



WIDER Working Paper 2016/77

Less restrictive birth control, less education?

Evidence from ethnic minorities in China

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June 2016

Abstract: This paper investigates the net impact of birth control policy in China on educational attainment of the partially excluded ethnic minorities. Exploring county-level variation in the value of fines levied for unsanctioned births, we show that more stringent enforcement of the birth control policy reduces educational attainment of urban ethnic minorities. Suggestive evidence shows this negative impact is likely to reflect the spillover effect from improved quality of ethnic majority children. For rural ethnic minorities, however, the level of enforcement of the birth control policy does not significantly affect education. The documented negative impact on education of urban ethnic minorities, combined with the improved quality found for both rural and urban ethnic majorities, implies that the birth control policy substantially contributes to the rising educational gap between ethnic minorities and majorities in China.

Keywords: birth control, education, minority, quantity–quality tradeoff, China

JEL classification: I21, I24, J15, J13

Tables and Figures: at the end of the paper.

Acknowledgements: We would like to thank participants at UNU-WIDER workshop on ‘Discrimination and Affirmative Action: What have we learnt so far?’ for helpful comments. We acknowledge support from UNU-WIDER.

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This study has been prepared within the UNU-WIDER project on ‘Discrimination and Affirmative Action: What have we learnt so far?’, which is part of a larger research project on ‘Disadvantaged Groups and Social Mobility’.

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Information and requests: publications@wider.unu.edu

ISSN 1798-7237 ISBN 978-92-9256-120-8

Typescript prepared by Leslie O’Brien.

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The Institute is funded through income from an endowment fund with additional contributions to its work programme from Denmark, Finland, Sweden, and the United Kingdom.

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The views expressed in this paper are those of the author(s), and do not necessarily reflect the views of the Institute or the United Nations University, nor the programme/project donors.

1. INTRODUCTION

Ethnic minorities are generally among the disadvantaged groups in any society. To compensate for past discrimination and promote equal opportunity for citizens, many countries have adopted “affirmative actions”, focusing on school admission and employment equity. A large body of literature has documented the effectiveness of these policies in promoting school enrollment and employment for minorities (Leonard, 1984a,b, 1986; Kane, 1998).

By exploring the unique birth control policy in China, this paper is the first to investigate the impact of an affirmative action that favors ethnic minorities in terms of fertility restrictions on their educational attainment. The central government of China has implemented and strictly enforced a series of population control policies since early 1970s to curb the rapid population growth, with one child policy implemented in early 1980s being the strictest form. Under this policy, each couple was allowed to have only one child for the majority Han Chinese, constituting approximately 91% of the population of China. Sanctions for violating the policy include fines, loss of jobs, or even forced abortion. In contrast, ethnic minorities faced a more relaxed birth control policy (Scharping, 2013). Most ethnic minorities were allowed to have two children with certain minorities/regions having three. While the more lenient birth control rule was to prevent marginalizing the minorities and protect the historically disadvantaged groups, there is lack of empirical evidence regarding whether ethnic minority children have benefited from this partial exclusion from the birth control policy.

Most micro-level empirical studies on the consequences of family planning policies in China for ethnic majorities, and in particular, the birth control policy may significantly influence the Han Chinese children’s welfare via changes in intra-household resource allocations. Following the seminal work of Becker and Lewis (1973), many empirical works have used the one child policy to test the existence of tradeoffs be-

tween child quantity and quality (Q-Q tradeoff). Successful examples include Li et al. (2008), Rosenzweig and Zhang (2009), and Liu (2014), who found a negative relationship between family size and educational and health outcomes. In contrast, Qian (2009) failed to find such evidence using the relaxation of the one child policy. While most of these papers recognized the difference in birth control policies between ethnic majorities and minorities, and often controlled for ethnicity in their regressions, none of the previous studies have directly evaluated the policy's educational impact for ethnic minorities.

The family planning policy in China could potentially affect ethnic minorities' educational attainment via two channels. On the one hand, the one child policy did place fertility restrictions on ethnic minorities, even though in a less restrictive way than for Han Chinese. Given the higher fertility rate of ethnic minority women¹ compared with Han Chinese and the overall fertility rate of 5.47 in 1970 (The World Bank, 2016),² the "two-child" restriction was likely to be binding for ethnic minorities and could potentially influence child quality through the Q-Q tradeoff. This is the direct effect of the one child policy on ethnic minorities. On the other hand, if the Q-Q tradeoff exists for ethnic majority children, as documented in many studies, then the changed cohort size and quality of the Han Chinese may indirectly affect ethnic minority children. The direction of this spillover effect may go either way. While minority children could potentially benefit from better peers in their class and achieve better school performance (e.g. Ding and Lehrer, 2007; Burke and Sass, 2013), their school enrollment could also decrease as they would compete with smarter and healthier peers in post-compulsory school admission process. Hence, the net impact of population control policy on ethnic minorities' educational attainment is theoretically uncertain and is left for empirical research.

¹The higher fertility rate was due to the birth-encouragement population policy implemented between 1950s and 1970s among minority regions to feed manpower needs (Heberer, 1989).

²The total fertility rate is defined as the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.

To fill the research gap in the literature, this paper explores county-level variation in the value of fines levied for unsanctioned births to evaluate the net impact of birth control policy on educational attainment of ethnic minorities. The monetary penalty for violators has been commonly used in the literature as an exogenous shock to fertility in China (McElroy and Yang, 2000; Ebenstein, 2011; Liu, 2014). In addition to the value of fines, we interact fine amount with an ethnic majority dummy in the empirical regressions to capture the contribution of fine value on the Han-minority educational gap. Given different birth control policies faced by rural and urban households, we evaluate the educational impact of fines for these two groups separately.

For urban households, we find that a 10% increase in the value of fines reduces high school enrollment rate for ethnic minority children by 1.1 percentage points. Results are similar when we use normalized years of schooling as an alternative measure of educational attainment. Given the minimal impact of fines on fertility of urban ethnic minorities, this negative effect is likely to result from spillovers from increased educational attainment of ethnic majorities. To investigate further the underlying mechanism, we split the sample by provincial public educational expenditure per capita, a measure of scarcity of educational resources, and re-estimate the educational impact of fines. Results show that a higher fine only reduces high school enrollment in provinces with low public educational expenditure, providing suggestive evidence that the documented negative impact of fines on education of urban ethnic minorities is via the increased competition level for educational resources. In contrast to urban findings, the net educational impact of fines is muted for rural ethnic minorities. As we find a 10% increase in fines significantly reduces the number of siblings of rural ethnic minorities by 0.02, the resulting smaller family size is likely to improve educational attainment according to the Q-Q tradeoff, which may offset any negative impact of a higher fine.

The second contribution of this study is that we show a harsher monetary penalty for violating the birth control policy leads to larger Han-minority educational gap. In particular, we find that a 10% increase in the value of fines enlarges the Han-minority high school enrollment gap by 1.5 and 0.9 percentage points for urban and rural samples respectively. The educational attainment of ethnic minorities in China has long been lagging behind that of Han Chinese and the gap has widened over time. This educational gap could potentially translate into disadvantages in other social welfare dimensions for ethnic minorities, such as occupation, health, income, and poverty.³ Hence, it is important to understand the forces driving the Han-minority educational gap. Identified factors contributing to this gap in previous studies include differences in geographic location and socioeconomic background (Hannum, 2002) and in school quality (Yang et al., 2015). In this paper, we suggest an additional factor may be at work: the more restrictive family planning policy for ethnic majorities leads to larger improvement in child quality for the Han Chinese than for ethnic minorities, and higher peer quality can further result in more intense competition in the admission to post-compulsory school for ethnic minority children. To the best of our knowledge, we are the first in the literature to provide empirical evidence on birth control policy's contribution to the Han-minority educational gap in China.

This paper also provides important policy implications for contemporary China. Recognizing the fast-changing demographic structure and the rapid aging issue, China is relaxing its one child policy for the majority Han group. "Single child" is permitted to have two children himself/herself. How would this relaxation affect the educational gap and relative welfare of ethnic minority and majority? Understand-

³For instance, Hannum and Xie (1998) argued that the educational gap was the key driver of the occupational gap in China between ethnic majorities and minorities; Ouyang and Pinstup-Andersen (2012) showed that education differences contributed to the Han-minority health gap, as measured by body mass index; and the difference in educational attainment was also likely to play a role in the persistent Han-minority income gap (Hannum and Wang, 2012) and rural poverty gap (Gustafsson and Sai, 2009).

ing the initial impact of the birth control policy helps predict possible changes in educational attainment and is crucial at this reform stage. Previous literature has documented that a removal of affirmative actions would offset the initial impact of the policy. For example, Long (2004a,b) and Hinrichs (2012) showed that a ban of the affirmative action that favors minority in school admission discouraged college enrollment of minorities. Given the contribution of the birth control policy to the Han-minority educational gap, a relaxation of the policy could potentially reduce the educational disadvantage of ethnic minorities in China.

The rest of this paper is organized as follows. Section 2 describes the institutional background of birth control policies and education system in China. Section 3 discusses data used in this study and main empirical strategy. Estimation results for family size and educational outcomes are presented in Section 4. Section 5 concludes.

2. INSTITUTIONAL BACKGROUND

In this section, we first outline the history of the Chinese birth control policies as well as the different population policies faced by ethnic majorities and minorities. We then briefly describe the education system in China, with a special focus on the school admission procedure for post-compulsory education.

2.1 Population Control in China

Recognizing the incompatibility between unchecked population growth and economic development, the central government in China enacted a series of population control policies starting from early-1970s (Wang, 2012). In July 1971, China launched a family planning campaign promoting the policy, “Later (later marriage),

Longer (longer interval between births) and Fewer (fewer children),” with education and free distribution of contraceptives to married couples (McElroy and Yang, 2000; Wang, 2012; Liu, 2014). This policy required parents to space the birth of their children at least four years apart and recommended a family size of two children for urban households and three children for rural households.

To curb the rapid population growth in China further, a stricter policy, commonly known as the one child policy, was introduced in the fifth National People’s Congress in 1979 and was enacted in 1980. Both rural and urban married couples were forced to practice birth control and were mandated to have one child per family. In addition to frequent campaigns on abortion and sterilization, this policy was further enforced by providing incentives for compliance. One child families were rewarded in terms of better housing and cash subsidies, while violating families were mainly punished via fines, which was generally larger than the amount of subsidy for one child families (Wang, 2012). According to Short and Fengying (1998), the median fine value amounts to 50% of the median household income in early 1990s. In addition, violation of the policy prevented parents from officially registering their “out-of-plan” children, and unregistered children were given inferior health and educational services (Short and Fengying, 1998). Due to widespread resistance from peasants, the policy was relaxed in 1984, allowing rural households to have a second child if the first born was a girl. As shown in Figure 1, despite this mild relaxation, family planning policies in China have successfully reduced birth rates since early 1970s.

The one child policy mainly targeted ethnic majorities, with ethnic minorities facing a more relaxed birth control policy. Prior to the one child policy, ethnic minorities were exempt from all family planning policies (Chang et al., 2005). While the stricter one child policy also restricted fertility of ethnic minorities, they were allowed a certain degree of flexibility. In September 1980, the Communist Party of China Central Committee issued an open letter mandating the members of Commu-

nist party and Communist Youth League to have one child per couple while allowing more flexible birth control regulations for ethnic minorities. Ethnic minorities' partial exclusion from the birth control policy was made clearer by the China Communist Party Central Committee in Document 7 on April 13, 1984. In general, most ethnic minorities were allowed to have two children with certain minorities/regions having three (Banister, 1991). Even though the one child policy was relaxed for rural Hukou holders after 1984,⁴ the policy and its enforcement were always more restrictive for the Han Chinese. Due to the "affirmative action" in family planning policies, the share of ethnic minorities in the population have increased since early 1970s, as shown in Figure 2.

2.2 Education System

Education in China is run by the government and schools at all levels are public. Every Chinese citizen is required to attend nine years of compulsory education, including six years of primary education and three years of junior secondary education (middle school). The costs of compulsory education are mainly beared by the government. Upper secondary (high school) and tertiary education were also heavily subsidized until 1994, when China launched the education reform to let households share part of the educational costs (Pan, 2016).

The transition from middle school to high school is via annual high school entrance exam. Upon graduation from middle school, students take the three-day entrance exam covering six subject areas including Chinese, mathematics, English, physics, chemistry, and politics (Ding and Lehrer, 2007), and admission solely depends on the exam score. The exact contents of the exam and the scoring system vary by county and application and admission are generally conducted within each county.

⁴Every Chinese citizen was categorized as rural or urban at birth according to their parents' Hukou status. See Pan (2015) for details of the Hukou inheritance rule.

High school admission was more competitive prior to 1990s with an admission rate of 38.3% in 1990 (Ministry of Education of PRC, 1989). While being admitted to high school is becoming easier nowadays due to high school expansion, there is still severe competition for getting into top high schools, which better prepare students for the more competitive college entrance exam.

3. DATA AND EMPIRICAL STRATEGY

3.1 Data

Data used in this paper are extracted from the China Health and Nutrition Survey (CHNS). The first round of the CHNS panel took place in 1989 and surveyed around 3,800 households drawn by a random cluster process from eight provinces.⁵ Follow-up surveys were carried out in 1991, 1993, 1997, 2000, 2004, 2006, 2009, and 2011. While the CHNS sample is not representative of the overall population, it covers less developed (Guizhou and Guangxi), medium developed (Liaoning, Henan, Hubei, and Hunan), and developed coastal provinces (Jiangsu and Shandong) in China. These provinces vary substantially in many aspects, such as geography, demographic composition, economic condition, and health condition.

Based on the CHNS panel, we construct cross-sectional data on educational attainment, a measure of the stringency of the local birth control policy, and a rich set of individual, household, and county controls. Due to community and household attrition and replacement, a large number of individuals covered by the CHNS panel did not participate in the last round of surveys in 2011. Therefore, we base our education measure on information reported in the most recent survey they participated

⁵These provinces include Liaoning, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi, and Guizhou.

in.

Following Liu (2014), we exclude households with the oldest child born before 1976, four years prior to the enactment of the one child policy. In 1970s, parents were required to space the birth of their children at least four years apart. For parents who had their first child in 1976, their eligibility for having a second child after 1980 would be revoked due to the implementation of the one child policy. In contrast, the fertility of parents who had the first child earlier was not fully constrained by the one child policy, as they were eligible to have a second child after the first child reached age four and before 1980.

Because of the nine-year compulsory education in China, we focus on individuals' high school enrollment in the main analysis. We exclude individuals younger than 15 when they were surveyed the last time, which is the common age to finish compulsory education and to be admitted to high school. As a robustness check, we also use normalized years of schooling as another measure of educational attainment. As many children were still in school by the last round of the survey, the conventional "years of schooling" measure would underestimate the educational attainment of these children. To address this issue, we normalize the years of schooling by the mean schooling of children at the same age following Rosenzweig and Wolpin (1980). We further exclude seven individuals without any formal education, most of whom are either physically or mentally disabled.⁶ The resulting sample consists of 2,641 individuals, among which 13 percent are ethnic minorities. The share of ethnic minority children in our estimation sample is comparable to the minority population share calculated using the 2000 population census (Figure 2).

The stringency of birth control policy is measured by the amount of fines imposed by the government for unsanctioned births. The fine information was collected from the person responsible for family planning in each town/village in the survey rounds

⁶Disabled children do not count towards the birth quota.

of 1989, 1991, and 1993. The question was then dropped from the surveys thereafter. Following Liu (2014), we take the average of fines across these three years to measure the level of punishment. Since the local family planning policy, including the amount of fines, is determined at the county level, we take the average amount of fines within each county, and use it as a measure of the stringency of birth control policy in the regression analysis. Another important reason for focusing on the impact of county-level fines on education is that educational resources and the level of competitiveness in school admission standards tend to vary across counties. In China, most children receive compulsory and high school education in their county of residence. High school entrance exam and admission are also organized at the county level. Therefore, educational spillover effect from ethnic majorities to minorities, if there is any, is expected to take place within each county.

The number of siblings for each person is mainly constructed using the birth history information of ever-married women. We exclude children who died before the age of five (less than 3% of all children ever born) in the calculation, since the early deceased children would not compete with their siblings for household educational resources.⁷ For individuals whose information is missing in the SEMW (about 16%), we use the CHNS family member relation file, which reports brother-sister relations for all household members, to calculate their number of siblings.

Table 1 shows summary statistics for the estimation sample. Since the one child policy was implemented more strictly for urban households, we report the mean individual characteristics for rural and urban Hukou holders separately.⁸ On average, urban children have 0.63 siblings and rural children have 1.45. This difference confirms the relaxed birth control policies for rural households. Around 84% of ur-

⁷Early deceased children do not count towards the fertility quota. If a single child dies, parents are allowed to have a second child.

⁸Note that rural individuals can change their Hukou status to urban if they attend occupational high school or college. Therefore, we categorize individuals as rural or urban according to their Hukou status prior to their enrollment in high school.

ban children pursued high school education after compulsory education, while only 44% of rural children ever attended high school. The average normalized years of schooling for the urban sample is 1.13, which is 21% higher than that for rural sample (0.94). At the county level, the fines for unsanctioned births account for a substantial 52% of average household annual income in 1993.

3.2 Empirical Strategy

Several existing studies have shown that the birth control policy in China resulted in improved child quality of ethnic majorities, which is consistent with the sharp increase in high school enrollment rate of the Han Chinese starting from 1970s as shown in Figure 3. However, most of these studies focused only on Han Chinese and none have analyzed the educational impact of the one child policy on ethnic minorities, a partially excluded group that may be subjected to potential spillover effects from the Han Chinese. This paper aims to fill this gap by examining the impact of birth control policy in China on both ethnic minorities' absolute level of educational attainment, measured by their high school enrollment rates, and their relative level of educational attainment, e.g. the Han-minority educational gap.

We use the amount of fines for unsanctioned births to measure the stringency of the one child policy. A higher fine is expected to lower the likelihood for a given household to have two or more children, and thus is more effective in restricting fertility. This measure has been widely used in the literature as an exogenous variation to identify the impact of the one child policy.⁹ One concern in our analysis is that the local stringency of the birth control policy may be correlated with other factors affecting education, such as the local development level. A richer county has both the budget to devote more resources to education and the need to implement a stricter

⁹For example, the amount of fine for violation of the one child policy have been used by Liu (2014) as an instrument for fertility to test Q-Q tradeoff and by Huang et al. (2015) to examine the contribution of the birth control policy in China on gender gap in educational attainment.

birth control policy as economic development induces migration inflow.¹⁰ We include two county-level variables to control for local development level, the stable coverage of electricity following Liu (2014) and the distance to provincial capital. In particular, we estimate the following equation for rural and urban samples separately using the constructed cross-sectional data:

$$Y_{itcp} = F_{cp}\beta_1 + (F_{cp} \times M_{itcp})\beta_2 + \alpha_0 + M_{itcp}\alpha_1 + X'_{itcp}\delta + Z'_{cp}\theta + \gamma_t + \phi_p + \epsilon_{itcp} \quad (1)$$

where Y_{itcp} is either a fertility or educational outcome variable of individual i , born in year t , living in county c and province p , F_{cp} is the logarithm of the county-level amount of fines for unsanctioned births, and M_{itcp} is an ethnicity dummy variable that equals one if individual i is Han Chinese and zero otherwise. X_{itcp} is a vector of individual characteristics including gender and parents' education. Z_{cp} s are county-level controls for local development levels including universal and stable electricity coverage and distance to provincial capital. We also include birth year fixed effects, γ_t , and a set of province dummies, ϕ_p , to control for time trend and regional differences in educational attainment. The impact of the stringency of birth control policy on educational attainment of ethnic minorities is captured by β_1 . The coefficient on the interaction term, β_2 , captures the difference in impacts of birth control policy on Han Chinese and ethnic minorities. The sum of β_1 and β_2 is the usually estimated effect of the one child policy on educational level in the literature for Han Chinese. We cluster the standard error at the county level to allow for an arbitrary correlation within county.

4. RESULTS AND DISCUSSION

¹⁰The penalty for unsanctioned birth may change based on local population and its potential increase.

In this section, we first show the effectiveness of fines for unsanctioned births in limiting fertility and family size for rural and urban subsamples separately. For each of the subsample, we then move on to analyze the impact of fines on ethnic minorities' educational outcomes and the Han-minority educational gap.

4.1 Fine and Fertility

While rural and urban households may reside in the same county, their fertility decision is expected to respond differently to monetary penalty for violation of the one child policy. On the one hand, urban households tended to be richer and their fertility rate was generally lower than their rural counterparts without any birth restriction. The one child policy was therefore more likely to be binding for rural households. On the other hand, the one child policy was more consistently and successfully implemented for urban households. At its early stage, the relentless implementation of the one child policy by the government caused rebellions due to forced abortion and sterilization, especially in rural areas (Davin, 1985; Short and Fengying, 1998). Liu (2014) also demonstrated that many one child policy violators are among the poorest rural residents, who can hardly afford the fine penalty. Facing these difficulties in enforcing the policy, Chinese government relaxed the policy for rural households, allowing them to have a second child if the first born was a girl. Given these differences, we conduct the following empirical analysis for rural and urban samples separately.

Estimation results reported in Table 2 confirm the different impacts of fines on rural and urban households. For urban households, while the level of financial penalty only has a small and statistically insignificant effect on the number of sibling for ethnic minorities, it significantly reduced fertility for Han Chinese. A 10% increase in the amount of fines decreases the number of siblings by additional 0.02 for Han Chinese compared with ethnic minorities. For rural Hukou holders, a 10% increase

in fines significantly decreases the number of siblings by 0.02 for ethnic minorities. Higher amount of fines further reduces fertility for Han Chinese, however, the additional impact is not statistically significant at conventional levels. Overall, we find that the financial penalty effectively reduced the number of siblings for Han Chinese and these results are consistent with findings from previous studies that examined the impact of the one child policy on fertility. For example, McElroy and Yang (2000) found that a 10 percent rise in fines reduces total birth per woman by 0.03. Liu (2014) also reported that a 10 percent increase in fines leads to 0.04 decrease in fertility.

More importantly, our results show a sharp decline in fertility in response to higher fines for rural ethnic minorities. Chinese government made tremendous effort to promote the one child policy and imposed severe punishment for violators. While most ethnic minorities were exempt from the one child policy, they still face a less restrictive birth constraint. Even though the enforcement of such birth constraint was relatively weaker for ethnic minorities, as documented in Chang et al. (2005) and Zhang (2001), the population growth was successfully controlled in dense minority regions through local officials' persuasion. Our results show the birth control policy also affected fertility of rural ethnic minority households.

In contrast with the rural results, the amount of fines did not have significant impact in restricting fertility for urban ethnic minorities. One plausible explanation for this difference is that urban households tend to be richer with lower fertility rate even without any birth restrictions. Hence, the "two-child" restriction might not be binding for many urban minority households. The different effects of the one child policy on fertility between rural and urban households give rise to potential difference in the impact of the one child policy on educational attainment between these two groups. While the declined fertility may result in Q-Q tradeoff for rural ethnic minorities, it is unlikely to be the case for urban ethnic minorities given their

unchanged number of siblings.

4.2 Education

Table 3 presents regression results for our main educational measure, high school enrollment. According to Column 1, a 10% increase in fines leads to a statistically significant reduction in the probability of enrolling in high school by 1.1 percentage points for urban ethnic minorities. Given the previous results of non-binding birth control for urban ethnic minorities, the impact of more stringent enforcement of the birth control policy is expected to affect their education through other indirect channels rather than the Q-Q tradeoff. For rural ethnic minorities, however, we do not find any statistically significant impact of fines on the likelihood of enrolling in high school (Column 2). The rural-urban difference in the impact of fines on education still exists using an alternative measure of education, normalized years of schooling, as shown in Table 4, Row 1. One likely explanation for the muted rural impact is that the reduced fertility in high fine areas has led to increased educational attainment according to the Q-Q tradeoff, which offsets any negative impact.

As shown in Table 3, Row 2, a higher fine leads to a higher educational gap between Han Chinese and ethnic minorities. A 10% rise in fines increases the Han-minority high school enrollment gap by 1.5 and 0.9 percentage points for urban and rural households respectively. These impacts on educational gap are both statistically and economically significant. One standard deviation increase in the amount of fines, which is around 75% increase from the sample mean based on Table 1, leads to an increase of 8.25 and 6.75 percentage points for urban and rural children respectively in the Han-minority high school enrollment rate gap. According to Figure 3, high school enrollment rate gap increased from 3 percentage points for the 1970 birth cohort (before any birth control policy) to 16 percentage points for the 1983 birth cohort (before the policy relaxation for rural households). The documented effects

of one standard deviation increase in fines hence are substantial compared with the overall increase of 13 percentage points in Han-minority gap.¹¹

Our results are consistent with the Q-Q tradeoff documented in several studies for the Han Chinese. For the rural sample, while higher financial penalties for unsanctioned births does not affect education of ethnic minorities, it significantly increases the Han-minority high school enrollment gap, implying an increased high school enrollment rate for the Han Chinese. For the urban sample, higher fines significantly lowers high school enrollment rate for ethnic minorities. However, the magnitude of the additional impact of fines on ethnic majorities' high school enrollment is larger and the net effect for Han Chinese is statistically different from zero (P-value=0.02). Note that our result of Han Chinese's higher educational attainment in higher fine areas does not necessarily contradict to those found by Liu (2014), who uses the same data and identification strategy, but only finds weak Q-Q tradeoff on education. While Liu (2014) measures educational attainment using middle school graduation rate and school enrollment rate for compulsory education age children, we focus on high school enrollment, which is more likely to be affected by the decreased number of siblings given the sharply increased tuition rate for post-compulsory education in 1990s.

Although we cannot pin down the exact mechanism through which the higher fines reduces urban ethnic minorities' educational attainment, one potential channel is the spillover effect from the increased educational attainment of Han Chinese. Even though positive spillover effect from Han Chinese to ethnic minorities is possible via better peers in class, the negative impact we find can potentially be explained by increased competition level in the school admissions process. To investigate further if this is the case, we split the sample by the scarcity of educational resources,

¹¹Unfortunately, we are unable to calculate the Han-minority high school enrollment gap for children originally holding rural and urban Hukou separately, because the census only collected the Hukou status at the time of the survey, which might be changed by individuals' enrollment in high school.

measured by the provincial¹² public educational expenditure per capita in 2000 (the median high school enrollment year in our sample), and re-estimate the impact of fines on education of urban ethnic minorities.¹³ Provinces with relatively high per capita educational expenditure is expected to have lower level of competition in the school admission process. As shown in Table 5, Row 1, a 10% increase in fines significantly reduces ethnic minorities' high school enrollment rate by 1.6 percentage points in "high competition" provinces, which is larger in magnitude than the overall urban sample. The impact of fines is no longer statistically significant for urban ethnic minorities residing in "low competition" provinces. Similar results are found for the normalized years of schooling in Table 6. These findings provide suggestive evidence that the one child policy may harm the educational attainment of the partially excluded ethnic minorities via increased competition for educational resources.

Another possible explanation for ethnic minorities' lower educational attainment in high fine areas is the increased sex ratio as a result of the birth control policy. Ethnic minority children would then compete with more Han boys, who may be more competitive than girls are. To test if our findings are driven by the increased sex ratio, we calculate county-level fraction of males for our sample and add it to our regression as a robustness check. This additional variable does not absorb the effect of fines. The negative impact of the amount of fine of urban minorities' education remains the same.¹⁴ Therefore, our findings are not likely to be mainly driven by the increased sex ratio.

¹²Unfortunately, we do not have information on the county level educational expenditure.

¹³Provinces with high level of educational expenditure include Liaoning, Jiangsu, Shandong, and Hubei and provinces with low level of educational expenditure include Henan, Hunan, Guangxi, and Guizhou.

¹⁴The estimate (s.e.) for high school enrollment and normalized years of schooling are -0.095 (0.042) and -0.087 (0.036) respectively.

5. CONCLUSION

This paper estimates the effect of birth control policies in China on educational attainment of ethnic minorities, a group partially excluded from the one child policy. We use the amount of fines for unsanctioned births to measure the enforcement of birth control policy and show that a higher fine has a significant negative effect on high school enrollment and normalized years of schooling for urban ethnic minorities. In addition, we find their fertility is unaffected by the amount of fines, indicating the “two-child” policy faced by urban ethnic minorities are not binding. Therefore, fines are likely to affect education through other indirect channels. For rural ethnic minorities, we do not find the fines to have significant impact on their education. Given that a higher fine significantly reduced fertility of rural ethnic minorities, the quality of children could potentially improve, which may offset any negative spillover effect from Han Chinese.

In addition to the impact on ethnic minorities’ absolute level of education, the birth control policy also negatively affects their relative educational attainment compared with Han Chinese. We find a more stringent enforcement of the birth control policy (i.e. a higher fine) enlarges the Han-minority educational gap for both rural and urban children. Birth control is likely to contribute to the Han-minority educational gap not only through improved quality of Han Chinese children, but also via its documented negative net impact on urban ethnic minority children.

It is beyond the scope of the paper to provide conclusive evidence on the mechanisms driving the negative impact of fines on education of urban ethnic minorities. While we cannot rule out other working channels, our findings suggest that birth control policy may negatively affect ethnic minorities via increased competition for educational resources due to improved child quality of Han Chinese.

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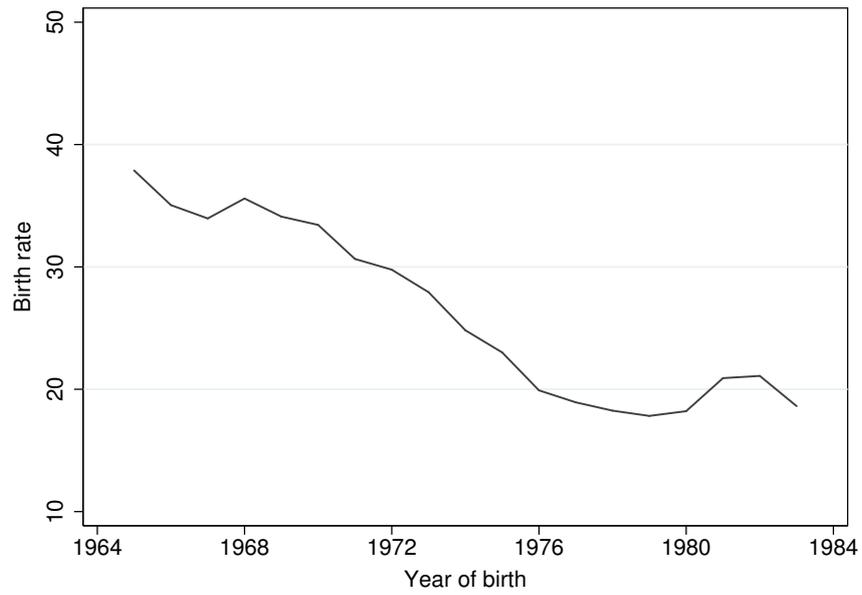
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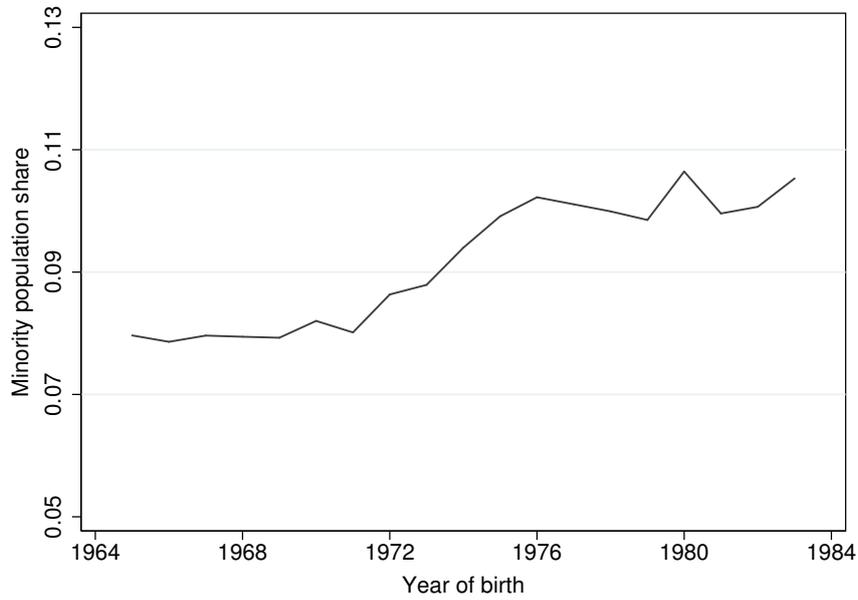
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Figure 1: Birth Rate by Year



Notes: The birth rate is measured as the total number of live births per 1000 population in a year.
Source: Created by Authors based on data from China Statistical Yearbook 1990 (National Bureau of Statistics of China, 1990).

Figure 2: Minority Population Share by Year of Birth



Source: Created by Authors based on micro data from the Fifth National Population Census of China (National Bureau of Statistics of China, 2000).

Figure 3: High School Enrollment Gap Between Ethnic Majority and Minority



Source: Created by Authors based on micro data from the Fifth National Population Census of China (National Bureau of Statistics of China, 2000).

Table 1: Summary Statistics

| Variable | Urban sample | | | Rural sample | | |
|---|--------------|--------|----------|--------------|--------|----------|
| | Obs | Mean | Std.Dev. | Obs | Mean | Std.Dev. |
| number of siblings | 879 | 0.627 | 0.741 | 1762 | 1.450 | 0.919 |
| high school enrollment | 879 | 0.837 | 0.369 | 1762 | 0.444 | 0.497 |
| normalized years of schooling | 879 | 1.129 | 0.227 | 1762 | 0.936 | 0.211 |
| father's schooling | 879 | 11.024 | 3.743 | 1762 | 8.570 | 2.916 |
| mother's schooling | 879 | 10.235 | 4.201 | 1762 | 6.787 | 3.706 |
| gender (male=1) | 879 | 0.546 | 0.498 | 1762 | 0.535 | 0.499 |
| ethnic minority status | 879 | 0.092 | 0.289 | 1762 | 0.151 | 0.358 |
| Panel 2: County level characteristics | | | | | | |
| Variable | Obs | Mean | Std.Dev. | Obs | Mean | Std.Dev. |
| value of fines | | | | 48 | 3014.8 | 2059.3 |
| distance to provincial capital (km) | | | | 48 | 224.4 | 150.3 |
| stable electricity supply | | | | 48 | 0.639 | 0.336 |
| provincial government education expenditure (yuan per capita) | | | | 48 | 195.0 | 110.5 |

Note: Normalized years of school is calculated by taking the ratio of individuals' years of schooling to the mean schooling of children at the same age.

Source: Authors' calculation.

Table 2: Estimated Effects of One Child Policy on Number of Siblings

| Dependent variable: number of siblings | | |
|--|---------------------|---------------------|
| | urban sample | rural sample |
| Fine | -0.067 (0.086) | -0.249 (0.121)** |
| Fine*majority | -0.201 (0.091)** | -0.226 (0.143) |
| Control variables | Y | Y |
| R-squared | 0.242 | 0.304 |
| Obs | 879 | 1762 |

Notes: County level clustered standard errors are in the parentheses. Control variables: birth year dummies, provincial dummies, household income, father's schooling, mother's schooling, gender, distance to provincial capital, and stable electricity supply. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Source: Authors' calculation.

Table 3: Estimated Effects of One Child Policy on High School Enrollment

| Dependent variable: high school enrollment | | |
|--|---------------------|--------------------|
| | urban sample | rural sample |
| Fine | -0.110 (0.042)** | -0.029 (0.041) |
| Fine*majority | 0.153 (0.041)*** | 0.090 (0.040)** |
| Control variables | Y | Y |
| R-squared | 0.205 | 0.187 |
| Obs | 879 | 1762 |

Note: Fine is measured in logarithms. County level clustered standard errors are in the parentheses. Control variables include birth year dummies, provincial dummies, household income, father's schooling, mother's schooling, gender, distance to provincial capital, and stable electricity supply. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Source: Authors' calculation.

Table 4: Estimated Effects of One Child Policy on Normalized Years of Schooling

| Dependent variable: normalized years of schooling | | |
|---|----------------------|-------------------|
| | urban sample | rural sample |
| Fine | -0.096 (0.032)*** | 0.007 (0.014) |
| Fine*majority | 0.104 (0.030)*** | 0.027 (0.013)* |
| Control variables | Y | Y |
| R-squared | 0.214 | 0.189 |
| Obs | 879 | 1762 |

Note: Fine is measured in logarithms. Normalized years of school is calculated by taking the ratio of individuals' years of schooling to the mean schooling of children at the same age. County level clustered standard errors are in the parentheses. Control variables include birth year dummies, provincial dummies, household income, father's schooling, mother's schooling, gender, distance to provincial capital, and stable electricity supply. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%. Source: Authors' calculation.

Table 5: Effects on High School Enrollment by Competition Level of Educational Resources

| Dependent variable: high school enrollment | | |
|--|---------------------|--------------------|
| urban sample | | |
| Level of competition | high | low |
| Fine | -0.157 (0.062)** | -0.114 (0.068) |
| Fine*majority | 0.169 (0.062)** | 0.174 (0.064)** |
| Control variables | Y | Y |
| R-squared | 0.202 | 0.247 |
| Obs | 467 | 412 |

Note: Competition level of high or low is categorized according to provincial educational expenditure per capita in 2000. Fine is measured in logarithms. County level clustered standard errors are in the parentheses. Control variables include birth year dummies, provincial dummies, household income, father's schooling, mother's schooling, gender, distance to provincial capital, and stable electricity supply. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Source: Authors' calculation.

Table 6: Effects on Normalized Years of Schooling by Competition Level of Educational Resources

| Dependent variable: normalized years of schooling | | |
|---|----------------------|-------------------|
| urban sample | | |
| Level of competition | high | low |
| Fine | -0.120 (0.034)*** | -0.162 (0.117) |
| Fine*majority | 0.166 (0.035)*** | 0.156 (0.114) |
| Control variables | Y | Y |
| R-squared | 0.255 | 0.234 |
| Obs | 467 | 412 |

Note: Competition level of high or low is categorized according to provincial educational expenditure per capita in 2000. Fine is measured in logarithms. Normalized years of school is calculated by taking the ratio of individuals' years of schooling to the mean schooling of children at the same age. County level clustered standard errors are in the parentheses. Control variables include birth year dummies, provincial dummies, household income, father's schooling, mother's schooling, gender, distance to provincial capital, and stable electricity supply. Coefficients that are significantly different from zero are denoted by the following system: *10%, **5%, and ***1%.

Source: Authors' calculation.