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Delayed Marriage in China: An Analysis of Education's Impact on Marriage

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Abstract

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Basing on the 2010 cross-sectional dataset from China Family Panel Studies (CFPS), which collects individual-level data spanning 25 provinces across the country, I conduct a research to estimate the impact of women's education on their marriage status and age at first marriage in the current Chinese society. Considering the gender inequality in Chinese society, and the socioeconomic differences between rural and urban China, the analysis is separated for women and men, and urban and rural areas for better comparisons and discussions.

I first use Ordinary Least Squares (OLS) regression models with dependent variables as marriage status in 2010, "ever married" by 2010, and age at first marriage, and each of the dependent variables is analyzed under four conditions: rural women, urban women, rural men, and urban men. The regression results demonstrate that women's education in both rural and urban China tends to delay their first marriages and decrease their marriage rates, contrary to the positive effect on men's marriage.

In the second stage, the two-stage least square (2sls) regression models with quarter of birth as the instrumental variable for year of schooling is applied to investigate the causality between education and marriage status. Although the influence of education on marriage for both genders decreases in 2sls regression results, their correlation cannot be fully denied considering the small values of R-squared. This suggests there might be some socioeconomic factors missing from the models. However, these factors are hard to be quantifiable in terms of economic or statistical contexts. For this reason, more research with an interdisciplinary background including psychology, sociology, and gender studies needs to be conducted to further investigate the relationship between education and marriage.

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I. INTRODUCTION

Chinese women in ancient China were known to conform to Confucian ideology which performed a strong gender hierarchy. Their miseries including the binding of feet, arranged marriages, and concubinage demonstrated female suppressions. In addition to these oppressions, Chinese women were required to obey male power in their families (Bauer, Wang, E. RILEY and Zhao 1992). According to *Book of Rites*, women were defined as followers (Chen 1990). The reason for this definition could refer to the tradition that unmarried women had to obey their fathers, and married women were supposed to be submissive to their husbands, and even their sons after their husbands passed away. In order to further restrict women, they were excluded from education because women with no ability, no education, and no independence were regarded as virtuous exemplars in ancient China. (Mao 1984).

Fortunately, this hoary notion gradually fades away as China achieves its economic and social progress which transits education from elite stage to the popular (Jing 2007). Although women now have equal access to education without gender discrimination, gender inequality still persists in China's society reflected from the attitude towards the proper qualities of husbands and wives (Bauer, Wang, E. RILEY and Zhao 1992). Specifically, wives are expected to have lower education and income level compared to their husbands. Therefore, most Chinese women are discouraged from pursuing higher educational diplomas such as master's and doctoral degrees to avoid the possible difficulty of finding spouses for marriage. However, there exists some Chinese families which are patterned as wives with higher education and personal income than husbands, an opposite situation from the stated opinion. The contradiction which lies in

the public intuition and societal presentation intrigues me to explore the details about the impacts of women's education on their marriage status in the current Chinese society.

Basing on the 2010 cross-sectional dataset from China Family Panel Studies (CFPS), which collects individual-level data spanning 25 provinces across the country, I conduct a research to estimate the impact of women's education on their marriage status and age at first marriage in China. I first use Ordinary Least Squares (OLS) regression models with dependent variables as marriage status in 2010, "ever married" by 2010, and age at first marriage, and each of the dependent variables is analyzed under four conditions: rural women, urban women, rural men, and urban men. The regression results demonstrate that education in both rural and urban China tends to delay marriages for both genders; meanwhile, it negatively affects women's marriage status while having positive effect on men's marriage.

In the second stage, the two-stage least square (2sls) regression models with quarter of birth as the instrumental variable for year of schooling is applied to investigate the causality between education and marriage status. Although the delaying effect of education on marriage for females maintain its significance, the impact on marriage possibility of both genders turns to be insignificant. This result suggests that education's influence on marriage status for both genders in China might be less than my assumption. The insignificance can also be explained by the inappropriateness of quarter of birth as the instrument in Chinese context. It is also possible that there might be some socioeconomic factors missing from the models for their unquantifiability. For this reason, more research with an interdisciplinary background including psychology, sociology, and

gender studies needs to be conducted on penal data to further investigate the relationship between education and marriage.

II. LITERATURE REVIEW

Although China is known as a country with a long history of education for more than three thousands of years, women were largely excluded from the mainstream education system because of the prevalence of Confucian ideology which confined females to an oppressed social status (Liu and Carpenter 2005). It was until the 1950's that Chinese women gradually enjoyed equal educational opportunities as men, a progress which led to the rise of female education in the 1950's (Lavely, Xiao, Li and Freedman 1990). However, a phenomenal political event, the Cultural Revolution (1966-1976), greatly harmed the educational system around China, and female education experienced a setback as a result.

Fortunately, the decline in the average education level among women reversed right after the ending of the Cultural Revolution (Song 2009). Since the late 1970's, the central government has contributed to establishing a gender-equality educational system to promote female education in both urban and rural China. By the year of 2000, the proportion of female faculty members at technical school (equivalent to the education level of secondary school but with specific majors) is 41, compared to 35 percent in 1995 (Liu and Carpenter 2005). This rise in the number of female educators indirectly demonstrates the increasing level of education among Chinese women. Besides, the

literacy rate among women in rural China is also improved from 10 percent in 1949 to 77.4 percent in 2000 (Liu and Carpenter 2005), and it continues to rise.

The other change among Chinese women since the late 1970's is their delayed marriage. In the 1950's, most Chinese women married before the age of 22 (Tien 1983). However, thirty years later, women's average age at their first marriage became 23 in rural China, and 25 in urban China, and the marriage age is still increasing in the recent years (Tien 1983). For example, a 1980's report mentioned that, "at age 30, 24 percent of urban women are still not married" in Shanghai (Tien 1983). And in the recent years, the issue of late marriage concerns numbers of Chinese women. Unmarried women above the age of 30 seem to be everywhere: they are around our daily lives, and they keep appearing on TV. Therefore, the statistics, along with the social focus on late marriage, demonstrates its prevalence in the current Chinese society.

Although some socioeconomic factors such as the cost of wedding, the influence of foreign cultures of marriage and some national polices might influence women's marriage status, there are a large amount of research focusing on the relationship between female education and late marriage. Some literature regards schooling as a catalyst for changes in marriage age, and argues that women's education strongly affects their delay of marriage (Premchand Dommaraju 2009). On the contrary, some scholars suggest that the increase in education could be the result of changes of marriage status, instead of the reverse (Premchand Dommaraju 2009). According to the suggested causal effect, I would summarize some important literature in three different categories:

1. Education lowers marriage rates, and postpones marriages.

A variety of literature and theories contribute to explain this negative effect of schooling on marriage status. Raymo J.M (1998) observed the incompatibility between marital and student roles in Japanese society, a theory which indicates that increasing the level of education among girls will decrease their marriage rates. In order to test the validity of this theory in South Asia, Asia Research Institute conducted a research to evaluate the effects of female schooling on their marriage status in Indian context based on the district-level panel data from the Indian censuses of 1981, 1991 and 2001.

Because the proportion of never-married among women aged 15-19 has greater changes than that of women aged 25-29, the dependent variable focuses on the younger ages (Premchand Dommaraju 2009). As this section title suggests, the most important independent variable should be women's schooling. In order to specifically capture its effect, it is measured by two variables: percentage of women in the district with primary school as the highest education level, and percentage of women in the district who have completed any level of schooling. The regression models also restrict for percentage agricultural workers (the proxy of economic status), percentage Muslim, percentage scheduled casts/tribes, percentage urban in the district, geographical region and marriage squeeze (numerical imbalance between "marriageable" men and women) (Premchand Dommaraju 2009). Analyzing the panel model through the method of OLS (Ordinary Least Squared), Asia Research Institute found that "a 1% increase in primary schooling at the district level increased the percentage of never-married women aged 15-19 by nearly 2.3% in 1981 and by about 2% in 2001", a result which demonstrates that education plays an important role in delaying marriages among women (Premchand Dommaraju 2009).

Another related research which was conducted by Tian examines the relationship between educational attainment and the age at first marriage for both women and men in urban China since the 1980's. Tian (2013) came up with an economic independence theory, which considers education as the source of economic independence, leading women to delay their marriages, and on the contrary encouraging men's marriages for their being considered as the economic dependence. To evaluate the proposed theory, Tian used the panel data consisting of detailed education and work histories from the 2003 and 2008 waves of the Chinese General Social Survey (CGSS).

Since the economic independence theory pertains to both genders, dependent variables are expected to include the age at marriage for women and men. Considering educational attainment as the core of the study, Tian classifies the independent variables for education as three time-varying dichotomous variables: (1) junior high or less, (2) senior high, and (3) college and up (Tian 2013). Another dichotomous variable which captures if the respondent was a student is included in independent variables to exclude education effect from enrollment effect (Tian 2013). Occupational statuses were also coded by a series of time-varying dichotomous variables to include in independent variables (Tian 2013). According to Axinn and Thorton's theory that people's advantages in socioeconomic backgrounds tend to delay their marriages, Tian includes three aspects of the socioeconomic background: mother's year of education, father's occupation, and father's Chinese Communist Party (CCP) membership (Axinn and Thorton 1992; Tian 2013). Additional variables containing residence (urban versus rural), geographical regions (differentiated by provinces) and ethnic minorities (ethnic minorities versus Han) are included as independent variables in the analysis (Tian 2013).

By using three nested discrete-time hazard regression models corresponding to three time periods in the panel data, and separately analyzing these models for women and men, Tian demonstrates the negative effect of educational attainment on age at marriage for both women and men in Chinese context.

2. Marriage status tends to influence educational attainments.

The causality between marriage status and education implies that marriage can also result in changes in educational attainments. Taubman (1994) and Behrman and Rosenzweig (2002) suggest that improved marriage outcomes leads to higher educational attainments after excluding genetic differences by conducting a comparing experiment between two twins.

With the method of OLS, Field and Ambrus (2008) shows that marriage postponement would promote educational level in the case of Bangladesh. The data for this analysis come from the 1966 MHSS, a primary survey consists of detailed economic and demographic data in Bangladesh at the individual, household, and village levels (Field and Ambrus 2008). In order to gauge the impact of marriage timing on educational attainment, Field and Ambrus analyzed "highest grade attained and literacy rates among women who were enrolled in school at age of 9" as the dependent variable in OLS regression model (Field and Ambrus 2008). As for independent variables, besides the age of marriage, adult height, family background and composition characteristics, religion, and a dummy variable indicating whether the woman currently resides in a district of Matlab that is part of the treatment region for the national fertility intervention are also

included (Field and Ambrus 2008). This OLS analysis indicates that "postponing marriage by 1 year between ages 11 and 16 increases educational attainment by an average of 0.22 year" and "an additional year of delay increases adult literacy by 5.6 percent", an outcome which demonstrates the positive impact of marriage postponement on schooling attainment (Field and Ambrus 2008).

3. Causal methods examine the relationship between education and marriage status.

As the economic independence theory suggests, women with higher educational attainments tend to have more potential in economic independence, which leads them to pursue occupational promotions and thus delay the time of getting married (Tian 2013). Although education is likely to postpone marriage, it can increase the marriage quality. The quality of husband and wife in marriage decides the quality of the marriage. According to the assortative mating theory, spouses tend to be similar in terms of educational attainment (Mare 1991), and occupation (Hout 1982). As a result, educated and well-employed women are able to find espouse with at least the same level of education and income. Despite that most literature focuses on this direction of the channel, Field and Ambrus (2008) explain the positive impact of late marriage on educational attainments for women in Bangladesh. Therefore, the causality between education and marriage leaves an important issue for related research.

Lefgren and McIntyre (2006) apply an IV (Instrumental Variable) strategy to investigate he causality between women's education and their marriage status in the United States. The analysis focuses on only one of the directions of the correlation:

impact of educational attainment on marriage outcomes. Therefore, instrumenting for education would solve the causality issue which causes unobserved heterogeneity and joint determination (Lefgren and McIntyre 2006). A valid instrumental variable should be "correlated with the endogenous regressor for reasons the researcher can verify and explain, but uncorrelated with the outcome variable for reasons beyond its effect on the endogenous regressor" (Angrist and Krueger 1991). In this case, the instrumental variable is expected to be strongly correlated with education, but has no correlation with marriage status.

Considering the selecting prerequisites, Lefgren and McIntyre demonstrate and use quarter of birth as the instrument for education by referring to Angrist and Krueger's research results. Angrist and Krueger 1991) discuss how birth quarter correlates with a January 1 enrollment cutoff and compulsory schooling laws to generate variation in the level of schooling. For example, January-born children are likely to complete less schooling when they drop out at the age of 16 compared to December-born children at the same age because January-born children will have enrolled in school a year later but be eligible to drop out at roughly the same time as individuals born in December (Lefgren and McIntyre 2006). Specifically, "children born in the fourth quarter of 1960 started school about 0.4 years later than students born in the first quarter" (Lefgren and McIntyre 2006). Basing on the assumption, Lefgren and McIntyre conduct an OLS analysis to test the correlation between quarter of birth and educational attainment, and find that quarter of birth has a great impact on the probability of high-school completion among women.

With quarter of birth as a valid instrument for education, Lefgren and McIntyre can analyze linear effect of women's education on their probability of being married in

1980 by OLS and IV strategy. According to OLS, "the linear effect of education on marriage is extremely small, though statistically significant" (Lefgren and McIntyre 2006). This suggests that one additional year of education reduces the possibility of marriage by less than one-tenth of 1 percentage point (Lefgren and McIntyre 2006). When the data is estimated by IV strategy, the result shows that "an additional year of schooling reduces the probability of marriage by about 1.5 percentage points" (Lefgren and McIntyre 2006). Although the effect from IV estimate is greater than the one obtained from OLS, it is statistically insignificant.

III. DATA & METHODOLOGY

Data

In order to estimate the impact of educational attainment on women's marriage status, I am using the dataset from China Family Panel Studies (CFPS), which is a nationally representative, annual longitudinal survey of Chinese communities, families, and individuals launched in 2010 by the Institute of School Science Survey (ISSS) of Peking University, China. There are 5 different datasets in the series, including detailed information of adult, child, family, family roster, and community. Since the adult dataset includes all variables necessary for this analysis, it is the only dataset which I refer to. This dataset contains 1,489 variables, and 33,600 observations collected from rural and urban areas in 25 provinces across China including Beijing, Tianjin, Hebei, Shanxi, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi Zhuang Autonomous Region,

Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, and Gansu in the year of 2010.

My analysis focuses on the impacts of educational attainments on marriage status, so I want individuals in the selected sample to be at the age when most Chinese finish education and are supposed to be married; otherwise, the regression results may be biased. According to the educational system in China, the general age to accomplish Doctoral degrees, which I consider as the highest diploma that most Chinese people will pursue, is around the age of 27 or 28. Considering that people need at least one year to prepare for marriage, 29 is the age constraint in my analysis. Specifically, only individuals at and above the age of 29 in the dataset are selected as my research sample.

Dependent Variables

Three variables in the analysis are selected to capture the marriage status: marriage status at the year of 2010, whether individuals were ever married (including currently married) by the year of 2010, and the age at first marriage. The marriage status indicates the possibility of being married at the year of 2010. It is represented as a binary variable which indicates the value of 1 if the corresponding individual was married in 2010 and 0 if they were not (including never married, widowed, divorced and cohabitation).

The "ever married" variable broadens the evaluation of marital status. Since the sample only accounts for individuals at and above the age of 29, it is likely that some individuals in the sample were married but they were divorced or their spouse passed away before 2010. Divorce rate is not the focus of my analysis, so taking the "ever

married" variable into account can better explain the marriage status of the selected sample. The "ever married" variable is also generated as a binary variable which has the value of 1 for married, divorced and widowed individuals, and 0 otherwise.

The third dependent variable, age at first marriage, helps to explain the marriage conditions of the selected sample. Although the dataset has no direct information of this variable, it can be easily calculated by subtracting each individual's birth year from the year of marrying the first espouse. The restriction I put on the age of first marriage is above 16. The reason for selecting 16 as the criterion is that the marriageable age in China is 20 for women and 22 for men but early marriage still exists in rural China. In order to examine the age at first marriage in both urban and rural China, I consider 16 is a reasonable constraint to maintain the comprehensiveness of the analysis.

Independent Variables

The main independent variable is education representing all levels of schooling in the sample. Eight levels of education including illiterate, primary school, junior high school, senior high school, 2- or 3-year college, Bachelor's degree, Master's degree and doctoral degree are originally defined in the education variable. The distribution indicates the small percentage of individuals with Master's and doctoral degrees, so I combine Bachelor's, Master's, and doctoral degrees to one as "Bachelor's degree and above". This combination reduces the levels of education contained in the variable from 8 to 6, a decrease which contributes to better interpretation of the regression models. In order to quantify education levels, each level of education from illiterate to Bachelor's degree and

above is named as education1 to education6, and generated as binary variable which contains the value of 1 for individuals with the corresponding level of education and 0 otherwise.

The models also control for age, age squared, level of intelligence, personal income, maternal literacy, father's CCP (Chinese Communist Party) membership, geographical region (25 provinces explained in the part of data, urban versus rural), and gender (male versus female). Intelligence level might affect individual's ability to handle issues in life, so it is likely to have impact on one's marriage decisions. The measurement of the intelligence level is unsystematic because it is calculated from the impressions of interviewers on each interviewee participating in the survey. The reason for me to try this variable is because little research has considered this factor. Therefore, I think investigating its effect on marriage can be interesting.

Individuals from advantageous socioeconomic backgrounds tend to marry later (Axinn and Thorton 1992). As a result, I include three aspects of socioeconomic background: personal income, maternal literacy, and father's Chinese Communist Party (CCP) membership. I take personal income into the models because it accounts for individual's economic background, and the other two variables are more correlated with family socioeconomic backgrounds.

Maternal literacy is measured as the years of schooling. The reason to choose mother's education instead of father's education or the higher level of education of parents is because children with more educated mothers tend to marry later in lives or have lower marriage rates (Tian 2013). In addition, father's CCP membership is an

important indicator of familial economic resources (Walder 1995, 2003). The original variable representing father's CCP membership contains 4 categories of membership: member of Communist Party, member of a democratic Party, member of communist youth league, and general public. In order to precisely capture the effect of CCP membership, I generate a binary variable which indicates the value of 1 for CCP membership and 0 otherwise. The detailed summary of all variables is listed in table1.

Methods

Ordinary Least Squares (OLS) is used to analyze the following regression model:

$$M_i = \beta_{0i} + \beta_{1i}E + \beta_{2i}AG + \beta_{3i}S + \beta_{4i}I + \beta_{5i}P + \varepsilon_i \qquad (1)$$

where M contains 2 dummy variables including current marriage status, whether individuals were ever married (including currently married) at the year of 2010, and 1 numerical variable: the age at first marriage; E represents the series of 6 binary variables indicating 6 levels of education including illiterate, primary school, junior high school, senior high school, 2- or 3-year college, Bachelor's degree and above; AG represents numerical variables: age and age squared; S stands for socioeconomic factors including personal income, level of mother's education, and father's CCP membership; I indicates the level of intelligence; P represents a series of 25 dummy variables to mark the province; subscript "i" represents each individual in the sample.

Most literature concentrates on the impact of educational attainments on marriage status for women. However, I decide to investigate the relationship for both genders. The huge difference in the socioeconomic conditions between urban and rural China inspires

me to separate the effect for these two areas. For these reasons, each regression model in equation (1) is analyzed under 4 different conditions:

1. rural women
2. urban women
3. rural men
4. urban men

The four constraints enable close comparisons of the impact of educational attainments on marriage status and age at first marriage between women and men, and between urban and rural China.

Although the previous discussion mentions the two-direction effect between education and marriage, I choose to only focus on the impact of educational attainments on marriage status. The causality between education and marriage can cause endogeneity problem, which describes the correlation between independent variables and error terms. Although endogeneity has no impact on the unbiasedness of OLS coefficients, it harms the unbiasedness of standard errors and thus makes hypothesis testing such as t-test and F-test invalid. As a result, estimating the causality becomes necessary.

Wooldridge (2002) explains a two-stage least square regression model to address the endogeneity problem. This method requires selecting an instrumental variable, which should be "highly correlated with that explanatory variable it is to replace, but which is uncorrelated with the error term" (Pearce 1992). Lefgren and McIntyre (2006) demonstrate quarter of birth as the appropriate instrument for education level because of its strong correlation with education and no correlation with error terms in the United

States. The intuition for the correlation between education and quarter of birth is discussed in literature review: January-born children are likely to complete less schooling when they drop out at the age of 16 compared to December-born children at the same age because January-born children will have enrolled in school a year later but be eligible to drop out at roughly the same time as individuals born in December (Lefgren and McIntyre 2006). Although the socioeconomic backgrounds and educational environments in China are much different from those in the United States, each year's starting month of education are both September. For this reason, quarter of birth in Chinese context tends to have the similar correlation with education in the U.S. Therefore, quarter of birth is used as the instrumental variable for education in my analysis.

The two-stage least square (2sls) regression model can be expressed as follows. Recall equation (1): $M_i = \beta_{0i} + \beta_{1i}E + \beta_{2i}AG + \beta_{3i}S + \beta_{4i}I + \beta_{5i}P + \varepsilon_i$. The first stage in the two-stage model is to regress the endogenous variable (E') using the instrument (Q: quarter of birth) as an independent variable. This can be represented in the following equation:

$$E' = \alpha_0 + \alpha_1 Q + \alpha_2 AG + \alpha_3 S + \alpha_4 I + \alpha_5 U + \alpha_6 P + u \quad (2)$$

where E' is the numerical variable "years of education" to make the implementation of 2SLS easier; Q is a series of 4 binary variables each of which has the value of 1 when the individual is born in the corresponding quarter and 0 when the individual is not; U is a binary variable which states 1 for urban areas and 0 for rural areas; AG, S, I, P represent the same variables explained in equation (1). In the second stage of the model, the fitted value of E' predicted from equation (2) will substitute for E in equation (1). The other

difference in 2SLS is that each dependent variables is now only evaluated under 2 conditions: women and men, because of no separation for urban and rural areas in this analysis.

IV. RESULTS

Table 2 shows the OLS regression results of equations (1) with the marriage status in 2010 as the dependent variable. Independent variables are the same as those discussed in OLS methods. One important thing should be noticed for the regression results is that only 5 of education variables, from primary school to Bachelor's degree and above, are included in the regression because the omitted dummy variable is treated as a comparing variable. In other words, the sign of the included coefficients reflects the impact of education on marriage status compared to illiteracy: a negative sign indicates a less effect than illiterate individuals; a positive sign implies a more influence compared to illiterate ones. Notice that province variables are controlled in the regression models, but are omitted for simplicity.

For rural women, only the coefficients of age and age squared are statistically significant among all the independent variables. According to the coefficients, rural women at or above the age of 29 are 1.3% more likely to be married in the year of 2010 than those one-year younger than them. As for education variables, the value of all coefficients is less than 0.03. In addition to their small values, all these coefficients are statistically insignificant. Thus, women with levels of education from primary school to

Bachelor's degree and above have the same marriage status as illiterate women. In other words, levels of education have little effect on marriage status for rural women.

In the regression results of urban women, the sign of coefficients changes from positive to negative at the educational level of senior high school. This result implies that educational attainments lower than senior high school positively affect women's marriage possibility, while higher education levels tend to have negative impact. However, all these education variables are statistically insignificant, which suggests that marriage status has no strong relationship with educational attainments for urban women. Similar to the results of rural women, women have about 1% more possibility to be married than those who are one-year younger. Father's CCP membership, as I expect, has a positive effect on women's marriage status at 10% level of significance. This is quite different from rural women's condition since the value of its coefficient increases and becomes significant at the same time. Therefore, for urban women, father's CCP membership plays a more positive and important role on women's marriage status compared to the case for rural women.

On the other hands, men's regression results reveal a different story from women's. Higher education, instead of negatively affecting possibility of marriage, has a positive impact on men's marriage status. Even men with Bachelor's and higher degrees have no less likelihood to be married than illiterate men in both urban and rural China. Although father's CCP membership increases the possibility of women's marriage, it has no significant effect on marriage status of men. Two results are notable: men with higher intelligence level tend to have higher possibility of being married; the other one is that mother's schooling has a statistically significant negative impact on marriage status for

urban men. Although the influence is small: one-year of extra mother's schooling tends to lower 0.4% marriage rate of urban men, it still reflects mother's schooling as an undesirable attribute of urban men for marriage consideration.

Table 3 lists the results gained from the same regression model of Table 2 except the dependent variable now as "evermarried" which defines as a dummy variable containing the value of 1 for divorced, widowed, and currently married individuals, and 0 otherwise. For rural women, all independent variables are statistically insignificant, a result implies that there might be other factors rather than educational attainments affecting marriage results. As for urban women, the coefficient of "Bachelor's degree and above" should be noticed for its significance, and its relative large value compared to other coefficients of educational variables. Compared to illiterate women, women with Bachelor's and higher degrees are 4% less to be ever married in urban China. This finding demonstrates the relationship between women's education and delayed marriage, a theory discussed in literature review. Besides Bachelor's degree and above, personal income is another significant variable. Although it is close to zero in the table, we cannot deny its effect on marriage status of rural women because of the unclear scaling unit of income in the dataset. Therefore, rural women's personal income has significantly negative effect on their "evermarried" possibility while the value of the effect is uncertain.

The "evermarried" regression analysis shows different results for men. Except "Bachelor's degree and above", all education variables are significant, and all these coefficients reveal positive values. For both rural and urban men, graduating from elementary schools, junior high schools, and senior high schools increases their marriage rate by about 5%, 6.5%, and 6% correspondingly compared to uneducated men. The

positive effect of 2- or 3-year college is greater for rural men than urban men, which leaves the puzzlement that why rural women tend to focus more men's schooling than urban women. One possible explanation for this disparity is provided by the table because men's personal income reveals positive and significant effect on their marriage status, a result which implies that urban women consider more aspects of spouses for marriage. The highest educational attainment explained by "Bachelor's degree and above", is no longer significant in the regression. However, the insignificance of the coefficient seems inconsistent with other education variables because men's education tends to have increasingly positive effect on their marriage possibility. The inconsistency might result from the insufficient sample who have already completed Bachelor's and higher degrees in the dataset.

Table 4 lists the results gained from the same regression model of Table 2 except the dependent variable changing to age at first marriage. The coefficients of education variables for both urban and rural women are now positive and significant. For rural women, completion of primary school increases the age at first marriage by 0.4-year-old; graduation from junior high school delays their first marriage by 0.9 years; a diploma from senior high school delays by about 2 years; accomplishment of 2- or 3- year college delays by 1.7 years; A Bachelor's or higher degree delays by more than 3 years. Similarly, for urban women, an education from primary school delays age at first marriage by 0.7 years; an education from junior high school delays by 1.4 years; an education from senior high school delays by 2.3 years; completion of 2- or 3- year college increases age at first marriage by 2.8-year-old; A diploma of Bachelor's or higher degree increases by 2.8-year-old. The pattern reveals that higher education tends to have greater impact on

increasing women's age at first marriage, a finding which demonstrates the delaying effect of education on women's marriage.

Different regression results are obtained for Chinese men. Although table4 indicate a similar pattern in terms of educational influence on marriage status for urban and rural men, the impact on marriage delay differentiates. For rural men, education seems to have little impact on their age at first marriage. However, as long as a rural man obtain a diploma of Bachelor's or higher degree, he is probable to delay his first marriage by 3 years compared to uneducated counterparts. In terms of urban men, each education level tends to delay marriages. Similar to female results, the higher the level of education, the later the first marriage will take place. Comparing values of coefficients, I find that the general effect of education on age at first marriage is smaller for men than for women. This can be explained by the statistically significant coefficients of personal income, father's CCP membership, mother's schooling and their own intelligence. As a result, men as spouses, are always appreciated for not only educational attainments, but also socioeconomic status in the current Chinese society.

Table 5 lists the results obtained from the 2nd stage of the two-stage least square (2sls) regression models. Two changes are made to independent variables: education is measured by years of schooling; the model includes a new dummy variable indicating the value of 1 for urban residence and 0 otherwise. This causality analysis by applying IV strategy alleviates the impact of education on marriage possibility. For both men and women, years of schooling has no significant on marriage status in the year of 2010 and their possibility of ever being married before the year referring to education coefficients in columns (1). (2), (3), (4), which reveal small value and statistical insignificance. On

the contrary, years of education for women have a strong impact on their age at first marriage. According to the coefficient demonstrated from the table, one-year education delays women's marriage by 0.75 years, a delaying effect which corresponds to OLS analysis. Besides year of schooling, independent variables including age squared, personal income, father's CCP membership, mother's schooling and level of intelligence are significant at 10% significance level. This reveals that with the consideration of causality, women's age at first marriage can also be influenced by socioeconomic factors and their intelligence. As for men, all independent variables are shown as insignificant. This verifies the previous assumption that other important factors might influence men's age at first marriage.

V. DISCUSSION

In OLS analysis, rural and urban China are separated to capture their differences in terms of the impact of educational attainments on marriage status and age at first marriage for both genders. Contrary to my assumption that education tends to have more influence on female than on male marriage status, the regression results demonstrates a greater effect on men's marriage outcomes. In contrast to ignorable impact on female marriage status, educational attainments increase men's possibility of being married. This result can be easily explained by the economic independence theory that education represents the potential of economic status in the future (Tian 2013). Men with higher economic status are more appreciated as spouses in marriages. As for effect on age at first

marriage, education tends to play an important role for both genders, and proves the delaying effect in Chinese context.

One thing should be noticed is the difference between rural and urban China. In my assumption, education should be more appreciated in urban areas considering its more prevalence than rural China. However, the regression results reveal a contradictory result: education is a more approvable attribute in rural China. As I mentioned in results, urban individuals tend to take more factors into consideration for marriage decision. Besides educational attainments, personal income, family background including father's political status and mother's schooling and men's intelligence are evaluated for husband's quality. Thus, the result that urban men's education has smaller effect on marriage is easy to understand.

The causality between education and marriage status is investigated by applying quarter of birth as the instrumental variable for years of schooling. This analysis reveals an insignificant correlation between them, and therefore suggests that delayed marriage among women might not be the result of the promotion in education. However, this insignificant result cannot be fully trusted. In the first place, quarter of birth might not be the optimal instrument in Chinese context, and thus its results can be biased. The second reason is that there are omissions of social factors which offset the impact of education on marriage. China has a long history of social penalty for non-marriage. For example, Watkins (1987) mentions that, in 1930's China, "only freaks and the morally depraved do not marry." Even the current society regards single women as "highly sexual, too materialistic, and not feminine" regardless of their socioeconomic status (Tian 2013). Under the pressure of social penalty, Chinese women are afraid of being unmarried. The

reluctant marriage decision is likely to offset the impact of education on delaying female marriage, and thus at least partly explains the insignificance effect obtained from the 2sls regression.

In addition, even if the IV analysis reveals an insignificant impact of education on marriage, and suggests a weaker effect than I used to consider, it is not enough for me to reject the indirect relationship between education and marriage. According to the economic independence theory, education contributes to women's confidence in their potential of promoting economic status through participating in job market without depending on marriage (Tian 2013). Therefore, women's willingness to delay their first marriage is indirectly caused by increase in their educational background. Besides, the assortative mating theory argues for individual's tendency to find spouse with equivalent socioeconomic and educational backgrounds (Lefgren and McIntyre 2006). In this circumstance, women are not exceptions. According to the distribution of individuals with different levels of schooling, the number of people goes down with the increase of education in the current Chinese society. As a result, educated women have less potential spouses to choose from for marriage. This implicit effect of education on marriage status is also hardly captured by my analysis.

The other uncertainty about my analysis results from the dataset on which I conduct the analysis. The dataset for the study is from China Family Panel Studies (CFPS), which is an individual-level and cross-sectional dataset. According to Asia Research Institute, cross-sectional analysis has some limitations because there might be some common factors that influence both schooling and marriage status, and cross-sectional analysis is nearly impossible to control for such common factors, such as

modernization or westernization (Premchand Dommaraju 2009). Exclusion of significant variables is potential to cause misspecification problems which correlate with biasedness. As a result, further study on the impact of educational attainments on marriage status and age at first marriage in the current Chinese society should be conducted on panel data which can better capture time-trend and the discussed implicit effects. The other advantage of panel data is its applicability to VAR models, which require no specifications for endogenous and exogenous variables. In this case, the causality between education and marriage can be better studied through granger-causality test.

The research demonstrates that the impact of educational attainments on marriage possibility and marriage age for men and women in the current Chinese society is hard to analyze because of the potential causality and unquantifiable variables that affect marriage decisions. Instead of an easy choice, marriage is now a convoluted decision pertaining to multi-factors expanding from personal to social context. Therefore, a conclusive study on this topic should never be restricted to economic and statistical regressions; instead, an interdisciplinary analysis pertaining to psychology, sociology, and gender studies can be brought into this topic.

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Table1: summary statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
everMarried	26585	0.980967	0.136645	0	1
currentMarried	26585	0.891706	0.310757	0	1
ageFirstMarriage	23974	23.16839	3.895322	16	66
age^2	26592	2814.387	1416.363	961	12100
age	26592	51.47157	12.84797	31	110
illiterate	26588	0.344704	0.475281	0	1
primary school	26588	0.223296	0.416463	0	1
junior high school	26588	0.259741	0.438501	0	1
senior high school	26588	0.119152	0.323973	0	1
2-or 3- year college	26588	0.033173	0.179091	0	1
Bachelor’s degree and above	26588	0.019934	0.139776	0	1
personal income	26590	9760.136	20037.57	0	800000
intelligence	26592	4.718524	1.316491	-8	7
CCP membership	26592	0.112026	0.315405	0	1
mother's schooling	11152	2.127869	3.584381	0	22

Table2: OLS regression, marriage status in the year of 2010 as the dependent variable

VARIABLES	(1) rural women currentMarried	(2) urban women currentMarried	(3) rural men currentMarried	(4) urban men currentMarried
primary school	0.007	0.027	0.069***	0.047**
	(0.008)	(0.018)	(0.014)	(0.023)
junior high school	0.005	0.012	0.085***	0.068***
	(0.009)	(0.017)	(0.014)	(0.021)
senior high school	-0.002	-0.012	0.074***	0.055**
	(0.015)	(0.019)	(0.019)	(0.023)
2- or 3- year college	0.030	-0.011	0.114***	0.074***
	(0.046)	(0.025)	(0.042)	(0.027)
Bachelor's degree and above	0.029	-0.031	0.020	0.042
	(0.052)	(0.030)	(0.096)	(0.030)
age	0.015***	0.011**	0.028***	0.021***
	(0.003)	(0.005)	(0.004)	(0.005)
age^2	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
personal income	-0.000	-0.000*	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
CCP membership	0.009	0.026*	0.000	0.021
	(0.009)	(0.013)	(0.015)	(0.014)
mother's schooling	0.001	-0.001	0.001	-0.004**
	(0.001)	(0.001)	(0.002)	(0.001)
intelligence	0.001	0.001	0.017***	0.010**
	(0.003)	(0.005)	(0.004)	(0.004)
Constant	0.689***	0.744***	0.090	0.258**
	(0.069)	(0.111)	(0.102)	(0.115)
Observations	3,004	2,941	3,098	2,860
R-squared	0.041	0.031	0.059	0.046

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: province variables are included in regression models but omitted from the table for simplicity.

Table3: OLS regression, "ever married" in and before the year of 2010 as the dependent variable

VARIABLES	(1) rural women everMarried	(2) urban women everMarried	(3) rural men everMarried	(4) urban men everMarried
primary school	0.005	0.000	0.055***	0.045***
	(0.003)	(0.009)	(0.011)	(0.017)
junior high school	0.003	0.008	0.067***	0.065***
	(0.004)	(0.008)	(0.012)	(0.016)
senior high school	-0.009	-0.001	0.061***	0.066***
	(0.006)	(0.009)	(0.015)	(0.017)
2- or 3- year college	0.007	-0.019	0.098***	0.053***
	(0.019)	(0.012)	(0.034)	(0.020)
Bachelor's degree and above	0.010	-0.040***	-0.014	0.009
	(0.021)	(0.014)	(0.078)	(0.022)
age	0.002	0.012***	0.018***	0.024***
	(0.001)	(0.002)	(0.004)	(0.004)
age^2	-0.000	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
personal income	0.000	-0.000**	0.000***	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
CCP membership	-0.002	0.006	-0.003	0.004
	(0.004)	(0.006)	(0.012)	(0.010)
mother's schooling	0.000	-0.000	0.001	-0.002*
	(0.000)	(0.001)	(0.002)	(0.001)
intelligence	0.002	0.003	0.017***	0.005
	(0.001)	(0.002)	(0.003)	(0.003)
Constant	0.945***	0.684***	0.324***	0.256***
	(0.028)	(0.052)	(0.083)	(0.086)
Observations	3,004	2,941	3,098	2,860
R-squared	0.009	0.049	0.066	0.071

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: province variables are included in regression models but omitted from the table for simplicity.

Table4: OLS regression, age at first marriage as the dependent variable

VARIABLES	(1) rural women ageFirstmarriage	(2) urban women ageFirstmarriage	(3) rural men ageFirstmarriage	(4) urban men ageFirstmarriage
pramiry school	0.401***	0.709***	-0.200	0.090
	(0.129)	(0.203)	(0.197)	(0.310)
junior high school	0.944***	1.415***	-0.307	0.578**
	(0.140)	(0.185)	(0.195)	(0.283)
senior high school	1.826***	2.345***	0.151	1.564***
	(0.240)	(0.208)	(0.252)	(0.299)
2- or 3- year college	1.701**	2.807***	0.818	2.020***
	(0.701)	(0.272)	(0.550)	(0.350)
Bachelor's degree and above	3.262***	2.863***	3.065**	2.639***
	(0.795)	(0.330)	(1.311)	(0.388)
age	-0.013	-0.021	-0.027	-0.134**
	(0.050)	(0.051)	(0.062)	(0.064)
age_2	0.000	0.001	0.000	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
income	-0.000	0.000	-0.000***	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
father's CCP membership	-0.050	-0.093	-0.583***	-0.233
	(0.151)	(0.144)	(0.200)	(0.175)
mother's schooling	-0.016	0.022	-0.003	0.075***
	(0.018)	(0.015)	(0.025)	(0.018)
intelligence	-0.010	-0.008	-0.055	-0.118**
	(0.042)	(0.052)	(0.061)	(0.057)
Constant	20.728***	21.364***	24.276***	26.496***
	(1.123)	(1.225)	(1.438)	(1.523)
Observations	2,807	2,795	2,792	2,669
R-squared	0.108	0.132	0.053	0.132

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: province variables are included in regression models but omitted from the table for simplicity.

Table5: 2sls regression results

VARIABLES	(1) women currentMarried	(2) men currentMarried	(3) women everMarried	(4) men everMarried	(5) women ageFirstmarriage	(6) men ageFirstmarriage
years of education	-0.024	-0.161	-0.000	-0.001	0.746**	4.636
	(0.019)	(0.280)	(0.008)	(0.088)	(0.303)	(6.597)
age	0.015***	0.047	0.008***	0.023*	-0.064	-0.582
	(0.003)	(0.037)	(0.001)	(0.012)	(0.050)	(0.742)
age^2	-0.000***	-0.001	-0.000***	-0.000	0.001**	0.008
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.010)
personal income	0.000	0.000	-0.000	0.000	-0.000*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CCP membership	0.041*	0.154	0.001	0.005	-0.617*	-4.335
	(0.021)	(0.242)	(0.009)	(0.076)	(0.328)	(5.786)
mother's schooling	0.006	0.037	-0.001	-0.001	-0.153*	-0.982
	(0.006)	(0.067)	(0.002)	(0.021)	(0.087)	(1.533)
intelligence	0.021	0.150	0.002	0.014	-0.506*	-3.861
	(0.017)	(0.232)	(0.007)	(0.073)	(0.260)	(5.493)
urban	0.023	0.317	-0.005	0.007	-0.508	-7.577
	(0.048)	(0.554)	(0.020)	(0.174)	(0.762)	(12.598)
Constant	0.700***	-0.039	0.807***	0.294**	21.285***	28.190***
	(0.072)	(0.435)	(0.030)	(0.136)	(1.111)	(7.235)
Observations	5,911	5,937	5,911	5,937	5,574	5,448
R-squared			0.026	0.047		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: province variables are included in regression models but omitted from the table for simplicity.