Economics Bulletin

Volume 35, Issue 2

Identifying the Causal Effect of Marriage on Women's Labor Force Participation in the Presence of Chinese Superstition

Junchao Zhang
Yokohama National University

Shiying Zhang
Yokohama National University

Abstract

Marital status could be potentially correlated with women's labor force participation through unobservable factors. Using micro-data from the Chinese Population Census, this paper exploits exogenous variations in marriage caused by the Chinese Zodiac to estimate the causal effect of marital status on female labor force participation. As a result, the causality of marriage has been found for both rural and urban females in China, decreases the probability of female labor force participation by 46.4 percentage points and 30.7 percentage points, respectively.

We especially thank Omori Yoshiaki, Ayako Kondo, various seminar participants, and one referee for helpful comments. We are responsible for remaining errors.

Citation: Junchao Zhang and Shiying Zhang, (2015) "Identifying the Causal Effect of Marriage on Women's Labor Force Participation in the Presence of Chinese Superstition", *Economics Bulletin*, Volume 35, Issue 2, pages 986-997

Contact: Junchao Zhang - zhang-junchao-dj@ynu.jp, Shiying Zhang - zhang-shiying-sp@ynu.jp.

Submitted: November 02, 2014. **Published:** April 22, 2015.

1 Introduction

An understanding of the relationship between marital status and labor force participation is critical for a number of theoretical and practical reasons. First, economists and demographers (Mincer 1962; Becker 1965; Grossbard-Shechtman 1993) have established a variety of models to link marriage and the labor market. They predict a high negative correlation between the two because married women can pay more attention to childcare and home production than men. Second, the link between marital status and labor force participation might partially explain the work-family conflict (Greenhaus & Beutell 1985; Barnett & Hyde 2011). Apparently, both men and women make complex decisions about how to spend their time within and without marriage. These decisions about time use also affect whether to marry or, once married, whether to stay married. Otherwise, marriage is regarded as one type of investment in human capital.

Although the question is important, the answer is not yet clear-cut because the causality between marital status and female labor force participation is complicated by endogenous marriage decisions. Becker (1973) argues that the observed correlations do not necessarily reflect a causal effect. On the one hand, marriage could give a determinant effect on the female labor force participation. On the other hand, unobservable characteristics, such as women's preferences for marriage and their expectations of careers, could also induce a non-marriage status. Due to the endogeneity, identifying the causal effect of marriage on labor force participation is a challenging task.

Many previous studies have investigated the female labor supply through fertility without accounting for marriage. Angrist & Evans (1998) shows that children lead to a reduction in the female labor supply by using sibling sex composition and twinning births to instrument fertility. Chun & Oh (2002) estimate the effect of fertility on labor force participation in Korea. They use the first child's gender to instrument fertility, and they find that having an additional child reduces the labor supply of Korean women by 27.5 percentage points. Both Angrist & Evans (1998) and Chun & Oh (2002) include only married women in their samples, and thus, the effect of marital status on the labor supply has not been accounted for.

To our knowledge, Van der Klaauw (1996) is the pioneering paper that jointly estimates the marriage and labor supply decision in the United States. Based on a structural model, he finds that ignoring the endogeneity of marriage could overestimate the adverse effect of marriage. However, the structural method must impose parametric assumptions on marriage and labor supply decisions, and then, the dynamic programming problems can be solved. Nevertheless, Lee (2005) shows some reduced-form evidence that marriage has a significant negative effect on female labor force participation by approximately 90 percentage points. Using South Korean data, he exploits the Asian zodiac as an instrumental variable to remove the endogeneity of marital status.

In China, the causal effect of marriage on female labor force participation remains an open question. Few papers have focused on the causality between marriage and labor market outcomes. Maurer-Fazio et al. (2011) employs the Chinese Population Census to estimate married, urban women's labor force participation decisions. They find that the presence of preschool children significantly decreases the women's labor force participation. In their earlier working paper, Maurer-Fazio et al. (2005) analyzes the changing pattern of labor force participation in the Chinese labor market. They report a positive effect of marriage by 5.9 percentage points for rural women aged 15 and older and a negative effect by 1.2 percentage points for urban women. Both of these

studies use Probit models to observe the determinants of the labor force participation.

Using micro-data from the Chinese Population Census, we exploit the Chinese superstition as an instrumental variable (IV) to address the endogeneity of marriage. The "*Shēngxiào*", which is known in English as the Chinese zodiac, derives a similar concept in western astrology and means "circle of animals". This system follows a 12-year mathematical cycle and relates each year to an animal. The animals are Rat, Ox, Tiger, Rabbit, Dragon, Snake, Horse, Goat, Monkey, Rooster, Dog, and Pig. Each zodiac sign has some specific characteristics, e.g., intelligence for the Rat, diligence for the Ox, and so forth. In particular, the Goat year is considered to be related to marriage. There is a widespread folk belief in China that literally "ten goats and nine incomplete". Namely, nine tenths of the people who were born in the Goat year are more likely to suffer from a miserable fate. Especially for women, they are always labeled as "widowed when young" because they are considered to bring misfortune to their husbands/partners. In brief, the Goat year women are unpopular in the marriage market. Therefore, the superstition that induces women into an exogenous selection of marriage might allow us to estimate the causality of marital status on labor force participation.

The remainder of this paper is organized as follows. Section 2 is a description of the data sets and briefly shows the difference in the demographic characteristics between the rural and urban samples. The following section presents the identification strategy that includes the empirical models and necessary assumptions to identify the causal effect. In Section 4, we first discuss the validity of the instrument and the first stage results, and then, we compare the estimates between OLS and IV. Section 5 provides a summary.

2 Data

Our primary data source is the 0.95‰ sample of the 2000 Population Census that has been conducted by the National Bureau of Statistics of the People's Republic of China. These data comprises the fifth of the series and follows the previous four censuses, which were collected in 1953, 1964, 1982, and 1990. The sample covers 1,180,111 individuals from 327,890 households. The dataset provides information on a variety of household characteristics and includes variables that describe the location, size, type, and composition of the household. Furthermore, information on each individual residing in the household is reported. The individual level information contains demographic characteristics, educational attainment, occupation, ethnicity, marital status, and fertility.

To sharpen the focus of this paper, first, we limit our sample to those women who have never been married or are in their first marriage. Second, we restrict these women to 17 - 30 years old, which is when the majority of women are first married. Approximately 90% of the women are married if they are over 30. The final sample contains 100,822 never married and first married women, only 27.4% of them have household registration records (*hukou*[*]) in urban areas. The average age is 23.7, and approximately 90% of the rural residents are not greater than middle school education while only 28% are middle school levels or less for urban residents.

We assign individuals' Chinese zodiac signs according to the birth information reported in the census. Unfortunately for privacy concerns, only the year of birth and

[*]A *hukou* is a record in the system of household registration that is required by law in the People' s Republic of China (mainland China). A household registration record officially identifies a person as a resident of an area and includes identifying information such as name, parents, spouse, and date of birth.

month of birth information are provided, which are reported by the solar calendar. However, the Chinese zodiac signs follow the lunar calendar. We have to transform the solar calendar to the lunar calendar, which makes it difficult to calculate the Chinese zodiac signs.* We cannot confirm a person's Chinese zodiac sign if he was born in January or February when we do not know his date of birth. As an alternative method, we delete them from the sample and only keep those who were born during March to December. Thus, the reported year of birth by the solar calendar is identical to the year in the lunar calendar.

We define the labor force participation according to the information about the job status in the census. Only those who are employed or unemployed but looking for a job are defined as participating in the labor force. Students, homemakers, retired persons, and disabled persons are not counted as labor force. In this sub-sample, for women of age 17-30, the labor force participation rate is approximately 81.1%, which is slightly higher than the country aggregate and developed countries.†

In Table 1, we report the descriptive statistics by Chinese zodiac signs and locations. Columns 1 and 2 display statistics for the rural sample by the Goat sign and other signs, which contain 4951 persons born in the Goat years and 68287 persons born in other years. Columns 3 and 4 display statistics for the urban sample by the Goat sign and other signs, which contain 1922 persons born in the Goat years and 25662 persons born in other years. Those of Goat and other zodiacs are different in age, marital status, years of schooling and labor force participation. Especially Goats have higher educational attainments compared with other zodiac years, which implies that they are not popular in the marriage market, and thus, that they choose further studies. The average age of Goats is approximately 21.3, which is younger than other zodiacs in this sample. This finding also explains partially why Goats are less likely to be married. The proportion of the Goat zodiac does not differ between races.

3 Identification Strategy

Marital status could be correlated with female labor force participation due to unobserved factors such as attitude toward marriage, ability and so forth. If so, the estimated coefficients by Ordinary Least Squares (OLS) will be biased. Alternatively, we employ Chinese superstition as instrumental variables (IV) to address this endogenous problem. Following the Two-Stage Least Squares (2SLS) method, the model can be written as follows:

$$LFP_i = \beta_0 + \beta_1 Married_i + \boldsymbol{X}'\beta_2 + u_i \tag{1}$$

where LFP_i represents the labor force participation of the female individuals, which equals 1 if the individual participates and 0 otherwise. The variable $Married_i$ is the marital status, which equals 1 if the individual is first married and 0 for never married. To simplify the analysis, we drop those women who are divorced and widowed to observe the effect of marriage. X is a vector of individual characteristics, which includes the age,

*The lunar new year differs each year in the solar calendar, and it is the boundary of the two adjacent Chinese zodiac signs. For example, people who were born in 1979 are assigned Goat zodiac sign if their birthdays are after Jan. 28th, but Horse zodiac signs if not.

†According to the World Bank data, the labor force participation in China was 77% in 2000, 66% in the United States, 62% in Japan, 62% in the United Kingdom. In the 0.95‰ sample of the 2000 Population Census, the labor force participation was 76.9% in China.

age squared, education level, ethnic group, and province where the woman resides. We also estimate rural and urban subsamples separately to determine the difference between areas that are in entirely different economic conditions.

Our parameter of interest is β_1, which represents the coefficient of the marital status. Due to the endogenous problem of marital status, we use the Goat sign as the instrumental variable for the marital status to identify the causality. The first stage of the two-stage least squares (2SLS) estimation equation is given by

$$Married_i = \alpha_0 + \alpha_1 Goat_i + \boldsymbol{X}'\alpha_2 + v_i \tag{2}$$

In Equation (2), $Goat_i$ is a dummy variable that equals 1 if born in the Goat year and 0 otherwise. X is the same vector of control variables, which includes age, age squared, education level, ethnic group, and province in Equation (1).

We exploit the Goat sign as an unusual instrument to solve the endogeneity of marriage. To check the validity of this instrumental variable, two necessary conditions should be satisfied, namely, that

$$Cov(Goat, Married) \neq 0 \tag{3}$$

$$Cov(Goat, u) = 0 \tag{4}$$

where Condition (3) means that the Goat sign should have an effect on a woman's marriage. If not, then the Goat sign will not be valid as an instrument. Condition (4) is the exclusion restriction, which implies that the Goat sign is uncorrelated with any other determinants of the labor force participation.

We can check Condition (3) by the estimated coefficients in Table 2. We can see that the Goat sign instrument affects marriage significantly. In other words, Condition (3) is satisfied. However, Condition (4) cannot be tested empirically, and we consider that the Chinese zodiac sign could not directly affect the error term u_i of the labor force participation in Equation (1). The reason is that those women who were born in the Goat years are only discriminated against in the marriage market, and no evidence shows that they are discriminated against in the labor force market.

To allow the marriage probability to differ with age, we also estimate an over-identified model by three instruments, which are Goat and its interaction terms with age and age squared. The continuous age variable allows for a few variations among Goat in the cross-sectional census.

4 Results

In this section, we discuss the regression estimates of OLS and IV, which were designed to test whether marriage has a negative effect on female labor force participation in China. We first discuss several issues regarding the validity of using the Goat sign as the IV for marriage. Then, we use the Goat sign to instrument marital status (first married or never married), and we perform estimations as specified by Equations (1) and (2). The results are shown in Table 2. In the following Tabel we show the over-identified model results. It is worthwhile to emphasize that we regressed the urban and rural samples respectively. This approach allows us to examine whether the effect of marriage is different in rural versus urban areas. For all of the regressions, we control for a full set of personal characteristics that comprise age, age squared, an indicator of being a

minority, educational attainments, and provincial dummies. Due to space constraints, the estimates for the provincial dummies are not reported. When estimating the OLS and IV coefficients, linear probability models are used because they are more robust than Probit-IV, and we report White-Huber standard errors due to the heteroskedasticity.

4.1 The First Stage

Before reporting the estimates, we first discuss the validity of using the Goat sign as IV in our paper. A good IV should be highly correlated with the marital status but should not affect female labor supply except through the marital status. In other words, a valid IV should not be correlated with unobserved characteristics that are captured by the error term u_i in Equation (1). The zodiac sign is an important source of exogenous variations in marriage for Asian countries, and Lee (2005) shows that the Horse zodiac has a negative effect on women's marriages in South Korea. The zodiac sign will be a good instrument for marriage because it is determined by the birth year, which is predetermined to an individual. Although the correlation between the Goat sign and unobserved characteristics cannot be tested by design, no previous studies have shown any evidence that the birth year is correlated with the family background.

The Goat sign affects people's marriages statistically. In other words, the IV is valid in the first stage. From columns (3) and (6) of Table 2, we can see that our instrument, the Goat sign, has significant negative effects on women's marital status for both the rural and urban samples. If a rural woman were born in the Goat year, she would be less likely to be married by 10.5 percentage points. However, if an urban woman were born in the Goat year, she would be less likely to be married by 13.7 percentage points. This finding implies that the Chinese male's preference in the potential wife's zodiac sign is powerful and decreases woman's probability of marriage. We show the over-identified model results in Table 3, the Goat effect keeps stable with the just-identified model and the over-identification test easily passed.*

Age shows a different size coefficient, but it is in the same direction for both the rural and urban areas. Compared to rural women, urban women are not as anxious to get married when they turn a year older. From the first stage results from Table 2, we can see that turning 1 year older will increase the probability of being married by 29 percentage points in the rural sample, while it is only increased by 6.8 percentage points in the urban sample. In rural areas, getting married at an early age is very common because most of the people are engaged in agriculture. They rarely face the challenge of how to weigh the potential benefits of marriage against their careers.

In addition, education shows different effects for rural and urban women. In rural areas, women who are educated less than primary school will have higher probabilities to be married by 5.1 percentage points, which is significant. However, women who are educated less than primary school will have lower probabilities to be married in urban areas (by 1.2 percentage points, which is insignificant in terms of statistics). Going to high/technical schools and above shows a significant negative effect in both rural and urban areas, but the coefficients are larger in the rural sample. This finding implies that more education makes it difficult for women to get married when the men's educational

*As we have shown in the descriptive statistics, the average age of Goat is 21.283 for the rural sample and 21.272 for the urban sample. Thus, we can calculate the Goat effect in the over-identified model. For the rural sample, $-106.6989 + 9.9648 * 21.283 - 0.2329 * 21.283^2 = -11.39\%$. For the rural sample, $-54.2042 + 5.1076 * 21.272 - 0.1206 * 21.272^2 = -12.66\%$.

attainments are not very high.

4.2 OLS and IV Estimations

Table 2 shows OLS estimates in columns (1) and (4) and IV estimates in columns (2) and (5) for the rural and urban samples, respectively, along with the first-stage relationship between marriage and the Goat sign. The over-identified model results in Table 3 keep stable with Table 2. In all of the regressions, provincial dummies are controlled. The 2000 Population Census covers 31 provinces except for Taiwan, Hongkong, and Macau. Due to space constraints, the estimates for provincial dummies are not reported.

The OLS estimates show that marriage significantly decreases the probabilities of female labor force participation. From columns (1) and (4) in Table 2, married women have lower probabilities of participating in the labor market by 13.3 percentage points in rural areas and by 12.3 percentage points in urban areas. The difference in the marriage effects between the rural and urban areas is not very large, at the same level at least. However, the OLS estimates do not reflect the causal effect because the endogeneity of marriage is not accounted for.

Compared to the OLS estimates, the IV estimates show a larger effect of marriage. From columns (2) and (5) in Table 2, we can see from the IV estimation that marriage decreases the probability of participating in the labor force market by approximately 47.4 percentage points for the rural sample and 30.2 percentage points for the urban sample. The differences between the OLS estimates are 34.1 percentage points and 17.9 percentage points. The IV estimates change dramatically for the following reasons. First, in the OLS estimation, there are several potential omitted variables that will cause an OVB (Omitted Variable Bias), such as attitude toward marriage, ability, and other unobserved characteristics. The OLS estimates will be upward biased toward zero if unobserved factors have positive effects on marriage. Suppose that more capable people have higher probabilities to get married; then, the positive correlation between ability and marital status will bias the OLS results upward. Second, the IV method captures the effect of treatment on compliers. The average effect for this group is called a local average treatment effect (LATE). In our research, this effect is the effect of marriage on those of Goat, who married because they were born in the Goat year but would not get married otherwise.

In addition, the IV estimates display an enormous gap between the rural and urban areas. The IV estimate of being married in the rural sample is larger in size than in the urban sample by 17.2 percentage points. However, no such evidence has been found in the OLS results. In general, rural women have higher probabilities of performing housework after getting married, and they have more pressure to look after babies. In the urban areas, the one child policy is relatively intensive, and as a result, the number of children of ever-married women is potentially less for the rural women.

What also shocks us is that education has an entirely inverse effect on rural and urban residents. From the IV estimation, columns (2) and (5), we can see that being educated less than or equal to primary school decreases the probability of labor force participation by 14.7 percentage points for the urban sample; however, it increases the probability of labor force participation by 2.4 percentage points for the rural sample. A reasonable fact is that knowledge and skill are required while finding a job in the urban areas because the urban areas have experienced a high-speed growth in economics, which brings a large amount of technical progress. However, the rural residents do not face this situation at all and have no incentive to be highly educated.

4.3 Policy Implication

Women face a complicated problem of work-family conflict with respect to whether to choose a more successful career or a happier family life. On the one hand, decreasing the female labor force participation will have a negative impact on their incomes and the development of human capital. On the other hand, increasing the time spent with families will enhance their marriage-specific human capital. During 1990 to 2010, the labor force participation of women aged 15-64 in China decreased by approximately 10 percentage points. The rapid recession in the female labor supply could have adverse effects on the women and their children through the decline in human capital.

We make the following proposals to increase the female labor supply in China. First, the government should improve the employment conditions for married women. A friendly environment for married women will decrease the opportunity costs of their employment in such a way that they can weigh the balance between work and family. Second, the governments should discourage women from getting married at an early age, and then, the decreasing female labor supply might be slowed down.

5 Concluding Remarks

In this paper, we analyze the effect of marital status on the labor force participation by utilizing a representative census dataset from China. To find the causal link between marriage and female labor force participation, we then instrument marital status with the Chinese zodiac sign to run an IV estimation. Finally, we find supportive evidence that marriage decreases the probability of participating in the labor market by 46.4 percentage points and 30.7 percentage points for rural and urban areas, respectively. The effects of marriage are not uniform between the rural and urban areas in terms of their size, which is not found in the OLS estimation.

References

Angrist, Joshua D. and Evans, William N. (1998) "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *The American Economic Review* **88(3)**, , 450-477

Barnett, Rosalind C. and Hyde, Janet S. (2011) "Women, Men, Work, and Family," *American Psychologist* **56(10)**, 781-796

Becker, Gary S. (1965) "A Theory of the Allocation of Time," *The Economic Journal* **76(299)**, 493-517

Becker, Gary S. (1973) "A Theory of Marriage: Part I," *Journal of Political Economy* **81(4)**, 813-846

Becker, Gary S. (1985) "Human Capital, Effort, and the Sexual Division of Labor," *Journal of Labor Economics* **3(1)**, 33-58

Chun, Hyunbae and Oh, Jeungil (2002) "An Instrumental Variable Estimate of the Effect of Fertility on the Labour Force Participation of Married Women," *Applied Economics Letters* **9(10)**, 631-634

Connelly, Rachel (1992) "The Effect of Child Care Costs on Married Women's Labor Force Participation," *The Review of Economics and Statistics* **74(1)**, 83-90

Greenhaus, Jeffrey H. and Beutell, Nicholas J. (1985) "Sources of Conflict between Work and Family Roles," *The Academy of Management Review* **10(1)**, 76-88

Grossbard-Shechtman, Shoshana (1993) "On the Economics of Marriage: A Theory of Marriage, Labor, and Divorce," Westview Press

Juhn, Chinhui and Potter, Simon (2006) "Changes in Labor Force Participation in the United States," *The Journal of Economic Perspectives* **20(3)**, 27-46

Lee, Jungmin (2005) "Marriage, Female Labor Supply, and Asian Zodiacs," *Economics Letters* **87**, 427-432

Maurer-Fazio, Margaret, Hughes, James and Zhang, Dandan (2005) "Economic Reform and Changing Patterns of Labor Force Participation in Urban and Rural China," *William Davidson Institute Working Papers Series*, wp787

Maurer-Fazio, Margaret, Hughes, James and Zhang, Dandan (2010) "A Comparison and Decomposition of Reform-Era Labor Force Participation Rates of China's Ethnic Minorities and Han Majority," *International Journal of Manpower* **31(2)**, 138-162

Maurer-Fazio, Margaret, Connelly, Rachel, Chen, Lan and Tang, Lixin (2011) "Childcare, Eldercare, and Labor Force Participation of Married Women in Urban China: 1982−2000," *Journal of Human Resources* **46(2)**, 261-294

Mincer, Jacob (1962) "Labor Force Participation of Married Women: A Study of Labor Supply," *Aspects of Labor Economics*, Princeton University Press, 63-106

Van der Klaauw, Wilbert (1996) "Female Labour Supply and Marital Status Decisions: A Life-Cycle Model," *The Review of Economic Studies* **63(2)**, 199-235.

Table 1: Descriptive Statistics

	Rural Sample		Urban Sample	
	(1) Others	(2) Goat	(3) Others	(4) Goat
LFP	0.861	0.910	0.672	0.672
	(0.346)	(0.286)	(0.470)	(0.470)
Married	0.593	0.281	0.487	0.089
	(0.491)	(0.449)	(0.500)	(0.286)
Age	23.936	21.283	23.869	21.272
	(3.972)	(0.234)	(3.966)	(0.236)
Age squared	588.704	453.000	585.481	452.540
	(186.697)	(9.973)	(186.299)	(10.038)
Minority(=1 if not *Han*)	0.105	0.104	0.070	0.075
	(0.306)	(0.306)	(0.256)	(0.264)
Education				
Primary school or less	0.334	0.260	0.024	0.018
	(0.472)	(0.439)	(0.154)	(0.134)
Middle school	0.577	0.621	0.269	0.183
	(0.494)	(0.485)	(0.444)	(0.386)
High/technical school	0.084	0.109	0.474	0.482
	(0.278)	(0.312)	(0.499)	(0.500)
Higher education	0.005	0.009	0.233	0.317
	(0.067)	(0.097)	(0.423)	(0.466)
Observations	68,287	4,951	25,662	1,922

Notes: Standard errors in parentheses. Columns (2) and (4) show descriptive statistics for females of Goat. Columns (1) and (3) show descriptive statistics among females of other 11 zodiacs.

Table 2: Estimated Coefficients

	Rural Sample			Urban Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	IV	First Stage	OLS	IV	First Stage
Dependent Variables	LFP	LFP	Married	LFP	LFP	Married
Age	0.1553***	0.2450***	0.2895***	0.5243***	0.5320***	0.0678***
	(0.0047)	(0.0133)	(0.0042)	(0.0083)	(0.0091)	(0.0075)
Age squared	-0.0029***	-0.0042***	-0.0042***	-0.0098***	-0.0096***	0.0005***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)
Married	-0.1326***	-0.4644***		-0.1225***	-0.3067***	
	(0.0037)	(0.0463)		(0.0065)	(0.0777)	
Goat			-0.1046***			-0.1371***
			(0.0064)			(0.0071)
Minority(=1 if not *Han*)	0.0168***	0.0189***	0.0060	-0.0171*	-0.0146	0.0140
	(0.0043)	(0.0047)	(0.0047)	(0.0103)	(0.0105)	(0.0087)
Education						
Primary school or less	0.0068**	0.0236***	0.0506***	-0.1447***	-0.1474***	-0.0117
	(0.0027)	(0.0038)	(0.0027)	(0.0212)	(0.0213)	(0.0143)
High/technical school	-0.2814***	-0.3086***	-0.0817***	0.0285***	0.0169**	-0.0623***
	(0.0060)	(0.0072)	(0.0042)	(0.0066)	(0.0082)	(0.0052)
Higher education	-0.3657***	-0.4565***	-0.2702***	-0.1111***	-0.1402***	-0.1551***
	(0.0258)	(0.0292)	(0.0179)	(0.0071)	(0.0137)	(0.0060)
Constant	-1.1598***	-2.3507***	-3.7886***	-6.0884***	-6.2942***	-1.3839***
	(0.0602)	(0.1764)	(0.0496)	(0.0978)	(0.1345)	(0.0854)
Provincial dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	73,238	73,238	73,238	27,584	27,584	27,584
R^2	0.1167	0.0257	0.6060	0.2869	0.2703	0.5706

Notes: Robust standard errors in parentheses. Provincial dummies are controlled in all regressions. The base group of educational attainment dummies is the middle school level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Estimated Coefficients for Over-Identified Models

	Rural Sample			Urban Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	IV	First Stage	OLS	IV	First Stage
Dependent Variables	LFP	LFP	Married	LFP	LFP	Married
Age	0.1553***	0.2478***	0.2892***	0.5243***	0.5317***	0.0679***
	(0.0047)	(0.0132)	(0.0042)	(0.0083)	(0.0091)	(0.0075)
Age squared	-0.0029***	-0.0042***	-0.0042***	-0.0098***	-0.0096***	0.0005***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)
Married	-0.1326***	-0.4749***		-0.1225***	-0.2999***	
	(0.0037)	(0.0456)		(0.0065)	(0.0773)	
Goat			-106.6989***			-54.2042***
			(21.3767)			(17.6958)
Goat*Age			9.9648***			5.1076***
			(2.0103)			(1.6661)
Goat*Age squared			-0.2329***			-0.1206***
			(0.0473)			(0.0392)
Minority(=1 if not *Han*)	0.0168***	0.0189***	0.0059	-0.0171*	-0.0147	0.0141
	(0.0043)	(0.0047)	(0.0047)	(0.0103)	(0.0105)	(0.0087)
Education						
Primary school or less	0.0068**	0.0242***	0.0505***	-0.1447***	-0.1473***	-0.0117
	(0.0027)	(0.0038)	(0.0027)	(0.0212)	(0.0213)	(0.0143)
High/technical school	-0.2814***	-0.3094***	-0.0817***	0.0285***	0.0173**	-0.0623***
	(0.0060)	(0.0071)	(0.0042)	(0.0066)	(0.0082)	(0.0052)
Higher education	-0.3657***	-0.4594***	-0.2697***	-0.1111***	-0.1391***	-0.1552***
	(0.0258)	(0.0292)	(0.0180)	(0.0071)	(0.0136)	(0.0060)
Constant	-1.1598***	-2.3882***	-3.7860***	-6.0884***	-6.2865***	-1.3858***
	(0.0602)	(0.1741)	(0.0496)	(0.0978)	(0.1342)	(0.0855)
Provincial dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	73,238	73,238	73,238	27,584	27,584	27,584
R^2	0.1167	0.0198	0.6061	0.2869	0.2715	0.5706
F of excluded instruments			158.30			83.29
Hansen J statistic			p=0.1790			p=0.3024

Notes: Robust standard errors in parentheses. Provincial dummies are controlled in all regressions. The base group of educational attainment dummies is the middle school level. *** p<0.01, ** p<0.05, * p<0.1