Behavioral Accommodations to the Excess Supply of Men in the Chinese Marriage Market[1]

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Abstract

Many recent studies predict the consequences of the coming sex ratio imbalance in the Chinese marriage market by assuming a static marriage market where up to 30 million men will never be able to marry. These forecasts are based on assuming that current marriage practices will not adapt in any way to the excess of men. We predict, however, that the marriage market will change dynamically in response to the pressure of these "bare branches." An increase in the age gap between spouses, increased re-marriage rates for widowed and divorced women, and sex-based immigration are all possible responses to the pressure. Our main focus is on our prediction that the age between spouses will increase in the Chinese marriage market in response to the sex ratio imbalance. Based on recent estimates of the change in the marriage age gap as a response to increased male mortality in France after World War I (Abramitzky et al. 2011), we simulate the changes that may occur in the Chinese marriage market of the future. An increased marriage age gap should absorb some of the excess males, and temper both the negative and positive predictions for coming cohorts.

Background

Much of the worry over the excess of unmarried males in the Chinese marriage market is due to concerns that large groups of unmarried men will engage in crime and other anti-social behavior. Part of this behavior will likely be due to increased risk-taking in order for men at the bottom of the marriage market to achieve a wife (Wei and Zhang 2011b), but some is also attributed to general dissatisfaction with their unmarriageable state (Edlund et al. 2007). Other models predict beneficial results from the sex ratio imbalance. In bargaining models, high sex ratios improve the bargaining position of women, eventually leading to an increased transfer of the surplus of marriage to women and a shift of household resources to children (Becker 1981, Lundberg et al. 1997). High sex ratios have also been credited with improvement of male behavior. Wilson (1987) proposes that low effective sex ratios (because of high imprisonment rates) among poor US Blacks contributes to low marriage rates and low levels of male parental investment.

The specter of increasing competition in the marriage market has already contributed to some behavioral changes in Chinese households. Wei and Zhang (2011a) find that parents of boys have responded to increased sex ratios by increasing their savings. They also find that households with a son are more likely to be entrepreneurs, and to accept more dangerous or unpleasant jobs (Wei and Zhang 2011b).

What most of these studies, as well as other predictions of the future of the Chinese marriage market, have in common is the assumption that the market is static and project that recent sex ratios at birth will be reproduced 25 years hence in the marriage market (Wei and Zhang assume that the disparity will be 30 million men will remain unmarried (2011a)). Our response is that these projections do not account for behavioral responses of men and women to the pressures of increasing sex ratios. Wei and Zhang have already shown one such response in their measurement of increased saving by parents of sons in China (Wei and Zhang 2011a). Curiously they ignore other responses observed elsewhere in the age gap between husbands and wives, sex biased migration and remarriage rates. Evidence from the current high sex ratios in the South Korean marriage market indicate that both sex-based immigration (Onishi 2007) and increased re-marriage rates for divorced women (Edlund 2009) are behavioral responses that we can also expect to see.

For this research, we plan to look specifically at the effect that skewed sex ratios will have on the age difference between spouses in the Chinese marriage market. Others have acknowledged that the age gap in China may increase (Ebenstein and Sharygin 2009) and even modeled the effect of sex ratio differences on the age gap in other Asian countries (Edlund 1999), but none have explicitly modeled how this will affect the future. This change is a result of the increased competition among men for wives. Since the likelihood of gaining a wife increases in wealth, we expect (and, indeed Wei and Zhang have already found (2011a)) that the savings rate among males will increase. Given that some males will now need a longer time to save enough money to obtain a bride will increase, we expect that the average age of husbands will rise, but the average age of wives will not.

How much of an increase in the age gap can we expect to see? While data is not available yet for China, given the future nature of the problem, the effect of skewed sex ratios on the age gap has been measured in other cultures. Abramitzky and co-authors (2011) found that falling sex ratios in post-WWI France due to excess male mortality from the war were associated with a drop in the age gap between husbands and wives. Their findings suggest that a 10% drop in the sex ratio is associated with an 11 month decrease in the age gap.

Taking these finding as our starting point, we propose to create a dynamic model of the Chinese marriage market, where the age gap between spouses changes with the sex ratio. Our preliminary estimate is that with an excess of about 25% over normal levels in the ratio of men to women in the Chinese marriage market we expect to find that the increased age gap of about 2.9 years will absorb almost half the estimated 30 million bare branches, leaving the final number of men who never marry much lower. In addition, we expect that an increase in re-marriage rates among divorced and widowed women as well as a decrease in re-marriage rates among divorced and widowed men will absorb a further portion of the bare branches. On the other hand, we do not expect that immigration of brides will absorb any significant proportion of the bare branch problem because of the scale of the shortage of women in China relative to the population of available source countries and because of the fact that the Chinese bachelors who will absorb the brunt of the bride shortage are much poorer relative to the potential source countries than has been true for South Korean and Taiwanese bachelors. In South Korea and Taiwan about 30% of peasant men have married foreign brides. It seems to us unlikely that China will see more than a small fraction of that.

Our prediction that behavioral response will mitigate but not eliminate the bare branch problem has consequences for planning policy responses to that problem.

Marriage Market Model with a Male Surplus

Our model of the marriage market in the face of a surplus of males is a two-period model. Males in our model have an initial endowment, and in each period they can choose to spend or save their endowment. Women in our model do not have an endowment, but consume with their husbands.

Both sexes want to be married in both periods. If men marry, they will consume their endowment and not save it. Women will only consume what their husbands provide, and so strongly prefer to be married in both periods. Women will also prefer to marry men with higher consumption.

Utilities and Constraints

Males

Utility function: $U_m = U(c_1, c_2, \text{married})$

Constraints: $E = c_{1s} + c_{2s} + c_{1m} + c_{2m}$

That is, male utility will be a function of their consumption in each period, and whether they ever marry. Consumption over both periods will be limited by the male's initial endowment, and will be different

depending on whether the male is single or married. If he is single in the first period, he will be able to consume less (save) in period 1 and consume more in period 2. If he is married in period 1, he will not be able to save for period 2.

Females

Utility function: $U_f = U(c_1, c_2)$

Constraints: $c_{if} = c_{im}$

That is, female utility will be a function of their consumption in each period, and their consumption will be tied to their husband's. It is assumed that women are married in both periods.

Implications

This framework implies that women will marry in period 1, and they will choose the husbands who offer them the highest level of consumption. These young women may choose to marry young men, who are also in period 1 of their life cycle, or they may choose to marry older men, who are in period 2. If women marry a man in period 2 (and older man), then they will become widows in period 2 of their own lives. These women will become eligible to re-marry in their second period, marrying men who are also in their second period.

When there is a surplus of men, only the men with the highest initial endowments will be able to marry in period 1. The rest will need to save in period 1 in order to be able to afford a wife in period 2. As the surplus grows larger, women will be able to demand larger consumption from their husbands, and even fewer men will be able to marry in period 1.

As the surplus of males increases, the group that never marries grows larger, while each subsequent group shifts outward toward larger endowments. This implies that fewer men will be marrying in period 1 of their lives, while more will be marrying in period 2. While some of these men will be marrying widows, many will also be marrying younger women, implying that the age gap between husbands and wives will grow.

Data

The data we are using is from the Chinese Statistical Yearbook from 2009. We obtained data on the number of males and females of every age for the entire country. This allows us to project the marriage market out to the year 2029, when girls born in 2009 will be 20 years old. Figure 1 plots the male to female sex ratio at every age, as measured in 2000.

Results of the Model

We apply a very simple model of the marriage market to our data. Allowing men and women to begin marrying at the minimum age for legal marriage in China, and assuming that peak first-marriage rates occur at the average age of marriage for both sexes, we compose an estimate of the size of the marriage market in each year. Li and coauthors report that in 2000, the minimum legal age of marriage in China

was 22 and 20 for males and females, respectively, while the corresponding average marriage ages were 25.6 and 23.5 (2005). Ideally, we would have data on the frequency of first marriage by age, but in the absence of this data, we sum over all males and females in the relevant age groups. In order to accommodate the fact that men will marry into later ages, we assume that the marriage market consists of 22 to 30 year olds, while the female marriage market spans a smaller set of ages, from 19 to 27. With our data and using these parameters, we are able to simulate the marriage market out to 2029.

To find the excess number of males in the marriage market, we subtract the total number of females in the marriage market from the total number of males for each year. We maintain a constant average age gap of 2 years. The results of this simulation can be seen in figure 2, in which we graph the number of excess males (in thousands) in the marriage market from 2015 to 2029. This simulation is consistent with previous models of the Chinese marriage market, producing excesses of up to 15 million men.

In order to model the dynamic response of males to imbalanced sex ratios in the marriage market, we next simulate the marriage market by allowing the youngest men to drop out of the market when sex ratios get too high. Specifically, we follow Abramitzky, Delavande and Vasconcelos' findings of an eleven month decrease in the age gap for every ten percentage point drop in the male to female sex ratio in France (2011). Further, we account for the fact that men cannot always immediately respond to increases in the sex ratio and assume that when sex ratios above 1.07 (the 2015 marriage market sex ratio) are observed, enough young men choose to postpone entry into the market to raise the age gap between spouses by half of this number.
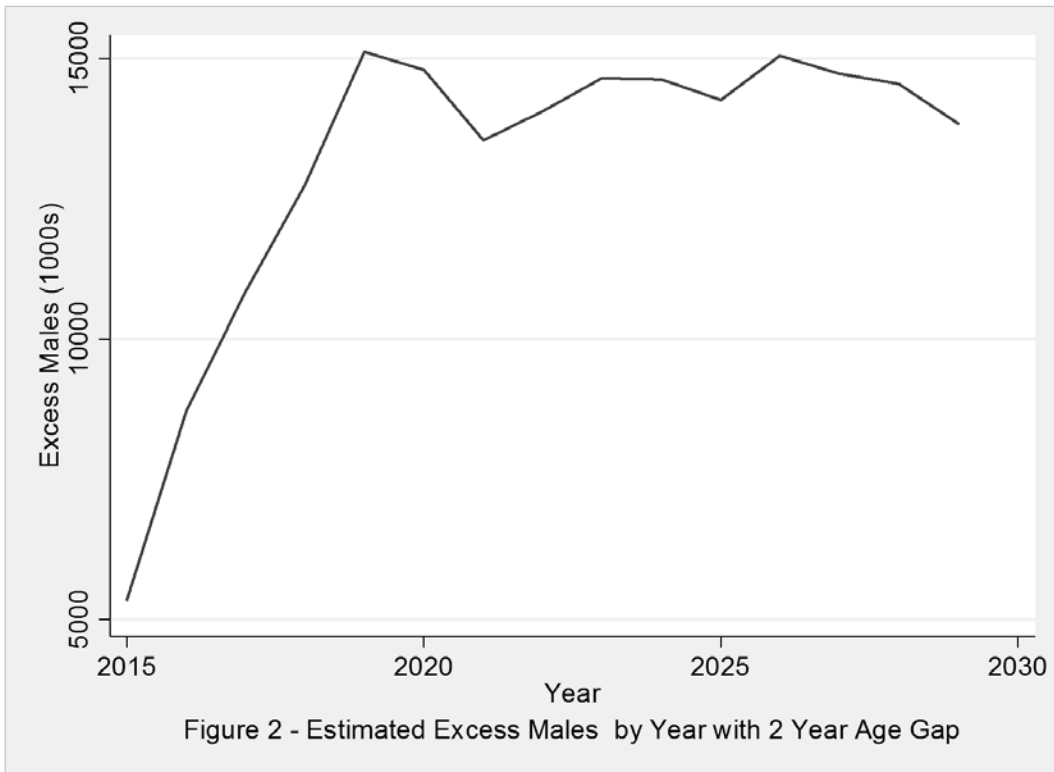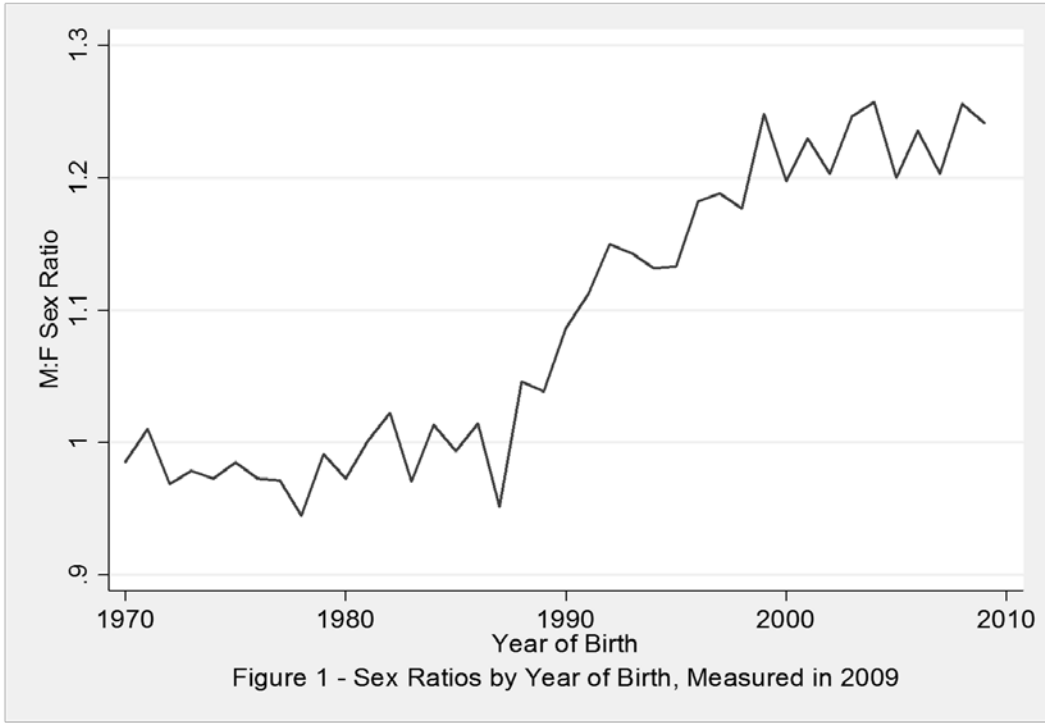
Figure 3 shows the simulated evolution of the marriage age gap from 2015 to 2029. The gap rapidly increases by about three-quarters of a year before leveling off around 2020. Figure 4 shows the excess number of men in the Chinese marriage market when we allow men to dynamically respond to sex ratio imbalances as described above. The figure show that after an initial high of over eight million excess men in the marriage market in 2016, the excess begins to decline and settles down to around three million in 2029.

Conclusion

These findings are preliminary, but they are suggestive. By allowing the marriage age gap to vary with the sex ratio, we estimate that there will be more than 10 million fewer excess men or "bare branches" in the Chinese marriage market. We believe that further study will affirm our conclusion that behavioral adaptations to growing sex ratios will mitigate many of the negative consequences of this imbalance that have been predicted in previous studies.

In addition to refining our model, our future research plans include incorporating remarriage into our model. We anticipate that increased remarriage of divorced and widowed women will further decrease the number of bare branches.
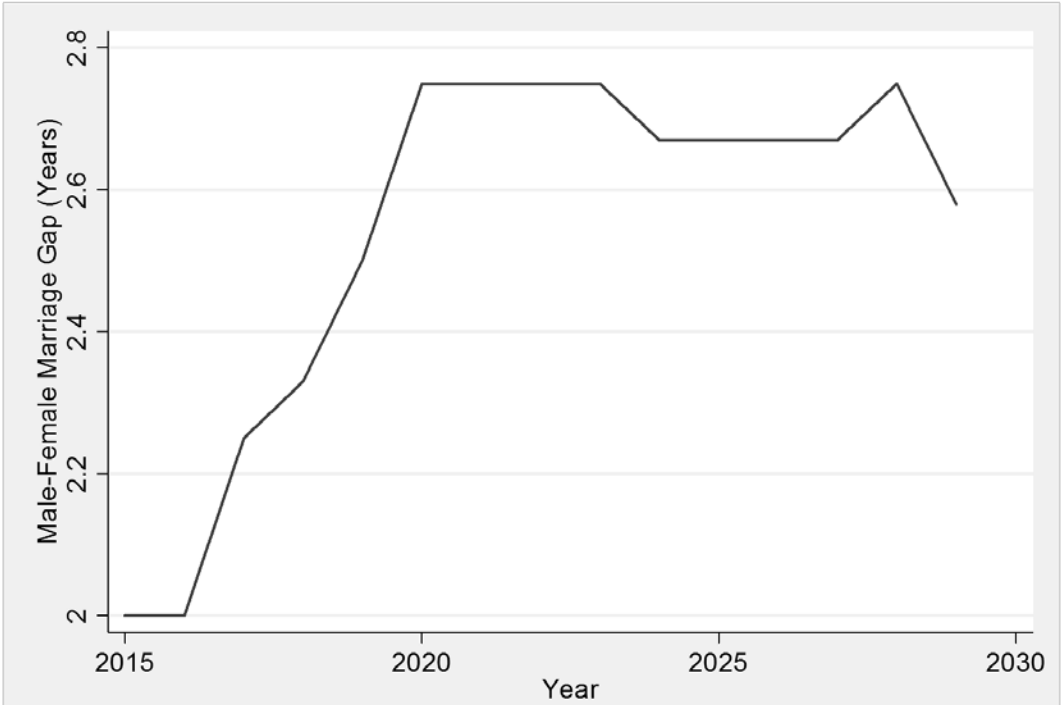
Figures

Figure 1 - Sex Ratios by Year of Birth, Measured in 2009

Figure 2 - Estimated Excess Males by Year with 2 Year Age Gap

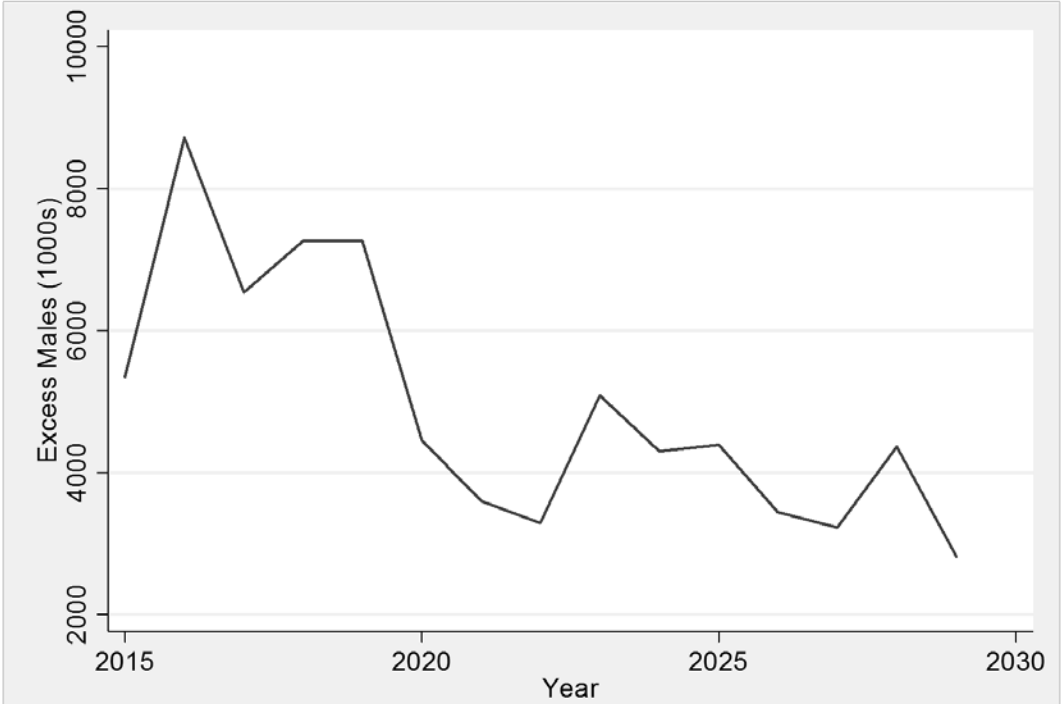Figure 3 - Marriage Age Gap Estimated in Dynamic Model

Figure 4 - Dynamically Calculated Excess of Males in Marriage Market

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