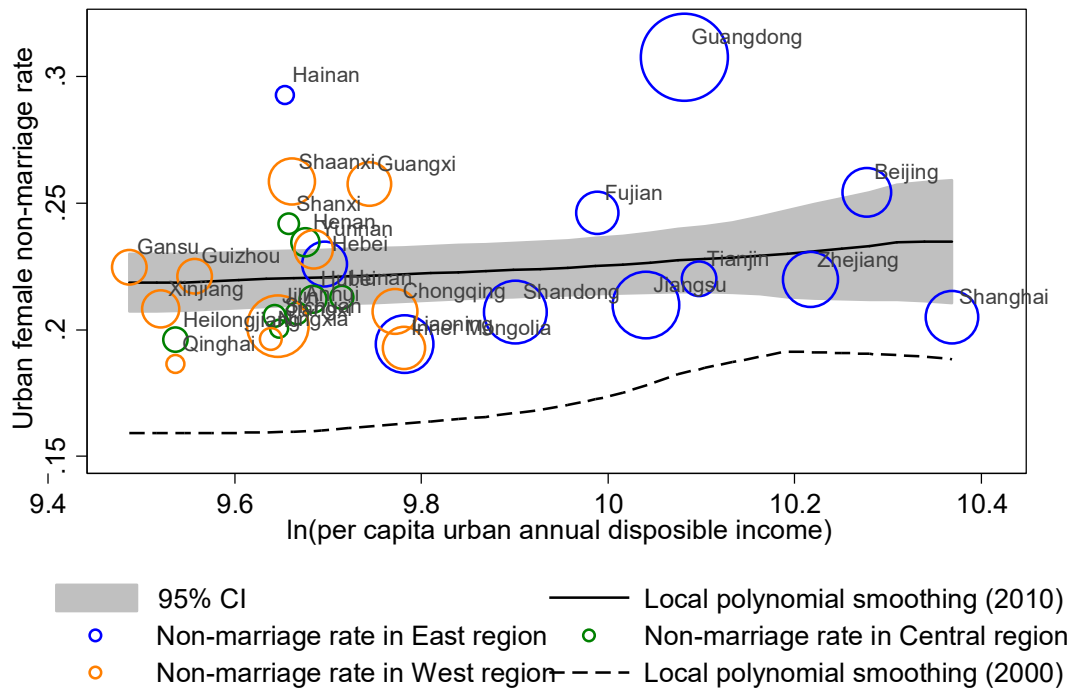
Source: Authors' calculation based on the 5th and the 6th Censuses (2000 and 2010).

Figure 3 Age at the first marriage in urban China (by gender)



Source: Authors' compilation of data from the 6th Census in 2010.

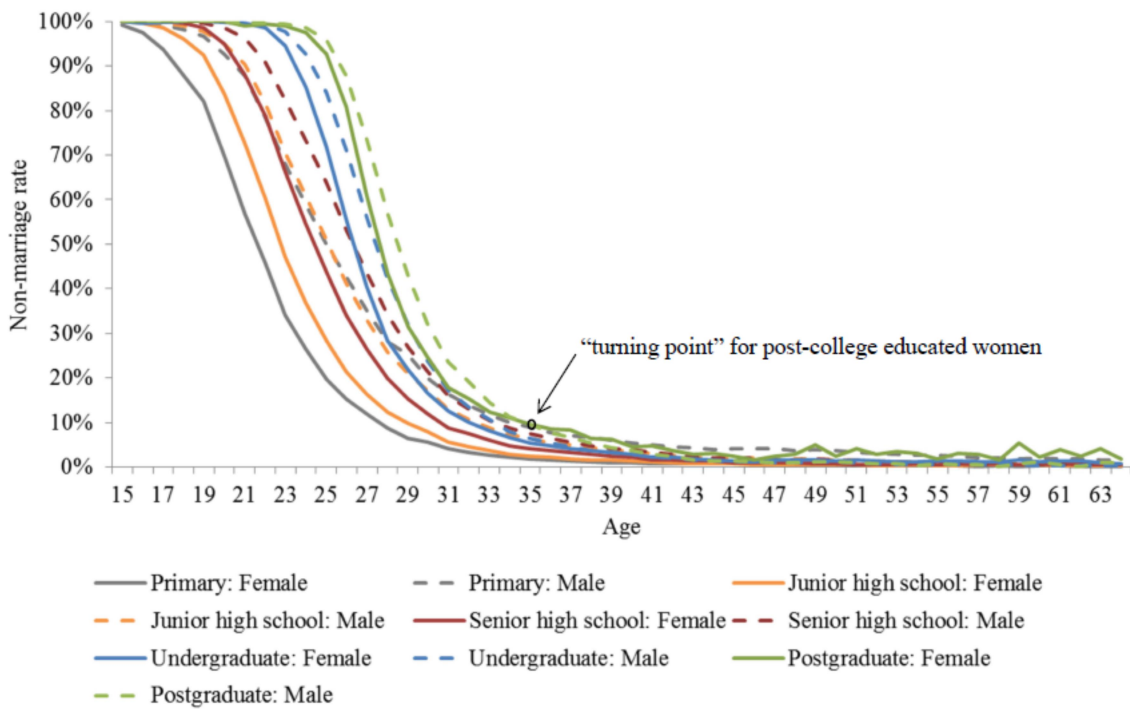
Figure 4 Concerto of urbanisation, income growth and women’s marriage



Source: Authors’ calculation based on based on the 5th Census in 2000 and the 6th Census in 2010, the 1% sampling of census in 2013, and the China Statistical Yearbook 2010 published by the NBS. Income is at the 2010 price level.

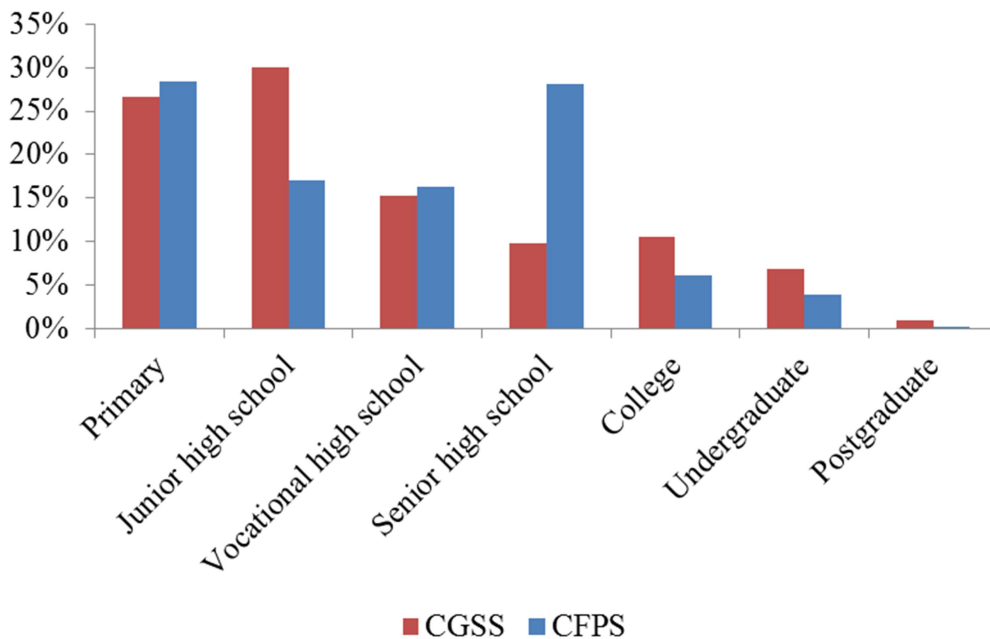
Note: Each bubble represents a provincial urban female non-marriage rate in 2010. The size of the bubble represents the provincial urban population (aged 15 or above) in the 6th Census in 2010 according to residence rather than individuals’ household registration types (i.e., the NBS criteria). The urban female non-marriage rate is calculated as the ratio of the number of unmarried females aged 15 or above over that of all females aged 15 or above in 2000 and 2010, respectively. Income is measured as per capita urban disposable income (total income net of all taxes and fees) at the provincial level in *yuan* in 2010. The classification of three geographic regions is according to the NBS criteria. All indicators are at the provincial level.

Figure 5 Urban non-marriage rates in 2010 (by gender and education)



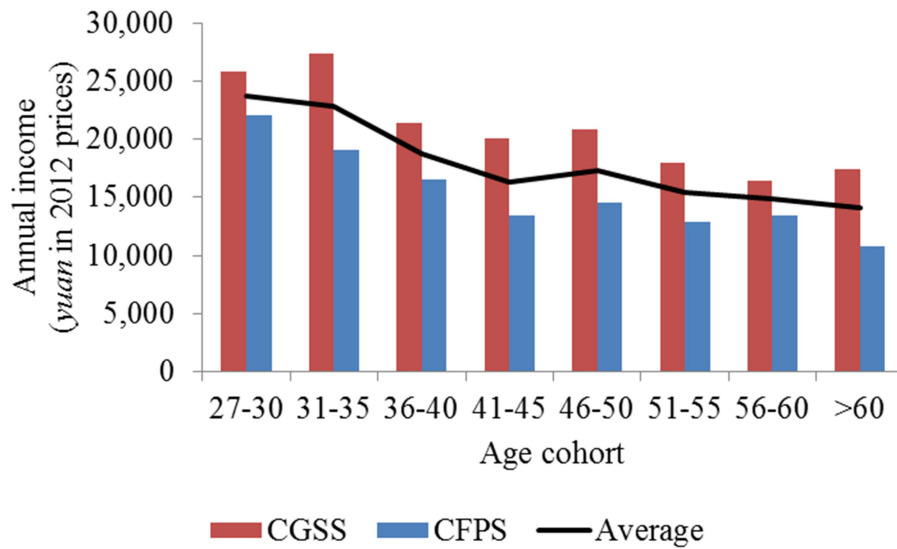
Source: Authors' calculation based on data from the 6th Census in 2010.

Figure 6 Distribution of female educational attainments



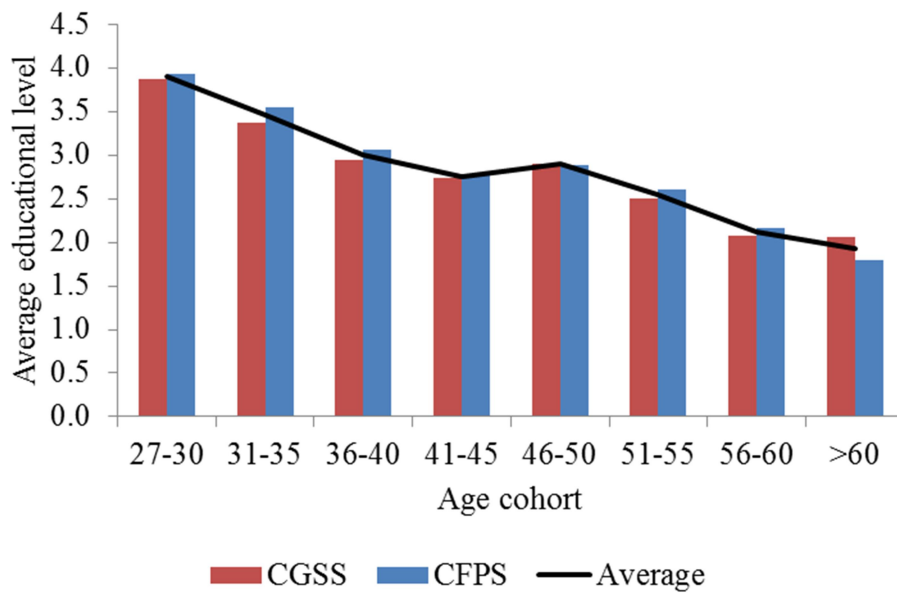
Source: Authors' calculation based on the CGSS (2008-2011) and the CFPS (2010-2012).

Figure 7 Average female income (by age)



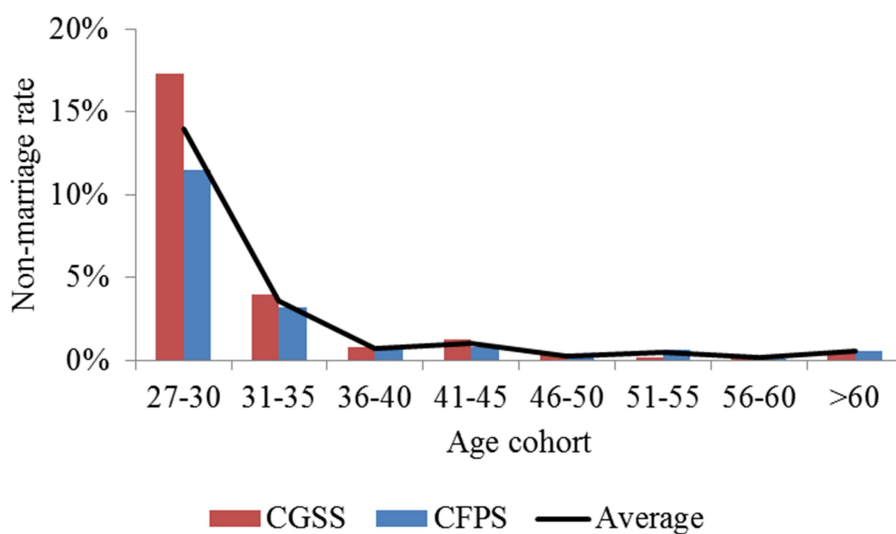
Source: Authors' calculation based on the CGSS (2008-2011) and the CFPS (2010-2012).

Figure 8 Average female educational attainments (by age)



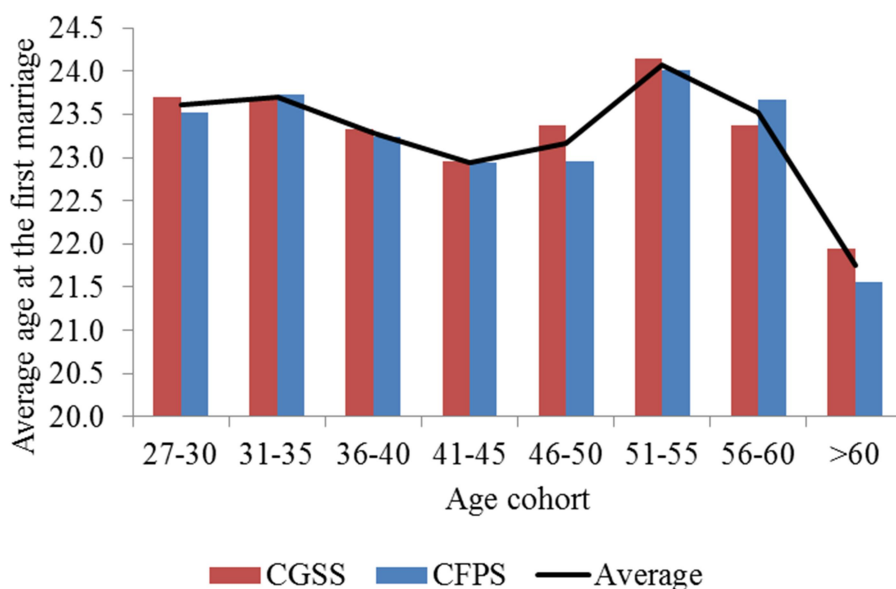
Source: Authors' calculation based on the CGSS (2008-2011) and the CFPS (2010-2012).

Figure 9 Female non-marriage rates (by age)



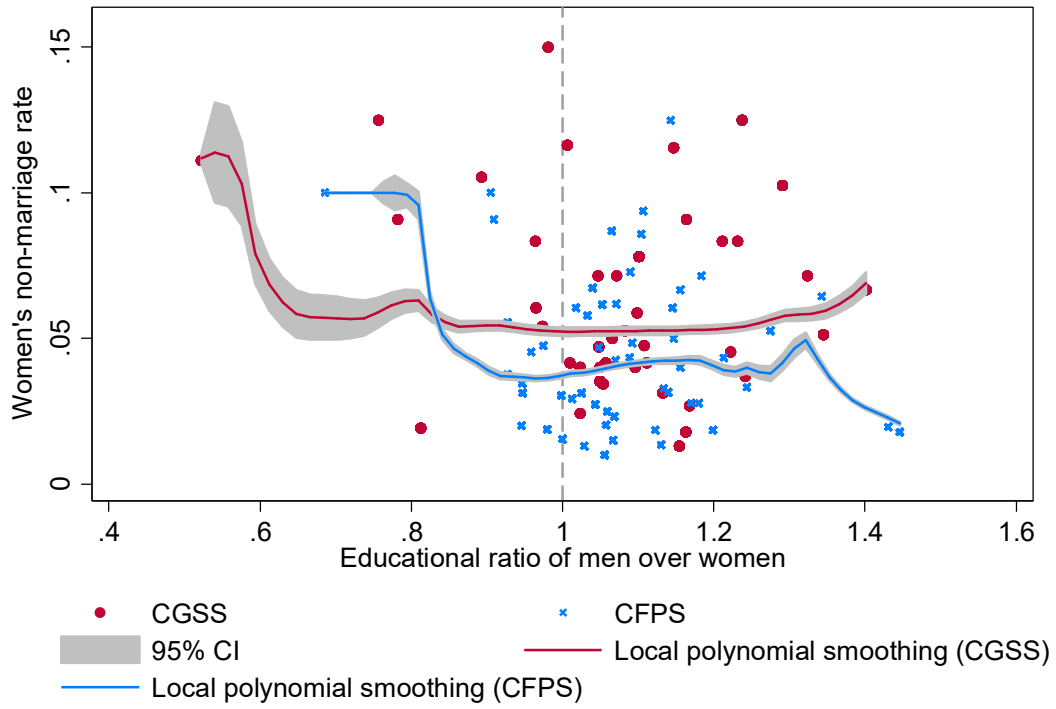
Source: Authors' calculation based on the CGSS (2008-2011) and the CFPS (2010-2012).

Figure 10 Women's age at first marriage

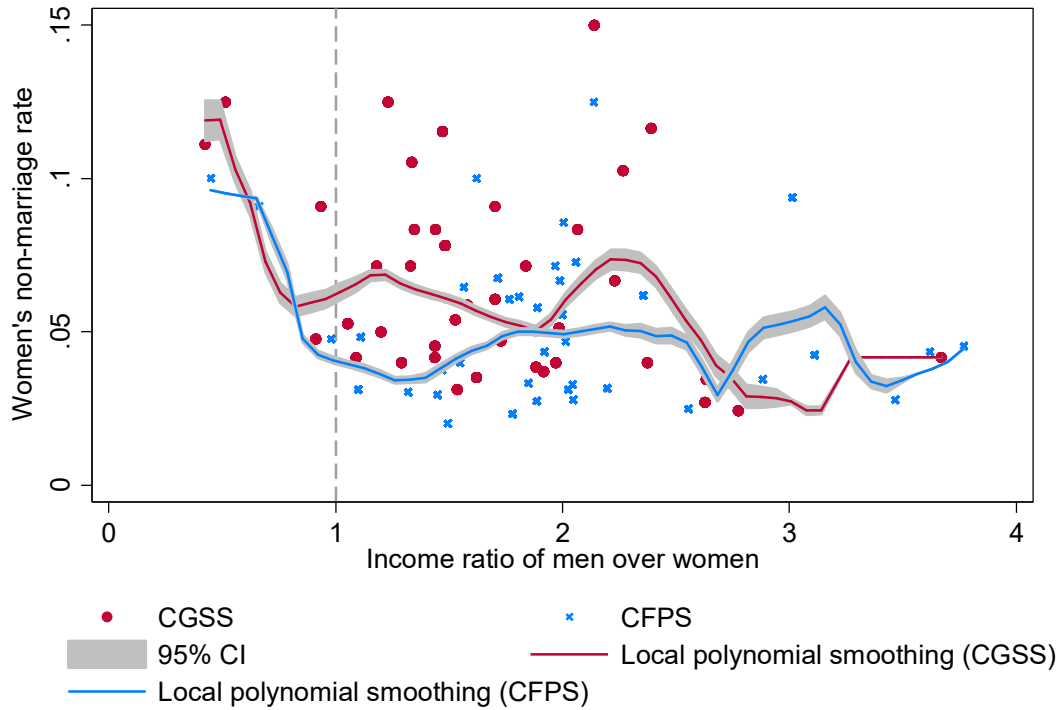


Source: Authors' calculation based on the CGSS (2010) and the CFPS (2010-2012). There is no relevant information in the CGSS (2008, 2011).

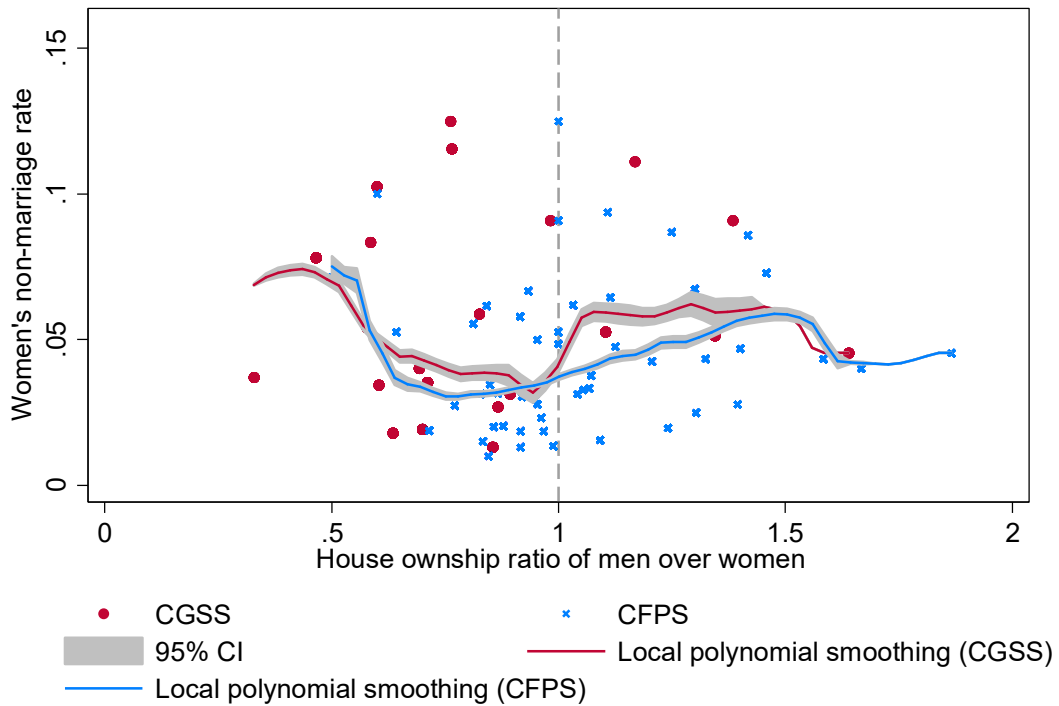
Figure 11 Comparison between men and women
(a) Education



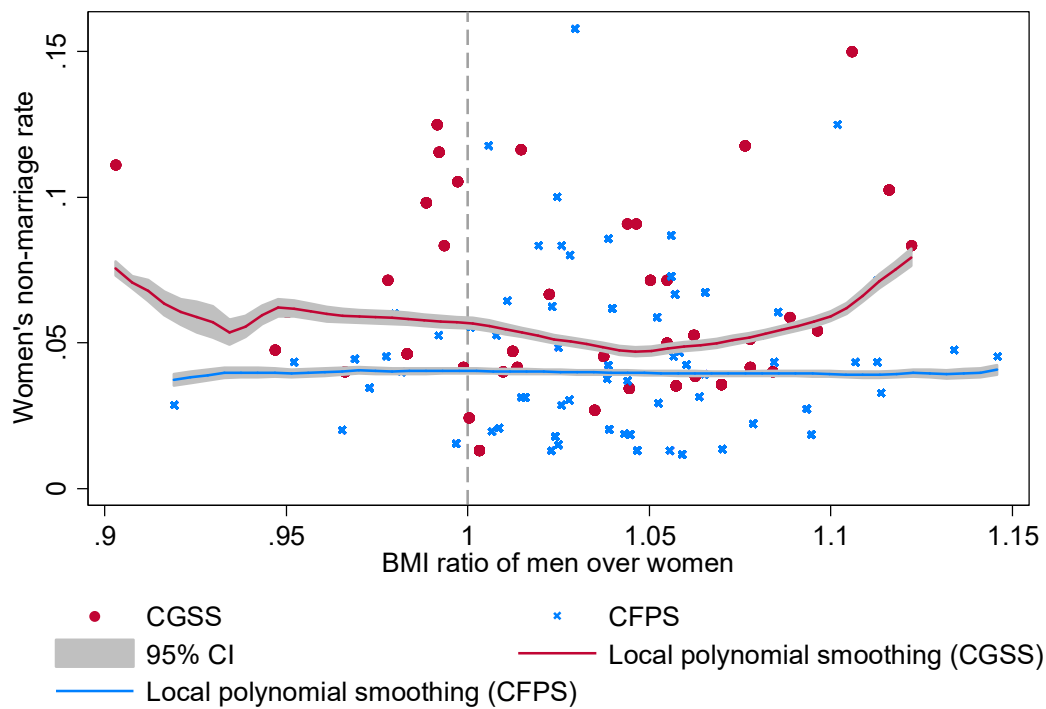
(b) Income



(c) Housing



(d) BMI

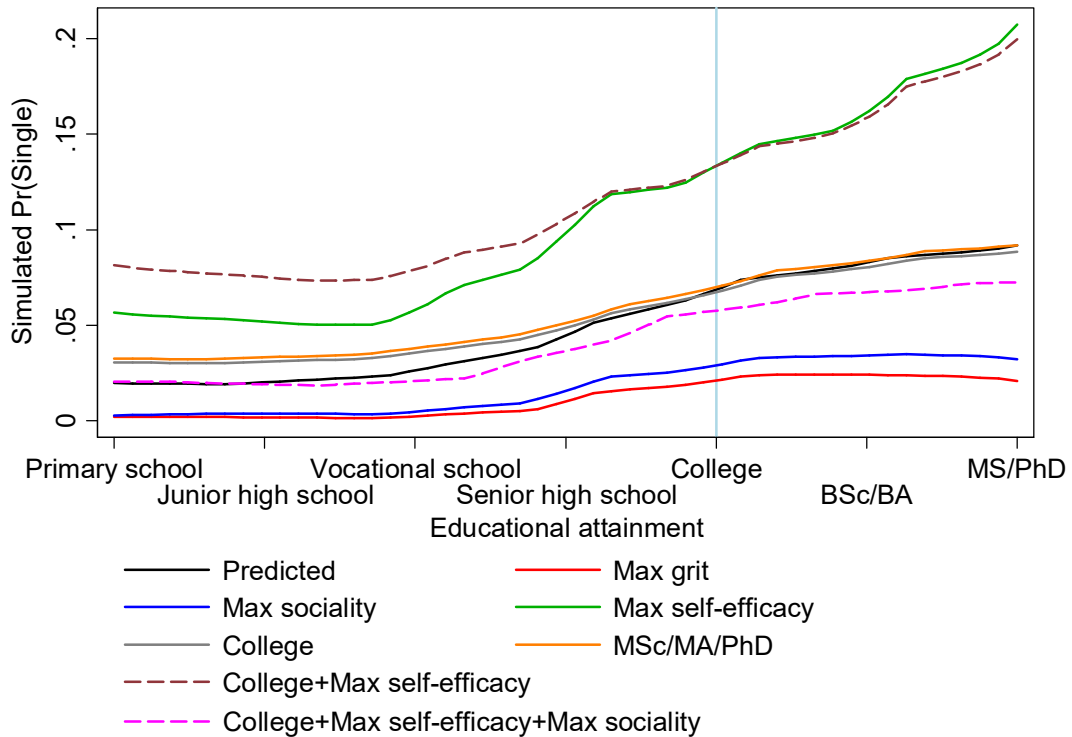


Source: Authors' calculation based on the CGSS (2008-2011) and the CFPS (2010-2012). The house ownership is defined as possessing the property at least 3 years prior to the interview. This variable in the CGSS is based on the waves in 2010 and 2011 as there were no relevant questions in the 2008 wave.

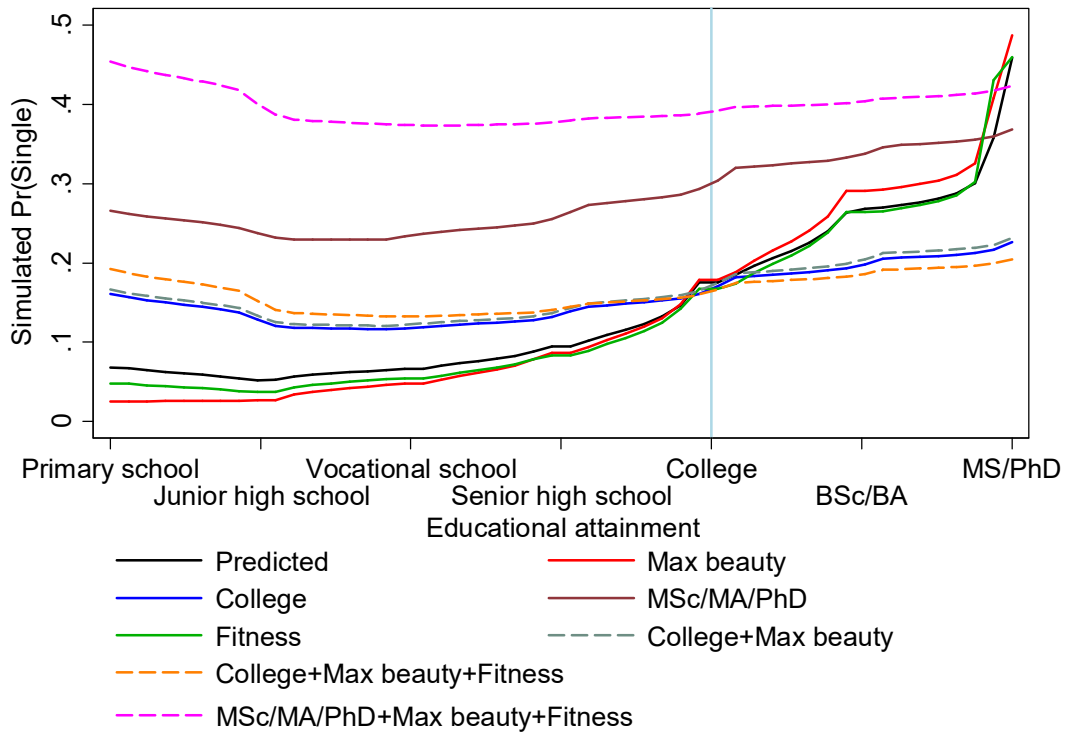
Note: For each indicator (i.e., the educational level, annual income, house ownership (1=yes),

and BMI), we first calculated the average for all sample men and women, respectively, at the city level. Both sample cohorts were aged between 27 and 60 at the time of interview. Then, the ratio of men's city average over the women's is calculated and plotted on the horizontal axis. The women's non-marriage rate on the vertical axis is the ratio of the number of unmarried sample women over the female sample size at the city level. Again the age of sample women was restricted to 27-60 years old at the time of interview.

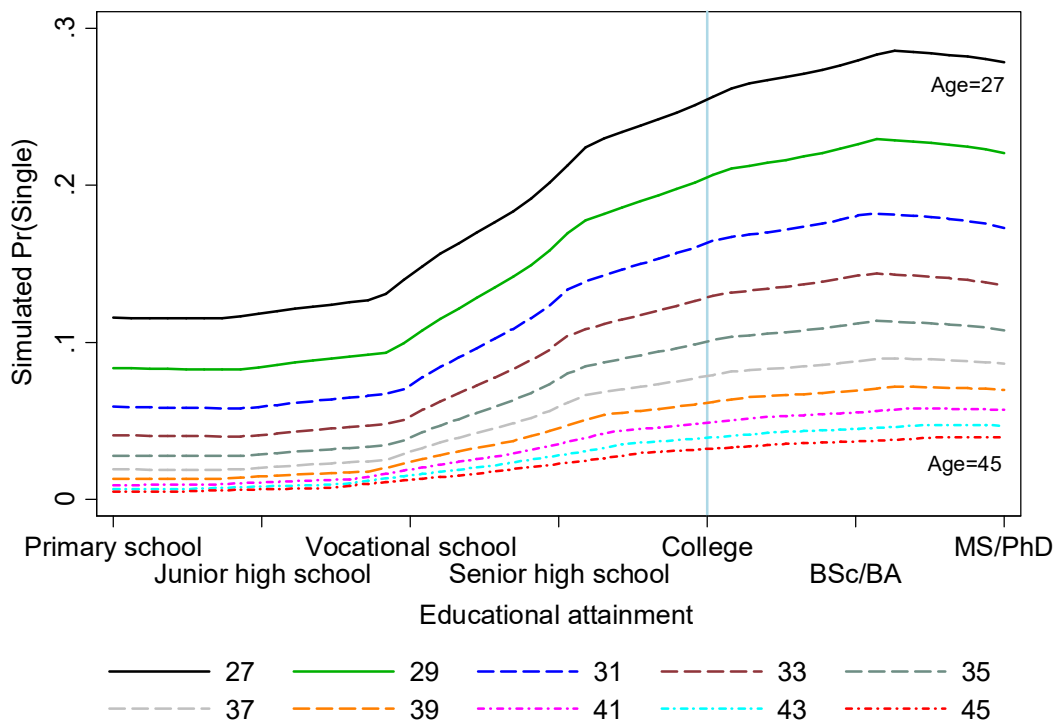
**Figure 12 Simulated counterfactual probability of remaining single
(a) Education, personality and attitudes (CGSS)**



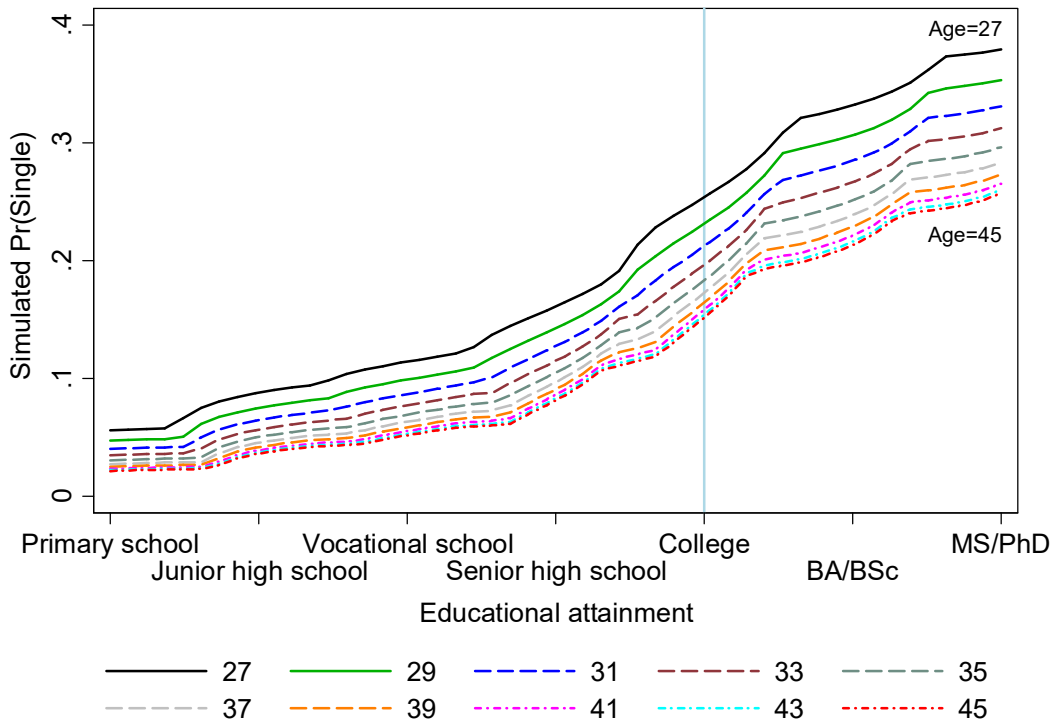
(b) Education and attractiveness (CFPS)



(c) Age effects (CGSS)



(d) Age effects (CFPS)



Note: (a) and (c) are based on Columns 7-9 of Table 9. (b) and (d) are based on Columns 7-9 of Table 10.

Table 1 Sample size

Wave	CGSS	CFPS	Total
2008	1,719		1,719
2010	3,278	6,935	10,213
2011	1,204		1,204
2012		6,519	6,519
Eligible	6,201	13,454	19,655
Obs.	6,184	8,897	15,081

Table 2 Distribution of age (%)

Age cohort	CGSS	CFPS
27-30	7.93	7.07
31-35	11.37	10.13
36-40	14.16	13.31
41-45	12.68	13.81
46-50	11.76	12.97
51-55	11.16	10.26
56-60	10.39	10.79
>60	20.56	21.66
Total	100	100

Table 3 Distribution of marital status (%)

Marriage status	CGSS	CFPS
Never married	2.29	1.53
Partnership	0.32	0.23
First marriage	84.85	85.45
Second marriage	0.89	0.00
Separated	0.29	0.00
Divorced	2.99	1.99
Widow	8.40	9.68
Total	100	100

Table 4 Portraits of ever and never married women (age ≥ 27 years)

Indicator	CGSS (2008-2011)		CFPS (2010-2012)	
	Married	Single	Married	Single
<i>Individual demographic characteristics</i>				
Age (in years)	49.023	33.204***	50.084	34.621***
Education (1-7 levels)	2.667	4.648***	2.648	4.389***
Education (in years)	9.468	13.704***	6.830	12.164***
Self-reported health status (1-5 levels)	3.082	3.156	3.373	3.697***
Height (cm)	161.212	162.643	158.706	160.470***
Weight (kg)	59.851	55.214***	57.656	52.978***
Interviewer-reported facial attractiveness compared to others in the respondent's age (1-7 levels)	5.181	5.515***	5.233	5.562***
Local urban <i>Hukou</i> (current, yes=1)	0.690	0.725	0.496	0.727***
Urban <i>Hukou</i> when 14 (CGSS) or 12 (CFPS) years old (yes=1)	0.274	0.338*	0.151	0.338***
<i>Individual socioeconomic status</i>				
Annual income (<i>yuan</i> at the 2012 price level)	20,124.85	31,858.05***	16,132.64	33,231.72***
EGP social class (based on occupation, yes=1)				
I. Higher and lower controllers	0.127	0.317***	0.082	0.268***
II. Routine nonmanual	0.119	0.218***	0.067	0.146***
III. Self-employed	0.055	0.028**	0.022	0.040***
IV. Manual	0.134	0.070**	0.110	0.067**
V. Agricultural workers or labourers	0.004	0.000	0.121	0.000***
Occupational reputation scores	125.452	279.516*	36.748	49.631***
<i>Type of work unit</i>				
State-owned enterprises (yes=1)	0.134	0.229***	0.090	0.167***
Private enterprises (yes=1)	0.202	0.332***	0.184	0.333***
Foreign enterprises (yes=1)	0.010	0.057***	0.016	0.071***
<i>Attitudes and perceptions on herself</i>				
Self-reported social class (past 10 yrs, 1-10 levels)	4.611	4.528	-	-
Self-reported social class (present, 1-10 levels)	4.803	4.669	2.632	2.622
Self-reported social class (future 10 yrs, 1-10 levels)	5.126	5.590**	3.589	3.529
Self-reported trust (the majority in the society are trustable=1)	0.634	0.505***	0.533	0.608
Self-reported happiness (1-5 levels)	3.813	3.768	3.670	3.408***

Self-reported satisfaction of wage (1-5 levels)	2.838	3.023 [*]	2.852	2.817
Self-reported frequency of feeling depression over last 4 weeks (1-5 levels)	2.138	2.081	3.151	3.032
<i>Self-efficacy</i>				
Feel able to achieve the goal I'm fighting for ^b (1-5 levels)	3.601	3.649	-	-
Feel able to control/manage the stuff relating to studies & education when 14 years old (1-5 levels)	2.472	2.743 ^{***}	-	-
<i>Self-esteem^d</i>				
There were many things of which I was proud (when 14 years old, yes=1)	0.118	0.183	-	-
Often compare myself to others to judge success ^c (yes=1)	2.370	2.574 [*]	-	-
Often compare family members (incl. the husband or the boyfriend) to others ^d (yes=1)	2.474	2.556	-	-
Importance of hard working for personal achievement (1-5 levels)	4.337	4.176 [*]	3.247	2.990 ^{***}
<i>Attitudes and perceptions on marriage^b</i>				
Importance of marriage (compared with work)	3.097	2.919	4.658	4.604
Importance of not being lonely	4.107	3.871 ^{**}	-	-
Sex before marriage	1.741	2.514 ^{***}	-	-
Extramarital affair (sex)	1.194	1.486 ^{***}	-	-
Homosexual relationship	1.283	1.770 ^{***}	-	-
Men for work and women for family	3.412	2.973 ^{***}	-	-
Men were born to have higher ability than women	2.826	2.589	-	-
Equal housework allocation between spouses	4.005	3.973	-	-
<i>Leisure activities</i>				
<i>Social activities^f</i>				
Self-reported interpersonal relationships (1-5 levels)	2.423	2.851 ^{***}	0.744	0.794
Self-reported ability to network and interact with others (1-5 levels)	1.990	1.829	4.062	4.152
No. of friends on QQ (Chinese Twitter)	-	-	4.155	4.160
Frequency of logging on social webs such as Xiaonei (Chinese Facebook) (1-4 levels)	-	-	55.114	114.064 ^{***}
TV (1-5 levels) ^g	-	-	2.287	3.040 ^{***}
Reading (1-5 levels)	4.582	4.178 ^{***}	4.450	4.248
Gourmet (1-5 levels)	2.422	3.129 ^{***}	2.066	2.921 ^{***}
	1.364	1.945 ^{***}	1.378	2.020 ^{**}

Sports and exercises (1-5 levels)	2.487	2.697	1.963	1.990
Mobile phones (1-5 levels)	1.544	2.280 ^{***}	1.611	2.537 ^{***}
Movies, music (1-5 levels)	3.812	3.421 ^{**}	-	-
Shopping (1-5 levels)	2.956	2.713 ^{**}	-	-
Studying (1-5 levels)	2.415	2.800 ^{***}	-	-
Internet (1-5 levels)	2.011	3.931 ^{***}	-	-
Travel (1-4 levels)	-	-	1.071	1.228 ^{***}
<i>Parents' characteristics</i>				
Father's education (1-7 levels)	1.523	2.281 ^{***}	1.982	2.870 ^{***}
Mother's education (1-7 levels)	1.248	1.914 ^{***}	1.521	2.590 ^{***}
Self-reported family social status when 12 or 14 years old (1-5 levels)	2.451	2.535	1.304	1.535 ^{***}
<i>Living arrangements</i>				
Live with parents (yes=1)	0.058	0.521 ^{***}	0.052	0.747 ^{***}
<i>Community^c</i>				
Traditional neighbourhood (yes=1)	0.246	0.194	-	-
Work unit/accommodation (yes=1)	0.252	0.323	-	-
Commercial or economic housing (yes=1)	0.395	0.435	-	-
Top-end/villa (yes=1)	0.025	0.048	-	-
Migrant community (yes=1)	0.083	0.000 ^{**}	-	-
<i>Residential place</i>				
Downtown (yes=1)	0.705	0.823 ^{**}	-	-
Urban township areas (yes=1)	0.181	0.059 ^{***}	-	-
Suburbs (yes=1)	0.114	0.118	-	-

Note: ^{***}, ^{**} and ^{*} represent 1%, 5% and 10% significance levels in turn for the t-tests of differences in the mean of each indicator between two groups. The null hypothesis is zero difference. "-" means no data.

a. Only available in 2008.

b. Only available in 2010. Every variable is categorical with 1-5 levels indicating increasing degrees of agreement.

c. Only available in 2008 and 2011.

d. Only available in 2011.

e. Only available in 2010 and 2011.

f. It is a categorical variable in the CGSS with 1-5 levels indicating self-reported increasing frequencies of social activities. In the CFPS, it is defined as a .

g. These activities are measured by categorical variables indicating how frequently the respondent does it in her leisure time in last year.

Table 5 Recursive and dynamic estimation results (benchmark)

Independent variables	CGSS (2008-2011)			CFPS (2010-2012)			CFPS (2010-2012)		
	Income (1)	Education (2)	Single (3)	Income (4)	Education (5)	Single (6)	Income (7)	Education (8)	Single (9)
<i>Individual characteristics</i>									
Age	-0.018 (0.006)***	-0.018 (0.015)	-0.216 (0.026)***	0.016 (0.025)	-0.007 (0.035)	-0.120 (0.046)***	-0.032 (0.015)**	-0.114 (0.115)	-0.095 (0.622)
Age square	0.0001 (0.0006)**	-0.0003 (0.0002)*	0.002 (0.0002)***	-0.0001 (0.0003)	-0.0004 (0.0004)	0.001 (0.0004)***	0.0004 (0.0001)***	0.001 (0.001)	0.001 (0.004)
Ethnicity	-0.045 (0.052)	-0.001 (0.106)	-0.476 (0.264)*	-0.151 (0.093)	-0.329 (0.220)	-0.169 (0.526)	-0.577 (1.077)	-0.610 (0.870)	—
Religion	-0.150 (0.037)***	-0.297 (0.082)***	0.130 (0.160)	-0.110 (0.107)	-0.127 (0.180)	-0.206 (0.521)	-0.124 (0.137)	-0.001 (0.358)	0.263 (3.125)
Health	0.020 (0.011)*	0.020 (0.023)	0.002 (0.050)	0.049 (0.025)**	0.085 (0.046)*	-0.251 (0.122)**	0.012 (0.033)	-0.086 (0.105)	-0.974 (3.506)
Urban <i>Hukou</i> (14- or 12-yrs old)	0.048 (0.028)*	0.302 (0.059)***	0.275 (0.124)**	0.205 (0.057)***	0.341 (0.122)***	0.292 (0.231)	-0.192 (0.174)	0.444 (0.750)	—
Working hours	0.001 (0.0006)*		-0.009 (0.003)***	0.024 (0.007)***		-0.047 (0.055)	-0.003 (0.009)		0.016 (0.381)
State-owned enterprise	0.313 (0.033)***		-0.281 (0.158)*	0.275 (0.075)***		0.077 (0.477)	0.079 (0.104)		0.009 (3.694)
Private enterprise	0.253 (0.033)***		-0.036 (0.154)	0.357 (0.068)***		0.221 (0.446)	0.109 (0.092)		-0.116 (3.702)
Foreign enterprise	0.348 (0.098)***		0.022 (0.342)	0.474 (0.158)***		0.875 (0.620)	0.179 (0.140)		—
Property ownership ^a			-0.479 (0.108)***			-0.330 (0.430)			0.401 (1.616)
Height			1.907 (1.586)			3.277 (3.505)			11.081 (56.690)
Weight			-1.615 (0.370)***			-2.004 (0.800)**			-0.024 (6.367)
<i>Household characteristics</i>									
Family's social status (14-yrs old, or in the Cultural Revolution)	0.026 (0.012)**	0.049 (0.024)**	-0.081 (0.050)	0.007 (0.026)	0.009 (0.056)	0.089 (0.096)	-0.022 (0.044)	-0.037 (0.171)	0.362 (1.408)

Father's education		0.223 (0.029) ^{***}	0.081 (0.055)		0.115 (0.051) ^{**}	-0.132 (0.121)		-0.225 (0.138)	-0.299 (1.542)
Mother's education		0.212 (0.045) ^{***}	0.053 (0.081)		0.238 (0.068) ^{***}	0.018 (0.126)		0.138 (0.200)	-0.614 (1.965)
Adult siblings' average education					0.422 (0.051) ^{***}			0.194 (0.162)	
Adult siblings' marriage						-0.143 (0.234)			-0.782 (5.373)
<i>Living arrangements</i>									
Live with parents			1.254 (0.164) ^{***}			1.403 (0.371) ^{***}			3.249 (9.777)
<i>Provincial controls</i>									
Sex ratio of unmarried men over unmarried women			0.897 (0.518) [*]			0.952 (1.175)			3078.096 (99.759) ^{***}
Ln(GDP per capita)	0.025 (0.309)	-0.401 (0.045) ^{***}	0.227 (1.574)	0.097 (0.620)	0.116 (0.091)	0.961 (3.275)	0.223 (0.142)	0.117 (0.520)	-1145.228 (13.210) ^{***}
Urbanisation			9.785 (6.989)			-2.218 (15.025)			5005.087 (-)
<i>Recursive components</i>									
Income		0.572 (0.030) ^{***}	-0.048 (0.066)		0.201 (0.041) ^{***}	0.019 (0.374)		0.133 (0.152)	-0.177 (1.345)
Education	0.236 (0.008) ^{***}		0.143 (0.039) ^{***}	0.286 (0.025) ^{***}		0.282 (0.139) ^{**}	0.041 (0.060)		0.269 (1.694)
Single	-0.096 (0.079)	0.418 (-)		0.076 (0.325)	0.708 (-)		-0.517 (0.226) ^{**}	0.243 (7.036)	
<i>Dynamic components</i>									
Income							0.186 (0.028) ^{***}	-0.073 (0.190)	0.685 (3.662)
Education							0.158 (0.062) ^{***}	2.796 (1.534) [*]	0.391 (1.342)
Single							0.464 (0.119) ^{***}	-0.500 (0.502)	-
Provincial dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.		6,184				8,897		(4,296) 8,897	
Log-likelihood		-10,615.876				-4.145e+08		-80,492.084	

LR/Wald χ^2 (*p*-value) 3,448.19 (0.000) 3,915.26 (0.000) 2.64e+09 (0.000)

Note: ***, ** and * denote 1%, 5% and 10% significance levels respectively. Heteroskedasticity-robust standard errors are in parentheses and those for the CFPS have been clustered at the individual level to take into account repeated individuals in two waves. “–” denotes no data.

- a. This variable is property ownership for more than 3 years for the CFPS, while is the current property ownership for the CGSS.
- b. We used the weighted estimation for the CFPS regressions. The weights are sampling weights constructed by the CFPS team, correcting for sampling bias. Thus, the CFPS estimation results can be considered to be nationally representative. There are no sampling weights in the CGSS 2011, but only in the waves of 2008 and 2010. To maintain the sample size, the estimation based on the CGSS is unweighted. We separately estimated Columns 1-3 with sampling weights of the CGSS (2008-2010). Results hold qualitatively.

Table 6 Distribution of methods of knowing partner (CFPS, %)

Method	2010	2012
School	3.48	5.36
Work	10.82	12.06
Residence	6.10	5.36
Other places	1.86	2.95
Relatives or friends	70.95	38.87
Agency	2.15	27.61
Parents	2.99	5.90
Internet	0.11	1.34
Others	1.54	0.55
Total	100	100

Source: Authors’ calculation based on the CFPS (2010-2012). The CGSS does not contain this information.

Table 7 Occupation and parents' work during filial childhood (replace relevant vars by new ones)

Independent variable	CGSS (2008-2010) ^a			CGSS (2008-2011)			CFPS (2010-2012)		
	Income (1)	Education (2)	Single (3)	Income (4)	Education (5)	Single (6)	Income (7)	Education (8)	Single (9)
<i>EGP social class^c</i>									
Self-employed (incl. entrepreneurs)				0.259 (0.159)*	-0.381 (0.411)	2.561 (0.313)***	0.834 (0.167)***	0.067 (0.325)	4.274 (0.731)***
Skilled and semi-unskilled manual, manual supervisors				-0.016 (0.155)	-0.167 (0.406)	3.127 (0.186)***	0.633 (0.134)***	0.431 (0.245)*	3.686 (-)
Routine manual				0.098 (0.156)	0.338 (0.406)	3.041 (0.171)***	0.691 (0.132)***	1.058 (0.466)**	3.918 (0.430)***
Lower and higher controllers				0.234 (0.157)	0.996 (0.410)**	3.186 (-)	0.865 (0.164)***	1.771 (0.326)***	3.998 (0.539)***
<i>Family background</i>									
Father's full-time work (14-yrs old)	0.029 (0.031)	0.430 (0.067)***	-0.489 (0.125)***						
Mother's full-time work (14-yrs old)	0.097 (0.035)***	0.300 (0.075)***	0.386 (0.134)***						
<i>Recursive components</i>									
Income		0.612 (0.035)***	0.076 (0.069)		0.534 (0.052)***	0.118 (0.099)		0.239 (0.072)***	0.030 (0.370)
Education	0.236 (0.010)***		0.132 (0.039)***	0.214 (0.012)***		0.079 (0.054)	0.227 (0.027)***		0.369 (0.163)**
Single	-0.019 (0.085)	0.451 (-)		0.007 (0.084)	0.404 (-)		0.082 (0.464)	0.873 (10.732)	
Provincial dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.		2,751			6,184			8,897	
Log-likelihood		-8,255.987			-5,222.054			-1.987e+08	
LR/Wald χ^2 (<i>p</i> -value)		3,211.70 (0.000)			2,204.17 (0.000)			2,854.75 (0.000)	

Note: ***, ** and * denote 1%, 5% and 10% significance levels respectively. Heteroskedasticity-robust standard errors are in parentheses and those for the CFPS have been clustered at the individual level to take into account repeated individuals in two waves.

a. We only used two waves in 2008 and 2010 for the CGSS regression as in 2011 there was no information on parents' work when the individual was 14 years old.

b. There are three categories of occupation, namely informal employment (i.e., those without formal employers or without regular payments),

formal employment (i.e., those having formal employers), and self-employment (including freelance and entrepreneurs). The last category was used as the reference and dropped from the regression.

c. The category of self-employment was used as the reference in both datasets and dropped from the regressions.

d. We used the sampling weights in estimation in both datasets. Thus, results in this table can be considered to be nationally representative.

Table 8 Average marginal effects of education on the probability of unmarried

	CGSS (%)	CFPS (%)
Primary school -> Junior high school	1.072	1.359
Junior high school -> Vocational school	1.541	1.948
Vocational school -> Senior high school	2.143	2.696
Senior high school -> College	2.880	3.602
College -> BSc/BA	3.734	4.638
BSc/BA -> MSc/MA/PhD	4.661	5.741

Source: Authors' calculation based on Columns 1-6 of Table 5.

Table 9 Estimation results of traits, attitudes, activities, and gender and social identity

Independent variable	Traits and attitudes ^a (CGSS)			Leisure activities ^b (CGSS)			Gender and social identity ^b (CGSS)			Gender and social identity ^c (CFPS)		
	Income (1)	Education (2)	Single (3)	Income (4)	Education (5)	Single (6)	Income (7)	Education (8)	Single (9)	Income (10)	Education (11)	Single (12)
<i>Traits and attitudes</i>												
Grit/Self-discipline (14-yrs old)	0.014 (0.013)	0.128 (0.022) ^{***}	-0.200 (0.084) ^{**}	0.014 (0.013)	0.128 (0.022) ^{***}	-0.240 (0.132) [*]	0.014 (0.013)	0.128 (0.022) ^{***}	-0.216 (0.114) [*]			
Self-efficacy/control life	-0.030 (0.021)	-0.003 (0.034)	0.546 (0.182) ^{***}	-0.030 (0.021)	-0.003 (0.034)	0.618 (0.315) ^{**}	-0.030 (0.021)	-0.003 (0.034)	0.665 (0.256) ^{***}			
Trust in others			-0.191 (0.239)			-0.328 (0.290)			-0.373 (0.330)			
Sociality			0.021 (0.129)						-0.871 (0.505) [*]			
<i>Activities</i>												
TV						-0.497 (0.219) ^{**}						
Internet						-0.097 (0.117)						
Mobile phone						-0.072 (0.200)						
Physical exercises						0.292 (0.146) ^{**}						
Shopping						-0.296 (0.179) [*]						
Reading						0.027 (0.136)						
<i>Gender identity (unmarried women vs. median men within the city)</i>												
More sociality ^d									1.713 (0.784) ^{**}			
Higher BMI									-0.899 (0.621)			0.485 (0.259) [*]
Longer working time									-0.684 (0.630)			-0.214 (0.441)
Higher income									0.228 (0.454)			0.244 (0.360)
Higher educational level									0.308 (0.774)			-0.326 (0.448)
Higher family social									-0.209			0.264

status (14-yrs)								(0.489)		(0.345)	
Higher future social status								-0.214		-0.474	
								(0.306)		(0.262)*	
<i>Recursive components</i>											
Income		0.490	-0.275		0.490	-0.291		0.490	-0.291	0.201	-0.001
		(0.029)***	(0.139)**		(0.029)***	(-)		(0.029)***	(0.204)	(0.040)***	(0.236)
Education	0.216		0.127	0.216		0.077	0.216		0.031	0.286	0.368
	(0.011)***		(0.010)	(0.011)***		(0.128)	(0.011)***		(0.256)	(0.020)***	(0.185)**
Single	-0.131	0.585		-0.131	0.585		-0.131	0.585		0.076	0.708
	(0.093)	(0.188)***		(0.153)	(0.177)***		(0.188)	(0.173)***		(0.172)	(2.065)
Provincial dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.		6,184			4,465			4,465			8,897
Log-likelihood		-7,178.436			-7,182.750			-7,176.970			-4.132e+08
LR/Wald χ^2 (<i>p</i> -value)		2,820.49 (0.000)			2,849.03 (0.000)			2,823.42 (0.000)			4,732.48 (0.000)

Note: ***, ** and * denote 1%, 5% and 10% significance levels in turn. Heteroskedasticity-robust standard errors are in parentheses and have been clustered at the individual level to take into account repeated individuals in two waves. We used the weighted estimation for the CFPS regressions. The weights are sampling weights constructed by the CFPS team, correcting for sampling bias. Thus, the CFPS estimation results can be considered to be nationally representative.

a. CGSS (2008-2011).

b. CGSS (2010-2011) due to data limitations.

c. CFPS (2010-2012). The individual trust (sociality and attitudes towards marriage) is only available in the wave of 2012 (2010). There are no data on traits or leisure activities, either. We only incorporate variables of gender identity which are available in both waves and can make the specification as consistent as the CGSS.

d. "More trust" is dropped due to multi-collinearity.

Table 10 The premium of beauty (CFPS, using Columns 7-9 of Table 8 without height and weight)

Independent variable	Beauty			Beauty×Education			Fitness×Education			Dynamic Beauty		
	Income (1)	Education (2)	Single (3)	Income (4)	Education (5)	Single (6)	Income (7)	Education (8)	Single (9)	Income (10)	Education (11)	Single (12)
Beauty	0.091 (0.022)***	0.120 (0.048)**	-0.399 (0.132)***	0.091 (0.022)***	0.120 (0.048)**	-0.359 (0.140)**	0.091 (0.022)***	0.120 (0.048)**	-0.356 (0.141)**	0.010 (0.035)	-0.100 (0.131)	0.329 (15.238)
More beauty			0.862 (0.285)***									
Beauty × education						0.073 (0.033)**			0.074 (0.034)**			-0.106 (2.633)
Fitness × education									-0.691 (0.315)**			
<i>Recursive components</i>									0.102 (0.077)			
Income		0.195 (0.045)***	-0.018 (0.063)		0.195 (0.044)***	-0.003 (0.059)		0.195 (0.044)***	-0.002 (0.062)		0.102 (0.429)	0.064 (7.575)
Education	0.272 (0.020)***		0.421 (0.119)***	0.272 (0.020)***		-0.026 (0.191)	0.272 (0.020)***		-0.096 (0.196)	0.032 (0.061)		1.132 (8.347)
Single	0.082 (0.096)	0.622 (18.770)		0.082 (0.096)	(-)		0.082 (0.096)	0.622 (-)		-0.627 (0.250)**	0.200 (-)	
<i>Dynamic components</i>												
Beauty										0.062 (0.031)**	-0.267 (0.797)	0.658 (5.202)
Income										0.180 (0.030)***	-0.040 (0.356)	0.382 (5.410)
Education										0.168 (0.061)***	3.010 (5.175)	0.250 (5.853)
Single										0.555 (0.126)***	-0.561 (8.554)	-
No. of obs.	8,897			8,897			8,897			8,897		
Log-likelihood	-4.116e+08			-4.130e+08			-4.136e+08			-7,808.547		
LR/Wald χ^2 (p-value)	3,316.26 (0.000)			3,344.12 (0.000)			3,338.39 (0.000)			5.94e+09 (0.000)		

Note: ***, ** and * denote 1%, 5% and 10% significance levels in turn. The estimated coefficients of other independent variables are not reported.

Table 11 Average marginal effects of facial attractiveness on the probability of unmarried

Facial attractiveness	Column 3 of Table 10 (%)	Column 6 of Table 10 (%)	Column 9 of Table 10 (%)
1 -> 2	-10.213	-9.443	-4.324
2 -> 3	-9.116	-7.620	-3.058
3 -> 4	-7.583	-5.727	-2.046
4 -> 5	-5.904	-4.047	-1.295
5 -> 6	-4.331	4.848	-0.775
6 -> 7	-3.020	4.296	-0.438
Average	-6.695	-2.949	-1.989

Appendix

Table A.1 Definition of variables and descriptive statistics

Variable	Definition	CGSS (2008-2011)		CFPS (2010-2012)	
		Mean	S.D.	Mean	S.D.
Single	Dummy variable, 1=unmarried; 0=otherwise.	0.023	0.150	0.015	0.120
Income	Natural logarithmic real annual net income (2012 prices).	9.490	0.976	9.086	1.473
Education	Categorical variable, 1=primary school; 2=junior high school; 3=vocational school; 4=senior high school; 5=college; 6=university; 7=postgraduate (including masters and PhDs).	2.713	1.597	2.674	1.414
Age	Age in years at the time of interview.	48.652	13.672	49.855	14.088
Health	Self-reported health status. Categorical variable, 1-5 levels indicating better health.	3.085	1.171	3.377	1.298
Ethnicity	Dummy variable, 1=ethnic minorities; 0=otherwise.	0.064	0.244	0.031	0.174
Religion	Dummy variable, 1=having religious belief in childhood; 0=otherwise.	0.125	0.331	0.083	0.275
Urban <i>Hukou</i> (14 or 12 yrs old)	Dummy variable, 1=urban <i>Hukou</i> when the individual was 14 (in the CGSS) or 12 (in the CFPS) years old.	0.276	0.447	0.154	0.361
Working hours	The number of working hours over the past week in the CGSS, while per day on average over the past year in the CFPS. Considering working overtime or short unemployment spells, we did not aggregate or disaggregate working hours to equalise definitions between two datasets, but rather used their original definitions in respective questionnaires. The mean indeed varies between two kinds of measurement. However, this only affects the magnitude of the estimate of working hours, if any, without changing the signs or statistical significance.	30.492	28.198	2.438	4.049
EGP-class	Categorical variable indicating different social classes according to (Ref?). In our constructed dataset, we finally coded 268 different occupations in the CGSS and 136 in the CFPS into a 5-categoriy variable as below: 1=Agricultural laborer; 2=skilled and semi-skilled manual and manual supervisors; 3=self-employed (including entrepreneurs); 4=routine manual; 5=lower and higher controllers. In regressions of Table 7, we use dummy variables of each social class as the EGP-classification itself does not imply social hierarchy.	4.553	2.931	6.671	3.817
State-owned enterprise	Dummy variable, 1=the individual works in a state-owned enterprise; 0=otherwise.	0.198	0.399	0.091	0.287
Private enterprise	Dummy variable, 1=the individual works in a private enterprise;	0.228	0.419	0.186	0.389

Foreign enterprise	0=otherwise. Dummy variable, 1=the individual works in a foreign enterprise; 0=otherwise.	0.014	0.119	0.016	0.127
Family's social status	Categorical variable, 1-4 levels indicating higher social status. It is measured as self-reported (original) family's social status when the individual was 14 years old (in the CGSS) or during the Cultural Revolution over the years 1968-1978 (in the CFPS).	2.452	1.315	1.307	0.852
Father's education	Educational attainment of the individual's father. The categories are same as "Education".	1.541	0.952	1.996	1.158
Mother's education	Educational attainment of the individual's mother. The categories are same as "Education".	1.264	0.646	1.538	0.901
Adult siblings' average education	Average educational attainment of the individual's siblings aged 18 or above. The categories of each sibling's educational attainment are same as "Education".	-	-	3.299	1.331
Adult siblings' marriage	Marriage status of the individual's siblings aged 18 or above. For each adult sibling, 1=married; 0 otherwise.	-	-	0.583	0.493
Father's full-time work (14-yrs old)	Dummy variable, 1=individual's father had full-time employment when she was 14 years old.	0.418	0.493	-	-
Mother's full-time work (14-yrs old)	Dummy variable, 1=individual's mother had full-time employment when she was 14 years old.	0.221	0.415	-	-
Height	Individual's height (cm).	161.244	6.834	158.732	5.586
Weight	Individual's weight (kg).	59.742	10.948	57.590	9.305
Beauty	Categorical variable according to interviewer's perception on the respondent's facial attractiveness compared to other women in her age, from 1 (the least beautiful) to 7 (the most beautiful).	-	-	5.238	1.173
Property ownership	Dummy variable, 1= having possessed residential property for at least 3 years; 0=otherwise.	0.257	0.437	0.107	0.310
Living with parents	Dummy variable, 1=if the respondent lives with parents; 0=otherwise.	0.069	0.253	0.062	0.240
Sibling living at home	Dummy variable, 1 if any sibling(s) living with parents; 0 otherwise.	0.039	0.194	0.275	0.446
Trust in others	Dummy variable, 1=the majority in the society are trustable; 0=otherwise.	0.630	0.483	0.534 ^a	0.499 ^a
Sociality	Categorical variable in the CGSS, 1-5 levels indicating self-reported (increasing) frequencies of having social activities in last year. In the CFPS, it is measured by the number of days a week in social activities with friends.	2.432	1.006	0.745	1.008
Grit	An index calculated as the weighted average level of three personalities, including self-discipline, passion and perseverance and when the	4.047	2.426	-	-

respondent was 14 years old (by asking the respondents to recall their young adolescence and school life). Each personality is a categorical variable with 1-4 levels. Self-discipline is indicated by the question: “I can achieve my best performance even when studying subjects that I don’t like”. Passion is indicated by the question: “I can hold on and maintain consistent performance even it takes long time to realise good marks”. Perseverance is indicated by the question: “I try my best to go to school even feeling ill”. We use principal component analysis for three personalities in each wave to obtain time-variant weights for each personality and then calculate their weighted average in each wave as the individual’s grit.

Self-efficacy	Categorical variable, 1-5 levels indicating the degrees of feeling able to control the stuff relating to studies and education when 14 years old.	2.480	0.901	-	-
Sex ratio of unmarried men over unmarried women ^b	The number of unmarried men aged above 15 over that of unmarried women aged 15 at the provincial level.	1.331	0.143	1.341	0.122
Ln(GDP per capita) ^b	Natural logarithmic provincial GDP per capita.	10.415	0.512	10.525	0.457
Urbanisation ^a	Share of urban population in total population at the provincial level. According to the NBS criteria, urban population is defined as those whose primary residential places are in urban areas.	0.564	0.163	0.583	0.168

Source: Authors’ calculation based on data from the CGSS and CFPS.

Note: a. Only available in 2012. It is not used in estimation.

b. Authors’ calculation based on data from China Statistical Yearbooks published by the NBS.

c. This table only covers variables used in estimation. See the note of Table for other variables.

Table A.2 Estimation results of the endogenous living arrangements

Independent variable	CGSS (2008-2011)	CFPS (2010-2012)	CFPS (2010-2012)
	(1)	(2)	(3)
<i>Individual characteristics</i>			
Age	-0.012 (0.002) ***	-0.024 (0.002) ***	-0.025 (0.003) ***
Age square	0.0001 (0.00002) ***	0.0002 (0.00002) ***	0.0002 (0.00002) ***
Ethnicity	-0.009 (0.015)	0.015 (0.021)	0.013 (0.021)
Religion	0.035 (0.011) ***	0.003 (0.015)	0.004 (0.015)
Health	-0.003 (0.003)	-0.008 (0.004) **	-0.008 (0.004) **
Local urban <i>Hukou</i>	0.044 (0.008) ***	0.060 (0.009) ***	0.062 (0.009) ***
Working hours	-0.0001 (0.001)	0.0005 (0.001)	0.0001 (0.001)
<i>Household characteristics</i>			
Family's past social status	0.004 (0.003)	0.014 (0.006) **	0.013 (0.005) **
Siblings live at home	0.142 (0.027) ***	0.003 (0.014)	-0.0004 (0.014)
<i>Provincial controls</i>			
Ln(GDP per capita)	-0.111 (0.098)	-0.036 (0.085)	-0.045 (0.082)
Provincial dummy	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes
No. of obs.	6,184	8,897	8,897
Log-likelihood	-10,682.544	-7.533e+08	-1.778e+08
LR/Wald χ^2 (<i>p</i> -value)	8,052.51 (0.000)	10,016.79 (0.000)	772.07 (0.000)

Note: The dependent variable is whether the individual lives with parents (either father or mother or both=1; otherwise=0). All columns adopt linear probability specification and estimated jointly with income, education and marriage equations by SML.