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Working Paper

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GLO Discussion Paper, No. 204

Provided in Cooperation with:
Global Labor Organization (GLO)

The Power of the Government: China's Family Planning Leading Group and the Fertility Decline since 1970 *

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Current Draft: April 2018.
First Draft: November 2016.

Abstract

China introduced its world-famous One-Child Policy in 1979. However, its fertility appears to have declined even faster in the early 1970s than it did after 1979. In this study, we highlight the importance of the Family Planning Leading Group in understanding the fertility decline since the early 1970s. In 1970, provinces gradually established an institution named the Family Planning Leading Group to facilitate the restoration of family planning, which had previously been interrupted by the outbreak of the Cultural Revolution. An important feature of this policy change is that the process differed by province. We find provinces that formed the leading group earlier also experienced an earlier decline in the fertility rate. Exploiting this provincial variation in establishment year, we estimate a difference-in-difference model that can explain about half of the decline in China's total fertility rate from 5.7 in 1969 to 2.7 in 1978. In comparison to the 1979 One-Child Policy, which previous research has widely treated as an exogenous shock to the fertility rate, our empirical strategy has three features: it captures a greater decline in the fertility rate, does not result in a contemporaneous increase in the sex ratio, and is robust to the inclusion of province-specific trends.

Keywords: Family Planning, Fertility Rate, Sex Ratio

JEL code: J13

*We thank M. Niaz Asadullah, Qingman Liu, Adriana Lleras-Muney, Fei Wang, and Klaus F. Zimmermann for their insightful comments. This paper has been presented at Xi'an Jiaotong University, Jinan University, Shanghai Lixin University of Accounting and Finance, The 2nd Camphor Economist Circle Workshop, 2017 International Symposium on Contemporary Labor Economics, and the IESR-GLO Joint Labor Workshop. Comments from all seminar participants are highly appreciated. All remaining errors are our own.

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1 Introduction

Fertility has been playing an important role in economic growth models since Solow (1956). A large body of literature has documented the importance of fertility in various critical economic variables, including but not limited to economic growth (Romer 1986; Wang, Yip, and Scotese 1994), technological change (Kremer 1993), migration (Coleman 2006), taxation (Apps and Rees 2004), employment (Blau and Robins 1989), labor force participation (Macunovich 1996; Goldin and Katz 2002), gender inequality (Galor and Weil 1996), and the savings rate (Modigliani and Cao 2004; Banerjee et al. 2014). Although understanding the effect of the fertility rate has important theoretical and empirical implications, identifying the causal impact can be difficult because of the endogeneity of the fertility rate. It is hard to disentangle the effect of fertility from those of other variables. This challenge reiterates the need to find an exogenous shock to fertility for the purpose of identification.

China's experience provides rare opportunities for the study of fertility rates. China, which is currently the most populous country and the second largest economy in the world, has experienced an unprecedented decline in its fertility rate since the 1970s and equally remarkable economic growth since the 1980s. A majority of the existing literature seeking exogenous changes in China's fertility rate references the One-Child Policy, which came into effect in 1979. The policy sets a quota on the number of children to which a couple can give birth.[1] Exceeding the quota results in heavy penalization.[2] The One-Child Policy has received significant attention because it is the first time in human history that a government has attempted to control its population using such an extreme policy measure.

However, the question remains regarding whether the One-Child Policy is a good exogenous shock for understanding the economic consequences of the fertility rate. The 1979 One-Child Policy has three possible limitations. First, there are debates regarding whether the One-Child Policy has a sizable effect on China's fertility decline. Many studies have argued that the impact is limited (Schultz and Zeng 1995; McElroy and Yang 2000; Narayan and Peng 2006; Cai 2010;

[1] More specifically, the policy permits only one child per couple in urban China, whereas in rural China, depending on the local policy, a second child may be permitted. Some counties allow for a universal second birth, and some others permit a second birth only if the first-born child is female.

[2] The penalty includes a one-time fine varying from one to five times the annual income, which has been widely discussed in literature (McElroy and Yang 2000; Ebenstein 2010; Wei and Zhang 2011; Liu 2014; Huang, Lei, and Zhao 2016). The punishment can be even more severe for urban residents working in state-owned enterprises because they can lose their jobs and all related social welfare (Scharping 2003).

Wang 2014). Figure 1 shows the time series data for China's fertility rate.[3] In particular, the figure reveals that a majority of the decline actually occurred before the enforcement of the One-Child Policy. The fertility rate declined by three children from 5.7 in 1969 to 2.7 in 1978. During the succeeding decade, the rate marginally dropped to 2.5 children in 1988. Second, Figure 1 also suggests that after 1979, there was a rapid escalation in the sex ratio at birth (the number of male children per 100 female children). The sex ratio steadily exceeds 115 after 1990. Much of the literature has discussed the relationship between the One-Child Policy and the biased sex ratio (Hull 1990; Ding and Hesketh 2006; Ebenstein 2010; Bulte, Heerink, and Zhang 2011; Li, Yi, and Zhang 2011; Loh and Remick 2015). The sex ratio on its own is an important variable affecting numerous economic outcomes, for example, marriage market outcomes (Rao 1993; Angrist 2002; Chiappori, Fortin, and Lacroix 2002; Porter 2016; Brainerd 2017), labor market outcomes (Angrist 2002), the savings rate (Wei and Zhang 2011), crime (Edlund et al. 2013), and prostitution and sexually transmitted infections (Ebenstein and Sharygin 2009). Therefore, it is hard to distinguish the effect of fertility from that of the sex ratio because the One-Child Policy simultaneously affects both variables. The final limitation, which has not yet been sufficiently explored in the current literature, is provincial heterogenous trends. The common-trend assumption is crucial for identifying a difference-in-difference style model. This assumption does not hold necessarily for a policy-induced natural experiment and the failure of the assumption can result in serious estimation bias.[4] As we will discuss formally later in this paper, provinces with higher initial fertility rate in the late 1960s was experiencing faster fertility decline during the 1970s prior to the implementation of the One-Child Policy, which leaves the common-trend assumption debatable.

Is there an alternative approach which can overcome the above-mentioned limitations of the One-Child Policy strategy? The period from 1970 to 1979 is worth further investigation. Figure 1 suggests that there was a rapid decline in fertility without a contemporaneous increase in the sex ratio. What happened during this period? How can the effects on the fertility decline be quantified? Our empirical analysis approaches these questions in three steps.

[3] The data source is Lu and Zhai (2009). Other data sources, including United Nations Population Division, World Bank, and OECD reveal a similar pattern.

[4] For example, Stephens and Yang (2014) re-study the compulsory education law in the United States and point out that the common-trend assumption may not hold in the United States because of differential changes across states during this period. For example, the school quality in the Southern U.S. experienced more dramatic improvement compared to the northern state. After adding regional-specific linear trends, they find significant changes in the estimation results. Some even switch the signs from positive to negative.

In the first step, we document the policy changes in the early 1970s and estimate their effects on the fertility rate. The One-Child Policy is only one component of China's grand family planning policy. Family planning was first proposed in 1963 but was later suspended owing to the outbreak of the Cultural Revolution in 1966. Family planning policy was gradually restored starting from 1970. From 1970 to 1975, the provincial Family Planning Leading Group was established, which symbolized the restoration and enhancement of family planning policy in all provinces. One specific and well-known policy that the leading group was responsible for enforcing is the "later (marriage), longer (intervals), fewer (children)" (*wan*, *xi*, *shao*) policy. We empirically show that the leading group is closely related to the decline in fertility: provinces with an early establishment of the leading group also experienced an early decline in the fertility rate. Our model can explain about half of the decline of China's total fertility rate from 5.7 in 1969 to 2.7 in 1978. In additional to the province-level evidence, we also provide micro-level evidence using China's 1982 Population Census and 2005 One-Percent Population Census. Because of the provincial variation in the establishment years of the Family Planning Leading Group, members of the same cohort across the country were differently exposed to the policy. We find greater exposure to the policy is associated with later marriage, longer birth spacing, and fewer lifetime births.

In the second step, we further explore the underlying driving force of the decline in the fertility rate. We observe an increasing pressure from upper government, together with a substantial increase in family-planning-related funds, after the establishment of the leading group. There were also intensified propaganda programs and more frequent uses of fertility control measures. For example, the number of intrauterine device (IUD) insertion operations almost tripled from 6.2 million to 16.7 million from 1971 to 1975.

In the third step, we discuss whether three important contemporaneous historical events, namely the Cultural Revolution, the "sent-down-youth" program, and the school expansion program in rural China, may affect our estimation. The Cultural Revolution from 1966 to 1976 was a catastrophic political event for large sections of the population, with the number of victims (fatalities plus those imprisoned or persecuted) estimated to be close to 30 million (Walder and Su 2003). Fertility is supposed to be a procyclical decision (Becker 1960; Ben-Porath 1973; Lindo 2010; Schaller 2016; Chevalier and Marie 2017). As a result, uncertainties related to the outbreak of the Cultural Revolution may have suppressed the fertility rate. Moreover, the Cultural Revolution disrupted government functioning, including family planning. Therefore, its provincial severity may have been related to the establishment of the Family Planning Leading Group. The "sent-down-youth" program had similar effects. From 1967 until 1978, an estimated 17.7 million urban youths were sent down to rural areas (Gu 2009). Those young people were at the peak of their fertility but were sent to an unfamiliar place away from their hometown. Thus, this program is expected to have discouraged fertility. Finally, a remarkable school expansion program in rural China, which started in the late 1960s, boosted China's secondary school enrolments from 3 million in 1965 to 51 million in 1977 (Hannum 1999). The impact of this program on fertility is obvious — education should increase the opportunity cost of having children (Becker 1981). To isolate our estimated effect of the family planning leading group from those events, we construct our measures of the provincial intensities of those events from historical documents and previous literature. Although we cannot exclude the possibility that those events have direct effects on the fertility rate, our estimated effects of the provincial leading groups barely change because the establishment years are not systematically related to the local intensities of those historical events.

The main contribution of this study is twofold. First, we highlight the importance of China's family planning policy during the early 1970s in understanding the transition in the fertility rate and demographic structure.[5] We document this policy's institutional background, study its geographical variation, quantify its effect on the fertility rate, explore its mechanisms, and examine its robustness to other possible events that took place during the same period. Second, our study also provides a new source of exogenous fertility shock, the variation in the establishment year of the Family Planning Leading Group, which differs by province. Previous studies largely refer to the 1979 One-Child Policy as an exogenous shock to the fertility rate.[6] The main advantage of our strategy is that it captures a greater decline in the fertility rate without resulting in a

[5]China's One-Child Policy, which came into effect in the year 1979, is so world-famous that many researchers believe the rapid decline in fertility rate began in 1979. The "assumed" demographic shifts starting in 1979 play important roles in many studies. For example, the One-Child Policy serves as an important candidate explanation for the current high Chinese savings rate (Ge, Yang, and Zhang 2012; Choukhmane, Coeurdacier, and Jin 2016; Zhao and Imrohoroglu 2017). One empirical observation supporting this hypothesis is that China's savings rate started to rise only since 1979 (Modigliani and Cao 2004). If we acknowledge that China's demographic shift began in 1970 instead of in 1980, it is unclear whether a demographic change on its own can explain the evolution of China's saving rate.

[6]There are several ways to exploit the One-Child Policy as an exogenous shock. Some examples include comparing fertility behavior before and after 1979 (Ahn 1994; Ding and Hesketh 2006; Whyte, Wang, and Cai 2015), using the year 1979 as the cut-off for a regression discontinuity design (Qin, Zhuang, and Yang 2017), analyzing fines imposed on above-quota births (McElroy and Yang 2000; Ebenstein 2010; Wei and Zhang 2011; Liu 2014; Huang, Lei, and Zhao 2016), examining the *ex-post* violations of the policy (Li and Zhang 2017; Zhang 2017), treating the minority as a control group (Li, Zhang, and Zhu 2005; Li, Yi, and Zhang 2011), and exploiting the rollout of family planning stations (Edlund et al. 2013; Jia and Persson 2017).

contemporaneous increase in the sex ratio, and it is more robust to the inclusion of heterogenous trends.

We are not the first to explore China's family planning policy in the early 1970s. Scharping (2003) and Cai (2010) emphasize the importance of the "later, longer, fewer" campaign in understanding the fertility drop. Banerjee, Meng, and Qian (2010) and Banerjee et al. (2014) treat the year 1972 as the turning point at which "family planning policies shifted from a pro-fertility agenda to one that focused on curbing fertility."[7] Wang (2016) divides China's family planning history into three periods, Period 1 (1963–1970), with a softly and narrowly implemented family planning policy; Period 2 (1971–1979), with a strongly and broadly implemented family planning policy; and Period 3 (since 1980), with the One-Child Policy. He finds that conditional on policies in Period 2, the additional effect of the One-Child Policy is fairly limited. We contribute to this strand of literature by providing rigorous identification exploiting the provincial variation in the policies. The provincial variation, as we will show, plays an important role in understanding the different patterns in fertility across provinces and distinguishing the effect of the family planning policy from possible confounding factors.

The remainder of this paper is organized as follows. In section 2, we provide background information on China's family planning policies. Section 3 introduces the datasets used throughout this study. Section 4 discusses the empirical strategy. Section 5 presents the main results, that is, the effect of the Family Planning Leading Group on fertility and the sex ratio. Section 6 further discusses the mechanism by which the fertility rate is reduced and the robustness to three important contemporaneous events. Section 7 concludes.

2 Family Planning Policy in the Early 1970s

China's family planning policy has a much longer history than that of the One-Child Policy. The history of China's family planning dates back to December 1962, with the release of the No. [62]698 document. In 1964, the State Family Planning Commission was established, after which commissions at the province, city, and county levels were gradually set up across the country. However, the outbreak of the Cultural Revolution negatively affected these family planning institutions, most of which ceased to function in 1966.

[7] The authors define the treatment and control groups by whether the first child is born after 1972.

In early 1970, Premier Enlai Zhou emphasized that the implementation of a family planning policy should not stop. In 1971, the State Council released document [71]51, "Report on Better Implementing Family Planning Policy," signaling the recovery of family planning from the Cultural Revolution. The document required provinces to set up a Family Planning Leading Group to organize and lead family planning work. A pilot run was initiated in 1970, and, by 1975, all provinces had set up a leading group. The leading group is an important and high-level provincial institution. In most cases, its leader is also the main leader of the provincial party committee.

The primary duty of the provincial Family Planning Leading Group is to promote the implementation of family planning policy under the guidance of the central government. By 1960, the slogan "Later, Longer, Fewer" had already appeared, although no real action was enforced until the formation of the Family Planning Leading Group. The leading group's work can be categorized into the following three aspects (descriptions are summarized from Peng (1997)).

The first aspect is to promote the "later, longer, fewer" policy and design corresponding rewards and punishments. "Later" means marriage at a later age — 23 years for women and 25 years for men. "Longer" means a birth planning rule of waiting for more than three years between births. "Fewer" means that one couple could have two children at most. Concrete examples of rewards and punishments include paid vacations after a sterilization operation, priority in housing arrangements, and no subsidies for workers facing difficulties as a result of unplanned childbirth. Although there is narrative evidence suggesting that the campaign had several coercive elements (Whyte, Wang, and Cai 2015), overall, the policy enforcement was much more lenient during this period compared to that of the One-Child Policy period (Zhang 2017), when an above-quota birth could result in huge fines and even the loss of one's job.

The second aspect is to organize professional teams broadcasting family planning. Broadcasting materials include the "later, longer, fewer" policy, knowledge about contraception and sterilization, the advantages of birth control, and experiences of family planning. The team also helps in publishing popular science readings related to birth control. Relevant knowledge is also added to middle school textbooks. The size of the broadcasting team in each province varies from 10,000 to more than 200,000.

The third aspect is to provide technical support for birth control. This support includes training technical staff to conduct research on contraception and sterilization measures, introducing technology and equipment for sterilization, and distributing contraception pills.

To ensure the enforcement of family planning policy, both the central government and the provincial government set increasing budgets. This number increased from 59.5 million RMB in 1971 to 197.6 million RMB in 1979 (National Population and Family Planning Commission of P.R. China 2007).

3 Data and Variables

To understand the effect of China's family planning policies during the early 1970s, we compile a province-level data set with focus on the total fertility rate, which measures the average childbearing behavior of a given population. We also complement the province-level analysis with micro population census data.

3.1 Province-level Data

We construct data at the province-year level using various sources during the period from 1969–1978. We begin with the year 1969 because the provincial Family Planning Leading Groups were first established in 1970 in Shandong and Guangdong provinces. The groups were last set up in Guizhou and Xinjiang in 1975. Our analysis ends in the year 1978 to avoid any possible influence from the succeeding One-Child Policy and the Reform and Opening-up Policy, after which China initiated its unprecedented economic growth.

Establishment Years of Family Planning Leading Group

We collect data for the establishing years of the Family Planning Leading Group from the population chronicles in various province chronicles. Because the establishment of the leading group is a major event in a province's family planning history, it is clearly documented in most province chronicles. Still, we fail to find information about the leading group for Inner Mongolia. Thus, our final sample comprises 27 provinces.[8] Figure 2 plots the geographical variation in the years of establishment, which vary from 1970 to 1975 across the country.

Total Fertility Rate

We take the total fertility rate for each province from Coale and Li (1987), who compute the total fertility rate for each province in China from 1940 to 1982. They estimate the total fertility

[8] We exclude Tibet because of the lack of fertility data. We also exclude Hainan and Chongqing provinces because these provinces were established at a later date.

rates using China's 1982 One per Thousand Sample Fertility Survey, which was conducted by the State Family Planning Committee. The total fertility rate is not a variable that can be defined at the household level. Instead, it aggregates the fertility behavior of a group of people at a given time. Coale and Li (1987) divide women of child-bearing age (15–49 years) into several five-year age groups. Dividing the number of children born to women of a specific age group by the number of women in that group generates the age-specific fertility rate. Summing up the age-specific fertility rates and multiplying them by five gives us the total fertility rate. The total fertility rates represent the number of children a hypothetical woman would give birth to if she immediately went through her entire fertile history given the fertility pattern of the current population.

There might be concerns about the quality of data used in Coale and Li (1987). To our knowledge, there is no other readily available data on China's total fertility rate at the provincial level. Therefore, we cannot directly compare our data source with other data sources at the provincial level. Comparison at the national level suggests that Coale and Li (1987) provides convincing estimates (see Figure 3). Coale and Li (1987)'s estimate is not only close to the estimates from recent Chinese studies, such as Lu and Zhai (2009), but it is also close to the estimates from the United Nations Population Division, whose estimates are also adopted by the World Bank and the OECD. A second challenge is the underreporting of children. Previous studies argued that because parents would be fined for out-of-quota births and local officials would be penalized for failing to limit the fertility levels in their jurisdictions, there are powerful incentives for the underreporting of children (Feeney and Jianhua 1994; Smith 1994; Merli 1998; Scharping 2007). However, concrete evidence for child underreporting begins with China's 1990 census of population. In 1991, the central government listed family planning among three basic state policies, and local officials became personally responsible for implementing family planning rules. The fine rate for out-of-quota births (also known as the "social child-raising fee") increased significantly during 1989–1992 (Scharping 2003). The other side of this story is that incentives for underreporting were not that strong before 1990. Recall that Coale and Li (1987) derive their estimates from a survey in 1982. Goodkind (2011) estimates the underreporting of children in the 1982 census based on back projections from the 1990 and 2000 censuses. He finds an overcount of 0.4% (from 1990 census back projections) and 0.8% (from 2000 census back projections) for children ages 5–9.[9] This number is fairly comparable to those of other Asian countries outside

[9]The sample period in our analysis is 1969–1978. Children born during this period would have been ages 4–13

China. Therefore, we conclude that underreporting will not bias our empirical analysis during the period of interest.

Sex Ratio at Birth

We compute the provincial sex ratio at birth for cohorts born between 1969 and 1978 for each province using a 1% sample of China's 1982 population census (census 1982 henceforth). A caveat of this approach is that a census only collects information on the current *hukou* province in which the household is registered. We do not have data on the birth province. This was a minor issue in 1982 because migration was rare back then. Moreover, even though migration is becoming easier and more prevalent in China nowadays, obtaining *hukou* in the destination province still remains difficult. Using the 2010 China Family Panel Study, which contains information on both the current *hukou* province and the birth *hukou* province, we find that only 5.01% of the sample born during 1969–1978 changed their registration province. This rate should have been much lower in 1982. A second possible concern is excess underreporting of daughters. Using the census to compute the sex ratio at birth is subject to a similar underreporting concern to that of computing the total fertility rate, especially if parents have stronger incentives to "hide" girls than to hide boys. We argue although such underreporting is likely the case in the 1990 census and onward, underreporting should have a limited impact on the sex ratio in the 1982 census because the incentives to "hide" girls were not that strong at that time. Figure 1 shows that during the period of interest, 1969–1978, the national sex ratio at birth fluctuated at around 106, which is about the natural ratio. The rapid escalation in the sex ratio did not start until 1980. Goodkind (2011) find sex ratios in areas with a "1.5-child" policy are especially distorted because of excess daughter underreporting. Such a policy did not apply in the early 1970s.

Economic Control Variables

Because economic conditions can also affect fertility rates, we control for a set of variables, including GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP. The provincial economic variables can be found in National Bureau of Statistics of China (2010). Panel A of Table 1 reports the summary statistics at the province-year level.

Before we further proceed, we would like to add a comment. Although we also use the

in 1982.

household-level data, which will be introduced in the following subsection, we choose the province-level analysis as our main specification. We opt for this choice because of the difficulty in constructing exposure to the population policy at the household level. Previous literature using household-level analysis defines exposure to the policy on the basis of the children's birth years or the year of the first birth. This definition, however, does not necessarily capture the true variation in the policy. For example, assuming that a couple who gives birth to their first child in 1978 is a control group for the One-Child Policy may be inappropriate because they are also likely to have more children in the absence of the policy. We have no reason to expect their behavior to be fundamentally different from that of a couple whose first child was born in 1979. In the following subsection, we will introduce a measure of policy exposure that is independent of children's birth year. But the measure still makes strong assumptions about the counterfactual fertility behavior without the policies. The definition of total fertility rate, on the contrary, successfully avoids this critique because it reflects the average fertility behavior of a given population in a specific year. Therefore, this definition captures the immediate effect of the population policy on the whole population.

3.2 Micro-level Data

In addition to the aggregated province-level data, we also look into household-level data to further understand the micro-level responses to the establishment of the leading group. More specifically, as introduced in the background section, an important task of the leading group is to promote the "later, longer, fewer" policies. Therefore, it is natural to ask how the exposure to those policies affects people's timing of marriage, birth spacing, and number of children. To do so, we exploit a 1% sample of China 1982 census of population and a 20% sample of the 2005 1% inter-decennial population census (mini-census 2005 henceforth). For both census 1982 and mini-census 2005, we restrict our analysis to women born prior to the year 1965. Cohort 1965 would age 15 in the year 1980. Therefore, cohorts born after 1965 are universally exposed to the stringent One-Child Policy throughout their entire fertile period. The cohorts of analysis start from cohort 1930 for census 1982 and 1940 for mini-census 2005. In 1970, the year in which the first Family Planning Leading Group was first established, cohort 1930 would age 40 and are at the end of their fertile period. We have to further restrict our analysis to cohort born after 1940 because fertility history information is only available for women aged below 65 in the mini-census 2005.

Household Exposure to the Policies

To evaluate the policy effect on a set of family outcomes, we need to develop a new measure of exposure to the family planning policy. We borrow the idea from Wang (2016), who defines exposure according to the wife's birth cohort. Such measures are more exogenous as opposed to more traditional measures that are constructed according to children's year of birth. We improve Wang (2016)'s measure by introducing provincial variations. More specifically,

$$\mathrm{FPP}_{p,c} = \sum_{a=15}^{49} \mathrm{AFR}_p\left(a\right) I\left[c + a \geq T_p\right].$$

$\mathrm{FPP}_{p,c}$ defines the exposure to the family planning policy for cohorts born in year c in province p. I is an indicator variable, and a is age. $\mathrm{AFR}_p\left(a\right)$ is the age-specific fertility rate of province p in 1969, prior to the enforcement of any effective family planning policy. T_p is the year of the enforcement, which can vary by province. For the family planning policy in the early 1970s, it is defined by the establishment year of the Family Planning Leading Group. Therefore, the provincial variation within each cohort comes from (1) different years of establishment of the Family Planning Leading Group and (2) different initial fertility profiles. Figure 4 illustrates how exposure to the policy is computed, using the examples of Shandong and Beijing. Women born in 1945 are more exposed to the policy in Shandong than in Beijing because Shandong (1) formed the Family Planning Leading Group in 1970, three years earlier than Beijing, and (2) has a higher initial fertility rate. Note that such definition naturally applies to the One-Child Policy by defining T_p as 1979 for all provinces.

Age at First Marriage and Number of Children

Number of children and age at first marriage are computed using the mini-census 2005, which explicitly surveyed those two pieces of information. Women born between 1940 and 1965 would have completed their fertile periods by the year 2005. Panel B of Table 1 reports the summary statistics of mini-census 2005.

Birth Spacing

Birth spacing is more difficult to construct because it is not readily available from the census. To compute this variable, we use census 1982 and approach as follows. First, we take out children who are born after 1970 and can be unambiguously linked to the household head or spouse. Next, we compute the age gap between two youngest children and match the gap to their mothers. Such way of imputing birth spacing may suffer from two selection problems. First, because census is a household-based survey, it requires the children to live with their mothers in the same dwelling to make the children-mother match possible. This is not a strong restriction because we focus on children born after 1970, and therefore, would age at most 12 in the survey year (1982). Second, to compute the age gap we need to observe at least two births from 1970 to 1982. As a result, our estimated effect on birth spacing should be interpreted as a low-bound estimate — households who are most responsive to the family planning policy are more likely to have one or zero child born during the period. Panel C of Table 1 reports the summary statistics of census 1982.

4 Empirical Strategy

To investigate whether early establishment also leads to an early drop in the fertility rate, Figure 5 compares the total fertility rate of the provinces in which the leading groups were established from 1970 to 1971 (nine provinces) to those that established the leading group from 1973 to 1975 (also nine provinces). Figure 5 suggests that the leading groups are closely related to the decline in the provincial total fertility rate. The difference in the fertility rates between the two sets of provinces fluctuated at around 0.3 before 1971. During 1971–1974, when the Family Planning Leading Groups were established in the first set of provinces but not in the second, the fertility rates dropped more rapidly in the first set. The total fertility rate of the first set was 0.5 lower in 1974. After 1975, the leading groups were established in all provinces, and the difference in the total fertility rate between the two sets remained about constant at -0.5.

Figure 5 provides support for the common-trend assumption before 1970 and after 1975. The difference between the two groups only changes when the leading groups are set up in one group but not in the other. Exploiting this fact, we set up the following econometric model:

$$\begin{aligned} \text{TFR}_{p,t} &= \alpha + \beta \text{Y\_After}_{p,t} + \gamma \mathbf{X}_{p,t} + \text{Prov}_p + \text{Year}_t + \varepsilon_{p,t} \\ \text{Y\_After}_{p,t} &= \max(0, t - T_p), \end{aligned} \tag{1}$$

where $\text{TFR}_{p,t}$ is the total fertility rate for province p in year t; $\text{Y\_After}_{p,t} = \max(0, t - T_p)$ is the number of years since the establishment of the Family Planning Leading Group in province p, which takes the value of zero if the group has not yet been established; $\mathbf{X}_{p,t}$ is a vector of economic control variables; Prov_p are the province fixed effects; and Year_t are the year fixed effects. The parameter β, which captures the effect of the Family Planning Leading Group on the total fertility rate, is of primary interest in this model. The parameter β can be identified because $\text{Y\_After}_{p,t}$ has both secular and spatial variations. We call this the "linear-trend" specification.

Equation (1) implicitly assumes the effect of family planning policy is progressive instead of being lump-sum. We argue that the linear-trend specification is more appropriate than a dummy variable setting that uses $\text{After}_{p,t}$ instead of $\text{Y\_After}_{p,t}$. In Figure 1, we see no sudden changes in total fertility since 1949 except during the Great Famine (1959–1961). To provide further support for our empirical setting, we follow Lafortune, Rothstein, and Schanzenbach (2018) and estimate a nonparametric specification,

$$\text{TFR}_{p,t} = \alpha + \sum_{r=k_{\min}}^{k_{\max}} \beta_r I\left(t = T_p + r\right) + \gamma \mathbf{X}_{p,t} + \text{Prov}_p + \text{Year}_t + \varepsilon_{p,t}. \tag{2}$$

We exclude $r = 0$ and therefore, β_r captures the change in fertility rate r years from the establishment of the family planning leading group. We choose $k_{\min} = -5$ and $k_{\max} = 8$. Figure 6 compares the coefficients from equation (1) and those from equation (2). It is evident that our linear-trend specification approximates the nonparametric specification sufficiently well.

An alternative specification is the "first-difference" specification, which suggests that after the formation of the leading group, the total fertility rate would drop at a faster rate compared to that of the control group, as shown in Figure 5. More specifically,

$$\Delta\text{TFR}_{p,t} = \alpha + \beta\text{After}_{p,t} + \gamma\Delta\mathbf{X}_{p,t} + \text{Prov}_p + \text{Year}_t + \varepsilon_{p,t}, \tag{3}$$

where $\text{After}_{p,t}$ is an indicator variable that equals one if province p already established the Family Planning Leading Group in year t. This specification is mathematically similar to the linear-trend specification with one important difference. In the first-difference specification, we still control for the province fixed effects, which should have disappeared if we simply take the first difference of the linear-trend specification of two consecutive years. This means we also allow for heterogeneous trends in the total fertility rate in our first-difference specification. Therefore, the difference between equation (1) and equation (3) highlights the importance of heterogeneous trends. Note that throughout this paper, whenever we refer to the "first-difference" specification, we are always controlling for Prov_p.

Household-level analysis can be carried out in a similar fashion. More specifically, we can estimate following equation,

$$y_{i,p,c,t} = \beta_0 + \beta_1 \text{FPP}_{p,c} + \boldsymbol{\beta}_2 \mathbf{X}_i + \text{Prov}_p + \text{Cohort}_c + \text{Year}_t + \varepsilon_{i,p,c,t}, \quad (4)$$

where $\text{FPP}_{p,c}$ is our defined exposure to the family planning policy and Cohort_c represents cohort fixed effects.

Finally, it is noteworthy that our empirical specification identifies the additional effect of the provincial Family Planning Leading Group instead of the aggregate effect of the family planning policy. Figure 5 shows that from 1970–1974, there was a rapid decline in the total fertility rate even for provinces without the leading group, which can be explained either by national income growth, better educational attainment, or other policy changes at the national level. What we identify is that provinces with the Family Planning Leading Group experience an even faster decline in the total fertility rate because the leading group facilitates the enforcement of the family planning policy.

5 Empirical Results

5.1 Effects on the Total Fertility Rate

Main Results

Table 2 reports the main results of this study. Columns (1) and (4) report the results without controlling for economic variables.[10] The coefficients are similar when GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP are added to the regression. The coefficient -0.244 implies that after the establishment of the Family Planning Leading Group, the total fertility rate drops by an additional 0.244 unit per year. Therefore, the leading group can explain a decline in the fertility rate of 1.46 ($= 0.244 \times 6$)[11]

[10]The total fertility rate might have important direct impacts on a set of economic outcomes. As a result, economic variables, such as GDP per capita, can be affected by fertility and become "bad controls." For robustness, we report results with and without economic controls.

[11]The average year of establishment is 1972. Thus, in 1978, the average length of exposure is about six years.

during our sample period (1969–1978). The national total fertility rate dropped from 5.72 in 1969 to 2.72 in 1978 in one decade, and the Family Planning Leading Group explains 49% of the decline. This magnitude is much larger than that of the decline after 1979 when the One-Child Policy took effect. The fertility rate was 2.75 in 1979 and dropped by 0.4 to 2.35 in 1989 and by 1.15 to 1.6 in 1999. The average annual decline in fertility during 1969–1978 is therefore about six times the annual decline during 1979–1999. Therefore, our empirical strategy potentially captures a greater decline in the fertility rate when compared to the One-Child Policy.

In the following step, we try to understand the heterogeneous effects of the leading group among different provinces. One natural conjecture of the heterogenous effects is that the leading group's effect is larger among provinces with higher initial fertility. Note that for the period in our study (1969–1978) such pattern is interpreted as heterogenous effect. But for the studies of the One-Child Policy, changes prior to 1979 become the pre-existing heterogenous trends and threaten the common-trend assumption. Following equation formally tests this hypothesis,

$$\begin{aligned}
\text{TFR}_{p,t} &= \alpha + \beta_1 \text{Y_After}_{p,t} + \beta_2 \text{Y_After}_{p,t} \times \left(\text{TFR}_{p,1969} - \overline{\text{TFR}}_{1969}\right) \\
&\quad + \gamma \mathbf{X}_{p,t} + \text{Prov}_p + \text{Year}_t + \varepsilon_{p,t} \\
\Delta\text{TFR}_{p,t} &= \alpha + \beta_1 \text{After}_{p,t} + \beta_2 \text{After}_{p,t} \times \left(\text{TFR}_{p,1969} - \overline{\text{TFR}}_{1969}\right) \\
&\quad + \gamma \Delta\mathbf{X}_{p,t} + \text{Prov}_p + \text{Year}_t + \varepsilon_{p,t},
\end{aligned}$$

whereas $\text{TFR}_{p,1969}$ is the initial provincial total fertility rate of province p in 1969 and $\left(\text{TFR}_{p,1969} - \overline{\text{TFR}}_{1969}\right)$ captures the deviation from the mean. Table 2 columns (3) and (6) reports the estimation results, which supports the hypothesis that the effect of the family planning policies during the early 1970s is significantly larger among provinces with higher initial fertility. In 1969, the highest fertility rate is 6.73 in Guizhou province and the average rate is 5.545. Take the estimates from column (3), we find the effect in Guizhou province is 32% larger than the average effect.[12]

One last important finding from Table 2 is that the linear-trend specification (column (1)–(3)) and the first-difference specification (column (4)–(6)) share very similar estimates. Therefore, our main results are robust even if we allow for province-specific trends.

To confirm that the variation in the establishing years plays an important role in our identification, we perform a set of permutation tests to show that random years of establishment would

[12] $\frac{-0.253-0.068\times(6.73-5.545)}{-0.253} - 1 = 0.319$

not generate the same results. That is, our identification source does not simply come from a before-after comparison. We assume that all provinces have equal probabilities of setting up the leading group from 1970 to 1975. Figure 7 shows the distributions of 1,000 counterfactual simulations for both the linear-trend and first-difference specifications. From Figure 7, we can see that random establishment years do not generate similar coefficients.

Addressing Possible Endogeneity of Reform Years

Our identification relies on the assumption that the years in which the Family Planning Leading Group was founded are exogenous. One may concern about the endogeneity of the establishment year of the leading group. The final decision of establishment is made by either the provincial or the central government and may depends on local characteristics, e.g., local government's willingness to control population.

We use three approaches to address this possible endogeneity concern. First, we control for a rich set of fixed effects: province and year fixed effects in the linear-trend specification and an additional control for provincial heterogeneous trends in the first-difference specification. Therefore, our specifications account for all unobservable provincial characteristics that are invariant or trend linearly across time. Second, we run a regression of establishment years on a set of initial provincial conditions in 1969, including the total fertility rate, sex ratio, GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP. We find no evidence that these factors jointly predict the establishment year. The joint F-value is 1.39 with a p-value of 0.266. Finally, we conduct a set of placebo tests by shifting the establishment year along with the sampling period for all provinces back and forth by five years, which is reported in Table 3. If the decline in fertility rate is driven by other related factors, moving the window should still capture the effect. However, we see no sign of significance in any placebo test, suggesting that the drop in fertility rate is likely to be driven by policy changes that occurred in the early 1970s.

5.2 Micro-level Response to the Policy Change

The previous subsection highlights the large effect of the family planning leading group on total fertility rate at the provincial level. Note that provincial total fertility rate is aggregated from the household fertility behavior (Coale and Li 1987). Therefore, it would be helpful to understand the household-level response to the changes in the family planning policies that took place in the early 1970s.

Table 4 reports the regression outcomes of equation (4), which estimate the effect of household's exposure to the policies on three outcomes: number of children ever give birth to, age at first marriage, and birth spacing. Column (1) suggests that exposure to the family planning policy during the early 1970s is associated with a smaller family size. Column (2) separately estimates the effects of exposure to the 1970s policy and to the One-Child Policy.[13] The results suggest that the 1970s policies capture most of the decline in family size and that the additional effect of the One-Child Policy is quite mild. Despite being statistically significant, the coefficient of the One-Child Policy is less than one-fifth that of the Family Planning Leading Group (-0.050 versus -0.264). This finding is consistent with the observations from Figure 1 and the findings from Wang (2014) and Wang, Zhao, and Zhao (2017), who also find a small additional effect of the One-Child Policy conditional on previously existing policies. The full exposure (cohort 1960 and onwards) to the 1970s policies averages 5.67. Multiplying by a coefficient of -0.264, the results suggest the policy leads to a reduction of 1.50 children. Column (3) highlights the importance of provincial variation in our specification. If we compute $\text{FPP}_{p,c}$ by assuming that all provinces establish the leading group in 1972 and if we use the national age-specific fertility rate instead of the provincial fertility rate, we no longer observe a significant effect of exposure to the family planning policy. Finally, the policy also delays people's marriages and prolong the spacing between births, as shown in Columns (4) and (5).

The analysis at the micro-level provides further insight into understanding the decline in the total fertility rate. Because the total fertility rate captures the aggregated fertility behavior of a group of people in a given year, its decline can be roughly decomposed into two parts — delaying effect and reduction effect. Delaying effect refers to that people are not having children in the current year and put the childbirth off to the future. In that scenario, even without a decline in the number of children that would be eventually born, we can still observe a decline in the total fertility rate. The "later" (marriage) and "longer" (intervals) policies are expected to postpone the arrival of children.[14] Reduction effect refers to a reduction in the total number of

[13]The coefficient in front of exposure to the One-Child Policy should be interpreted as the additional effect of the One-Child Policy.

[14]Those two policies can also have an indirect effect on the number of children. Given a woman's fertile period is fixed, later marriage and longer intervals naturally shrink the time she can have children. Such effect is larger in areas with higher fertility rate.

children that a woman gives birth to in her entire life. Which effect dominates? Delaying effect or reduction effect? If the delaying effect explains most of the decline in the total fertility rate, we expect no long-run impact on the country's demographic structure despite a rapid decline in the fertility within a short period. On the contrary, children reduction effect can permanently shift the demographic structure. A comparison between the estimates from provincial-level data (Table 2) and those from micro-level data (Table 4) suggests the reduction in the total number of children explains the whole decline. Table 2 suggests the early-1970s policies can explain a decline in the fertility rate of 1.47 prior to the 1979 One-Child Policy. Table 2 reveals that the exposure to the early-1970s policies (conditional on the exposure to the One-Child Policies) can account for a drop of 1.50 children in one's entire life. Those two numbers are very close to each other, suggesting the fewer births in a given year are not put off to a future day, instead, they are not ever born.

5.3 Does the Decline in Fertility Rates Lead to a Biased Sex Ratio?

A major concern in using the 1979 One-Child Policy as an exogenous variation in the fertility rate is that it results in a simultaneous rise in the sex ratio. This relationship violates the exclusive assumption as for a valid instrument when the sex ratio directly affects the dependent variable of interest. Our empirical strategy focuses on 1969–1978 instead. Figure 1 shows that at the national level, there are no obvious changes in the sex ratio during this period. To further assure that our empirical strategy is not subject to the same critique as the One-Child Policy, Table 5 estimates the linear-trend and first-difference specifications with the birth year-province sex ratio as the dependent variable. We see no significant effects on the sex ratio.

Two reasons can explain why a decreasing fertility rate does not lead to an escalating sex ratio in the early 1970s even though the son preference may be as prevalent. First, the family planning policy was mostly voluntary during the early 1970s or was at least significantly less coercive than the One-Child Policy that followed (Zhang 2017). Although there existed an explicit quota on how many children a couple could bear, the punishment for a violation was quite limited. Gender selection involved risks and costs. As a result, the incentive for gender selection without a strict birth quota was limited. Second, gender selection technology (mainly Ultrasound B) did not become prevalent in China until the late 1980s (Zeng et al. 1993; Chu 2001; Li and Zheng 2009; Chen, Li, and Meng 2013). Son preference on its own cannot generate a biased sex ratio without an approach for choosing a child's gender (Li, Yi, and Zhang 2011). Even if households have the desire to have more sons, they are not able to do so without gender selection technology. Coale and Banister (1996) find that an escalation in the proportion of young women missing since the 1980s has been largely caused by the rapid escalation in sex-selective abortions. Li and Zheng (2009) and Chen, Li, and Meng (2013) demonstrate that improved local access to ultrasound technologies has resulted in a substantial increase in the sex ratio at birth.[15]

5.4 Family Planning Leading Group versus One-Child Policy

We end this section with a comparison between our strategy exploring the variation in family planning policies during the early 1970s and that using the One-Child Policy. Previous subsections highlight three important features of our empirical strategy: it results in a large decline in the total fertility rate; it does not simultaneously lead to a biased sex ratio; and it is robust to the inclusion of provincial heterogenous trends. Therefore, it would be useful to reassess the effect of the One-Child Policy as a benchmark.

We try to replicate two strands of OCP literature that allows for both cross-sectional and temporal variations.[16] The first strand of literature adopts the fines rate for above-quota births as a proxy for local intensities of the One-Child Policy (McElroy and Yang 2000; Ebenstein 2010; Wei and Zhang 2011; Liu 2014; Huang, Lei, and Zhao 2016). The fines rate is defined as the ratio to local average household income, which is computed based on the policy documentation from Scharping (2003) (see Ebenstein (2010) for a detailed description for constructing this measure).[17] The second strand of literature explores the rollout of One-Child Policy (Edlund et al. 2013; Jia and Persson 2017). The One-Child Policy is an umbrella term for a raft of family-planning policies officially launched in 1979 (Peng 1997). Edlund et al. (2013) and Jia and Persson (2017) focus on three programs: Family Planning Science and Technology Research Institutes, Family

[15]Literature also documents two other approaches for gender selection: female infanticide and misreporting (or hiding) (Zeng et al. 1993; Coale and Banister 1996). However, the incentive to use such extreme methods without a strict birth quota, such as the One-Child Policy, is limited.

[16]To our knowledge, there is also another research looks at the variations in the intensity of the One-Child Policy. Li and Zhang (2017) define the One-Child Policy intensity using excess fertility rate, which is calculated as the percentage of existing *Han* mothers aged 25–44 years and who reported a higher order birth in 1981. We decide not to follow this literature because the excess fertility rate is an *ex post* measure, which is an outcome of the One-Child Policy. Because the variable of key interest in our study — total fertility rate — is also an outcome variable, regressing outcome on outcome is clearly problematic.

[17]We thank Wei Huang for sharing his data on the fines rate.

Planning Propaganda and Education Centers, and Associations for Population Studies,[18] which are originally documented in Peng (1997).

Following existing literature, we estimate the effect of the One-Child Policy with the following specification,

$$\begin{aligned} \mathrm{Y}_{p,t} &= \alpha + \sum_{r=1}^{3} \beta_1^r I\left(t > T_p^r\right) + \beta_2 \mathrm{Fines}_{p,t} + \gamma \mathbf{X}_{p,t} + \mathrm{Prov}_p + \mathrm{Year}_t + \varepsilon_{p,t} \\ \Delta \mathrm{Y}_{p,t} &= \alpha + \sum_{r=1}^{3} \beta_1^r \Delta I\left(t > T_p^r\right) + \beta_2 \Delta \mathrm{Fines}_{p,t} + \gamma \Delta \mathbf{X}_{p,t} + \mathrm{Prov}_p + \mathrm{Year}_t + \varepsilon_{p,t}, \end{aligned} \tag{5}$$

where T_p^r refers to the establishment year of three programs as a part of the One-Child Policy and $\mathrm{Fines}_{p,t}$ refers to the fine rate of province p in year t. $\mathrm{Y}_{p,t}$ is the dependent variable, which can be either total fertility rate or sex ratio at birth.

Our reassessment of the One-Child Policy focuses on period 1979–2000. Therefore, we need to extend our original province-level data set on total fertility rate and sex ratio beyond the year 1982.[19] Our post-1982 provincial estimates of total fertility rates come from National Bureau of Statistics of China (2007), who derives the estimates from the 1990 census and 2000 census. We compute the sex ratio at birth for cohorts 1982–1990 using a 1% sample of 1990 census and that for cohorts 1991–2000 using a 1% sample of 2000 census.

It is important to note neither National Bureau of Statistics of China (2007)'s estimate for total fertility rate nor our computation for sex ratio at birth adjust underreporting. As discussed in the data section, the underreporting is not prominent in census 1982. However, it has been widely recognized as an issue for census 1990 and 2000 (Smith 1994; Merli 1998; Banister 2004; Goodkind 2004; Scharping 2007; Goodkind 2011). Despite acknowledging the issue, we still opt for not making any adjustment for four reasons. First, existing studies have not yet proposed a convincing approach to back-up a sex ratio without underreporting. Therefore, it is difficult to develop a new measure that is both convincing and compatible with previous studies, who mostly leave underreporting unadjusted (Li and Zheng 2009; Ebenstein 2010; Li, Yi, and Zhang 2011;

[18] Edlund et al. (2013) and Jia and Persson (2017) use the term "Family Planning Associations." We checked Peng (1997) and confirmed "Family Planning Associations" and "Associations for Population Studies" are two different programs. The data used in their studies actually correspond to the latter program.

[19] The total fertility rate prior to 1982 is obtained from Coale and Li (1987), whose imputation was based on China's 1982 One per Thousand Sample Fertility Survey. The sex ratio is computed based on 1982 China's census of population. Therefore, both variables in our main specification end in the year 1982.

Wei and Zhang 2011; Chen, Li, and Meng 2013; Edlund et al. 2013). Second, child underreporting itself is a distortion behavior as a consequence of the One-Child Policy and has been recognized as an important reason for the sex ratio imbalance (Goodkind 2011). As a result, our statistics wish to retain this distortion behavior. Thirdly, previous studies have identified that the scope of underreporting is insufficient to explain the biased sex ratio. The demographers have reached a consent that, after adjustment for underreporting, the distorted sex ratios are still very pronounced (Banister 2004). This implies the high sex ratio is not merely an artefact of faulty data. Sex-selective abortion has also been playing a critical role (Banister 2004; Li, Yi, and Zhang 2011; Chen, Li, and Meng 2013). By comparing the sex ratio at birth in the 1990 census with the sex ratio for 10-year-olds in the 2000 census, Wei and Zhang (2011) conclude that the number of underreported infant girls is not large enough to make a noticeable distortion to the reported sex ratio imbalance. Finally, if anything, underreporting should exaggerate the effect of the One-Child Policy in reducing fertility rate. Therefore, the relative size of our suggested approach would be even larger without the existence of underreporting.

Table 6 reports the results using fines rate for above-quota births and the rollout of family planning stations as a measurement of the One-Child Policy. Table 6 discloses three notable findings. First, despite being statistically significant, the measures for the One-Child Policy can only explain a small decline in the fertility rate. If we take the estimates from Panel A column (3) and given the mean fines rate increased from 118% in 1979 to 257% in 2000, the One-Child Policy can explain a fertility decline of $0.103 + 0.067 + 0.131 + 0.032 \times 1.39 = 0.345$, which is about one fourth of the magnitude that can explained by the policy change during the early 1970s (1.46). Second, the inclusion of provincial specific trends changes the estimates on the total fertility rate drastically. The coefficients in front of the family planning stations shrink greatly and that in front of fines rate even turns to an opposite direction. One possible explanation for such sensitivity to heterogenous trends is — prior to the One-Child Policy enforcement in 1979, there already exists other family planning policies, which is exactly the focus of our study. The heterogeneity analysis in Table 2 suggests that the fertility decline during the 1970s is faster among provinces with higher initial fertility rate. Finally, the One-Child Policy significantly leads to a higher sex ratio, as highlighted in Panel B. This confirms the findings from Ebenstein (2010) and Edlund et al. (2013). Interestingly, by comparing the linear-trend specification and the first-difference specification, we find the estimation results on sex ratio is robust to heterogenous trend. This echoes our findings in previous subsections — while the family planning policies in the early 1970s dramatically reduce the fertility, it does impact a great impact on sex ratio. Therefore, the common-trend assumption for pre-1979 period is a valid assumption for sex ratio, but not that valid for fertility rate.

6 Discussion

The previous section highlights the importance of the Family Planning Leading Group in understanding the rapid decline of the total fertility rate in China during the 1970s. However, two important questions remain unanswered. First, what is the mechanism of the leading group, or, in other words, what did the leading group actually do to reduce the total fertility rate? Second, can we isolate the effect of the Family Planning Leading Group from other contemporaneous events, such as the Cultural Revolution?

6.1 Mechanisms of the Family Planning Leading Group

In Section 2, we summarize that the leading group has three main duties — enforce "later, long, fewer" policies; broadcast family planning policies; and provide technical support for birth control. We provide evidence that the "later, long, fewer" policies had been quite effective using micro-level census data. So what did the government do to achieve the goal of population control? In this subsection, we explore three channels using either statistical or narrative evidence — pressure from high-level officials, intensified propaganda program, and increased usage of birth control measures (either voluntary or coercive).

First, the Family Planning Leading Group is a high-level institution at the provincial level, whose group leader is typically the first or the second chair of the provincial government. Therefore, the establishment of the leading group symbolizes a greater emphasis on family planning from the upper-level government. For example, the Shanxi Family Planning Leading Group held a conference in June 1971 shortly after its establishment. The conference decided that

> "*Enforcing family planning involves every household. We must inspire a broad population and give family planning a big buildup on press ... The Revolution Committee should put family planning on calendar and assign specific persons in charge of studying, inspecting, and enforcing family planning policies. Responsible cadres at all levels*

must take the lead in studying, advocating, and practicing the policies . . . Departments of propaganda, commerce, technology, planning, finance, and public health must put family planning into routine works and coordinate together to enforce the work of family planning." (Peng 1997), p1276

Support comes together with pressure. We observe increasing funds for family planning affairs[20] after the establishment of a provincial leading group. National Population and Family Planning Commission of P.R. China (2007) documents the amount of funds for family planning at the national and the provincial level since the year 1971. Figure 8 plots this amount at the national level in the 1970s. Funds for family planning experienced two rounds of rapid expansion. The second expansion period is the post-1978 increase that accompanied the enforcement of the more stringent One-Child Policy, and the first expansion took place exactly from 1971 to 1975, the period when provinces gradually established the leading group. To verify that leading group establishment causally leads to an increase in the amount of funds for family planning, Table 7 adopts a regression framework similar to that used in the analysis of total fertility rate. The results suggest that provinces with established leading groups receive more funds supporting the family planning business from the central government.

Second, the policies in the early 1970s were accompanied with intensified propaganda programs. The programs spread widely from province level to county level. For example, chronicles of Henan province document that

> *"In January 1975, Henan advocated an activity named "Family Planning Awareness Month." Henan Office of Family Planning held a conference of over 7,000 people to broadcast the family planning policies and to criticize old thoughts and ideas. The activity was endorsed by the state Family Planning Leading Group and was promoted to the whole country. Since then, "Family Planning Awareness Month" was held every year in Henan for 13 times from 1975 to 1987."*

The county government also attached great importance to the propaganda programs. For example, local gazetteers of Shanggao, a county located in Jiangxi province, document that

[20] 30-35% of the funds are used for administrative affairs, and 60-65% are used for distributing contraceptive pills and covering fees for birth control operations (National Family Planning Commission of P.R. China, Comprehensive Planning Department 1983).

> *"In 1975, Shanggao county held over 360 classes and over 42,400 cadres and masses participated in the study. The classes selected activists to form family planning report groups, whose goal are to educate people down to the village. Shanggao county also transferred bare-foot doctors and medical staffs to form 19 teams of family planning. The teams went down to each village to advocate family planning policies and introduce knowledge about birth control. They also helped to fulfill the need for birth control. Shanggao county was chosen as a national advanced model of family planning."*

The propaganda programs not only go down to village, but also involve school curriculum. For example, chronicles of Jiangsu province document that

> *"Starting from 1975, the province requested middle schools to offer courses on physiological hygiene and encourage late marriage. ... The province printed over two million family planning booklets between 1972 and 1978."*

The propaganda programs quickly made family planning policies and measures of birth control aware to everybody.

Thirdly, the policy witnessed increasing usages of fertility control measures. National Family Planning Commission of P.R. China, Comprehensive Planning Department (1983) records the number of family planning operations, including IUD insertion, sterilization, and abortion from 1971 to 1982, which is shown in Figure 9. IUD insertion was the most important birth control measure at that time[21] and experienced the most rapid increase in the early 1970s. In 1971, there were 6.2 million IUD insertion operations, and in 1975, this number almost tripled to 16.7 million. The number of IUD insertion operations remained approximately stable after 1975. The post-1978 One-Child Policy period, on the contrary, accompanied a rapid increase in abortions. This difference reiterates the fact that the family planning policies in the early 1970s were more compromising than the One-Child Policy.

One related question here is — are the increasing usages of fertility control measures voluntary or coercive? To probe this question, we use the 2014 life history survey from China Health and Retirement Longitudinal Study (CHARLS), which is a nationally representative survey of Chinese

[21] In 1982, 127 million women of fertile age were subject to birth controls. Among them, 114 million adopted at least one birth control measure; 42 million (36.8%) had either the husband or wife sterilized; 57 million (50.0%) had an IUD inserted; and 13 million (11.4%) used condoms or took contraceptive pills (National Family Planning Commission of P.R. China, Comprehensive Planning Department 1983).

residents ages 45 and older to serve the needs of scientific research on the elderly. In the year 2014, CHARLS surveys respondents' life history, including pregnancy history. There are 1,871 women who report being pregnant for at least once from 1965 to 1990. Figure 10 plots how each pregnancy is ended. Prior to 1970, the rate of induced abortion fluctuates at around 6%. The rate rose rapidly to 11% in 1975, but it was still significantly lower than a rate of 20% after the 1979 implementation of the One-Child Policy. Figure 11 reveals that family planning is not the only reason for induced abortion. Prior to the year 1975, unwanted birth remains the dominant reason for induced abortion. After 1979 as the policies became more stringent, policy related abortions account for over two-thirds of total abortions. Therefore, we conclude at least part of the decline in the fertility rate can be attributed to households' greater ability to control their fertility and to avoid unwanted births during the early 1970s. This echoes Goldin and Katz (2002) and Bailey (2006)'s idea that access to oral contraceptive pill improves women's ability to plan childbearing in the United States.

6.2 Possible Influence from other Contemporaneous Events

This subsection consecutively discusses three historical events that share two common features. First, all those events have potentially important impacts on the fertility rate. Second, those events also took place around the early 1970s, and therefore, may coincide with the establishment of the Family Planning Leading Group.

Cultural Revolution

The Cultural Revolution was a catastrophic political event in China that spanned the decade from 1966 to 1976. The estimated fatalities range from 250,000 to 1.5 million (Walder and Su 2003). In addition to widespread violence, there were also disruptions in government functioning, including family planning. The Cultural Revolution can possibly contaminate our empirical strategy for two reasons. First, fertility is a procyclical decision (Lindo 2010; Schaller 2016; Chevalier and Marie 2017). Therefore, the violence and uncertainty brought by the Cultural Revolution could suppress fertility. Second, the severity of the Cultural Revolution may directly affect the establishment of the leading group. Provinces with less violence might have experienced less disruption in government functioning and were able to set up the leading group earlier.

In order to evaluate the possible impact of the Cultural Revolution on our empirical analysis, we need to construct a variable indicating the local severity of the Cultural Revolution. Following Bai and Wu (2017), we use provincial fatalities, which are aggregated from regional gazetteers,[22] as a share of the 1965 population to proxy the local intensity of the Cultural Revolution. Table 8 reports the estimation results that additionally include the interaction between Cultural Revolution local intensity and post-leading group establishment.[23] There is no evidence suggesting that the Cultural Revolution is systematically associated with the family planning policy.

"Sent-Down-Youth" Program

The sent-down-youth movement, also known as "rural rustication," was partially related to the attempt to end the urban unrest with the outbreak of the Cultural Revolution and was, in part, to discharge the Red Guards (Bernstein 1977). The movement resettled roughly 17.7 million urban youth to rural areas from 1967 to 1978 (Gu 2009). Unsurprisingly, being far from home and living in an unfamiliar place could have lifetime consequences, including delayed marriage and childbearing (Zhou and Hou 1999). Although the vast majority (over 90%) of the sent-down youth returned to urban areas by the year 1980, a small proportion permanently stayed in the rural areas to which they were sent. Figure 12 briefly describes the impact of the sent-down-youth program from the 2010 wave of China Family Panel Study, which provides information about whether individuals experienced the sent-down-youth movement along with the start and the end year. Cohorts born between 1945 and 1960, who were at the peak of their fertile period during the 1970s, were the most severely impacted.

As in the analysis of the Cultural Revolution, we need to construct the local intensities of the sent-down-youth program. We take total sent-down youth (both those settled within the province and those settled outside the province) from Gu (2009). We divide this number by the provincial population who were born between 1945 and 1960 (calculated based on census 1982) as a proxy for the intensity of the sent-down-youth program. Table 9 reports the results accounting for the possible influence of the sent-down-youth program. Panel A suggests that including the local intensities of the sent-down-youth program has little impact on the estimated effect of the Family Planning Leading Group. Its own coefficient is positive and significant, suggesting that provinces that were more affected by the program experienced a smaller decline in the total fertility rate after the establishment of the leading group. However, this pattern is mainly driven by the fact that

[22]We thank Andrew G. Walder for sharing his data.

[23]The local intensities themselves would be absorbed by the provincial fixed effects.

large cities, which had lower initial fertility, were more affected by the sent-down-youth movement, so there was less room for fertility to decline. Panel B also includes the initial provincial total fertility rate in 1965, and the positive coefficient on the sent-down-youth movement is completely absorbed. To conclude, we find no evidence that the sent-down-youth program can systematically affect our main results.

School Expansion Programs during the 1970s

There is a large literature studying how the disruption of the education system in urban China during the Cultural Revolution negatively impacts people's educational attainment (Meng and Gregory 2002; Zhang, Liu, and Yung 2007; Giles, Park, and Wang 2015; Meng and Zhao 2016). The Cultural Revolution seemingly suggests a decline in school enrollment during the 1970s. However, we see an exactly opposite pattern from the data. Based on *China Compendium of Statistics 1949–2008*, we computed the enrollment of primary school and secondary school per 10,000 from 1960 to 1990, as plotted in Figure 13. We observe a marvelous increase in secondary school enrollment per 10,000 from 200 in 1968 to 750 in 1977 — a triple increase within merely ten years. The pattern is mainly explained by a school expansion program in rural China, whose goal was to achieve universal junior secondary education (Pepper 1990). The expansion in rural areas is simultaneous to the disruption in urban areas but it is rarely studied (see (Hannum 1999) for more institutional details).

More school enrollment can reduce the fertility rate, especially for the teenage girls. Therefore, we additionally control for the share of primary school and secondary school students in the population in Table 10. Note that this is a conservative approach because lower fertility can inversely encourage schooling (Miller 2010; Huang, Lei, and Sun 2016). Nevertheless, Table 10 suggests that more school enrollment is indeed associated with a lower total fertility rate, but it barely affects our estimated effect of the Family Planning Leading Group.

7 Conclusions

In this study, we highlight the importance of the Family Planning Leading Group in explaining the rapid decline in China's total fertility rate during the 1970s. Since 1970, provinces gradually began forming the Family Planning Leading Group, whose responsibility is to promote the implementation of the Family Planning Policy under the guidance of the central government. This establishment symbolized the recovery of family planning from the Cultural Revolution and proved to be rather effective. The total fertility rate significantly declined from 5.7 in 1969 to 2.7 in 1978. Exploiting different establishment years for the provincial Family Planning Leading Group across the country, our estimation suggests that it can explain about half of the decline in fertility during the period. We also provide empirical evidence that the decline in fertility in the 1970s is robust to the province-level heterogenous trends and it did not result in a contemporaneous increase in the sex ratio.

This study has two important takeaways. First, the year 1970 should be considered as the starting point of effective family planning policy and the gradual transition of the fertility pattern in China, not the 1979 One-Child Policy. The assumption that China experienced an abrupt decline in the fertility rate in 1979 is invalid based on our empirical analysis. Second, provincial variation plays an important role in isolating the effect of the family planning policy. China is a large country that is always experiencing rapid changes. It is difficult to identify a period when only one reform took place. For example, in this study, we exploit the provincial variation in the timing of the leading group establishment. Although the early 1970s coincide with the Cultural Revolution, the "sent-down-youth" program, and the school expansion program, all of which can suppress the fertility rate, these events do not affect our main specification because the local intensities of the events are not systematically associated with the provincial variation in the leading group establishment years.

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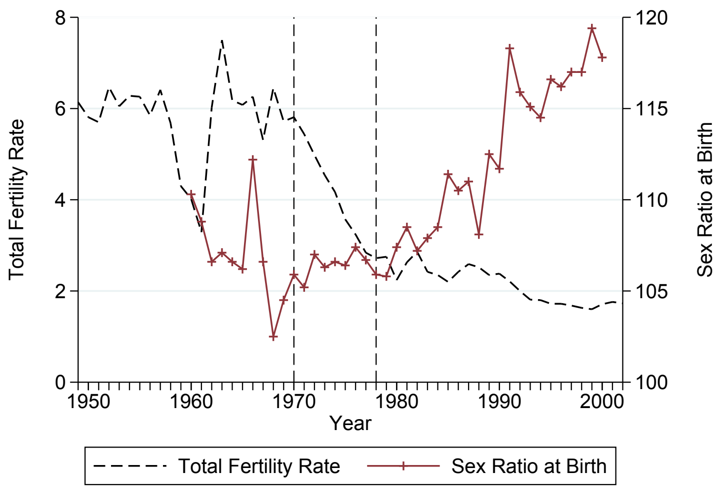
Figures and Tables

Figure 1: Trends in China's Total Fertility Rate and the Sex Ration at Birth, 1949–2002



Data source:
Total fertility rate 1949–2002: Lu and Zhai (2009) "Sixty Years of New China Population."
Sex ratio at birth 1960–1988: Liang and Chen (1993).
Sex ratio at birth 1989–2000: China Population Statistics Yearbook.

Figure 2: The Establishment Year of Family Planning Leading Group in Each Province

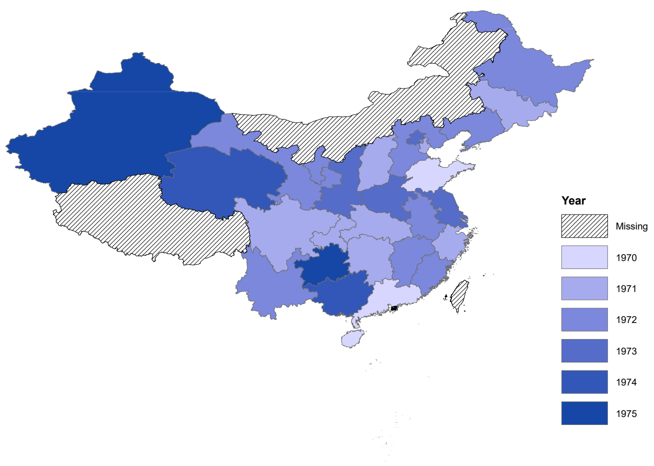


Figure 3: China's Total Fertility Rate from Various Sources

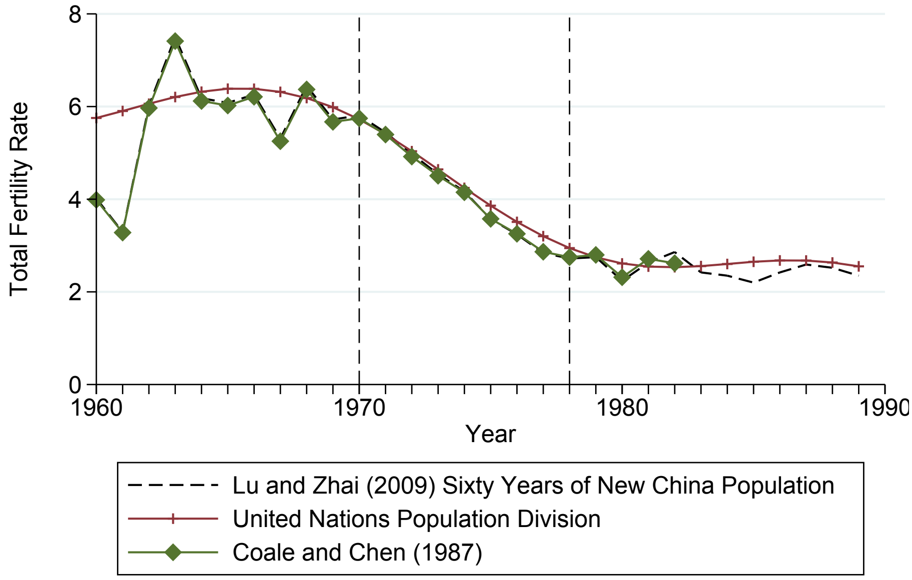


Figure 4: Example of Constructing the Exposure to Policy (for cohort born in 1945)

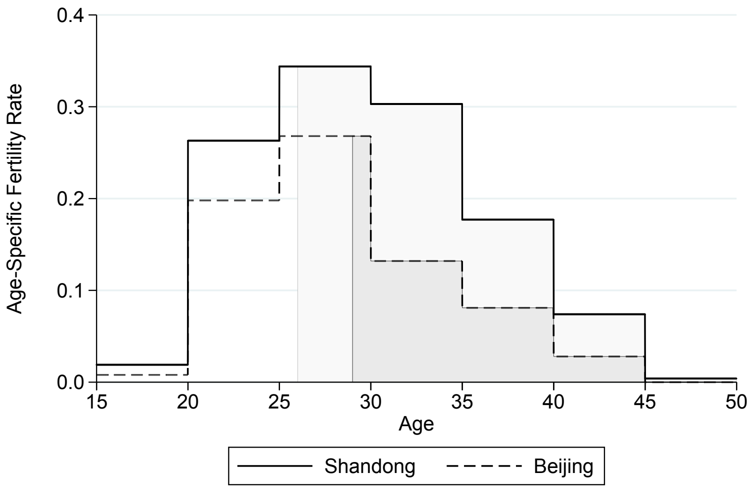


Figure 5: Trends in Total Fertility Rate, Early Establishment Provinces versus Late Establishment Provinces

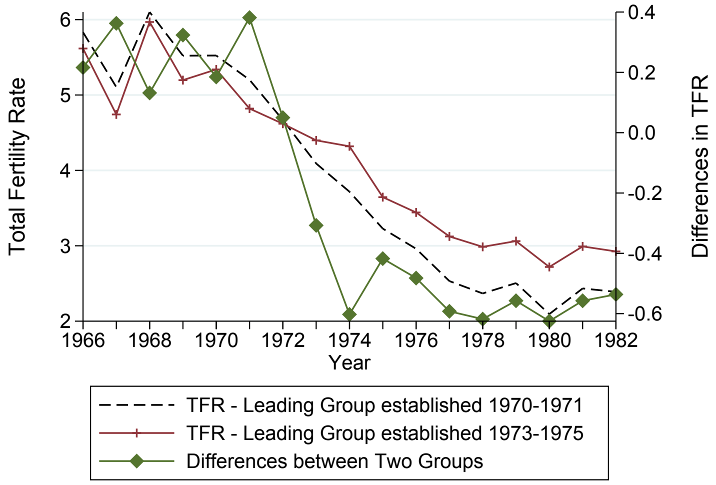


Figure 6: Event Study Estimates of the Effect of Leading Group on Total Fertility Rate

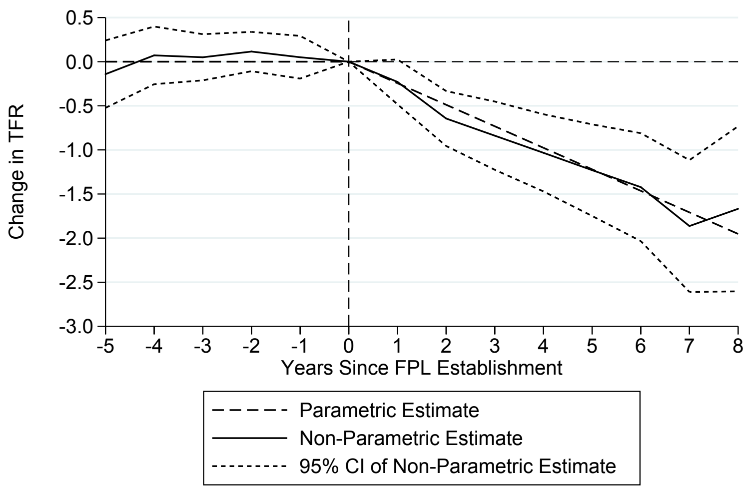
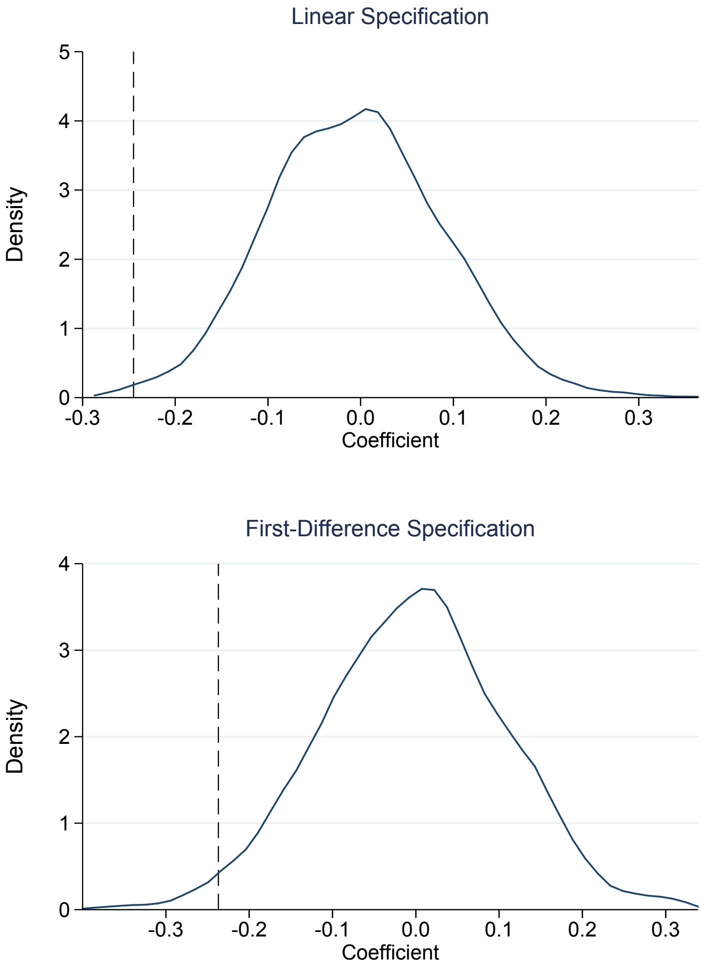
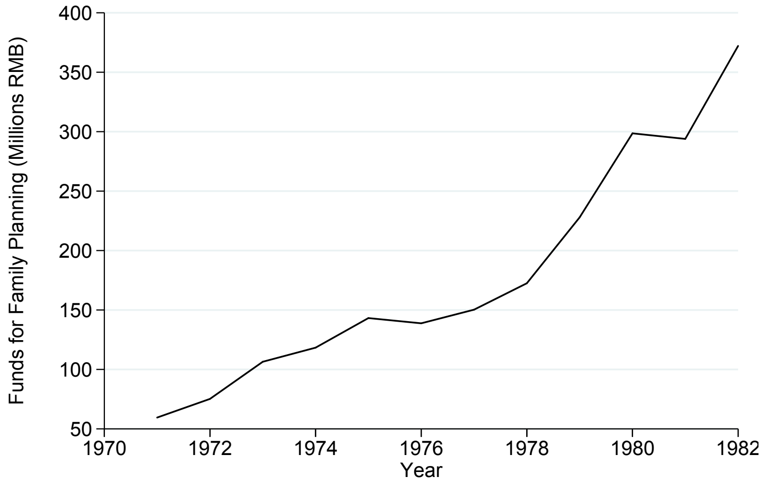


Figure 7: The Simulated Coefficients if the Years of Establishment distribute Evenly from 1970–1975 for All Provinces



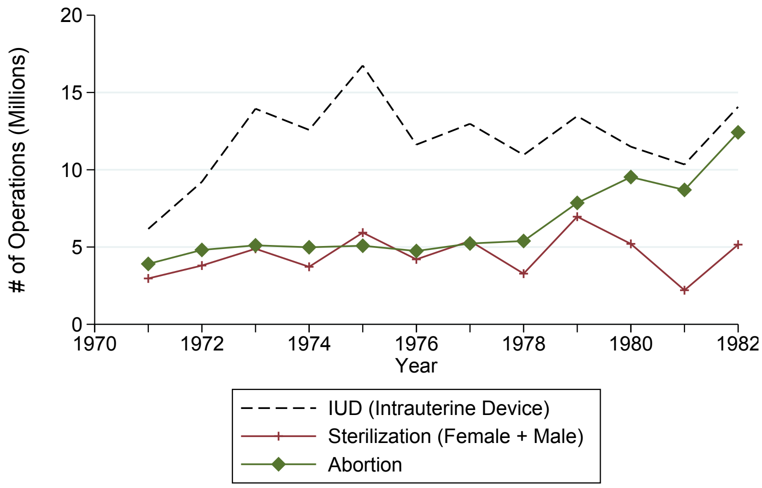
Note: 1,000 simulations for each specification. The vertical dash lines represents the coefficients using actual years of establishment.

Figure 8: Trends in Funds for Family Planning



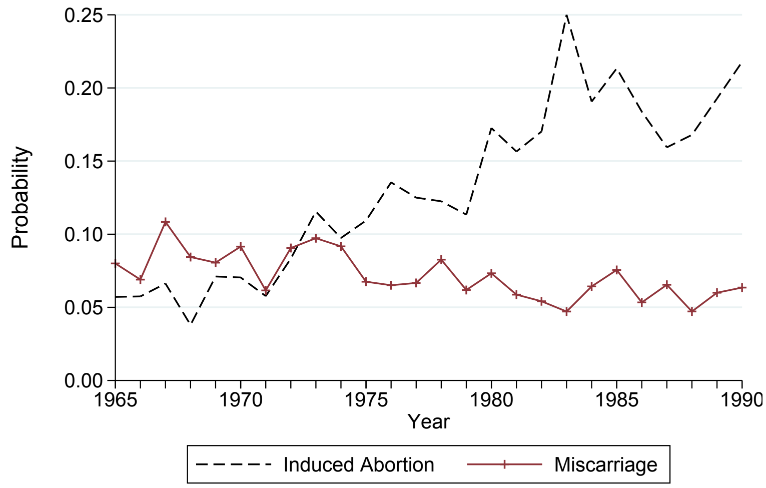
Note: Data from National Population and Family Planning Commission of P.R. China (2007).

Figure 9: Different Methods of Birth Control



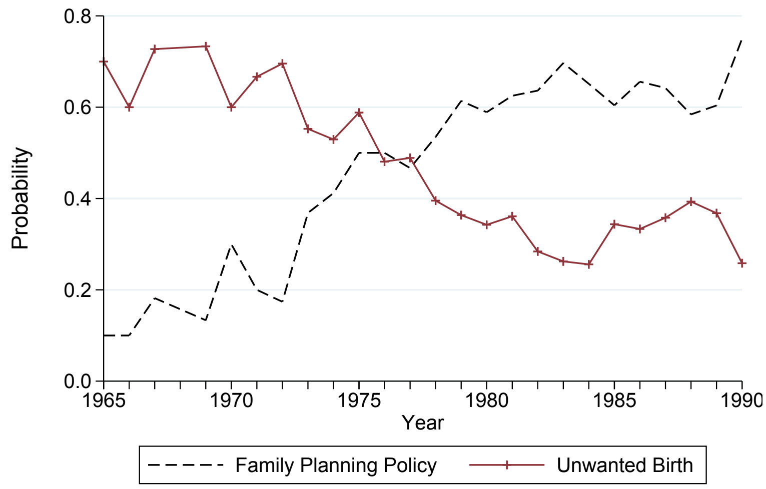
Note: Data from National Family Planning Commission of P.R. China, Comprehensive Planning Department (1983)

Figure 10: How a Pregnancy is Ended?



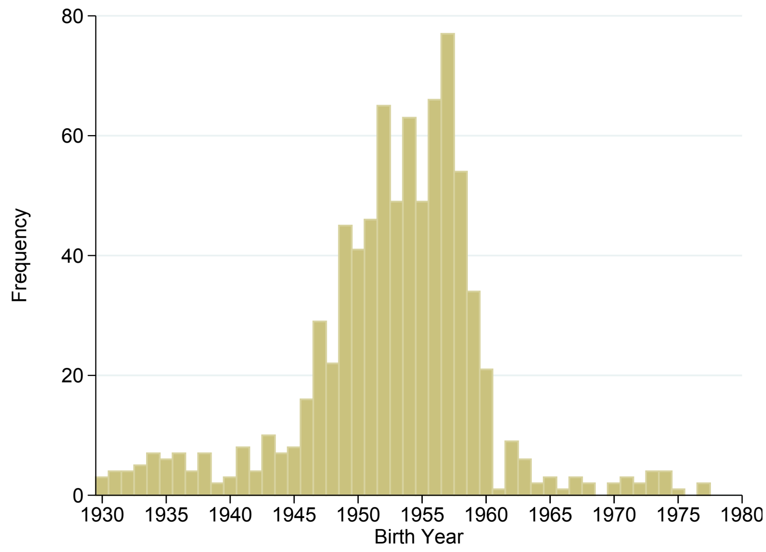
Note: Authors' calculation based on China Health and Retirement Longitudinal Study 2014.

Figure 11: Reasons for Induced Abortion



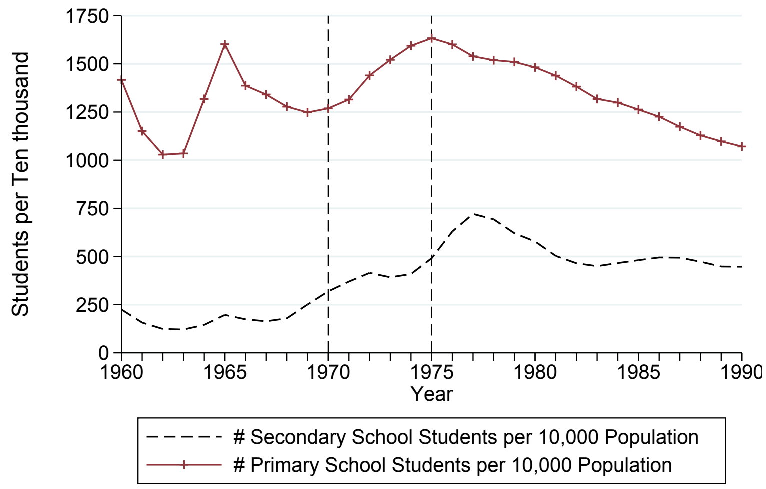
Note: Authors' calculation based on China Health and Retirement Longitudinal Study 2014.

Figure 12: Cohort Distribution of the Sent-Down-Youth



Note: Authors' calculation based on China Family Panel Study 2010.

Figure 13: School Expansions during the Early 1970s



Note: Authors' calculation based on National Bureau of Statistics of China (2010).

Table 1: Summary Statistics

Variable	Mean	S.D.	Min	Max
Panel A: Province-Level Data				
Year of FPL Establishment	1972.148	1.299	1970	1975
Total Fertility Rate	4.302	1.546	1.174	7.038
Sex Ratio at Birth	106.032	3.759	87.067	120.614
Population (10,000)	3116.821	1888.401	264.970	7160
GDP per capita (RMB)	372.785	350.903	101	2498
Share of Non-agricultural Population	0.199	0.141	0.070	0.635
Share of Primary Industry in GDP	0.355	0.142	0.035	0.654
Share of Secondary Industry in GDP	0.448	0.138	0.196	0.778
Observations	270			
Panel B: Mini-census 2005 (Cohort 1940–1965)				
Age	49.935	6.921	40	65
Number of Children	2.341	1.209	0	12
Age at First Marriage	22.315	3.314	16	64
Exposure to the 1970s Policy	4.900	1.391	0.2	7.035
Exposure to the One-Child Policy	3.793	1.798	0.015	7.035
Less than Primary School	0.220	0.414	0	1
Primary School Graduate	0.338	0.473	0	1
Junior High Graduate	0.285	0.451	0	1
Senior High Graduate	0.119	0.324	0	1
Some College or Above	0.037	0.190	0	1
Observations	336,278			
Panel C: Census 1982 (Cohort 1930–1965)				
Age	36.322	7.167	17	52
Birth Spacing	3.370	1.802	1	15
Exposure to the 1970s Policy	3.579	1.875	0.003	7.035
Less than Primary School	0.549	0.498	0	1
Primary School Graduate	0.330	0.470	0	1
Junior High Graduate	0.094	0.292	0	1
Senior High Graduate	0.023	0.150	0	1
Some College or Above	0.003	0.059	0	1
Observations	910,262			

Table 2: The Effect of the Family Planning Leading Group on Total Fertility Rate

Dependent Variable	Total Fertility Rate					
Period	1969–1978					
Specification	Linear-Trend			First-Difference		
	(1)	(2)	(3)	(4)	(5)	(6)
Years since FPL Establishment	-0.267***	-0.244***	-0.253***	-0.260**	-0.252**	-0.255**
	(0.076)	(0.047)	(0.044)	(0.109)	(0.109)	(0.110)
Years since FPL Establishment			-0.068***			-0.108**
$\times \left(\text{TFR}_{p,1969} - \overline{\text{TFR}}_{1969}\right)$			(0.017)			(0.045)
Observations	270	270	270	243	243	243
R-Squared	0.928	0.933	0.938	0.227	0.234	0.250
Provincial Controls		X	X		X	X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Year dummies and province dummies are controlled in all specifications. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP.

Table 3: Placebo Test

Dependent Variable	Total Fertility Rate			
Year of Establishment	Move Back 5 Years		Move Forward 5 Years	
Period	1964–1973		1974–1982	
Specification	Linear	Difference	Linear	Difference
	(1)	(2)	(3)	(4)
Years since FPL Establishment	-0.057	0.175	0.040	-0.067
	(0.046)	(0.127)	(0.044)	(0.083)
Observations	270	243	243	216
R-Squared	0.921	0.634	0.912	0.410
Provincial Controls	X	X	X	X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, share of secondary industry in GDP, year dummies, and province dummies.

Table 4: Are "Later, Longer, Fewer" Policies Effective?

Dependent Variable	Number of Children Ever Give Birth to			Age at First Marriage	Birth Spacing
Data	Mini Census 2005				Census 1982
Birth Cohort	1940–1965				1930–1965
	(1)	(2)	(3)	(4)	(5)
Exposure to the 1970s Policy	-0.296***	-0.264***		0.254***	0.183***
	(0.008)	(0.010)		(0.025)	(0.009)
Exposure to the One-Child Policy		-0.050***			
		(0.008)			
Exposure to the Placebo Policy without Provincial Variation			-0.029		
			(0.023)		
Observations	336,278	336,278	336,278	336,278	910,262
R-Squared	0.374	0.374	0.371	0.193	0.083
Individual Controls	X	X	X	X	X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Only female subsample is used. Robust standard errors are in parentheses. Control variables include: level of education dummies, cohort dummies, and province dummies.

Table 5: The Effect of the Family Planning Leading Group on Sex Ratio

Dependent Variable	Sex Ratio at Birth	
Birth Year	1969–1978	
Specification	Linear-Trend	First-Difference
	(1)	(2)
Years since FPL Establishment	0.600	0.790
	(0.383)	(1.152)
Observations	270	243
R-Squared	0.265	0.070
Provincial Controls	X	X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, share of secondary industry in GDP, year dummies, and province dummies.

Table 6: The Effect of the One-Child Policy on Total Fertility Rate and Sex Ratio

Period	1979–2000					
Specification	Linear-Trend			First-Difference		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Total Fertility Rate as the Dependent Variable						
Post - Science and Technology	-0.106*		-0.103*	-0.054		-0.054
Research Inst.	(0.056)		(0.056)	(0.049)		(0.049)
Post - Education Center	-0.080		-0.067	0.028		0.025
	(0.058)		(0.059)	(0.038)		(0.038)
Post - Population Association	-0.136**		-0.131*	0.007		0.006
	(0.069)		(0.068)	(0.065)		(0.065)
Fines for Excess Fertility		-0.040**	-0.032**		0.026**	0.026**
		(0.016)	(0.016)		(0.011)	(0.011)
Observations	563	563	563	536	536	536
R-Squared	0.891	0.889	0.891	0.494	0.495	0.496
Provincial Controls	X	X	X	X	X	X
Panel B: Sex Ratio as the Dependent Variable						
Post - Science and Technology	1.856**		1.783**	2.502		2.500
Research Inst.	(0.873)		(0.873)	(1.880)		(1.879)
Post - Education Center	-0.428		-0.696	-0.743		-0.817
	(0.930)		(0.959)	(1.108)		(1.091)
Post - Population Association	0.001		-0.104	-0.913		-0.940
	(0.965)		(0.960)	(1.185)		(1.185)
Fines for Excess Fertility		0.674**	0.653*		0.710**	0.724**
		(0.329)	(0.335)		(0.335)	(0.348)
Observations	563	563	563	536	536	536
R-Squared	0.609	0.608	0.612	0.085	0.081	0.088
Provincial Controls	X	X	X	X	X	X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, share of secondary industry in GDP, year dummies, and province dummies.

Table 7: The Effect of the Family Planning Leading Group on the Amount of Funds for Family Planning

Dependent Variable	Funds for Family Planning (Millions RMB)			
Period	1971–1977			
Specification	Linear-Trend		First-Difference	
	(1)	(2)	(3)	(4)
Years since FPL Establishment	71.531***	66.870***	57.235*	54.345*
	(22.418)	(24.959)	(31.867)	(30.675)
Observations	189	189	162	162
R-Squared	0.876	0.886	0.282	0.293
Provincial Controls		X		X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Year dummies and province dummies are controlled in all specifications. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP.

Table 8: The Robustness of the Family Planning Leading Group from the Cultural Revolution

Dependent Variable	Total Fertility Rate			
Period	1969–1978			
Specification	Linear-Trend		First-Difference	
	(1)	(2)	(3)	(4)
Years since FPL Establishment	-0.244***	-0.233***	-0.260**	-0.234**
	(0.049)	(0.049)	(0.111)	(0.110)
Years since FPL Establishment *Fatalities per 10,000 during the Cultural Revolution	0.005	0.003	-0.000	-0.002
	(0.003)	(0.003)	(0.008)	(0.008)
Observations	270	270	243	243
R-Squared	0.930	0.934	0.227	0.246
Provincial Controls		X		X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Year dummies and province dummies are controlled in all specifications. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP.

Table 9: The Robustness of Family Planning Leading Group from the "Sent-Down-Youth" Movement

Dependent Variable	Total Fertility Rate			
Period	1969–1978			
Specification	Linear-Trend		First-Difference	
	(1)	(2)	(3)	(4)
Panel A: Effect of Sent-Down-Youth				
Years since FPL Establishment	-0.254***	-0.239***	-0.262**	-0.241**
	(0.047)	(0.046)	(0.111)	(0.110)
Years since FPL Establishment	0.007***	0.005**	0.013**	0.011
%SDY among 1945-1960 Cohorts	(0.002)	(0.003)	(0.007)	(0.007)
Observations	270	270	243	243
R-Squared	0.932	0.934	0.239	0.254
Provincial Controls		X		X
Panel B: Take Initial Fertility into Account				
Years since FPL Establishment	-0.252***	-0.247***	-0.263**	-0.244**
	(0.043)	(0.042)	(0.111)	(0.110)
Years since FPL Establishment	-0.001	0.001	0.003	0.003
%SDY among 1945-1960 Cohorts	(0.002)	(0.002)	(0.012)	(0.012)
Years since FPL Establishment	-0.088***	-0.108***	-0.092	-0.072
Provincial TFR in the Year 1965	(0.015)	(0.021)	(0.088)	(0.089)
Observations	270	270	243	243
R-Squared	0.938	0.940	0.243	0.256
Provincial Controls		X		X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Year dummies and province dummies are controlled in all specifications. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP.

Table 10: The Robustness of Family Planning Leading Group with Controls for Share of Students in the Population

Dependent Variable	Total Fertility Rate			
Period	1969–1978			
Specification	Linear-Trend		First-Difference	
	(1)	(2)	(3)	(4)
Years since FPL Establishment	-0.244***	-0.224***	-0.252**	-0.272**
	(0.047)	(0.052)	(0.109)	(0.123)
% Secondary School Students		-5.849		-5.347
in the Population		(4.616)		(4.527)
% Primary School Students		-3.169		-4.956
in the Population		(2.856)		(4.774)
Observations	270	238	243	207
R-Squared	0.933	0.938	0.234	0.231
Provincial Controls	X	X	X	X

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses. Year dummies and province dummies are controlled in all specifications. Control variables include: GDP per capita, share of non-agricultural population, share of primary industry in GDP, and share of secondary industry in GDP.