Bride Drain: Rising Female Migration and Declining Marriage Rates in Rural China

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Abstract. In this paper, I focus on the fall of the marriage rates of Chinese rural males in their early twenties and study the extent to which the rise in rural young women's participation in migratory work has contributed to this fall. I perform the analysis using the self-collected rural household survey panel data from 1985 to 2005 in Zhijiang municipality, Hubei; and also examine the relationship using a nationally representative data set from the Chinese Household Income Project (1995, 2002 waves). My findings support the following conclusions: (1) A shortage of availability of women brought about by female out-migration presents a problem of bride drain in rural China, a 10 percentage point increase in the local female out-migration reduces rural male marriage propensity by 5%; (2) the impact of the bride drain was felt by both non-migrant and migrant men, but the marriage propensity of migrant men was affected more by female out-migration than non-migrant men; (3) the more educated the migrant rural men, the less severely their marriage probability was affected by the local female out-migration.

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1 Introduction

The proportions of married young people in rural China have fallen considerably in recent decades. Based on the nationally representative rural household survey data from China Health and Nutrition Survey (CHNS,1989) and Chinese Household Income Project (CHIP, 1995 and 2002), 69.5% of men 22-29 and 66.2% of women 20-29 were married in 1989[1]; in 2002, these percentages dropped to 45.8% and 52.1% respectively. The sharp decline of the marriage rates over these years was concentrated among those who were in their twenties, marriage rates remained high for the older age cohorts: for example, of all the men (women) 30-34, 93.8% (98.3%) were married in 1989, and 94.1% (98.7%) in 2002[2]. In this paper I focus on the role of rising female participation in rural-urban migration and study the extent to which it has disrupted the traditional local marriage markets and contributed to the fall in the marriage rates of young men in rural China.

There are several explanations provided by marital search models that can account for the drop in the marriage rates. The first category of the explanation has to do with the availability of local mates (Preston and Richards (1975); Lichter, McLaughlin, Kephart, and Landry (1992)). For example, a shortage of men depresses female marriage rates; in addition, women have to lower their "reservation quality" of future partner in the presence of a shortage of available males, further thwarting their incentives to marry (South and Lloyd (1992); Lichter, McLaughlin, Kephart, and Landry (1992); Wood (1995)). Lloyd and South (1996) also find that a shortage of prospective female partners in the local marriage market lowers men's marriage rates. A competing imbalanced sex ratio theory however predicts that the shortage of one sex in the local marriage market will increase the marriage rate of the other sex (Guttentag and Secord (1983); Fossett and Kiecolt (1990); Angrist (2002)). For

[1]According to the Marriage Law of China, the legal marriage age is 22 for men and 20 for women. The stipulation regarding the legal marriage age has remained the same since 1980.

[2]However, this does not mean that the high marriage rates will necessarily persist for rural people who reach their thirties in more recent years.

example, in the presence of female shortage, men are more motivated to commit to marriage and attach themselves permanently with a potential wife. A frequently used indicator of mate availability is the sex ratio, measured by the number of males to the number of females in relevant age cohorts. The shortage of females (thus high sex ratio) is a demographic reality in China and the situation has deteriorated since the implementation of the one-child policy in 1978. The dearth of girls is mainly caused by the son preference combined with low fertility, the one-child policy worsened sex-selective abortion, female infanticide and neglect of baby girls (Banister (2004)). Table 1 shows that between 1995 and 2002, the sex ratios at peak marriage ages in rural China rose - men in their twenties increasingly outnumber women of similar ages. According to the marriage search theory, it is not surprising that a shortage of women in both the local and national context will lead to a fall of male marriage rates. But the the factor of rising sex ratio alone leaves unexplained why a decline of marriage rates among young women also occurred in rural China.

The second type of explanation centers on the quality of the searcher, and a frequently studied dimension of quality is individual earnings. Individual earnings have two opposite effects on transition to marriage: the "self-reliance" effect that enhances the value of outside option, making marriage less likely, and a "good catch" effect that signals the quality of the searcher, making marriage more likely (Burgess, Propper, and Aassve (2003)). Both these effects are at work and it is difficult to predict which one dominates a priori. Empirically, it is found in the U.S. that for men the "good catch" effect dominates (Lloyd and South (1996); Burgess, Propper, and Aassve (2003)). This pattern may run counter to the popular opinion that high-wage persons marry later, but it has been consistently found for men of different birth cohorts in the U.S. since the pioneering work of Becker (1973). Becker in his analysis in the early 1970s also suggested a gender difference in the impact of own earnings on marriage formation: an increase in the wage rate of women relative to men would decrease women's incentive to marry. This is because the gain from marriage is greater

for women the lower the female wage rate is relative to male wage rate[3]. The empirical evidence on the relationship between female earning and marriage formation is however mixed. Earnings ability and employment opportunities are found to accelerate women's transition to marriage (McLaughlin, Lichter, and Johnston (1993); Buck and Scott (1993)), suggesting that the "good-catch" effect dominates for women as well as for men; but other researchers also find that marriage rates are decreasing in the female wage rates and female employment opportunities (Klaauw (1996); Burgess, Propper, and Aassve (2003)), arguing that for women the main impact is the "self-reliance" effect.

In the context of China, rural household income as well as rural male and female non-farm wage rate have risen since the early 1980s (Khan and Riskin (1998, 2005)). The most reliable data shows that the annual growth rate of rural net household income from 1991 through 2004 is 4.9% (Naughton (2007)). The non-farm wage rates for men and women have increased by 22% and 25% respectively from 1995 to 2002[4]. As the off-farm labor market conditions improved for rural men, the more recent birth cohort of men in their twenties earned more than their predecessors. If the "good catch" effect for men dominates in China as well as in the developed countries, rising male earnings will increase the likelihood of young men to get married, the sharp over all decline of the marriage rates among young men in rural China is thus a puzzle. If the "self-reliant" effect dominates for women, the rise in female earnings will diminish women's incentive to enter marriages at the traditional marriage age, resulting in a decline in the marriage rates among people in their twenties.

In this paper I broach yet another explanation which I call rural bride drain. The bride drain is a consequence of the dramatic rise of the rural female participation in migratory work from virtual non-existence since the 1990s (De Brauw, Huang, Rozelle, Zhang, and

[3]The underlying assumption is that the increase in female wage rate would not increase married output as much as the decrease in male wage rate would decrease it if married women worked sufficiently fewer hours in the market sector than single women, and married men worked at least as much as single men (Becker (1973)).

[4]These figures were calculated using the 1995 and 2002 CHIP data. Details about the data are provided in section 2.

Zhang (2002)). Table 2 presents the percentage of married men aged 22 to 26 and the percentage of women aged 20 to 24[5] who engaged in migratory work from 1985 to 2005 using the field survey data I collected in Zhijiang, China. The table gives a first pass about a highly suggestive relationship between male marriage rates and female migration rates. The momentum of migration of young women picked up in the mid 1990s, before the marriage rates of young men started to drop noticeably in the 2000s. In Table 3, I also present the shares of women from various age cohorts who engaged in migratory work in 1995 and 2002 using the nationally representative data[6]. The rise of women engaged in migratory work is phenomenal, given that the data only covers a seven year span, and is concentrated in the age cohorts that are typically young and unmarried. For example, 15% of all women aged between 20 and 24 engaged in migratory work in 1995, in 2002, this proportion rose to 35%. And these female migrants were overwhelmingly single as over 85% of them were unmarried in both years. Based on the simplest and most straightforward form of the Granger causality test [7], rising female out-migration Granger-causes the decline of male marriage[8]. The one way causal direction is however sensitive to the age cohort specified. If single women aged between 20-26 is used instead, not only female out-migration Granger-causes the decline of male marriage rate, the drop in male marriage rate also Granger-causes female out-migration, suggesting there may be a lagged feedback effect.

This exodus of women out of the countryside has profound impact on the local marriage markets. For 50 years, rural men and women were excluded from the urban marriage markets (but not vice versa) because they not only lacked the social and economic privileges and

[5]Women's age is chosen to be few years younger than men to account for the tendency that women marry men few years older than themselves. The average sample size of the yearly cohort is 214 for men and 202 for women.

[6]The 1995 and 2002 CHIP data are used to compute the table.

[7]The orders of the lags used are two for municipality level marriage rates of men aged between 22-26 and two for female out-migration rates of single women aged between 22-26.

[8]For the male marriage rate equation, the Wald F-statistic for the omission of the female migration variables is 4.16 and the corresponding p-value is 0.03 (the asymptotically equivalent test statistic is greater than the 5% critical values for a $\chi_2(2)$ variable). But the decline of male marriage does not Granger-cause female out-migration (the F-statistic is 1.37 with a p-value 0.28).

entitlements pertaining solely to the urban residents, they were also physically restricted to stay in the countryside by government decree and could not move to the urban marriage markets to receive or make marriage offers. As the invisible walls separating the rural and urban society in China started to break down in the midst of the economic reform, mass rural-urban migration ensued, and it is now physically feasible for rural people to expand their marriage markets beyond their local confines and into urban areas.

But rural men and women do not experience the expansion of the marriage markets in the same way. As researchers have pointed out (Fan and Huang (1998); Huang (2001); Fan and Li (2002)), rural men encounter more difficulties to enter the urban marriage markets than rural women because of the practice of hypergamy intertwined with patrilocal residence in China. The male-centered marriage custom requires that husbands be at least as socially and economically established as wives in a marriage union. Urban women thus rarely consent to marry rural men. The difficulties faced by rural migrants to settle down in cities have further stigmatized the low economic and social status of rural men when compared to urban males, making them unattractive to both urban and rural women who prefer to live in urban areas. Rural women, on the other hand, have a much more credible chance of marrying an urban partner because there is a large population of single and old men in cities, who are willing to take rural wives in the absence of better urban matches (Ding, Zhu, Zhu, Fan, and Sun (1999)). Rural women are not the most desirable in the urban marriage markets, but they nonetheless have the urban marriage markets opened up for them in unprecedented ways since the relaxation of mobility restrictions. Under the assumption that rural women prefer urban men to rural men[9], through migration they would deplete the potential pool of spouses for local rural men, driving down the marriage rates of young men in rural China. But incomplete information and inadequate social networks that can facilitate marriage matches for rural women in urban areas may also lead to failures of matches for rural women who

[9]The assumption describes the general tendency in the Chinese society well, please see Huang (2001) for discussion.

want to marry urban men, which may explain why the marriage rates of women dropped as well.

My empirical strategy is to use the inter-locality variation in female out-migration in order to explain individual marriage choices of men. I use self-collected data in Zhijiang, China that covers the period of 1985 to 2005. By using the individual level data, personal characteristics such as age and education can be included in the analysis. Other local level variables such as sex ratio, female education, mean female wage, mean male wage have also be controlled for wherever data is available; the national trends in the preference for formal marriage and changing social norms have been accounted for by including year dummies. The results show that male marriage propensity indeed decreases in the rate of local female out-migration: a 10 percentage point rise in the share of local young women engaged in migratory work leads to about 5% reduction in the probability of getting married for men in their early twenties. The impact of the bride drain brought about by female out-migration is felt by both migrant and non-migrant men, but marriage propensity of migrant men is more negatively affected by female out-migration. I also find that for migrant men, higher education background may attenuate the negative impact of the bride drain on their marriage probability, except for those with college degrees. The key relationship is also found to be robust when a nationally representative data set is used for analysis.

In section 2, I present the data used in the analysis and describe the phenomenon of declining marriage rates in more detail. In section 3, I explain the rising female migration and the resulting bride drain. In section 4, I discuss the empirical methodology, give and interpret the estimation results. Section 5 offers concluding remarks.

2 Declining Marriage Rates in Rural China

2.1 Data

The primary data used in this study was collected through rural household surveys that covered 1,200 households and 4,640 individuals in Zhijiang municipality during the Chinese Spring Festivals of 2006 through 2008. Zhijiang is a migrant-sending municipality with a traditional farming base in the hinterland province of Hubei. It situates in the southwest of Hubei and is on the north bank of the middle sections of the Yangtze river. Zhijiang has a population of 510,000 in 2005, of which 64% are rural. The initial survey of spring 2006 elicited retrospective information since 1985 on migration, marriage, education, and employment history for all adult household members above the age 16. An important variable lacking in most standard household surveys: the age of first marriage, was also obtained since the initial survey. Another important dimension of the data is that it includes the information on the origins of the spouses of the household heads, their original household registration location and birth location. From 2007 to 2008, follow-up surveys were done on the same households and the resulting data set constitutes what is essentially a rich panel data set[10].

In the absence of census data, I use instead in this analysis the publicly accessible data of 1989 China Health and Nutrition Survey (CHNS) and the 1995 and 2002 Chinese Household Income Project (CHIP) to examine the national pattern. The CHNS is an on-going international collaborative project and designed to primarily examine how the social and economic changes in China are affecting the health and nutritional status of the its population. The CHNS covers both urban and rural areas in nine provinces that vary substantially in geography, economic development, public resources, and health indicators and its data is hence nationally representative. Unfortunately, the CHNS does not contain migration information. I therefore use the 1995 and 2002 wave of the CHIP data to document changes in marriage

[10]The details about the data set please see Meng (2009).

rates and migration rates at the national level. The CHIP collects nationally representative data to measure and estimate the distribution of personal income in both rural and urban areas in China. Its 1995 wave covers 19 provinces and the 2002 wave covers 22 provinces.

The marital status questions used in the CHIP data are identical across time and also identical to the one used in the 1989 CHNS. Unlike the CHNS data, the CHIP data contain information on migration. The 1995 CHIP defines migration as leaving the local village for work for at least a month in the past year and designs a straight-forward question soliciting such information. The 2002 CHIP breaks the migration information into parts and first asks the number of days an individual worked outside home in the past year and then asks for the location of the employment. I synthesize the information in the 2002 CHIP to create a migration indicator that is comparable to the definition of migration in the 1995 CHIP.

2.2 Declining Marriage Rates

It has been taken for granted in rural China that as men and women approach their legal marriage age, which is 22 for men and 20 for women, they would get married. Traditionally, a good proportion of Chinese rural men and women were married in their early twenties. For Zhijiang as a whole, 83% of men 22 to 26 and 74% of women 20 to 24 were married in 1987. In 1997, however, the proportions married within the first five-year window since the legal marriage age dropped to 67% for men and 70% for women. In 2007, the respective shares further dropped to 22% for men and 19% for women.

This is not a local phenomenon. Using nationally representative data, I find that for both men and women the proportions married within the first five-year window since the legal marriage age fell markedly between 1989 and 2002. For example, 61% of rural men 22 to 26 and 44% of women 20 to 24 were married in 1989. In 1995, the respective proportions dropped to 43% and 32%. The shares of married men and women in their early twenties continued to decline and in 2002, 32% of men 22 to 26 and 29% of women 20 to 24 were

married in rural China. The national downtrend is not driven by specific regions. Table 4 lists the marriage rates for rural men 22 to 26 and rural women 20 to 24 for a representative sample of 19 provinces in China in year 1995 and 2002. The reduction of marriage rates for rural young men is nearly across the board. The fall in female marriage rates is less dramatic in the national context, but it fell on average by 3 percentage point between 1995 and 2002 nevertheless.

A natural question concerning the fall is whether the decline reflects a change in the marriage age (i.e. a postponement of marriage) or an equilibrium change of the marriage rates (i.e. an increase in forgone marriages). It's difficult to draw a clear answer at this point, but evidence suggests that it is not simply an issue of rural people marrying late, for example, the phenomenon of the declining marriage rates is not limited to people in their early twenties. The proportion married in the late twenties also fell in the last two decades. In 1989, 92% of rural men 27 to 31 and 92% of rural women 25 to 29 were married, but in 2002, only 80% of men and 85% of women entered marriage in their late twenties in rural China. But the unmarried men and women in their late twenties could eventually get married in their thirties, yet for the more recent birth cohorts time need to pass before data concerning their transitions to marriage can be collected.

I present in Figure 1 and 2 the marriage-age trajectories for men and women of various birth cohorts in Zhijiang. Using the information on age at first marriage, I draw for men the trajectories of percentage married across different ages by birth-cohorts five years apart, from the 1961-1965 birth cohort to the 1981-1985 birth cohort. Although the legal marriage age is 22 for men (and 20 for women), few reported to have been married at age 21 (and 19 for women), the spike comes nonetheless for all birth-cohorts at 22 for men (and 20 for women). The median age for men at first marriage for the various birth cohorts has remained at 22 for the 1961-1965, 1966-1970, and 1981-1985 cohorts, and rose to 23 for the 1971-1975 and 1976-1980 cohorts. For women, the median age at first marriage has been at 21 except for the

1976-1980 birth cohort, which rose to be 22. Figure 1 shows that men of the 1961-1965 and 1966-1970 birth cohorts have quite similar marriage trajectories, both trajectories asymptote to 100% after males reach their mid to late thirties. The marriage trajectory of men born between 1971 and 1975 lies farther below the trajectories of the earlier cohorts, indicating a decline of marriage rate at every age in one's twenties and early thirties; but the trajectory of this birth-cohort of men quickly asymptotes to 100% around mid to late thirties, resulting in virtually no bachelors in this cohort as men age. The younger cohorts (born between 1976-1985), however, could have different marriage trajectories than the older cohorts, and there could be a non-negligible proportion of unmarried men in these younger birth cohorts as men age, the extent to which is however difficult to gauge. Figure 2 presents the case for women. The pattern of marriage-age trajectories for women show that for women born between 1961 and 1975, over 80% were already married by the age 23, almost 100% were married by the age 30. However, for women in the more recent birth cohort (those born between 1981 and 1985), only 40% were married by the age 23, the marriage trajectory for this cohort could asymptote to 100% once they reach their thirties, it could also level off before reaching 100%. Since the information on marriage collected in Zhijiang ends in 2007, the trajectories are incomplete for men and women for the more recent birth cohorts.

Declines of first-marriage rates among people in their early twenties have been extensively documented in the developed countries, notably the U.S. and most of the other Western nations, since the 1970s (Eldrige and Kiernan (1985); Bumpass, Sweet, and Cherlin (1991); Gould and Paserman (2003)). These declines coincide with a shift in attitude away from formal marriage and a rising trend of cohabitation, which to a certain extent replaces formal couplehood at an early age. Does the fall in marriage rates observed in rural China simply imply an increase in the rate of cohabitation that may be a prelude to or a substitute for formal marriage? Research on premarital cohabitation in rural China is scarce. A survey conducted in rural areas of Shanxi province (Qiao (2000)) in 2000 shows that most of the

adult rural residents oppose cohabitation replacing formal marriages as a living arrangement, but 30% of the young people (aged 18 to 24) interviewed acknowledge that pre-marital cohabitation is a private matter and need not be rejected because it defies tradition. There is anecdotal evidence indicating the actual occurrence of premarital cohabitation in rural China and that it is more tolerated by the rural-urban migrant population, but these reports also acknowledge that even among the migrants the incidences of cohabitation are still quite limited, the traditional institution of marriage still dominates the rural scene and cohabitation is in general tabooed and sanctioned by the local villages (Chen (2003); Zhou (2009)).

Rising divorce rates could also influence people's decision to enter marriage. In the past thirty years, there has been an upsurge of divorces in China. For China as a whole, the number of divorces per 1,000 population (the crude divorce rate) increased steadily from 0.35 in 1978 to 0.95 in 1998 (Wang (2001)), and rose to 1.37 in 2005. However, China's present level of divorce rate is still low by Western standards (e.g., the crude divorce rate is 2.7 in Japan in 2001 and 4.1 in the U.S. in 2000). It is very hard to find data on divorce disaggregated by urban and rural areas in China. What researchers have agreed upon is that the incidence of divorce in rural China is on the rise but remains low relative to its urban counterpart (Gao (1998); Wang (2001)). The sharp fall of first-marriage rates for young people in rural China since the 1980s therefore cannot be interpreted simply as a shift of preference away from the formal institution of marriage, and its reasons need to be found in the more substantial changes in the local marriage markets since the Chinese economic reform.

3 the Bride Drain

China has since the 1950s an unusually large rural-urban divide. The dualistic system was institutionally imposed and maintained by strict mobility controls. Residents in its rural and urban areas have essentially two different forms of citizenship (Naughton (2007)), and they consume, work, and invest in different goods, labor, and capital markets. This is especially true in the marriage markets. The marriage markets have been segmented for the rural and urban population mainly through the household registration system (the *hukou* system). Within the system, rural residents were tied to the land and could not move to cities to live or find employment. In addition, the system made it extremely difficult for farmers to convert their rural *hukou* status to that of an urban one in order to enjoy the level of benefits and public goods provided in the city. Rural men and women were therefore physically restricted from entering the urban marriage markets and were also socially and economically disadvantaged as potential marriage partners. The rural-urban migration ushered in by the Chinese economic reform, however, has changed the landscape of the marriage markets, and relative to rural men, rural women have a better access to the suburban and urban marriage markets via migration.

Deeply embedded in the Chinese marriage culture is the norm of patrilocal residence in addition to the the practice of hypergamy[11]. Hypergamy originally refers to the custom among Hindu women of "marrying up" into a caste at least as high as their own. The term also describes the common and cross-cultural tendency for women to marry better-off men. Chinese culture is unusually explicit about hypergamy. Husbands are expected to be "superior" to or at least as well off as their wives in socioeconomic status, they are also expected to provide housing for their brides upon marriage (Fan and Huang (1998)). In rural China, the provision of housing for wives takes the form of patrilocal residence, a system in which the married couple lives with or close to the husband's parents. Although migration

[11]I thank Professor Barry Naughton for making a forthright point about this feature in the Chinese culture.

could potentially expand rural men's marriage markets, they still primarily search in the local marriage markets for spouses. This is because except for few elite rural male migrants who have managed to purchase housing and settle down in cities, the majority of the rural male migrants cannot expect to "marry up" into more prestigious urban social groups, the pool of potential urban wives is still not opened to rural men. And rural men will turn to their hometowns to search for wives. Using data I collected in Zhijiang, I compile in Table 5 the origin of wives for the married males of different birth-cohorts in year 2005, distinguished by men's migration status. Regardless of men's migration status, at least 65% of men in each five-year birth cohort found wives within the rural communities of Zhijiang, over 85% found wives within the same province. Wives of other-province origin[12] are increasing for people in the younger birth cohorts, yet constitute still a small proportion. It's difficult to compile a similar table for the origin of husbands for the locally born married women. Because of the patrilocal marriage custom, women in general follow their husbands after marriage and disappear from my sampling frame as they change their household registration location and/or status. Although the permanent migration and household registration information for all the children and siblings of the household head was obtained in the Zhijiang data, it was yet to be coded by gender, making it practically difficult to trace how many women have changed their household registration location by marrying husbands of suburban or urban origin.

The urban marriage markets could be less limiting to rural women compared to rural men. Because women's inferior social and economic status are less of an obstacle than men in the marriage markets, the prospect of "marrying up" into more prestigious social group in urban areas has always existed for women. However, from the 1950s into the 1990s, the household registration legislation stipulated that children's *hukou* status must be inherited from their mothers' *hukou* status, and this made rural women undesirable in the urban

[12]The Zhijiang data is not yet coded in such a way as to tell whether the wives of outside province origin are rural or urban. Presumably most of these wives came from rural origins.

marriage market. Urban males who married rural women would have had to deal with the fact that their offspring would not have the same privileges they had, and might not even be allowed to go to the urban school, live in the same place and assume the same *hukou* status. The traditional practice of patrilocal residence in marriage made the concern for the hereditability of *hukou* status of one's children and its related privileges work invariably against the taking of rural wives by urban males.

Between 1985 and 1990, as the mobility restrictions started to unwind and rural-urban migration budded, rural men preceded women to leave the countryside as most of the urban jobs were in construction industries. But even at this early stage, female migrants took advantage of the mobility relaxation and extended their marriage markets to more developed rural and suburban areas. According to the 1990 Census, marriage was the leading reason of female migration, accounting for 28% of inter-province female migration. Fan and Li (2002) find in their field study in western Guangdong (the prominent migrant-destination province) that 60% of the female migrants they interviewed left their home villages to "marry up" into a higher income and better region. They also find that the migrant women consider rural men in richer coastal areas more desirable than rural men in their relatively poorer hometown. Those who marry the migrant rural women in the more developed rural areas are found to be older and poorer relative to other men in the same region, some are even mentally or physically handicapped (Fan and Huang (1998)), however, their favorable residential location and the employment opportunities the location purports compensate for their perceived lower ranking in the socioeconomic status. This pattern of lower status men in wealthier regions marrying migrant women from poorer regions holds internationally as well. Humbeck (1996) finds that in Germany, women from Thailand married German who are older and less educated. Piper (1999) cites that rural Japanese men imported wives from Korea, Thailand, China, and Philippines when face problems in the domestic marriage markets. In

a recent overview article, Jones and Shen (2009)[13]present more evidence on how relatively less educated men from more developed countries such as Japan, Taiwan, South Korea, and Singapore are increasingly seeking brides from poorer countries such as China, Philippines, Thailand, and Vietnam who are not in as "choosy" a position as local women if they wish to get secure and legal residence status in the host country.

Since the second half of the 1990s, rural women accelerated their exodus from the countryside and the female migrant population was increasingly younger and composed of single women (De Brauw, Huang, Rozelle, Zhang, and Zhang (2002)). It should be noted that it is not the case that more women migrate than men; in fact, more men migrate than women (Liang and Ma (2004)). The crucial and interesting fact is that some significant number of women who are migrating are young and single, and their marriage trajectories after migration are quite different - unlike rural men, they have the option of leaving behind the local marriage markets and looking for spouses in wealthier suburban or urban areas. In 1998, a new policy changed the *hukou* inheritance law and began to allow children to inherit their *huku* status from either parent. This policy could have removed a great deal of discrimination that the urban marriage market had against rural women. However, hardly any research has been done to investigate how rural women fared in the urban marriage market after this law change. Recently Chyi (2009) began to study how urban men had benefited by the *hukou* system - that is, rural women would not refrain from marrying urban men with relatively lower socio-economic status in order to acquire urban residency.

Labor migration has expanded the marriage market for rural women in China, female out-migrants not only marry other rural men in more affluent regions, they also marry urban-dwellers and stay in cities. However, rural men are excluded from the urban marriage market due to their low social status, inability to purchase housing and settle down in cities. With local women expect to "marry up" after migration, the local pool of potential wives

[13]I thank Professor Barry Naughton for providing the reference.

is diminished, creating a bride drain for Chinese rural men. By studying the bride drain in this paper, I am not discounting the possibility of a groom drain caused by male out-migration, which could possibly explain the drop in female marriage rates. The focus on the bride drain acknowledges first that rural men, unlike rural women, do not have the option of "marrying up", i.e., entering the urban marriage markets, and are primarily confined to the local marriage markets. It also illustrates the practical difficulty of documenting the origin of husbands for the locally born rural women in the absence of suitable data.

4 Model Specification and Empirical Results

I take advantage of the variation in marriage and migration rates across Zhijiang's nine townships and over time in order to establish the link between male marriage propensity at the individual level and female out-migration at the township level. An underlying assumption is that rural men's local marriage market is not only primarily confined to the local municipality but to the local township. This assumption is quite reasonable as rural men often look for wives in the vicinity of their local community. Take Zhijiang for example, in 2005, 31% of all married men took wives from own village, 32% from other village in the same township, 17% from other townships in Zhijiang, and 16% come from municipalities nearby in the same province, the remaining 4% took wives from other provinces. In sum, 63% of the husbands found wives within the same township, 80% within the same municipality. I model the individual marital decision of men using a probit model. The basic empirical specification is:

$$P(M_{ijt} = 1) = \Phi(\alpha_0 + \alpha_1 F_{jt} + \alpha_2 S_{jt} + \alpha_3 X_{ij} + \delta_j + \delta_t + \lambda_j t) \quad (1)$$

where M_{ijt} is a dummy variable with value 1 if man i in township j at time t was married, and with value 0 otherwise. F_{jt} is the key variable of interest, it is the migration rate of

young women in township j at time t; S_{jt} is the age-specific proportions of young men over young women in township j at time t, the sex ratio measures the intensiveness of men's competition for women in a given locality over time. X_{ij} contains individual characteristics that do not vary across time, such as education. δ_j and δ_t are the township and year dummies that account for the unobserved township level fixed effect and all the national trends in the tastes for marriage, such as contraceptive methods, technological progresses in household production, divorce laws, and social norms. By controlling for the township fixed effect, the regression will yield consistent estimates for my key variable of interest if the unobserved township characteristics that are correlated with both marriage and migration are indeed time-invariant. $\lambda_j t$ is a township-specific linear time trend. By including it in the specification along with the township fixed effect, all the cross-township variation in the levels and trends in female migration have been thrown away. The parameter of interest is therefore identified only from deviation in the female migration rates and in men's marriage rates from a township-specific linear trend. In other words, I am assuming that the variations around the transition path of each township's female out-migration are random. If a time varying township level characteristic, such as the township specific business cycle, is negatively (positively) associated with female out-migration and positively (negatively) correlated with male marriage propensity, then the coefficient estimate of key variable will be negatively biased (i.e., biased away from zero). The parameter of interest is α_1, according to the the bride drain explanation, it is expected to be negative.

My main sample consists of over 1000 men in the age cohort 22-26 in Zhijiang's 9 townships in year 1985, 1990, 1995, 2000, and 2005. There is no specific reason why a five-year interval is chosen over the six or seven-year intervals. I have performed the same analyses separately for men aged 22 to 27 and 22 to 28, the regressions yield similar results. To operationalize the female migration variable F_{jt}, I first define migration as leaving one's home township for at least three consecutive months within a given year. The migration

rate of young women is then defined as the proportion of female migrants in the age cohorts of 20 to 26. This age cohort is chosen because only female aged 20 and above are eligible for marriage so that their leaving the countryside could potentially deplete the local marriage market. Various age cohorts, such as 20-24, 20-25, have also been examined, slightly different definition of the age cohorts do not alter the estimation results or the statistical significance of the coefficient estimates of interest. The age specific sex ratio variable S_{jt} is defined as the number of men aged 22 through 26 divided by the number of women aged 20 through 24 in each township across time. The sex ratio variable is a time-varying township level variable, based on 5-year age groups. Ideally, the sex ratio should pertain to the actual age cohorts and should not be calculated based on the current residents. In the Zhijiang data, the age and gender information on all the children and siblings of the household head was collected and the children and sibling data can be treated as separate random samples and used to compute the appropriate sex ratios. However, the data is yet to be coded by gender. Therefore, in this study, I compute the sex ratio using the current sample. If the age-cohorts for women in the definition of the sex ratio were chosen to be even younger than men, for example, if the numerator changes to the number of women ages 18 through 22, the estimation results are hardly affected. Alternative definitions of the sex ratio such as the number of men aged 22 to 26 divided by the number of women aged 22 to 26 also do not alter the estimation results. The age cohorts of women are specified to be two year younger than men to account for the fact that men in general marry women younger than themselves. The summary statistics for selected years are presented in Table 6.

Column 1 in Table 7 presents the marginal effects probit results for the basic specification. Standard errors have been adjusted for clustering by both township and year. Since the key variable of interest is at a higher level of aggregation than the individual units, two dimension clustering allows for correlation among different townships in the same year and different years within the same township. After controlling for age, education, the local market sex

ratio, the township and year fix effects, and township specific linear trend, men's marriage propensity decreases in female migration, and the coefficient estimate for the key variable is negative and statistically significant. The magnitude of the estimated coefficient suggests that at the average values of the covariates, a 10 percentage point increase in the female migration rate in the 20-26 age cohort in Zhijiang will decrease men's marriage probability by 5 percent. The results also show that as sex ratio rises, male marriage propensity falls. Compared to men of primary school education, men of middle and high school education are more likely to get married. The marriage propensity however declines for men of college education, but this result is not statistically significant. Not surprisingly, for young men in their early twenties, the probability of marriage rises with age.

In column 2, I allow men of different education background to be impacted differently by female out-migration. The results suggest that relative to men of primary school education, men of college education are more affected by the bride drain brought about by female out-migration, and the result is statistically significant. Concurrent with the rising female migration is the rise in the formal schooling of women in rural China, the years of schooling for women of the 20-26 age cohort rose from 7.67 to 10.76 years from 1985 to 2007. The effect of female out-migration on male marriage could be overestimated if the growing female out-migration reflects partly the growing earning prospects for women who are increasingly better educated so that the "self-reliance" effect for women is at work. In column 3 and 4, I include the township level time-varying variable of female education, measured by the formal years of schooling, to account for this consideration. After controlling for female education, female out-migration still exerts a statistically negative impact on male marriage probability.

In Table 8 I categorize men by migration status each year and examine whether migrant young men and non-migrant young men are both affected by the female out-migration. The results suggest that in Zhijiang, the phenomenon of bride drain is affecting men regardless of their migration status. The estimated coefficients on female migration remain negative

and statistically significant for both groups of men. Again it seems that the negative impact of female out-migration on male marriage propensity diminishes with education at least for those who do not have college degrees. The rise in female migration rates has a larger effect on migrants than on non-migrants, the difference is statistically significant at 5% level (standard error for the difference is obtained by running a fully specified model with a migrant status dummy and its interaction with all covariates). This is possibly due to the fact that non-migrants by staying in the local community can access the local marriage markets with more frequency or they have more land wealth than migrants.

To broaden the implication of my analysis beyond Zhijiang, I also examine the relationship between female out-migration and male marriage propensity using the nationally representative CHIP data. There are 58 counties in 19 provinces covered in both the 1995 and 2002 wave of the CHIP data. I use the same model specified in equation 1 but change the township level variable to that of the county level and define all the other relevant variables in similar ways. Table 9 presents the summary statistics. The estimation results are presented in Table 10. Male marriage probability again decreases with female out-migration, and the coefficient estimate for the key variable of interest is statistically significant too. The magnitude is much higher than that obtained in the Zhijiang data. A 10 percentage point increase in the female migration rate evaluated at the average values of the covariates will decrease men's marriage probability by 57 percent. Since the CHIP data also contain individual's monthly wage information in 1995 and 2002, I construct a county level non-farm average wage variable for men and women to proxy for local labor market conditions and include them in the regression in column 2. The coefficient estimate of the key variable of interest remains negative and statistically significant, despite the fact that it is positively correlated with both female education and female wage. The non-farm monthly wage of men is positively associated with male marriage propensity, suggesting that the "good catch" effect dominates for men. Similar to the female out-migration rate and female education, the

non-farm county level female wage rate is also negatively associated with male marriage rate, suggesting there might be "self-reliance" effect for women as earnings rise. In column 3 and 4, I perform the analysis on migrant men and non-migrant men separately. Regardless of the migration status, female migration negatively affected men's marriage propensity, just as found in the Zhijiang data, migrants are more negatively impacted than non-migrants, and the difference is statistically significant. The results also show that for migrant men, male marriage propensity diminishes with men's education level, but female out-migration exerts less negative impact on marriage propensity for men with higher levels of schooling.

The striking fall in the first-marriage rate of rural Chinese men in their early twenties and its relationship to the rise in young women's participation in migratory work in recent decades is not only obtained in the Zhijiang data, it is also found in the nationally representative data. In both cases, the estimation results suggest that the effect of female out-migration on male marriage propensity attenuates for men of higher education background; but the Zhijiang sample also indicates that men of college education is more affected by the rural bride drain. Female out-migration is positively correlated with female education, and by including female education in the regression, the effect of female migration on male marriage remains negative and statistically significant. The coefficient estimates for the sex ratio variable are also negative and statistically significant in both the Zhijiang and the national samples, supporting the predictions of the marital search model over the imbalanced sex ratio theory. Another common finding in both the Zhijiang and national data sets is that regardless of migration status, female out-migration is negatively associated with male marriage probability, and the relationship is more pronounced for migrants than for non-migrants. Also for migrants, marriage propensity decreases with education, but the patten is only statistically significant in the national data. Including county level non-farm wages for both men and women in the regression does not wash out the effect of female out-migration on male marriage propensity, the key coefficient of interest is still significant even in the presence of

multicollinearity. The results also show that men get married more when their local labor market prospects improve (relative to women) and, except for migrant men, the marriage propensity decreases for men when labor market prospects for women are relatively better.

5 Conclusion

The fall in the first-marriage rates among Chinese rural people in their early twenties in the past two decades is remarkable. This paper examines the impact of local female out-migration on the decline of men's marriage rates. Via migration, the marriage market for rural females has expanded and they can expect to "marry up" into suburban or urban social groups, however, for rural males, the marriage market is still primarily confined to the local market. This created a bride drain for rural men in the local community, shrinking the availability of local mates, and according to the marriage search model, the bride drain reduces the marriage incidence of men. Using both local and national data set, my results indeed show that male marriage propensity decreases with female out-migration and the result is robust after controlling for local level sex ratio, female education level, male wage rate, female wage rate, individual level male education and age, local fixed effect and national trends.

Another important finding in this paper is that female out-migration has reduced male marriage propensity regardless of the migration status of men and, compared to non-migrants, migrants are more affected by the bride drain in the local marriage market. There is also some evidence, especially among migrant men, that increased schooling can attenuate the negative impact of the bride drain. Since the key variable of interest in this paper is aggregated at a higher level than the individual unit, by controlling for the local fixed effect and locality-specific linear time trend, the parameter of interest is identified on the premise of whether the within-locality acceleration of female out-migration explains the within-locality

deceleration of male marriage rates. Essentially, my identifying assumption is the randomness not of the long run transition path of female out-migration of each locality but of the variation from that transition path. In order to examine the impact of a shock to the migration options of local women on men's marriage choices in a cleaner manner, instrument for female out-migration needs to be found in future work.

The focus on the decline of male marriage rates in this paper in no way discounts the phenomenon of the fall in marriage rates among women in their twenties in rural China. Traditionally, virtually all rural women wed by about age 30, whether this pattern will continue to hold for the more recent birth cohort who is apparently marrying late is not fully known, the available evidence from Zhijiang suggests that women from this cohort might eventually get married too. While male out-migration could potentially create a similar groom drain for women whose marriage markets are confined locally, it is less reasonable that this should be the cause for the falling marriage rates of young women who can feasibly expand their marriage markets into wealthier regions. The impact of female out-migration on women's marriage pattern is not clear. While mobility expands women's marriage markets and can therefore drive up marriage incidence for women, rising female wage, education and training (all are positively associated with female out-migration) could also make women more confident of their ability to find a good suitor and therefore more willing to keep their option open longer, knowing that by delaying marriage for a while they would improve marriage prospects in the long run. Future research can investigate rural female marriage pattern and its relationship with female out-migration.

As Becker (1973) pointed out, marital patterns have major implications for fertility decision, population growth, inequality in income, and the allocation of leisure and other household resources. Possible extensions of this research involve the study of the consequences of the bride drain, for example, of its impact on fertility and on female bargaining power in the marriage market and in the household. The relationship between the intensities of

female migration and factors that reflect female bargaining power such as the bride price they command in the marriage market and the outcome on children within the household may be interesting to look at in future research.

6 Figures and Tables

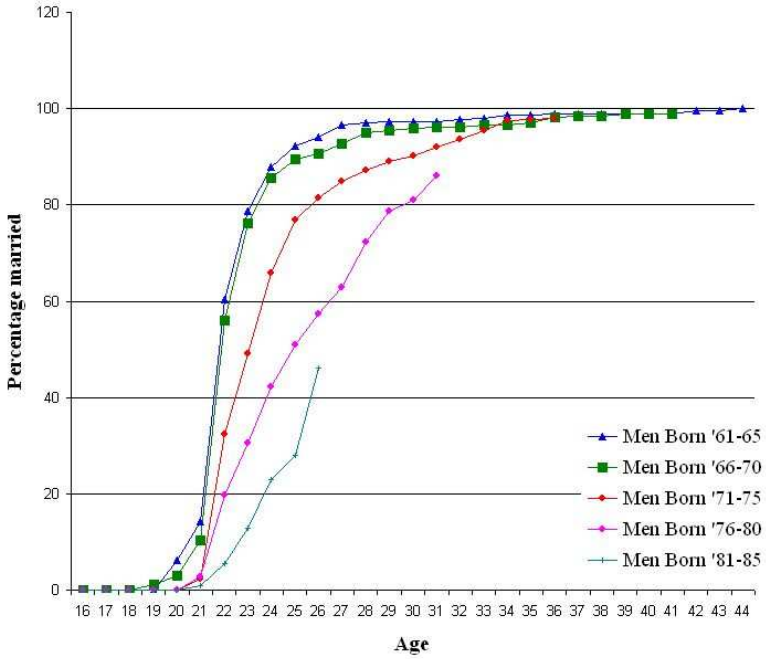

Figure 1: Men's Marriage-Age Trajectories, Zhijiang

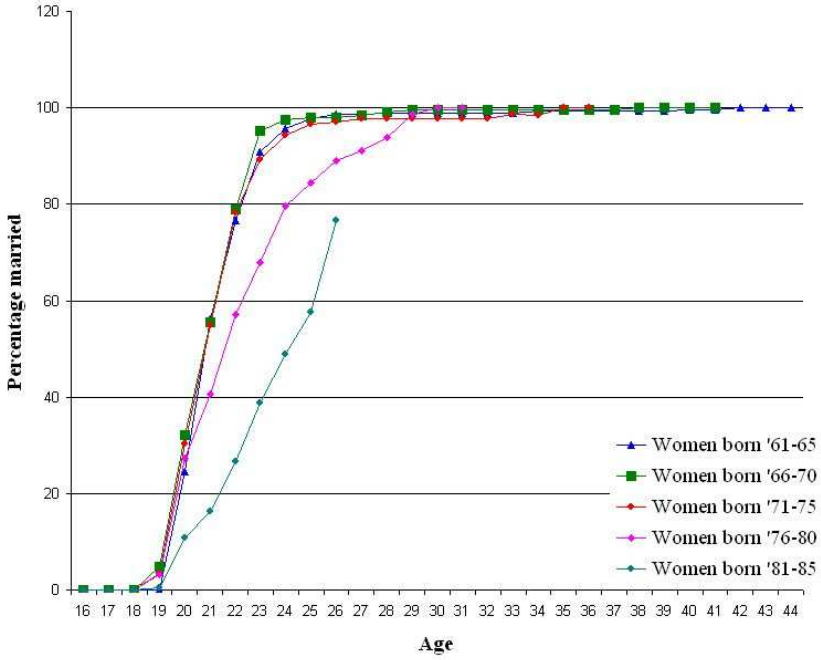

Figure 2: Women's Marriage-Age Trajectories, Zhijiang

Table 1: Sex Ratios in Rural China from 1995 to 2002, Various Age Cohorts

Age Cohorts	1995	2002
22-26	1.09	1.14
20-24	0.97	1.07
16-20	0.93	1.01
11-15	1.20	1.15
6-10	1.17	1.24
1-5	1.22	1.16

Note: This table table was constructed using the 1995 and 2002 wave of Chinese Household Income Project. Sex ratio here is defined as the number of males over the number of females in each age cohorts.

Table 2: Declining Male Marriage and Rising Female Migration in Zhijiang, 1985 - 2007

Year	Marriage Rate		Migration Rate	
	Men 22-26	Δ (in %)	Women 20-24	Δ (in %)
1985	79.8		0.0	
1990	79.7	-0.1	2.8	2.8
1995	73.0	-6.7	10.3	7.5
2000	49.2	-23.8	33.1	22.8
2005	28.0	-21.2	65.5	32.4

Table 3: Rising Female Migration in Rural China, 1995 - 2002

Age cohorts of females	1995 % migrated	% unmarried female migrants	2002 % migrated	% unmarried female migrants
16-19	9.39	95	18.42	97
20-24	15.35	88	35.14	86
25-29	2.81	41	18.05	32
30-34	2.25	0	11.41	2
35-39	1.39	0	6.84	0
40-54	0.80	0	4.20	0

Note: This table was constructed using the 1995 and 2002 wave of Chinese Household Income Project.

Table 4: Declining Marriage in Rural China, 1995 - 2002

	Men 22-26, (in %)			Women 20-24, (in %)		
Province	1995	2002	Δ	1995	2002	Δ
Beijing	22	20	-2	16	25	9
Hebei	54	36	-18	34	17	-18
Shanxi	30	26	-4	21	24	3
Liaoning	25	28	3	29	31	2
Jilin	69	46	-23	42	34	-7
Jiangsu	42	37	-6	36	23	-13
Zhejiang	27	24	-3	21	25	4
Anhui	40	39	-1	31	27	-5
Jiangxi	42	41	-1	34	46	12
Shangdong	41	24	-17	11	14	3
Henan	48	38	-11	27	31	5
Hubei	61	22	-39	44	22	-22
Hunan	28	24	-4	28	17	-12
Guangdong	25	15	-9	16	16	0
Sichuan	52	42	-10	36	41	5
Guizhou	40	38	-1	29	48	18
Yunnan	41	40	-1	49	47	-3
Shaanxi	55	21	-34	39	27	-12
Gansu	53	50	-3	56	40	-16
Average	43	32	-11	32	29	-3

Note: This table was constructed using the 1995 and 2002 Chinese Household Income Project.

Table 5: Origin of Wives by Husbands' Migration Status in Zhijiang

Birth Cohort	Nonmigrant (in %)			Migrant (in %)		
	within Zhijiang	within Hubei	other province	within Zhijiang	within Hubei	other province
1936-1940	67	92	8	no	migrant	
1941-1945	78	100		no	migrant	
1946-1950	81	97	2.6	100		
1951-1955	77	97	3	77.7	100	
1956-1960	83	98.1	1.9	94.7	100	
1961-1965	89	98.2	1.7	79	95.4	4.6
1966-1970	76	98	1.95	76	96.8	3.2
1971-1975	76	94.9	5.1	70	93	7
1976-1980	100			71	85.7	14.3
1981-1985	no	married	males	no	married	males

Table 6: Summary Statistics (Zhijiang, Selected Years)

	1985	1995	2005
Percent male 22-26 married	79.76	73.03	28
Percent female 20-26 migrated	0	7.5	64.8
Sex ratio	0.99	1.11	1.2
Mean years of schooling female 20-26	7.5	8.35	10.04
Percent male 22-26 primary	8.5	3.73	3.5
Percent male 22-26 middle school	61.9	83.06	64.5
Percent male 22-26 high school	29.55	10.78	25
Percent male 22-26 college	0	2.41	7

Table 7: Probit Model of Being Married, Men 22-26 (Zhijiang, 1985, 1990, 1995, 2000, 2005)

	(1)	(2)	(3)	(4)
Female migration	-0.005*	-0.005	-0.006***	-0.006***
	(0.003)	(0.006)	(0.002)	(0.002)
Sex ratio	-0.21**	-0.21***	-0.25***	-0.26***
	(0.06)	(0.06)	(0.02)	(0.03)
Female education			-0.08*	-0.09**
			(0.05)	(0.04)
Middle school	0.12	0.14*	0.11	0.12
	(0.17)	(0.22)	(0.18)	(0.19)
High school	0.17	0.15	0.18	0.15
	(0.12)	(0.18)	(0.13)	(0.63)
College	-0.36	0.42***	-0.35	0.42***
	(0.24)	(0.01)	(0.25)	(0.004)
Middle school×		-0.001		0.002
female migration		(0.005)		(0.003)
High school×		0.002		0.003**
female migration		(0.004)		(0.001)
College×		-0.133***		-0.135***
female migration		(0.001)		(0.002)
Age	0.15***	0.16***	0.15***	0.16***
	(0.03)	(0.02)	(0.003)	(0.003)
Year dummies	Yes	Yes	Yes	Yes
Township dummies	Yes	Yes	Yes	Yes
Township specific linear time trends	Yes	Yes	Yes	Yes
No. of observation	1062	1062	1062	1062

Note: Standard errors in parentheses are adjusted for clustering by township and year. *, **, *** mean that estimated coefficient is significant at 10%, 5% and 1% level.

Table 8: Probit Model of Being Married, Men 22-26, by Migration Status (Zhijiang, 1985, 1990, 1995, 2000, 2005)

	Migrant	Non-migrant
Female migration	-0.023**	-0.005*
	(0.01)	(0.003)
Sex ratio	-0.22	-0.17*
	(0.36)	(0.08)
Female education	0.09	-0.065
	(0.15)	(0.06)
Middle school	-0.08	0.14
	(0.54)	(0.14)
High school	-0.05	0.15*
	(0.49)	(0.08)
College		0.305***
		(0.007)
Middle school×	0.009	-0.001
female migration	(0.009)	(0.006)
High school×	0.014*	0.003*
female migration	(0.008)	(0.001)
College×		-0.11***
female migration		(0.003)
Age	0.22***	0.12***
	(0.02)	(0.004)
Year dummies	Yes	Yes
Township dummies	Yes	Yes
Township specific linear time trends	Yes	Yes
No. of observation	275	783

Note: Standard errors in parentheses are adjusted for clustering by township and year. *, **, *** mean that estimated coefficient is significant at 10%, 5% and 1% level.

Table 9: Summary Statistics (CHIP 1995, 2002)

	1995	2002
Percent male 22-26 married	43	32
Percent female 20-26 migrated	12	44
Sex ratio	1.07	1.2
Mean years of schooling female 20-26	7.27	8.44
Percent male 22-26 primary	25.73	10.34
Percent male 22-26 middle school	57	61
Percent male 22-26 high school	13.89	19.37
Percent male 22-26 college	1.09	8.09
Mean male monthly wage	530	650
Mean female monthly wage	381	480

Table 10: Probit Model of Being Married, Men 22-26 (CHIP 1995, 2002)

	All Men Aged 22-26		Migrant	Non-migrant
	(1)	(2)	(3)	(4)
Female migration	-0.057***	-0.03*	-0.10***	-0.07***
	(0.01)	(0.014)	(0.01)	(0.01)
Sex ratio	-0.29***	-0.53***	-0.62***	-0.25***
	(0.01)	(0.02)	(0.05)	(0.01)
Female education	0.17***	-0.05***	0.73***	0.26***
	(0.01)	(0.005)	(0.02)	(0.005)
Mean county female wage		-0.04***	0.4***	-0.1***
		(0.005)	(0.02)	(0.01)
Mean county male wage		0.1***	0.09***	0.8***
		(0.004)	(0.02)	(0.01)
Middle school	-0.05	-0.05	-0.85***	0.06
	(0.20)	(0.20)	(0.13)	(0.21)
High school	-0.01	-0.01	-0.91***	0.05
	(0.16)	(0.16)	(0.03)	(0.22)
College	-0.27***	-0.27***	-0.44***	-0.26
	(0.07)	(0.07)	(0.01)	(0.15)
Middle school×	0.02	0.02	0.05***	0.02
female migration	(0.01)	(0.02)	(0.003)	(0.02)
High school×	0.02	0.02	0.05***	0.02
female migration	(0.01)	(0.01)	(0.003)	(0.02)
College×	0.02	0.02	0.05***	0.02
female migration	(0.01)	(0.01)	(0.005)	(0.02)
Age	0.15***	0.15***	0.07***	0.18***
	(0.01)	(0.01)	(0.01)	(0.01)
Year dummies	Yes	Yes	Yes	Yes
County dummies	Yes	Yes	Yes	Yes
County specific linear time trends	Yes	Yes	Yes	Yes
No. of observation	1581	1581	543	964

Note: Standard errors in parentheses are adjusted for clustering by county and year. *, **, *** mean that estimated coefficient is significant at 10%, 5% and 1% level. Female and male wages are measured in hundreds of yuan.

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