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Marriage Squeeze for Highly Educated Women?

Gender Differences in Age and Educational Assortative Marriage in Urban China

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Abstract

Today in urban China, it is common to refer to well-educated women who remain single until their late twenties as “leftover ladies”; however, empirical research has yet to examine the impact of education on marriage formation. This study pools four years of Chinese General Social Survey (2003, 2005, 2006, and 2008) data to investigate the gendered patterns of marriage by education and age in the early years of the twenty-first century in urban China. Results show that university-educated women have lower marriage rates than their male counterparts. Particularly, the marriage rate for highly-educated males above 30 is almost four times that for their female counterparts. Findings indicate that for those with less education, women have higher marriage rates than males. Log-linear models indicate that women are more likely to marry men with levels of education similar to or higher than their own. This assortative marriage pattern does not appear to change as women age. The implications of this study are discussed**,** given the imbalanced sex ratio in China as well as a trend towards delayed marriage and non-marriage in Asia.

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Today in urban China, well-educated women who remain single until their late twenties are referred to as "leftover ladies", or *shengnü* in Chinese. This derogatory term suggests dim marriage prospects for older, highly-educated Chinese women who, nevertheless, seek to marry. This stigma seems to exist only for these women, as no similar terms are applied to their male counterparts or similarly aged women with less education. In fact a similar phenomena in the U.S occurred in the early 1980s. A similar perception of the diminishing chances of marrying for older, better educated women was generated by the popular press (Cherlin 1990). However, utilizing data from Current Population Surveys, Qian & Preston (1993) found no support for this widespread impression. In contrast, they found that first marriage rates increased for college-educated women ages 25 and above between 1979 and 1987, despite a decline in availability of eligible partners, indicating attractive marriage prospects for highly-educated women. This raises a quandary: is the term "leftover ladies" publicized by the media also misleading, or alternatively, revealing the deteriorating position of older, well-educated women in marriage markets in urban China? In order to empirically scrutinize the gendered account of relationship between education, age and marriage popularized by the mass media, this study uses nationally representative sample survey data to examine the gender differences in marriage patterns in the early years of the twenty-first century in urban China.

Widespread attention has been given to evaluating the effects of education on family formation and marriage outcomes, predominantly in the contexts of industrialized societies

(e.g. Blossfeld 1995; Blossfeld & Timm 2003; Esteve & Cortina 2006; Goldstein & Kenney 2001; Lewis & Oppenheimer 2000; Lichter 1990; Mare 1991; Park & Smits 2005; Qian 1998; Raymo 2003; Raymo & Iwasawa 2005; Rose 2005; Rubin 1968; Schwartz & Mare 2005; Shafer & Qian 2010; Smits & Park 2009; Smits, Ultee, Lammers 1998; Sweeney 2002; Torche 2010). However, as a developing country that has experienced dramatic socioeconomic and demographic changes in recent decades, China provides a unique social context to investigate gender differentials in the role of education and age on marriage patterns. First, among these unique contexts are demographers' concerns about millions of excess males in China from 2000 onwards who will not be able to find Chinese brides because of imbalanced sex ratios since the 1980s (Goodkind 2006; Guilmoto 2012; Jiang et al. 2007; Poston & Glover 2005; Tuljapurkar et al. 1995). Given the male surplus and female deficit in China, women should be scarce and therefore highly valuable resources in the marriage market. However, the popular notion of a particular group of women are described as "being left" in the marriage market runs counter to this logic. Therefore, studying distinctive marriage patterns in China facilitates a better understanding of implications of the paradoxical situation in which the shortage of potential brides and delayed marriage or non-marriage for women coexist in marriage markets in China.

Furthermore, Oppenheimer's independence hypothesis of marriage (1997) predicts that, as women's economic roles resemble those of men, a woman's earning power, usually indicated by educational attainment, has positive effects on her marriage outcomes. This has been supported by empirical evidence from the U.S. marriage markets (Sweeney 2002; Sweeney & Cancian 2004). Interestingly, as suggested by the conventional wisdom regarding

the marriage prospects of highly-education women in China, women with good economic prospects are not regarded as sought-after wives in China even though more than 90 percent of married women are in the labor force and nearly equally share economic resources with their husbands (Bian, Shu, & Logan 2000). Evaluating the application of theories in the unique Chinese context sheds light on the importance of developing and advancing context-sensitive theories of marriage.

In light of these perplexities, this paper intends to empirically examine the gender differences in the role of education and age in marriage formation and assortative marriage patterns. The remainder of the paper is organized as follows. I first review Becker's specialization and trading model (1981) and Oppenheimer's independence hypothesis of marriage (1994; 1997), two theories widely used to guide the studies in social contexts of Western industrialized countries, and general findings from existing studies. Next, I describe the unique Chinese context of education, marriage, and the gender system, and propose my hypotheses accordingly. An account of data, methods, and analytical strategy is followed by the result section. Results of descriptive analysis and log-linear models are presented, respectively. This paper concludes with a discussion section.

LITERATURE REVIEW

Theoretical Frameworks

The economic approach provides a theoretical framework for conceptualizing the exchanges and rational decisions individual make in marriage markets. Social exchange theory advanced in the work of sociologists George Homans (1958), Peter Blau (1964) during the 1960s (see Sabatelli & Shehan 1993 for a detailed summary of the exchange framework)

and, to a greater extent, Becker's specialization and trading theory (1974; 1981) are widely used to understand mate-selection and relationship formation and dissolution processes.

Under the exchange framework, people will evaluate the rewards and costs so as to decide whether to enter or stay in a relationship (Sabatelli & Shehan 1993). The gain of marriage and marital stability rely on the mutual dependence between husbands and wives. Likewise, according to Becker's specialization and trading theory of marriage (1974; 1981), individuals prefer to marry only if their utility from marriage exceeds their utility from remaining single. Women have the ability to conceive and bear children. Therefore, Becker maintains (1981), women tend to have a heavy biological commitment to reproduction and childcare. Meanwhile, sexual differences in specialized investments, with men investing more in market-oriented human capital and women investing more in home production skills, reinforces the biological differences (Becker 1981). Due to both the biological difference and specialized investments, men have a comparative advantage in market work, while women have a comparative advantage in household work. Within households, men and women have complementary comparative advantages, and couples maximize the gains from marriage by allocating as much time as possible to tasks they have a comparative advantage in. Thus, sex role specialization in marriage, with husbands bearing the breadwinner role and wives specializing in domestic work and childcare, maximizes the utility of marriage.

Therefore, on the aggregate level, Becker (1981) maintains that positive assortative mating increases the efficiency of the marriage market by maximizing aggregate commodity output when traits are complements, such as women's nonmarket traits (e.g. beauty and young age) with men's market skills (e.g. education and income). On the individual level,

interdependence between partners implies that the ability to obtain profits in a relationship is contingent on the ability to provide others with rewards (Sabatelli & Shehan 1993).

The exchange arguments above suggest that men with higher earnings gain more from marriage than other men do because they can attract higher quality wives. In contrast, women with higher earnings gain less from marriage than other women do, as economic independence facilitated by higher earnings reduces the advantages of the sexual division of labor in marriage (Becker 1981). Also, it is expected that men with characteristics the average woman prefers will tend to marry women with characteristic most men prefer, and vice versa. In sum, social exchange theory and Becker's specialization and trading theory suggests that men with better market skills are willing and also easier to get married, while women with better market skills tend to forgo marriage due to the reduced gain from marriage.

In addition, Becker (1981) argues that the gain from marriage is further reduced by decreases in fertility because sex-role specialization within households becomes less advantageous. Empirically, Becker's theory appears to be more applicable to societies with greater gender-asymmetric division of labor within families, such as Italy and East and Southeast Asia. Not surprisingly, within these societies, educational level is found to be negatively associated with entry into marriage (Jones & Gubhaju 2009; Pinnelli & De Rose 1995; Raymo & Iwasawa 2005).

In contrast to Becker, Oppenheimer (1988) argues that the prevalence of female's labor force participation leads to later marriage rather than non-marriage of females. Moreover, Oppenheimer's independence hypothesis (1994; 1997) predicts that changes in the labor market positions of women contribute to the growing importance of women's earning power

in determining their marriage prospects. Applying the job-search theory to the mate selection processes, Oppenheimer's independence hypothesis (1988) argues that everyone in the marriage market has a standard for the minimally acceptable match. They will remain single until they find the acceptable match. When gender roles are highly segregated, women are likely to marry at young ages because their attributes have been relatively stable. As long as men's economic role in the family remains of considerable importance, the timing of the transition to a stable work career has an important impact on marriage timing.

However, increases in the female labor force participation, indicative of changes in gender roles, raises the level of early uncertainty about women's attributes as well, and thus leads to marriage delays. Better-educated women with greater economic independence are able to set and stick to a higher standard for the minimally acceptable match and spend longer time in the mate search process in marriage markets. Oppenheimer's theory is supported in societies with more gender-egalitarian division of labor within household, such as the United States, Sweden, and West Germany, in which education is insignificantly or positively related to marriage (Blossfeld & Rohwer 1995; Hoem 1995; Oppenheimer et al. 1995; Sweeney 2002; Sweeney & Cancian 2004). Thus, prior research implies that the effects of education on marriage depend on the degree of role differentiation by gender in the society.

Yet, marriage delays are not without costs for females. Given the tendency for women to marry men older than themselves, the supply of potential mates decreases with age for women but increases for men (Goldman et al. 1984). In addition to the sharply shrinking marriage pool due to the normative age hypergamy, England and McClintock (2010) find that women are devalued as they age more than is the case for men in US marriage markets. They

refer to this as “a gendered double standard of aging”. Therefore, marriage outcomes may differ for men and women who marry late in a marriage market due to the shrinking availability of potential partners as well as gender-based discrimination against older, single individuals.

Educational Homogamy and Age Hypergamy

Both age and education are key individual attributes in the marriage market. Extensive empirical research has found educational homogamy and age hypergamy, the tendency of people to marry people of similar education and the tendency of men to marry women younger than themselves (Casterline 1986; Kalmijn 1998; Mare 1991; Presser 1975).

In general, there are three reasons why people tend to be prone to educational homogamy. First, the educational system is a marriage market which determines the structural opportunities to meet potential spouses (Blossefld & Timm 2003). Second, Education is such an important indicator of economic prospects and socioeconomic status that competition for individuals of high status as spouses leads to education homogamy (Mare 1991). People, in general, prefer to marry someone of high status. As a result, high-status individuals in marriage markets tend to attract and choose each other, while low-status individuals have no choice but to pair among themselves. Third, individuals with similar education attainment are likely to share similar interests and lifestyles (Kalmijn 1994). In sum, educational homogamy can be mainly explained by structural opportunities and constraints and individuals preferences (Kalmijn 1998).

Furthermore, age and education have interactive effects on marriage outcomes. First, enrollment in the educational system delays entry into marriage (Blossfeld 1995). Since

attaining an education makes it difficult to adopt family roles in most countries (Marini 1985) and involves a low degree of economic independence, most young men and women at school are therefore normally "not ready" to start a family. Completion of education thus becomes a socially significant precondition for entering into marriage. Therefore, education will postpone marriage.

Meanwhile, patterns of educational assortative mating are affected by marriage timing, that is, age at first marriage. The odds of homogamy may be lower among those who marry at older ages because of changing nature of the marriage market as people age (Schwartz and Mare 2003). As young people leave educational institutions and move into the labor market they may be more likely to encounter potential spouses who do not share their educational attainment. This implies that the longer the time between departure from school and marriage, the greater the chances that couples will form educationally heterogamous marriages (Mare 1991).

Educational homogamy may also be lower among people who marry late because of the shrinking availability of potential partners (Schwartz and Mare 2003). As potential mates are increasingly unavailable, still-single men and women may be forced to redefine what constitutes an acceptable match. For instance, men and women in their early 20s tend to have partners better educated than themselves, but persons in their 30s tend to cross the less-than-high-school/more-than-high-school educational barrier when partners differ in educational attainment (Qian 1998).

In sum, prior research examining the U.S. marriage market suggests that educational homogamy and age hypergamy are the dominant assortative marriage pattern. Nevertheless,

people marrying late tend to be engaged in educational heterogamous marriages.

Chinese Gender System

A gender perspective is necessary in mate selection and marriage formation research because a heterosexual marriage involves both sexes. Gender norms in a societies have an impact on how sociodemographic characteristics of men and women may be valued in market markets. As I will discuss in detail below, under the Chinese gender system, marriage patterns by education and age may be different for men and women.

A variety of competing social forces influences gender norms in China. Traditionally, Chinese Confucian culture advocates patriarchy and support a strong gender hierarchy, and in this system, women are regarded as subordinate to men (Bauer 1992). However, like most socialist states that explicitly makes gender equality an policy goal (Zhou et al. 1998), the Communist government has instituted a series of measures since the founding of People's Republic of China in 1949, aiming at raising the status of women. Particularly, the Party strongly promoted women's labor force participation and equal marriage right, by implementing a host of legislation efforts to that effect. These efforts included prohibiting arranged marriage, raising the legal age at marriage, giving women and men equal rights to dissolve marriage and to possess property after divorce, providing access to a wider variety of work opportunities, and mandating equal pay to men and women doing the same job (Bauer et al. 1992; Cleverley 1991; Davis 1976). Indeed, Chinese women have been participating in the paid labor force to an extent that has exceeded that in most other modern societies (Bauer et al. 1992; Parish & Busse 2000).

Despite significant improvements in women's employment, income, and education

(Whyte 1984; Hannum & Xie 1994), gender inequality persists in China (Bauer 1992). Women bear the double burden of full-time paid work and major responsibilities for child care and housework (Bian 1987; Wang and Li, 1982; Parish & Farrer 2000). During China's economic reforms in the 1990s, the Chinese urban population experienced a rapid shift from a planned to a market economy (Tang & Parish 2000). The role of the Chinese state in pursuing gender equality has been diminished in the emerging market economy (Cohen & Wang 2009). Increasing gender inequality has been observed in the most recent period (Cohen & Wang 2009; Honing & Hershatter 1988; Zhou et al. 1998).

Moreover, the high levels of female labor force participation do not necessarily imply egalitarian gender norms. Parish and Busse (2000) argues that the pressure for women to go to work came often not from an internal drive to achieve or find fulfillment, but from external forces, either economic (i.e. help maintain family budgets) or ideological (female emancipation). In reform-era China, the market developed and eroded the power of the state (Bian 2002) which may have resulted in the official ideology, that calls for gender equality, to not be as prevailing as before.

Also, the level of gender egalitarianism and its changes may differ substantially by gender itself. For instance, Chang (1999) find that Chinese women are significantly more egalitarian than men in work and family values. Pimentel (2006) examines gender attitudes and gender behaviors including division of labor and decision making across three marriage cohorts in Beijing: the early Maoist period (married 1949 to 1965); the Cultural Revolution and its aftermath (married 1966 to 1979); and economic reform period (married 1980 to 1991). Pimentel's results showed that while women remain egalitarian in gender ideology

across cohorts, the percentage of men who hold egalitarian gender attitudes declines significantly across cohorts. Furthermore, educated individuals hold more egalitarian gender attitudes (Shu 2004). Yet, this positive effect of individual education is larger for women than for men (Shu 2004).

In addition, the breadwinner role of the husband and the housekeeping role of the wife remain their primary place in the Chinese family (Zuo & Bian 2001). Although nearly all adult women in urban China work full time in jobs that paid only slightly less than their husbands' jobs (Parish & Farrer 2000), few couples perceive the wife's disproportionately heavy household responsibility as unfair (Feng et al 1995; Zheng 1997). Instead, a failure of a husband to fulfill the provider role may increase a sense of unfairness in marital exchange (Zuo & Bian 2001). Some interview data indicate that traditional gender roles might be rising in the reform era; some women fantasize about fleeing work and seeing women's place as being primarily in the family (Parish & Busse 2000:212, Lee 1998:34-35).

In China, the stereotype of a strong husband with a weak wife might still dominate many Chinese's minds in modern times (Sun 2002). In terms of mate selection criteria, Women put more emphasis on financial traits, such as education, occupation, and income, while men care more about nonmarket traits, such as appearance, and age (Xu 2000; Zhang 1989; Yu 2011). While men are expected to fulfill the financial duty, career-oriented women is commonly criticized as "selfish", "nonfeminine", and "irresponsible to household needs" (Zuo & Bian 2001), which suggests that women with high earning power and career aspirations are not viewed as attractive in Chinese marriage markets.

Since the implementation of China's "One-Child" policy in 1979, the nation has

experienced dramatic fertility declines (Guo & Chen, 2007). The drastic decline in fertility and the steady growth in family income have contributed to higher parental investment in each child (Bian 1986; Fong 2004). Pimentel (2006) argues that smaller family size may have at least reinforced the importance of women's domestic responsibilities, by placing extreme value on the production of the perfect only child. As a result, women dedicated to childrearing instead of paid work may be more attractive in the marriage market.

Changing Contexts of Education and Marriage in China

Massive educational expansion after 1978 dramatically reshaped the educational distribution in China. In 1978, after a ten-year setback due to the Cultural Revolution (1966-1976), the state government launched a nationwide educational reform effort (Deng & Treiman 1997). This mainly included implementing compulsory completion of nine years of education and reopening post-secondary education institutions. China's higher education has expanded at an unprecedented pace since 1999. The unprecedented expansion in China's higher education sector in the last decade indicates that higher education in China has transformed from an elitist to a mass system (Zhao and Sheng 2008; Wu and Zheng 2008). From 1970 to 2000 the mean years of schooling increased for both men and women (Han 2010). In urban areas, the growth in education was concentrated at the college level, with the number of college more than doubling and the enrollment of students more than tripling by the end of the 1980s (Shu 2004).

With these greater opportunities for education, women's education starts to resemble that of men, especially in urban areas. In regular academic high schools, women's share of total enrollment increased from 40 percent in 1980 to 46 percent in 1997. Over the same

period, women's share of college enrollment moved from one-fourth to over one-third (SSB 1998a, P.692). While these are nationwide statistics, including both rural and urban areas, the more rapid convergence of male and female college enrollment happened in cities (Tang & Parish 2000).

In addition to educational expansion and greater gender equality in education, income rewards for people with more education have been increasing as well (Bian and Logan 1996; Zhou, Tuma, and Moen 1996, 1997). Since education plays an increasingly important role in determining individual's economic position in Chinese labor markets, education should also count more in marriage markets, especially for females who tend to emphasize on economic and financial traits of future husbands (Xu 2000). Indeed, Han (2010) finds that the estimated odds of educational homogamy increase substantially between 1980 and 1995 and then grow at a slower pace in the late 1990s.

With the increasing trend of men marrying women with similar education, males on average have been two years older than females when marrying (Parish & Farrer 2000; Zhang & Gu 2007). The trend of later marriage is salient in China, especially in urban areas. Between 1970 and 2000, the median age at first marriage grew from 25 to 27 for urban men and from 22 to 25 for urban women (Han 2010). Yet, forgoing marriage is not common in China. Universal marriage has been observed among the Chinese female population until very recently (Jones 2007; Zeng 2000). In contrast to the 30 percent or more in Asian societies such as Japan and Hong Kong, less than two percent of women remain single at age 30 around the year 2000. Even in Shanghai, the most developed city in China, the figure is three percent (Jones 2007; Jones and Gubhaju 2009). However, data from the 2005

one-percent population survey (also known as mini-census) confirm that the proportion of women remaining single has indeed risen in all age groups despite its low level compared with elsewhere in East Asia. For instance, 2.2 percent of women at ages 30 to 34 remained single in 2005, up from 1.3 percent in 2000, but it was dramatically lower than 32 percent in Japan or the 19 percent in South Korea (Jones and Gubhaju 2009).

Great educational differentials in marriage formation patterns exist for both men and women. In general, education appears to be positively associate with marriage for men, but negatively associated with marriage for women. For instance, according to the 2000 Chinese censuses, among women in the 30 - 34 age group, the proportion single is 0.6 percent among women with primary education, doubles for women with Junior high school education (1.2 percent), is more than quadrupling for women with senior high school education (2.8 percent), and reaches four percent and 11 percent for women with tertiary education and for those with post-graduate degrees, respectively (Jones and Gubhaju 2009). In contrast to women, for men above age 30, proportions single are the highest among those with no schooling and those with primary schooling, and these proportions decline at higher levels of education (Jones and Gubhaju 2009).

HYPOTHESES

In order to investigate the gendered effects of age and education on marriage patterns in urban China, both probabilities of first marriage and assortative marriage patterns are examined in this study. Based on the literature review, I propose the following hypotheses for this study:

a) According to Becker's specialization and trading model of marriage, empirical

research findings on gendered differentials in marriage probabilities by educational attainment in other Asian societies, and existence of traditional gender role values in China, I expect gender differences in marriage rates differ by educational attainment: poorly-educated women have higher marriage rates than their male counterparts, while highly-educated women have lower marriage rates than their male counterparts.

b) In additional to the gendered differentials in marriage formation by education, the age hypergamy tradition, and the increasingly shrinking marriage pool particularly for women who delay their marriages, women tend to be devalued as they age more than is the case for men (England & McClintock 2010). I hypothesize that among highly-educated people, age is positively associated with marriage rates for men, while women who delay their first marriage into their thirties have poor marriage prospects, indicated by their low marriage rates.

c) Taking both the dominant homogamy patterns and the gender norms in China into account, I hypothesize that both education homogamy and education hypergamy are important features of assortative marriage patterns in urban China.

d) Drawing on the prior studies on the interactive effects of age and education on assortative marriage patterns and the unattractiveness of older women in marriage markets, I hypothesize that age moderates the gender differences in educational assorative marriage patterns, but the moderating effects of age differ by gender. As men age, their chances of marrying a spouse with less education increase, while the chances of marrying a spouse with more education decrease as women age.

METHOD

Data

To examine gender differences in the effects of age and education on marriage outcomes in China, I use pooled nationally representative data from the Chinese General Social Surveys (CGSS) conducted in 2003, 2005, 2006, and 2008. Questions asked in the four years of CGSS are different, but they all provide information on gender, date of birth, marital status, marriage date, current level of education, and relationship to the householder for each member within the household. The proposed data from the CGSS provide the most up-to-date large-scale nationally representative individual-level data, and allow me to get information on single people as well as married respondents and their spouses. All of these features make the CGSS data the most appropriate for this study. Although 2005, 2006, and 2008 surveys cover the rural areas, owing to the sharp socioeconomic and institutional divide and differential marriage patterns between rural and urban China (Han 2010; Knight & Song 1999), only urban residents are included in this study. The sample sizes of urban samples for these four surveys are 5,984 in 2003, 6,098 in 2005, 6,013 in 2006, and 3,982 in 2008.

Sample

My analysis will be conducted in two steps. First, I study both single and first-married individuals through first marriage rates by education and/or age for males and for females, respectively. In the first step, the unit of analysis is person-year of exposure to risk of first marriage. In the second step, I examine the assortative marriage patterns among currently first-married couples in urban China, in which the unit of analysis is couples in their first marriage.

One approach to examining educational assortative marriage is to study prevailing marriages including all intact marriages at the time of each survey. However, variation in marriage timing, marriage dissolution, and education upgrading after marriage may all affect the degree of resemblance between spouses in a marriage cohort (Schwartz and Mare 2003). Using data from newly-established first marriages can lessen these biases (Mare 1991; Qian and Preston 1993; Qian 1998; Paymo and Xie 2000). Therefore, I limit my analysis to first marriages contracted between 2000 and 2008.

Yet, two potential problems exist. First, some marriages dissolve before the surveys occur, despite the fact that I limit the analysis to a relatively short time period. Secondly, I can only know exactly whether the focal respondent is in the first marriage or not, but have no way to identify the marriage order of the current marriage for spouses. However, despite recent increases, the divorce and remarriage rates are still very low in China (Jones 2010; Zeng & Wu 2000; Zhang & Gu 2007). Since the 2006 CGSS data contain detailed information on marriage and family life, which allows me to examine the extent to which my results might be affected. For example, in 2006 CGSS, 453 out of 6,013 respondents, or 7.53 percent, are divorced, remarried, or widowed, and among them, 221 respondents, almost 50 percent, experience marital dissolution primarily due to the death of spouse at old age. If we restrict the sample to the 700 respondents currently in their first marriages contracted between 2000 and 2006, only nine of them, or 1.29 percent, dissolved their first marriages before the survey. Eleven of the 700 respondents, or 1.57 percent, have spouses who are not in their first marriages. Considering the small fraction of marriage dissolution or marrying a remarried spouse for individuals entering their first marriages not long before each survey, I

believe that these two concerns will not substantially change my results.

In addition, only never married people between the ages of 20 and 49 and first-married individuals and their spouses who got married between the ages of 20 and 49 during the period 2000 – 2008 are included in this study. Several reasons account for this restriction. First, 20 is the minimum legal age of marriage for women and 22 is for men. Few women marry before age 20 and few men marry before age 22 in urban China. Twenty is used as the lower bound of the age group covered in this study for both men and women. Also, it is better to use the closed age group (i.e. 20 - 49) instead of the open-ended age group (i.e. 20+) so that the population at risk can be identified as precisely as possible for calculating marriage rates. In demography, it is typically assumed that people are never going to marry if they remain single until 49 (Lindgren 2009). Thus, 49 is chosen as the upper bound of the age group.

In the first stage of my analysis, I replicate Raymo & Iwasawa's (2005) analysis to calculate marriage rates by using the large sample of pooled survey data to reconstruct the population at risk of first marriage. Following Raymo & Iwasawa (2005), I accomplish this in three steps. First, I generate observations for spouses based on the responses about their spouses' educational attainment, birth date, and date of marriage provided by the focal respondents who are currently in their first marriages contracted between 2000 and the survey year. Second, I merge the data for the married and unmarried samples of each sex. Third, I expand these merged data into person-year record form, creating one observation for each year that respondents were between the ages of 20 and 49 during the period 2000 – 2008. Observations for each person end when they reach the age limit, they are still single at the

time of survey, or they get married. The number of person-year observations is 11,311 for females and 14,156 for males.

In the second stage of analysis, I will restrict my analytical sample to first-married couples and aim to answer the question about who marries whom. Four years of survey data are pooled, and six observations are dropped because of missing data on educational attainment for either respondents or their spouses. Finally, the analytical sample comprises 2151 couples in their first marriages contracted between 2000 and 2008 wherein both husbands and wives got married between the ages of 20 and 49.

Variables

Information on educational attainment was collected via similar questions in four years of CGSS; the questions asked the respondents to report their current educational level and their spouses' educational attainment. Therefore, current educational attainment used in my study is not exactly the educational attainment at the time of entering first marriage. However, current educational attainment approximates educational attainment at the time of entering first marriage. Because of the conflict between the role of students and that of a spouse, school enrollment tends to delay marriage (Blossfeld 1995; Yabiku 2005). In addition, increases in educational level after marriage are rare among Chinese people. For instance, in the 2006 CGSS data in which each respondent was asked about the year when the highest education achieved and date of first marriage, only 33 out of 646 respondents in my analytical couple sample, or 5.1 percent, accomplished their highest education after getting married. Therefore, the selection arising from education upgrading after marriage is not problematic. Furthermore, I categorize educational attainment into four groups: less than

senior high school, senior high school, vocational college (*Da Zhuan*), and four-year university and up. Due to the universalization of nine-year compulsory education in urban China, all people with junior high school or less are collapsed into one educational group. Considering the substantial differences between vocational colleges and four-year universities in China, people with higher education are classified into two groups: those with vocational college education and those with university or postgraduate education.

For the pooled dataset, individuals are grouped into three age intervals: 20 – 24, 25 - 29, and 30 - 49. A small proportion of people marry for the first time after the age 30 (Jones & Gubhaju 2009), so people entering their first marriage at the age 30 and above are classified into one group.

Marriage rate

In demography, rates are normally known as "occurrence/exposure rates." First marriage rates thus contain in the numerator a count of the number of first marriages occurring within some defined time period, and in the denominator an estimate of the number of "person-year" lived in the population during that time period, indicative of the population's amount of exposure to the risk of first marriage. The amount of exposure in the denominator of a first marriage rate combines two features—the number of persons in the population and the length of the time frame in which exposure is counted (Preston, Heuveline, & Guillot 2001: P3 - 4). Therefore, both single and first-married individuals are examined through the marriage rates calculated for males and females, respectively. This approach makes it possible to take into account the full picture of the potential marriage market in China. In sum, the first marriage rate takes the form of:

$$\text{Marriage Rate } [0, T] = \frac{\text{number of first marriages occurring between Time 0 and T}}{\text{person-years of explosure to the risk of occurrence of first marriage}} \quad (1)$$

For each person-year observation in my sample, if the event (i.e., first marriage) does not occur, that is, that person remains single at that year, that person-year observation contributes one year to the denominator. If we assume marriages happen evenly throughout one year, which usually holds true in a large population, then a person contributes half a year to the denominator at the year of entering first marriage. Likewise, the age-education-specific marriage rates are calculated in the same way.

Log-linear models

When studying the age and education assortative patterns, I will use log-linear models, a method widely used in assortative marriage research. Log-linear models can control for the differential marginal distributions of men and women in each age and education group so as to study the assortative marriage patterns net of the effects of population structure (Hout 1983).

Considering that education and age homogamy may be the dominant assortative marriage patterns, I add an education homogamy parameter and an age homogamy parameter to the cells along the main diagonals for education and age, respectively. In order to examine the sex differences in marriage patterns, I add education and age hypergamy parameters to represent the gender asymmetry models. For age, I constrain the table cells where men's age groups are greater than women's age groups into one parameter; for education, I create a parameter in which men are better educated than women.

I also employ crossings models used in Mare's (1991) analyses of assortative mating patterns. Crossings models can reveal which educational differences between partners are

serious barriers to intermarriage. Each crossing parameter corresponds to a single move across adjacent levels of schooling of spouses (Mare 1991). Table 1 presents the parameters for crossings effects on educational assortative marriage. The greater the distance between prospective spouses, the more barriers they must cross.

Table 1: Parameters for Crossings Effects on Educational Assortative Marriage

Men's Educational Attainment	Women's Educational Attainment			
	Less than high school	High school	Vocational college	University and up
Less than high school	1	ν_1	$\nu_1\nu_2$	$\nu_1\nu_2\nu_3$
High school	ν_1	1	ν_2	$\nu_2\nu_3$
Vocational college	$\nu_1\nu_2$	ν_2	1	ν_3
University and up	$\nu_1\nu_2\nu_3$	$\nu_2\nu_3$	ν_3	1

Note: Table is adapted from Mare (1991) and Qian (1998).

When asymmetry and crossings models are included, the model can be presented as follows:

$$\mathrm{LogN_{ijkl}} = \beta_0 + \sum\beta_i^{MA}X_i^{MA} + \sum\beta_j^{WA}X_j^{WA} + \sum\beta_k^{ME}X_k^{ME} + \sum\beta_l^{WE}X_l^{WE} + \sum\beta_c^{MAME}X_i^{MA}X_k^{ME} + \sum\beta_d^{WAWE}X_j^{WA}X_l^{WE} + \sum\beta_p^{HE}X_p^{HE} + \sum\beta_q^{AE}X_q^{AE} + \sum\beta_r^{HA}X_r^{HA} + \sum\beta_s^{AA}X_s^{AA} + \sum\beta_u^{CE}X_u^{CE} \quad (2)$$

Where $\mathrm{N_{ijkl}}$ denotes the expected number of marriages between men aged *i* with education *k* and women aged *j* with education *l*. β_0 is an intercept and other βs denote parameters to be estimated. X_i^{MA} and X_j^{WA} denote age categories for men and women, respectively (i, j = 20 - 24; 30 – 49; 25 – 29 is the reference group). X_k^{ME} and X_l^{WE} denote educational categories for men and women, respectively (k, l = less than high school; vocational college; university and above; high school education is the reference group). People do not make marriage decisions on age independent of education, or on education independent of age. Rather, they look at each other's age, given their educational attainment,

and they look at each other's educational attainment, given their age: they make decisions based on the combination of both characteristics. Therefore, I control for the interactions between age and education for both husbands and wives in my model.

In the model, X_p^{HE} measures education homogamy (p = men with the same education as women), and X_q^{AE} denotes education hypergamy (q = men better educated than women), Likewise, X_r^{HA} measures age homogamy (r = men in the same age group as women), and X_s^{AA} denotes age hypergamy (s = men in the older age group than women). X_u^{CE} is a set of educational-crossings parameters. The education crossings barriers include marriages between persons who have less than high school and who have high school education and above; between persons with less than vocational college education and those with vocational college and above; and between persons with less than university education and those with university education.

Results

1. Marriage rate

Figure 1 presents first marriage rates for males and females at each educational level. The figure reveals substantial gender differences in education-specific first marriage rates. Overall, women have a higher first marriage rate than men. After disaggregating males and females according to educational attainment, we see that gender differences in first marriage rates vary by educational attainment level. Women have higher marriage rates across educational groups except for the highest educational attainment level. For individuals with less than university education, women have higher marriage rates than men at each educational attainment level, and the gender gap in marriage rates narrows as educational

attainment increases. Among the least educated individuals (i.e., individuals with less than high school education), the marriage rate for females (319‰) is almost 1.5 times as high as that for males (213‰). The marriage rate for high-school-educated females (231‰) is about 28 percent higher than that for their male counterparts (181‰). Vocational-college-educated women and men appear to have even closer marriage rates: 166‰ for females and 141‰ for males. However, for the most highly-educated individuals (i.e., university-educated individuals), women have a lower marriage rate than their male counterparts. The marriage rates are 105‰ and 125‰ for university-educated women and men, respectively.

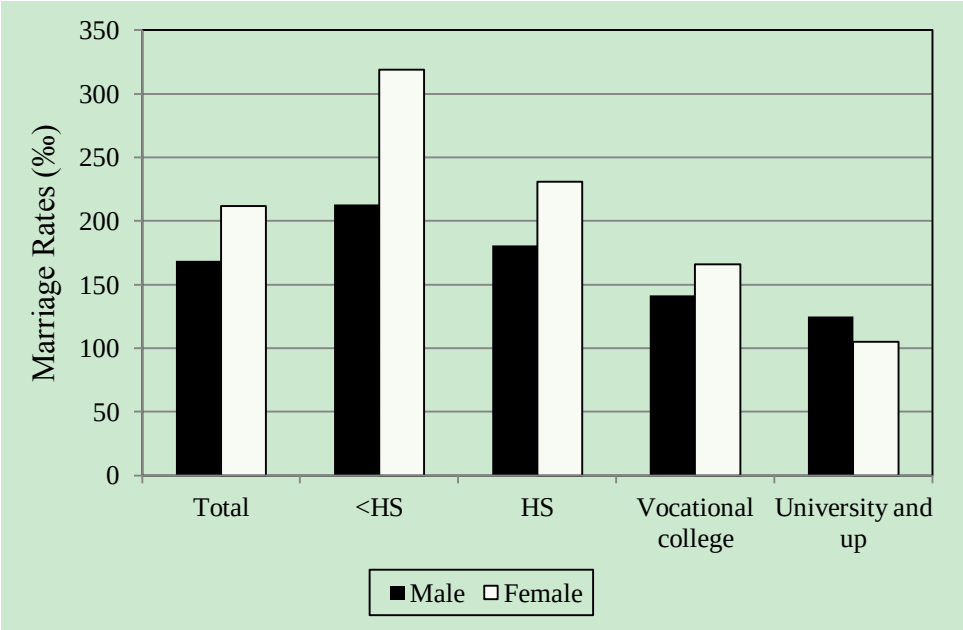

Figure 1. Education-Specific First Marriage Rates for Males and Females

Note: <HS = less then senior high school, HS = senior high school

Figure 2 and Figure 3 present education-age-specific first marriage rates for males and females, respectively. Overall, women marry later than men. For instance, at ages 20-24 and 25-29, women have higher marriage rates than their male counterparts, while at ages 30-49, men have higher marriage rates than women. After disaggregating males and females according to age and educational attainment, we see that gender differences in first marriage

rates vary substantially by both education and age. For both male and females at ages 20-24, marriage rates decrease with increasing levels of education. Among individuals in the 20-24 age group, females have higher marriage rates than their male counterparts at each educational attainment level. At ages 25-29, both male and females have relatively high marriage rates regardless of educational attainment levels, and the female marriage rates are consistently higher than male marriage rates across educational groups. At ages 30-49, the gender differences in marriage rates by education are particularly striking. For men and women aged 30 or over, the least educated women (217‰) have a higher marriage rate than men with the same education (173‰); high school educated women have a marriage rate (239‰) slightly lower than that for high school educated men (244‰); the marriage rate for vocational-college-educated men (367‰) is almost 2.6 times as high as that for vocational-college-educated women (142‰); and the marriage rate for university educated men (335‰) is 3.7 times higher than that for university educated women (90‰). Moreover, highly-educated 30-49 year-old men (i.e., vocational-college-educated and university-educated men) have higher marriage rates than highly-educated men at younger age groups, than 30-49 year-old men with less education, and than their female counterparts. In contrast, highly-educated 30-49 year-old women (i.e., vocational-college-educated and university-educated women) have lower marriage rates than highly-educated 25-29 year-old women, than 30-49 year-old women with less education, and than their male counterparts. Figure 2 and Figure 3 imply that highly-education men have much better marriage prospects than highly-educated women if they delay their marriages until their thirties.

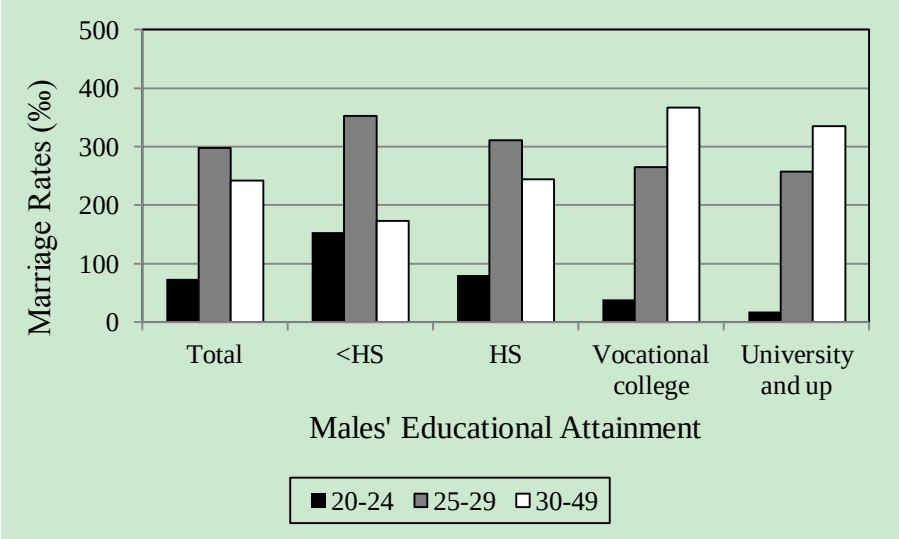

Figure 2. Education-Age-Specific First Marriage Rates for Males

Note: <HS = less then senior high school, HS = senior high school

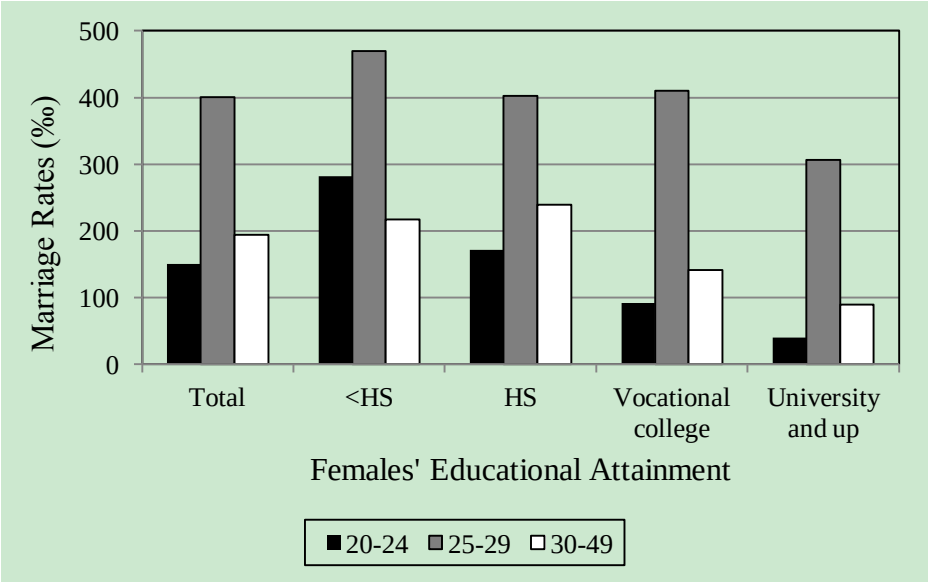

Figure 3. Education-Age-Specific First Marriage Rates for Females

Note: <HS = less then senior high school, HS = senior high school

2. Descriptive results: Patterns of who marries whom

Figure 4 and Figure 5 depict patterns of who marries whom by husbands' and wives' educational attainment, respectively. Single people are excluded when percentages presented in these two figures are calculated. Some educational assortative marriage patterns emerge from these two figures. Educational homogamy is the dominant marriage pattern for both

men and women. Seventy-seven percent, 53 percent, 44 percent, and 45 percent of men with less than high school education, men with high school education, men with vocational college education, and men with university education or more marry a spouse with the same level of education, respectively, and the figures are 62 percent, 56 percent, 45 percent, and 68 percent for women with less than high school education, women with high school education, women with vocational college education, and women with university education or more, respectively. A higher percentage of men than women marry a spouse with less education than themselves across all educational groups, with the exception of people at the highest educational level who are impossible to marry a spouse at an even higher educational level. Among the most highly educated men and women, over 50 percent of men have less-educated wives, while less than one third of women are married to men with less education. Moreover, relative to men at other educational levels, the least-educated men (77%) are most likely to marry a spouse at the same educational level, while compared with women at other educational levels, the most highly educated women (68%) are most likely to marry a spouse with the same level of education.

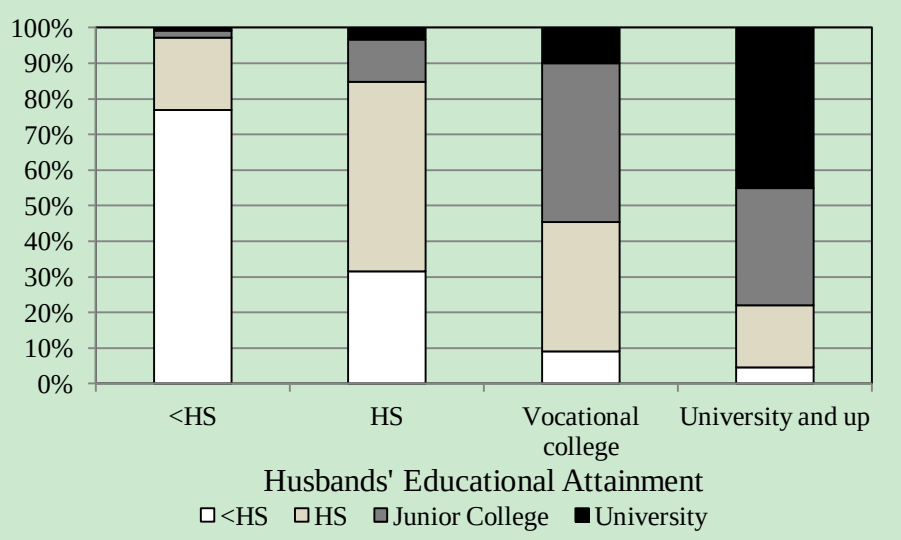

Figure 4. Percentage Distribution of Wives' Education by Husbands' Education

Note: <HS = less then senior high school, HS = senior high school

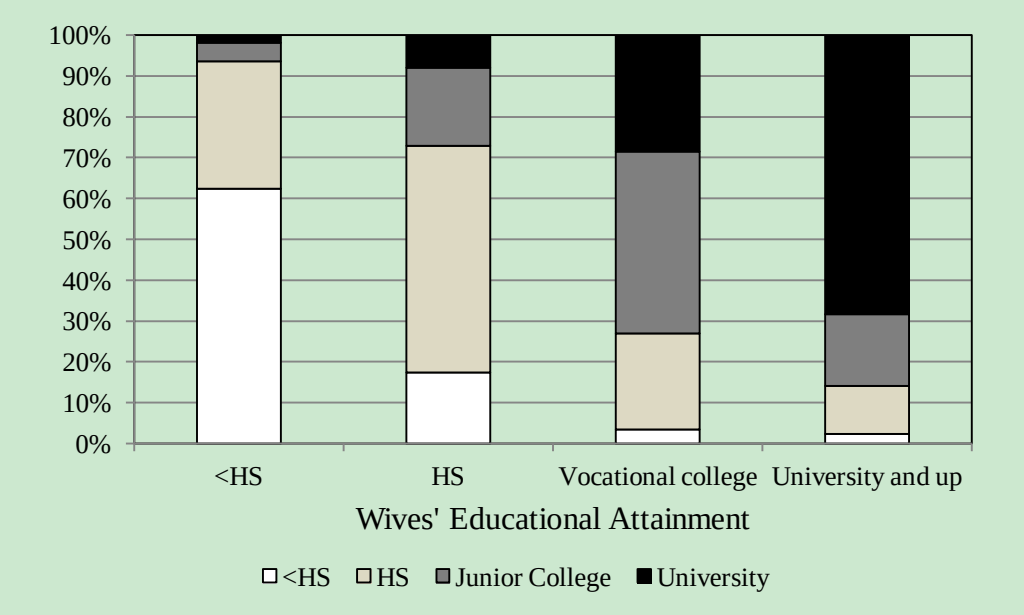

Figure 5. Percentage Distribution of Husbands' Education by Wives' Education

Note: <HS = less then senior high school, HS = senior high school

3. Log-linear models

To explore the association between husband's and wife's education controlling for the marginal distribution of educational attainment, I turn to a log-linear analysis. Table 1 reports the likelihood ratio L^2 and BIC statistics for the log-linear models of age and educational assortative mating. Model selection is crucial in log-linear models. A saturated model that uses up all the degrees of freedom in a table will always describe the observed frequencies perfectly, such a description is little improvement over simple examination of the observed frequencies (Hout 1983). Therefore, all other models can be seen as attempts to derive the essential structure of the table without having to fit it exactly. The goal of a log-linear analysis is to find a model with acceptable fit relative to the saturated model and more parsimonious than the saturated model. If two models are nested, i.e., when one model in some ways constrains one or more of the parameters of another, LRT test can be used to compare models. The difference between two L^2 with df_1 and df_2 degrees of freedom is

distributed as χ^2 with df_1-df_2 degrees of freedom. We need to show that the reduction in L^2 resulting from the addition of parameters could not have resulted just by random chance. Another way to compare models is to use the BIC statistic. The formula for calculating the BIC statistic of a log-linear model is: $L^2 - (df) \log(N)$. Negative BIC indicates that the current model is preferred to the saturated model, and the smaller the values of BIC, the better the fit of the model to the data (Raftery 1986).

Model 1 is an independent model, including only marginal distributions of men's and women's age and educational attainment. The model, which assumes no association among these variables, fits the data very poorly because the BIC is very large. Model 2, in which wife's education interacts with wife's age and husband's education interacts with husband's age, produces a significant decrease in L^2 ($L^2_{M2} - L^2_{M1} = 213.93$, df = 12, $P < 0.05$), suggesting that people make marriage decisions based on the combination of both characteristics of age and education.

Given the well-known propensity of individuals to marry within the same educational category, Model 3 adds a educational homogamy parameter. A big drop in L^2 ($L^2_{M3} - L^2_{M2} = 860.25$, df = 1, $p < 0.05$) in Model 3 shows that the main-diagonal parameter explains most of the association between husband's and wife's education in the table, suggesting a very strong educational homogamy. To test the gender differences in educational assortative marriage patterns, Model 4 adds a uniform educational hypergamy parameter. The reduction in L^2 ($L^2_{M4} - L^2_{M3} = 79.31$, df = 1, $p < 0.05$) indicates that wives display a tendency to marry up with respect to education, net of the disparate distribution of educational attainment across genders. Furthermore, changes in L^2 in these two models indicate that the educational

homogamy parameter explain much more of the association than do the educational hypergamy parameter, suggesting stronger educational homogamy than educational hypergamy. Educational crossings parameters are added in Model 5, and the model fit significantly improves (L^2_{M5} - L^2_{M4} = 367.60, df = 3, $p < 0.05$). The BIC statistic for Model 5 is -110.13, indicating that Model 5 is better than the saturated model. Changes in L^2 and the BIC statistics in these models indicate that both educational homogamy, hypergamy, and crossings parameters have improved the model fit. Thus, patterns of educational assortative marriage not only exhibit tendency toward homogamy and hypergamy, but also are affected by educational-crossings barriers.

Age assortative marriage patterns are explored in Model 6 and Model 7. To capture the tendency of individuals to marry someone of similar age, an age homogamy parameter is added in Model 6, and this causes a large reduction in L^2 (L^2_{M6} - L^2_{M5} = 343.73, df = 1, $p < 0.05$), suggesting a very strong age homogamy. To test the gender differences in age assortative marriage patterns, Model 7 adds a uniform age hypergamy parameter. The reduction in L^2 (L^2_{M7} - L^2_{M6} = 243.95, df = 1, $p < 0.05$) indicates that wives display a tendency to marry men older than themselves, net of the marginal distributions of men's and women's age. Decreases in L^2 and the BIC statistics in these two models indicate that both age homogamy and hypergamy parameters have improved the model fit. Thus, patterns of age assortative marriage show the tendency toward both homogamy and hypergamy. Adding education parameters causes greater changes in L^2 than adding age parameters, suggesting stronger educational than age assortative marriage.

Model 8 to Model 13 examine whether age and sex differences in educational

assortative marriage exist. Model 8 and Model 9 test whether women's and men's ages affect educational crossings parameters, respectively. Likewise, Model 10 and Model 11 test whether women's ages affect educational homogamy and hypergamy patterns, and Model 12 and Model 13 test whether men's ages affect educational homogamy and hypergamy patterns. Neither Model 8 nor Model 9 significantly improves the model fit relative to Model 7 (L^2_{M8} - L^2_{M7} = 5.26, df = 6, p > 0.05; L^2_{M9} - L^2_{M7} = 12.41, df = 6, p > 0.05), suggesting that the educational crossings parameters do not differ by women's or men's ages at first marriage. Neither Model 10 nor Model 11 significantly improves the model fit relative to Model 7 (L^2_{M10} - L^2_{M7} = 5.37, df = 2, p > 0.05; L^2_{M11} - L^2_{M7} = 3.36, df = 2, p > 0.05), but Model 12 and Model 13 significantly improves the model fit relative to Model 7 (L^2_{M12} - L^2_{M7} = 10.70, df = 2, p < 0.05; L^2_{M13} - L^2_{M7} = 6.09, df = 2, p < 0.05), suggesting that the educational homogamy and hypergamy patterns vary by men's ages instead of women's ages. Based on L^2, Model 12 and Model 13 are preferred over Model 7, and based on the BIC statistics, Model 7 shows the best fit to the data because the BIC statistic for Model 7 is the lowest among the thirteen models. Despite the little difference in the BIC statistics across Model 7, 12, and 13, the BIC statistics for these three Model are all negative and very close to each other, indicating the good fit of these models to the data. Therefore, I now examine in detail Model 7, Model 12 as well as Model 13.

Model 7 includes educational and age homogamy and hypergamy parameters and educational crossings parameters. Model 12 adds the interaction terms between men's age and educational homogamy parameters to Model 7, and Model 13 adds the interaction terms between men's age and educational hypergamy parameters to Model 7. Table 2 reports the

parameters obtained from these models. The parameter estimates are shown in Column 1, and the exponents of the parameter estimates are shown in columns 2. In model 7, homogamy and hypergamy parameters examine age and educational homogamy or hypergamy, and educational crossing parameters indicate which educational difference between partners is the most difficult barrier to cross. For educational assortative marriage patterns, a combination of educational homogamy, hypergamy and crossings parameters suggests that marriage is more likely for men and women who have the same educational categories than those who do not. For age assortative marriage patterns, the odds of men marrying older women are the lowest, followed by the odds of age homogamy, and the odds of men marrying younger women are the highest, indicating that age hypergamy are the most likely to happen, followed by age homogamy, while age hypogamy are the least likely to happen.

Table 1. Fit Statistics for Log-Linear Models of Age and Educational Assortative Marriage

Model		*df*	L^2	BIC
1	Marginals	133	2301.11	1280.51
2	model 1 + WAGE * WEDU + HAGE * HEDU	121	2087.18	1158.67
3	model 2 + Educational homogamy	120	1226.93	306.09
4	model 3 + Educational hypergamy	119	1147.63	234.46
5	model 4 + Educational crossings	116	780.02	-110.13
6	model 5 + Age homogamy	115	436.30	-446.18
7	model 6 + Age hypergamy	114	192.35	-682.45
8	model 7 + WAGE * Educational crossings	108	187.09	-641.67
9	model 7 + HAGE * Educational crossings	108	179.94	-648.82
10	model 7 + WAGE * Educational homogamy	112	186.98	-672.47
11	model 7 + WAGE * Educational hypergamy	112	188.99	-670.47
12	model 7 + HAGE * Educational homogamy	112	181.65	-677.80
13	model 7 + HAGE * Educational hypergamy	112	186.26	-673.19

Note: WAGE = wife's age; HAGE = husband's age; WEDU = wife's education; HEDU = husband's education.

Table 2. Parameter Estimates for Age and Educational Assortative Marriage From Model 7, 12, and 13

Parameters	b (1)	Exp(b) (2)
Model 7		
Educational homogamy	-0.24	0.79
Educational hypergamy	0.41†	1.51
Educational crossings		
Less than high school/high school	-1.44***	0.24
High school/vocational college	-1.28***	0.28
Vocational college/university and up	-1.20***	0.30
Age homogamy	3.28***	26.53
Age hypergamy	3.90***	49.26
Model 12[a]		
Educational homogamy		
Men aged 20-24	0.11	1.11
Men aged 30-49	-0.32**	0.72
Model 13[a]		
Educational hypergamy		
Men aged 20-24	-0.10	0.91
Men aged 30-49	0.30*	1.35

Note: [a]Men aged 25-29 are the reference category. †p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001

Table 2 presents the crossings parameters obtained from Model 7. The parameter estimates (b) presented in column 1 indicate the log-odds of marrying cross adjacent educational categories, and column 2 displays the corresponding odds (exp(b)). As expected, the odds of crossing all educational barriers are less than one, indicating that it is less likely to intermarry than to marry homogamously, in terms of education. The barrier separating Chinese with less than high school education from those with at least high school is the strongest. The barrier at the upper end of the educational distribution—those separating the university-educated people from those with less than university education are the weakest.

Model 12 and Model 13 examine whether educational homogamy and hypergamy differ by men's ages. Men aged 20-24 do not differ from men aged 25-29 in odds of educational homogamy or hypergamy. However, men aged 30-49 are 28% less likely than those aged 25-29 to have marriages in which men and women have the same educational categories, and 35% more likely than those aged 25-29 to marry women with less education. The results suggest that as men and women age, men are more likely to marry a spouse with less education, while women do not appear to change their mate selection behaviors.

CONCLUSION and DISCUSSION

Utilizing nationally representative sample survey data, this paper examines gender differences in marriage patterns by age and education in the early years of the twenty-first century in urban China. Overall, women have a higher marriage rate than men. However, gender differences in marriage rates vary substantially by education and age. After males and females are disaggregated according to educational attainment, the gender gap in marriage rates narrows with the increasing levels of educational attainment. Moreover, among the most highly educated people, the marriage rate for men exceeds that for women. These results suggest the disadvantage faced by university-educated women in marriage markets, at least in terms of the probabilities of getting married.

In consistent with the "gendered double standard of aging" (England & McClintock 2010), older age disadvantages university-educated women in the marriage market in urban China to a greater extent. At ages 20-24 and 25-29, the female marriage rates are consistently higher than male marriage rates across educational groups. At ages 30-49, the least educated women have a higher marriage rate than men with the same education; high school educated

women have a marriage rate slightly lower than that for high school educated men; the marriage rates for vocational-college-educated and university-educated men are almost 3 times and 4 times as high as the marriage rates for their female counterparts, respectively. In addition to the discrepancy between male and female marriage rates for the highly-educated 30-49 year-old, if we compare the marriage rates across educational and age groups within gender, highly-educated 30-49 year-old men have higher marriage rates than highly-educated men at younger age groups and 30-49 year-old men with less education, but highly-educated 30-49 year-old women have lower marriage rates than highly-educated 25-29 year-old women and 30-49 year-old women with less education. These findings suggest that highly-education men have much better marriage prospects than highly-educated women if they delay their marriages until their thirties. In general, university educated women have a lower marriage rate than university educated men, and it is a combination of the low marriage rate for university educated 30-49 year-old women and the high marriage rate for their male counterparts that contributes to the gender difference in marriage rates for the university educated people. I suspect that the term "*shengnü*" popularized by the mass media does reveal the deteriorating position of older, well-educated women in marriage markets in urban China.

In terms of patterns of who marries whom, the observed percentages suggest that educational homogamy is the dominant marriage patter and that men are more likely than women to marry a spouse with less education. Results from log-linear models do support these findings. After controlling for the marginal distributions of men's and women's education and age, log-linear models indicate that patterns of educational and age assortative

marriage not only exhibit tendency toward educational and age homogamy and hypergamy, but also are affected by educational-crossings barriers. For educational assortative marriage patterns, a combination of educational homogamy, hypergamy and crossings parameters suggests that marriage is more likely for men and women who have the same educational categories than those who do not. The educational crossings parameters suggest that the barrier at the lower end of the educational distribution is the most difficult to cross, while the barrier at the upper end of the educational distribution—those separating the university-educated people from those with less than university education are the weakest. For age assortative marriage patterns, age hypergamy are the most likely to happen, followed by age homogamy, while marriages in which men marry women at a older age group are the least likely to happen.

In addition, the educational assortative marriage patterns differ by men's ages at first marriage: as men age, men are less likely to marry a spouse at the same educational categories and more likely to marry a spouse with less education. However, women do not appear to change their mate selection behaviors as they age.

In China, the stereotype of a strong husband with a weak wife might still dominate many Chinese's minds in modern times (Sun 2002). When choosing spouses, women put more emphasis on financial traits, such as education, occupation, and income, while men care more about nonmarket traits, such as appearance and age (Xu 2000; Zhang 1989; Yu 2011). This a bidirectional process. On the one hand, women, even highly-educated women who have great earning power themselves, do not prefer to marry men with dim economic prospects. On the other hand, highly-education women are not viewed as attractive in Chinese marriage

markets because highly-educated women are more likely to pursue their own careers and may fail to fulfill the role of a good wife and good mother.

Under the dominant pattern of educational homogamy, there is also the tendency toward educational hypergamy. Under these two circumstances, highly-educated women have the smallest marriage pool, compared with less-educated women and highly-educated men. In addition to the tendency for men to marry a spouse who is younger or of the same age, the marriage pool shrinks even faster for highly-educated women when they delay their marriages. This study also finds that as men and women age, men are more likely to marry a wife with less education, while women do not appear to change their mate selection behavior. If we assume that men prefer to marry someone less-educated than themselves and women prefer to marry a husband better-educated than themselves, the findings from this study suggest that when delaying their marriages until their thirties, man eventually marry a wife they most desire to marry, and women are not willing to marry by compromising their mate selection criteria. A combination of these two patterns suggests that it is difficult for highly-educated women and poorly-educated men to get married at older ages.

There are a number of limitations to this study that should be recognized. First, due to the relative small sample size, 39 out of 144 cells, or 27 percent, are zero cells in the 4*4*3*3 count tables. These zero cells are likely to be sampling zeros, that is, if the sample size is large enough, we expect that these cell would not be zero cells. A large number of zero cells tend to yield unstable or biased results. However, I did use the pseudo-Bayes estimates (Bishop et al. 1975) as a sensitivity analysis (results are available upon request), and generated nearly identical results. Therefore, I believe that results presented are quite robust.

Second, the log-linear analysis is eminently descriptive. Further research, particularly qualitative research, is needed to explore the underlying force (e.g. individual preferences in mate selection processes) driving the marriage patterns in China.

The results from this study supports Becker's exchanging and trading model more than the Oppenheimer's independence hypothesis of marriage. This result is also consistent with findings from previous research that the relationship between education and marriage outcomes depends on the gender system in a society. Also, this study suggests that the high female labor force participation does not automatically translate into the egalitarian gender norms in the society.

China provide a unique context to examine the marriage patterns. Studying the marriage patterns in the early years of the 21st century can also shed light on the future of China's marriage patterns, given the prediction by the demographers that the shortage of potential brides will impact severely on male marriage patterns from 2010 onwards at the national level (Goodkind 2006; Zeng 2007). Two extreme situations are likely to go hand in hand in marriage markets in China. On the one hand, lower-educated men in poorer provinces are disproportionately unable to get married because of both the bride shortage and the hypergamy patterns (Gupta, Ebenstein, & Sharygin 2010). On the other hand, scatter evidence suggests that a rising proportion of women, especially highly-educated women, are likely to be still single at age 30 in China's major cities (Jones & Gubhaju 2009). The testing of coexistence of the "leftover ladies" and the bride shortage has yet to continue.

References

Bauer, J., Wang Feng, J., Riley, N. E., & Zhao Xiaohua, N. E. (1992). Gender inequality in urban china: Education and employment. *Modern China, 18*(3), 333-370.

Becker, G. S. (1974). A theory of marriage: Part II. *Journal of Political Economy, 82*(2)

Becker, G. S. (1981). *A treatise on the family*. Cambridge, Mass.: Harvard University Press.

Bian, Y., & Logan, J. R. (1996). Market transition and the persistence of power: The changing stratification system in urban china. *American Sociological Review, 61*(5), 739-758.

Bian, Yanjie, John R. Logan, & Xiaoling Shu. 2000. "Wage and job Inequalities in the Working Lives of Men and Women in Tianjin." Pp. 11 1-33 in *Re-Drawing Boundaries: Work, Households, and Gender in China*, edited by Barbara Entwisle and Gail Henderson. Berkeley: University of Indiana University Press. California Press.

Bishop, Y. M. M., Fienberg, S. E., & Holland, P. W. (1975). *Discrete multivariate analysis : Theory and practice*. Cambridge, Mass.: MIT Press.

Blossfeld, H. (1995). *The new role of women : Family formation in modern societies*. Boulder: Westview Press.

Blossfeld, H. –P. & G. Rohwer. 1995. "West Germany" Pp. 56-76 in *The New Role of Women: Family Formation in Modern Societies*, edited by H. –P. Blossfeld. Boulder, CO: Westview.

Blossfeld, H., & Timm, A. (2003). *Who marries whom? : Educational systems as marriage markets in modern societies*. Dordrecht; Boston: Kluwer Academic.

Casterline, J. B., Williams, L., & McDonald, P. (1986). The age difference between spouses: Variations among developing countries. *Population Studies, 40*(3), 353-374.

Cherlin, A. (1990). A review: The strange career of the "harvard-yale study". *Public Opinion Quarterly, 54*(1), 117-124.

Das Gupta, M., Ebenstein, A., Sharygin, J. & World Bank. Development Research Group. Poverty and Inequality Team. (2010). *China's marriage market and upcoming challenges for elderly men.* Retrieved

Deng, Z., & Treiman, D. J. (1997). The impact of the cultural revolution on trends in educational attainment in the people's republic of china. *American Journal of Sociology, 103*(2)

England, Paula and Elizabeth Aura McClintock. 2010. "The Gendered Double Standard of Aging in Marriage Markets." *Population and Development Review* 35 (4): 797-816.

Esteve, A., & Cortina, C. (2006). Changes in educational assortative mating in contemporary spain. *DemRes Demographic Research, 14*, 405-428.

Fong, V. L.,. (2004). *Only hope : Coming of age under china's one-child policy*. Stanford, Calif.: Stanford University Press.

Goldman, N., Westoff, C. F., & Hammerslough, C. (1984). Demography of the marriage market in the united states. *Population Index, 50*(1), 5-25.

Goldstein, J. R., & Kenney, C. T. (2001). Marriage delayed or marriage forgone? new cohort forecasts of first marriage for U.S. women. *American Sociological Review, 66*(4), 506-519.

Goodkind, D. 2006. "Marriage squeeze in China: Historical legacies, surprising findings." Paper presented at the 2006 Annual Meeting of the Population Association of America, Los Angeles, March 30-April 1, 2006.

Han, H. (2010). Trends in educational assortative marriage in china from 1970 to 2000. *DemRes Demographic Research, 22*(1), 733-770.

Hoem, Britta. 1995. "Sweden" Pp. 35-55 in *The New Role of Women: Family Formation in Modern Societies*, edited by H. –P. Blossfeld. Boulder, CO: Westview.

Hout, M. (1983). *Mobility tables*. Beverly Hills: Sage Publications.

Jiang, Quanbao, Isabelle Attané, Shuzhuo Li, & Marcus W. Feldman. 2007. "Son Preference and the Marriage Squeeze in China: An Integrated Analysis of the First Marriage and the Remarriage Market." Pp 343-63 in *Watering the Neighbour's Garden: The Growing Demographic Female Deficit in Asia*, edited by Isabelle Attané and Christophe Z. Guilmoto. Paris: Committee for International Cooperation in National Research in Demography

Jones, G. W. (2007). Delayed marriage and very low fertility in pacific Asia. *Review Population and Development Review, 33*(3), 453-478.

Kalmijn, M. (1994). Assortative mating by cultural and economic occupational status. *American Journal of Sociology, 100*(2)

Kalmijn, M. (1998). Intermarriage and homogamy: Causes, patterns, trends. *Annu.Rev.Sociol.Annual Review of Sociology, 24*(1), 395-421.

Kincade Oppenheimer, V. (1994). Women's rising employment and the future of the family in industrial societies. *Population and Development Review, 20*(2), 293.

Lee, C. K. (1998). *Gender and the south china miracle : Two worlds of factory women*. Berkeley: University of California Press.

Lewis, S. K., & Oppenheimer, V. K. (2000). Educational assortative mating across marriage markets: Non-hispanic whites in the united states. *Demography, 37*(1), 29-40.

Lichter, D. T. (1990). Delayed marriage, marital homogamy, and the mate selection process among white women. *Social Science Quarterly (University of Texas Press), 71*(4)

Mare, R. D. (1991). Five decades of educational assortative mating. (marriage of persons with different educational attainment). *American Sociological Review, 56*(1)

Oppenheimer, V. K. (1988). A theory of marriage timing. *Am J Sociol American Journal of Sociology, 94*(3)

Oppenheimer, V. K. (1997). Women's employment and the gain to marriage: The specialization and trading model. *Annu.Rev.Sociol.Annual Review of Sociology, 23*(1), 431-453.

Oppenheimer, V. K., H. –P. Blossfeld, & A. Wackerow. 1995. "United States of America" Pp. 150-73 in *The New Role of Women: Family Formation in Modern Societies*, edited by H. –P. Blossfeld. Boulder, CO: Westview.

PARK, H., & SMITS, J. (2005). Educational assortative mating in south korea: Trends 1930–1998. *Research in Social Stratification and Mobility Research in Social Stratification and Mobility, 23*, 103-127.

Pimentel, E. (2006). Gender ideology, household behavior, and backlash in urban China. *Journal of Family Issues, 27*(3), 341-365.

Pinnelli, Antonella & Alessandra De Rose. 1995. "Italy" Pp. 174-90 in *The New Role of Women: Family Formation in Modern Societies*, edited by H. –P. Blossfeld. Boulder, CO: Westview.

Poston, D. L., & Glover, K. S. (2005). Too many males: Marriage market implications of gender imbalances in china. *Genus, 61*(2), 119.

Preston, S. H., Heuveline, P., & Guillot, M.,. (2001). *Demography : Measuring and modeling population processes.* Malden, MA: Blackwell Publishers.

Qian, Z. (1998). Changes in assortative mating: The impact of age and education, 1970-1990. *Demography, 35*(3), 279-292.

Qian, Z., & Preston, S. H. (1993). Changes in american marriage, 1972 to 1987: Availability and forces of attraction by age and education. *American Sociological Review, 58*(4), 482-495.

Raymo, J. M. (2003). Educational attainment and the transition to first marriage among japanese women. *Demography, 40*(1), 83-103.

Raymo, J. M., & Iwasawa, M. (2005). Marriage market mismatches in japan: An alternative view of the relationship between women's education and marriage. *American Sociological Review, 70*(5), 801-822.

Raymo, J. M., & Xie, Y. (2000). Temporal and regional variation in the strength of educational homogamy. *American Sociological Review, 65*(5), 773-781.

Schwartz, C. R., & Mare, R. D. (2005). Trends in educational assortative marriage from 1940 to 2003. *Demography, 42*(4), 621-646.

Shafer, K., & Zhenchao Qian. (2010). Marriage timing and educational assortative mating. *Journal of Comparative Family Studies, 41*(5)

Smits, J., & Park, H. (2009). Five decades of educational assortative mating in 10 east asian societies. *Social Forces, 88*(1), 227-255.

Smits, J., Ultee, W., & Lammers, J. (1998). Educational homogamy in 65 countries: An explanation of differences in openness using country-level explanatory variables. *American Sociological Review, 63*(2), 264-285.

Sweeney, M. M., & Cancian, M. (2004). Placing patterns of economic assortative mating in context: A reply to press (2004) and england (2004). *J Marriage and Family Journal of Marriage and Family, 66*(4), 1038-1041.

Tang, W., & Parish, W. L. (2000). *Chinese urban life under reform : The changing social contract*. Cambridge, UK; New York, NY, USA: Cambridge University Press.

Torche F. (2010). Educational assortative mating and economic inequality: A comparative analysis of three latin american countries. *Demography Demography, 47*(2), 481-502.

Tuljapurkar S, Li N, & Feldman MW. (1995). High sex ratios in china's future. *Science (New York, N.Y.), 267*(5199), 874-6.

Zhao, Z., & Guo, F. (2007). *Transition and challenge : China's population at the beginning of the 21st century*. Oxford; New York: Oxford University Press.

Zhou, X., Tuma, N. B., & Moen, P. (1996). Stratification dynamics under state socialism: The case of urban china, 1949-1993. *Social Forces, 74*(3), 759-796.

Zhou, X., Tuma, N. B., & Moen, P. (1997). Institutional change and job-shift patterns in urban china, 1949 to 1994. *American Sociological Review, 62*(3)

Zuo, J., & Bian, Y. (2001). Gendered resources, division of housework, and perceived fairness. A case in urban china. *Journal of Marriage and the Family, 63*(4), 1122-1133.

(This is not a full list of references cited in this study.)