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Does Higher Education Lead to Fewer Children? Evidence from China

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ABSTRACT
This paper investigates the relationship of parental education on fertility using the Fixed-Effects model through a national dataset-CFPS (China Family Panel Studies). The fixed-effect estimation can control the time effects and the province-specific effects, therefore allow us to avoid potential omitted variable bias and ensures external validity. The finding suggests that both parents' education have a negative effect on fertility, with fathers having roughly 1/3 of the effect of mothers: each additional year of female education reduces the number of children born in the family by 0.024, while each additional year of male's education reduces the number of children born in the family only by 0.008. This relationship is highly robust across different family income levels. Our results extend previous literature, which mainly focuses on mothers' education and provides a systematic understanding of how parents' education contributes to fertility. Therefore, this paper can provide support for implementing fertility and education policy in China, and also serve as a reference for other developing countries.

Keywords: *Fertility, Education, Effect of parents' education*

1. INTRODUCTION

Since the 1950s, the world has witnessed an unprecedented decline in the fertility rate. The total fertility rate (TFR), the average number of children born to women, has rapidly declined from 5 to 2.5 over the last 70 years. This continuous decline in the fertility rate over the world has potentially devastating consequences for the development of the economy and human society. For instance, as the working-age population decreases, many countries have experienced workforce shortages for a long time, so that they are eager to take in immigrants and refugees to fill the domestic labor gap. According to statistics from the International Labor organization and UNHCR, more than 10% of all the world refugees are now living in EU, as well as more than 33 million labor migrants, which accounts for approximately 17% of the total EU labor force. The severe labor shortage has ultimately reduced productivity and technological innovation. Specifically, it results in a wage boom in the local area, which seems beneficial to the society, yet the increasing labor cost may drive investors to other areas, thus the massive loss of capital would have a negative impact on innovation. Another big issue arising from declining fertility rates is the aging population. It indicates an increasing proportion of the population receiving social benefits and a decreasing proportion of the population responsible for shouldering them, which has put considerable pressure on the local social security system in many areas. Especially in Japan, it is common that people over 65 continue working. One of the main reasons is the increased burden of social welfare, thus the pensions elderly people received are unable to sustain their lives. All in all, the overall decline in fertility has a severe negative impact on social and economic development.

The UN data shows China's fertility rate of the 1950s was 6.71, it was two-times above the average level of the most developed countries). However, until the 1980s, it directly fell to 3, while the world's average was still close to 4 children per woman. This was largely due to the implementation of "one-child" policy, which allowed most families to have only one child. Since then, with the rapid economic development of China, the fertility rate has been declining steadily. In the 2010s, the fertility rate of China falls to 1.6, which is almost equal to that of developed countries. Even after abandoning the one-child policy in 2016, China's fertility rate is still stable and there has been almost no increase since then. Therefore, one major question arises: why Chinses people do not give birth to more children now?

The effect of fertility has long been studied by Western researchers. Myrskylä et al. (2009) use Human Development Index (HDI) as the measurement, overturning the well-established conclusion that fertility has a negative impact on development. They find that there is an optimal point, before this point, country's development is negatively correlated with fertility; but after this point, the relationship is reversed and becomes positive [1]. Meanwhile, many other literature focuses on the effectiveness of fertility policies, such as Joshi and Schultz (2013), who study a 1977 family planning program in Matlab, Bangladesh. They find that the fertility planning program not only reduced fertility in the long term, but also improved the health and Ill-being of local children [2]. Regarding China, many researchers are also interested in discussing whether the one-child policy is the main factor for fertility decline. Wang Feng et al.(2013) use empirical methods to simulated the level of fertility in China without the one-child policy, through which, they argue that even without the one-child policy, the fertility rate would have declined to its current level as in 2010 [3].

Moreover, the factors that account for fertility are more widely referred in the literature. Calvin Goldscheider (1971) started to explore the role of religion in fertility decline [4], and the empirical findings of the Princeton studies of the decline of fertility in Europe have revealed how cultural beliefs or social norms, including religious practices, affect the fertility behavior in Europe and elsewhere (Lesthaeghe and Wilson, 1986) [5]. Some researchers have also found that access to reproductive technologies, such as contraception and safe abortion, plays a vital role in fertility decline (Malcolm Potts, 1997; Goldin and Katz, 2002; Ginneken and Razzaque, 2003; Bailey, 2010) [6] [7] [8]. More recently, an increasing number of studies have focus on the association between education of women and fertility [9], some of the empirical findings have clearly suggested a causal relationship between women's rising education and fertility decline (Becker et al., 2013) [10]. Such findings are not surprising, as the female labor force participation has long been considered as one of the core determinants of the fertility (Sweet, 1973) [11]. However, despite a firm recognition of an inverse relationship between female education and fertility, a systematic understanding of how parents' education contributes to fertility is still lacking, our research aims to fill this gap by answering the following research questions:

(1) Whose level of education has a greater impact on fertility, male or female?

(2) If the mother's education level has a greater impact on fertility, what role does the father's education level play in fertility?

(3) Whether the effect of education on fertility differ across family income?

Through empirical analysis, we conclude that not only female education has a significant effect on fertility, but male education also plays an essential role in fertility: each additional year of female education reduces the number of children born in the family by 0.024, while each additional year of male's education also reduces the number of children, but only by 0.008, approximately one third of female's. Moreover, the negative effect of female education on fertility increases as household income increases, while the effect of male education on fertility remain steady across different household income.

Leibenstein (1973) said that most of the families analyzed in Western micro-demographic economics are "middle-class families". Unlike Western countries, the proportion of middle-class in China is rather small, the fertility preferences and the cost of education vary among families of different classes. Therefore, understanding the impact of parental education on fertility in China can provide support for implementing fertility and education policy in China; secondly, China is moving from a developing country to a developed country, using China as a sample can serve as a reference for other developing countries.

The remainder of the paper is organized as follows: Section II briefly describes the fertility policy implemented in China, from the one-child policy in the 1980s to the three-child policy today. In Section III, we introduce the data we use and our approach to the fix-effect model. Section IV presents the results of our estimation. In Section V and VI, we present the evidence on heterogeneity and discusses a variety of robustness check. Section VII concludes.

2. BACKGROUND

China has the largest population in the world. According to the founding of New China, the huge population and the rate of population growth have brought enormous pressure on economic development. Therefore, China officially established one-child policy as the basic state policy in 1982, which advocating late birth and late childbearing, and only allow each family to have one child, except for some ethnic minorities. However, after 20 years, it can not be ignored that the strict implementation of the one-child policy has brought sever social problems, especially the aging population and the imbalance betIen men and women, have been a hidden obstacle to the long-term development of the Chinese economy. As a result, in 2013, the government gradually liberalized the one-child policy, as long as one parent is an only child, they can legally give birth to two children; in 2016, the two-child policy that allowed all couples to have two children was formally implemented; and within few years, the three-child policy is also approved in 2021.

However, with the change of the fertility policy, the

Chinese population has not achieved an expected increase, the fertility rate is continuing to decline. So the question arises, why Chinses people do not have more children?

3. DATA AND METHODOLOGY

3.1 Data

The data I used in the paper comes from China Family Panel Studies (CFPS), which is a national survey conducted by the Institute of Social Science Survey (ISSS) of Peking University, China. The CFPS formally implemented a baseline survey in 2010, and continue to conducted a follow-up survey in 2012, 2014, 2016 and 2018 respectively. The target sample size of CFPS was 16,000 households, and the scientific sampling approach allows the CFPS sample representative of the country by weighting.

Our analysis is based on cross-sectional data covering the year 2010 through 2018 from the CFPS dataset, from which we selected all households that were in marriage or cohabitation status, and other key variables mainly comes from household level such as family income, number of children etc. As shown in table 1-3, there are 58,919 households in total, the sample was representative with respect to year and Hukou, as nearly half of the sample(53.82%) was living in rural, of which the proportion of each year is around 20%. The average number of children born in each family is 1.56, with rural households having 1.75, significantly higher than the urban average of 1.34. In addition, there is a considerable difference between rural and urban parental education and income, with urban being much higher than those in rural areas.

Table 1: Descriptive Statistics

Year Hukou (urban or Rural)	2010 Freq (Percent)	2012 Freq (Percent)	2014 Freq (Percent)	2016 Freq (Percent)	2018 Freq (Percent)	2010-2018 Freq (Percent)
Rural (Urban=0)	6,113	6,937	6,492	6,489	5,678	31709
	(53.77)	(56.98)	(53.66)	(53.23)	(51.22)	(53.82)
Urban (Urban=1)	5,255	5,238	5,607	5,702	5,408	27210
	(46.23)	(43.02)	(46.34)	(46.77)	(48.78)	(46.18)
Total	11368	12175	12099	12191	11086	58919

Table 2: Descriptive Statistics

Variables	N	Mean	SD	Min	Max
Number of Children	60,016	1.561	1.056	0	10
Mother's Education(Year)	57,729	6.034	4.852	0	22
Father's Education(Year)	57,615	7.733	4.316	0	22
Mother's Age	60,003	47.59	14.01	16	95
Mother's Income	50,074	8,240	20,070	-17	1.800e+06
Father's Income	51,703	17,640	30,838	-17	1.800e+06
Family Income per person	58,302	16,961	42,424	0	4.168e+06

Table 3: Descriptive Statistics

	Rural (urban=0)					Urban (urban=1)				
Variables	N	mean	sd	min	max	N	mean	sd	min	max
Number of Children	31,709	1.750	1.115	0	10	27,210	1.340	0.941	0	10
Mother's Education(Year)	30,549	4.546	4.345	0	22	26,244	7.729	4.854	0	22
Father's Education(Year)	30,442	6.681	4.053	0	19	26,193	8.927	4.310	0	22

Mother's Age	31,704	47.58	13.90	16	90	27,207	47.92	14.10	17	95
Mother's Income	26,122	4,906	13,180	-17	800,000	23,234	11,878	25,256	-17	1.800e+06
Father's Income	27,017	13,037	23,446	-17	1.200e+06	23,869	22,685	36,912	-17	1.800e+06
Family Income per person	30,793	11,604	33,701	0	4.168e+06	26,491	23,123	50,173	0	3.300e+06

3.2 Methodology

This paper adopts the Fixed-Effect Model to estimates the number of children in the family as a function of parents' education, age, personal income, family income, ethnicity, Hukou (urban or rural). The fixed effect variables are Province and Year. The province fixed effects are included to solve the endogeneity problem, especially controlling for time-invariant location-related omitted variable bias, such as differences in the level of economic development across provinces. While Year fixed effects are included to control for national shocks like policy changes overtime. Since China's policy on fertility began to change gradually after 2010, these changes may affect fertility greatly but are otherwise not captured. To summarize, we estimate the following equation:

$$Y_{ipt} = \beta_0+\beta_1 X_{ipt}+\sum \text{Controls}+\alpha_p+ \lambda_t +\epsilon_{itp} \quad (1)$$

Where I represents each family, p represents each province and t represents each year (from 2010 to 2018). Y_{ipt} is the number of children the family I have in province p in year t. X_{ipt} is a vector of parental education, which we measured in years of education they received; α_p are province dummies; λ_t are year dummies; and ε_{ipt} is the error term.

Control variables include mothers' age, personal income, family income per person, ethnicity and Hukou (urban or rural). I add the female's age as a control variable because there are certain restrictions on women's childbearing from a biological perspective. It is long been recognized by the public that female's prime childbearing age is 22-35 years old. Once over 40 years old, women are usually facing a great risk at pregnancy, thus it is undoubtedablely that women's age poses a significant impact on fertility.

In addition, I also take mothers' and fathers' annual income into consideration respectively. As for women, there is a substitution effect between childbirth and work: the higher a woman's income, the higher the opportunity cost of childbirth. While for men, on the contrary, as the traditional breadwinner, the higher a man's income, the more capable they are to have children. Meanwhile, another income-related control variable I add is the family income per person. we separate the family income per person from individual parental income because in Chinese society, there are often three or more generations in the same household. Even if they do not live together, grandparents usually do their best to help raise the youngest generation.

Moreover, ethnicity is added to control for the effect of policies. Ethnic minorities are usually not subject to the one-child policy in China, and I include households in which either parent is an ethnic minority as an ethnic minority family. Finally, as for Hukou, it is to distinguish urban and rural, which is necessary because there is a big gap between urban and rural areas in China, especially the cost of living.

4. RESULTS

Table 4 shows the empirical results from my regression, as column 1-5 in Table 4 shows that there is a strong negative correlation between a mother's education and fertility: each additional year of a mother's education reduces the number of children in the family by an average of 0.044, which is consistent with findings in traditional literature. Moreover, even after we added father's education, mother's age, and parents' personal income into regression, the coefficient of mother's education remain stable, still around -0.04, while the coefficient of father's education remains -0.009.

However, when we also control family income, ethnicity and Hukou(urban or rural) as shown in column 6, I can find a sharp decrease in the effect of parental education on fertility, with the effect of mother's education dropping to -0.033 and father's to -0.004. This finding may indicate that the reason why parental education has a negative effect on childbearing is actually partly due to whether family income can support the cost of childbearing and whether policies allow for parents to have more children.

Furthermore, with the fixed province and year effects in columns 7-8, we can clearly see that both coefficients of male and female education is negative and statistical significant: each additional year of female education reduces the number of children born in the family by 0.024, while each additional year of male's education also reduces the number of children, but only by 0.008, approximately one-third of female's.

In conclusion, not only do our empirical results agree with the traditional argument in previous literature that female education is negatively correlated with fertility, but also our results indicate that education of males has a significant negative impact on fertility, even though not as big as that of female. The effect of father's education

on fertility is about one-third that of mother.

Table 4----Regression Results:The Effect of Parents' Education on Fertility

Variables	(1) Number of Children	(2) Number of Children	(3) Number of Children	(4) Number of Children	(5) Number of Children	(6) Number of Children	(7) Number of Children	(8) Number of Children
Mother's Education(Year)	-0.044***	-0.039***	-0.044***	-0.043***	-0.043***	-0.033***	-0.022***	-0.024***
	(-49.65)	(-35.83)	(-37.69)	(-34.76)	(-34.36)	(-24.79)	(-17.11)	(-18.64)
Father's Education(Year)		-0.008***	-0.009***	-0.009***	-0.009***	-0.004***	-0.007***	-0.008***
		(-6.56)	(-7.45)	(-6.83)	(-6.54)	(-3.19)	(-5.04)	(-5.70)
Mother's Age			-0.004***	-0.009***	-0.010***	-0.007***	-0.003***	-0.004***
			(-11.56)	(-25.07)	(-25.76)	(-18.41)	(-8.87)	(-10.57)
Mother's Income				-0.000***	-0.000***	-0.000	-0.000	-0.000*
				(-3.68)	(-4.14)	(-1.64)	(-0.43)	(-1.93)
Father's Income					-0.000	0.000**	0.000***	0.000***
					(-0.72)	(2.46)	(5.32)	(4.01)
Family Income per person						-0.000***	-0.000***	-0.000***
						(-8.68)	(-4.78)	(-6.63)
Ethinicity						-0.108***	-0.080***	-0.072***
						(-6.75)	(-4.51)	(-4.08)
Hukou(urban or rural)						-0.276***	-0.216***	-0.217***
						(-26.28)	(-20.71)	(-20.91)
Constant	1.826***	1.859***	2.084***	2.261***	2.276***	2.291***	1.991***	2.046***
	(265.86)	(205.93)	(97.22)	(99.58)	(98.54)	(87.90)	(72.42)	(74.16)
Observations	57,729	56,252	56,242	47,877	46,402	44,114	44,112	44,112
R-squared	0.041	0.041	0.043	0.046	0.047	0.066	0.148	0.155
province FE							YES	YES
Year FE								YES

Note: t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.

5. HETEROGENEITY

5.1 Family Income

Next, we examine whether the effect of education on fertility differs across family income. We divide the sample data into six groups according to the standard of household income in the 2009 China Statistical Yearbook: those with an annual net household income of less than 10,000 yuan are defined as extremely poor; those with an annual net household income between 10,000 yuan and 25,000 yuan are defined as low-income households; those with an annual net household income between 25,000 yuan and 50,000 yuan are defined as lower-Middle; those with an annual net household income between 50,000 yuan and 80,000 yuan are defined as Middle; those with an annual net household income between 80,000 yuan and 100,000 yuan are defined as Relative-rich; and those with an annual net household income more than 100,000 yuan are defined as Rich. However, due to the limited number of data observations, I categorize all households with an annual income of more than 80,000 as rich.

As shown in Table 5, the negative effect of female education level on fertility increases as household income increases: each year of increase in female education decreases the number of children born in the household by 0.034 in a rich family. While in low-income households, each year of increase in female education only leads to the number of children being reduced by 0.01, and this coefficient is even statistically not significant in an extremely poor family. At the same time, the negative impact of male education on fertility is rather steady across different family income levels, each year of male education only reduces the number of children in the family by approximately 0.008-0.009. The only exception is in low-income households, where the coefficient becomes statistically insignificant.

Why does the impact of parental education on fertility vary so much in different income classes, especially the mother's education? I argue that this is largely due to the changing perceptions of fertility in today's society. In traditional Chinese culture, childbirth not only serves the role of "passing on the family name", but also plays a

vital role of "against old age".The more children parents have, the less they worry about life after retirement. However, in wealthier households, parents may not need children to support them in their old age.

5.2 Urban VS Rural

We further examine our argument by separating urban and rural and did the same regression analysis. Regression results from Table 6 show that each additional year of female education reduces the number of children born in the family living in cities by 0.027, while each additional year of female education in rural areas only leads to the number of children decreasing by 0.018. At the same time, in urban areas, male education also has a significantly strong negative impact on fertility, while in rural areas it does not.

The results from the regressions in Table 6 support our hypothesis that shifts in fertility perception caused differences in the impact of parental education on fertility among different household incomes. As compared to rural areas, urban areas have a better social security environment, better participation rates and coverage in pension insurance, thus made parents more likely to have a stable income after retirement. As a result, parents living in cities are usually less dependent on their children in old age. Furthermore, highly-educated women in cities are more likely to get well-paid jobs. Hence childbearing means higher opportunity costs for them, which would also lead to the preference for fewer children.

Table 5----Regression Results: The Effect of Parents' Education On Fertility Across Different Family Income

	(1) Extremely Poor (<=10000)	(2) Low Income (10000-25000)	(3) Low-Middle Income (25000-50000)	(4) Middle Income (50000-80000)	(5) Rich (>80000)
Variables	Number of Children	Number of Children	Number of Children	Number of Children	Number of Children
Mother's Education(Year)	-0.004	-0.010***	-0.019***	-0.024***	-0.034***
	(-0.95)	(-3.27)	(-8.28)	(-9.49)	(-14.28)
Father's Education(Year)	-0.009**	-0.002	-0.007***	-0.008***	-0.011***
	(-2.30)	(-0.64)	(-3.14)	(-2.91)	(-4.50)
Mother's Age	-0.017***	0.001	0.005***	0.009***	0.008***
	(-13.36)	(0.56)	(6.45)	(11.21)	(11.27)
Mother's Income	-0.000	0.000	0.000	0.000	-0.000
	(-0.78)	(0.18)	(1.26)	(1.40)	(-0.15)
Father's Education	0.000*	0.000***	0.000***	0.000***	0.000***
	(1.93)	(3.12)	(5.37)	(4.00)	(2.70)
Family income per person	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(-16.35)	(-35.42)	(-39.13)	(-33.64)	(-8.25)
Hukou(Urban or Rural)	-0.051	-0.128***	-0.196***	-0.221***	-0.247***
	(-1.42)	(-5.45)	(-10.92)	(-11.01)	(-12.98)
Ethinicity	-0.082	-0.087**	-0.024	-0.005	-0.023
	(-1.54)	(-2.25)	(-0.79)	(-0.14)	(-0.69)
Constant	2.635***	2.478***	2.289***	2.169***	1.677***
	(33.01)	(39.19)	(46.00)	(38.57)	(31.17)
Observations	5,651	8,618	12,006	8,454	9,376
R-squared	0.185	0.259	0.288	0.328	0.264
province FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Note: t-statistics in parentheses : *** p<0.01, ** p<0.05, * p<0.1

Table 6----Regression Results: The Effect of Parents' Education on Fertility Across Urban and Rural

	(1)	(2)
	Urban (urban=1)	Rural (urban=0)
Variables	Number of Children	Number of Children
Mother's Education(Year)	-0.027***	-0.018***
	(-16.46)	(-9.15)
Father's Education(Year)	-0.014***	-0.001
	(-7.93)	(-0.66)
Mother's Age	-0.007***	-0.001
	(-14.21)	(-1.27)
Mother's Income	-0.000	-0.000
	(-1.28)	(-0.86)
Father's Income	0.000***	0.000***
	(3.49)	(3.14)
Family income per person	-0.000***	-0.000**
	(-6.99)	(-1.97)
Ethinicity	0.013	-0.157***
	(0.53)	(-6.14)
Constant	1.923***	1.925***
	(49.48)	(47.90)
Observations	20,800	23,312
R-squared	0.155	0.114
province FE	YES	YES
Year FE	YES	YES

Note: t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.1

6. ROBUSTNESS CHECK

In the previous regressions, we control for province fixed effects and year effects, respectively, where province fixed effects are used to capture individual province characteristics that do not change over time and year fixed effects are used to capture national characteristics, such as national policies, that change over time in each year. But one problem is that the model assumes national policies have the same effect for all provinces within China. However, province varies greatly across provinces in China, and in particular, policies involving fertility were piloted in a few provinces before they are implemented nationally, which may affect the accuracy of the conclusions in this paper. Therefore, our paper adds provincial time effects to equation (1), which is $\text{province} * \text{t}$.

$$Y_{ipt} = \beta_0 + \beta_1 X_{ipt} + \sum \text{Controls} + \alpha_p + \lambda_t + \text{province} * \text{t} + \epsilon_{it} \quad (2)$$

Moreover, given that in CFPS, personal income, household income per person refers to the net income, which results in the existence of negative income, especially for rural households who make a living on agriculture, thus we replace the original income data with ln(income+100) and run the regression again using model 1 and model 2. As showed in Table 7, the coefficients for parental education were almost identical to the original model and were still significant at the 1% level.

Table 7----Robustness check: The Effect of Parents' Education On Fertility

Variables	(1) Number of Children	(2) Number of Children	(3) Number of Children	(4) Number of Children
Mother's Education(Year)	-0.024***	-0.024***	-0.023***	-0.023***
	(-18.64)	(-18.51)	(-17.20)	(-17.11)
Father's Education(Year)	-0.008***	-0.007***	-0.006***	-0.006***
	(-5.70)	(-5.62)	(-4.74)	(-4.70)
Mother's Age	-0.004***	-0.004***	-0.004***	-0.004***
	(-10.57)	(-10.46)	(-10.10)	(-9.98)
Mother's Income	-0.000*	-0.000**		
	(-1.93)	(-2.06)		
Father's Income	0.000***	0.000***		
	(4.01)	(3.93)		
Family income per person	-0.000***	-0.000***		
	(-6.63)	(-6.66)		
Hukou(Urban or Rural)	-0.217***	-0.218***	-0.210***	-0.211***
	(-20.91)	(-20.96)	(-20.06)	(-20.14)
Ethinicity	-0.072***	-0.073***	-0.070***	-0.071***
	(-4.08)	(-4.12)	(-3.95)	(-3.98)
ln(100+income_female)			-0.009***	-0.009***
			(-4.01)	(-4.00)
ln(100+income_male)			0.009***	0.009***
			(4.29)	(4.24)
ln(100+Family_income_per)			-0.038***	-0.037***
			(-7.10)	(-6.97)
Constant	2.046***	2.044***	2.339***	2.334***
	(74.16)	(73.98)	(46.75)	(46.49)
Observations	44,112	44,105	44,112	44,105
R-squared	0.155	0.157	0.155	0.157
province FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
province*cyear FE	NO	YES	NO	YES

Note: t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.1

7. CONCLUSION

In Gary Becker's theory(1960), it can be understood why female education is inversely associated with fertility rate, it is because the opportunity cost for better-educated women is higher [12] [13]. As much previous literature confirms this argument from an empirical perspective, little attention has been focused on whether male education affects fertility. Our paper, looks at the relationship between the education level of both parents and fertility and how this relationship changes across different income, the results reported in this paper clearly indicates that both male and female education has a negative impact on fertility, the effect of father's education on fertility is about one-third that of mother's: each additional year of female education reduces the number of children born in the family by 0.024, while each additional year of male's education also reduces the number of children, but only by 0.008. Moreover, the negative effect between female education and childbearing is more significant for higher-income households, while the effect of male education on childbearing remains relatively stable.

Our analysis leads to a variety of policy makings and implications. Most importantly, contrary to current belief, we find that male education also has some impact on fertility, this might be large due to the high cost of children's education, leading many highly educated fathers to prefer to have fewer children in order to order to improve the quality of their children. At the same time, the huge difference between the impact of male and female education on fertility clearly points out that gender discrimination still exists in China. China is currently working to implement its new fertility policy in order to increase fertility rates, but our research suggests that the fertility policy alone does not work, but rather reduces the cost of high-quality education and avoids discrimination against women due to childbirth can truly increase fertility rates.

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