The Long-Term Consequences of China's "Later, Longer, Fewer" Campaign in Old Age*

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Abstract

We examine how China's "Later, Longer, Fewer" (LLF) policies in the early 1970s affect the quality of life of the Chinese elderly forty years later. We identify the causal impact of the LLF policies by exploiting the provincial heterogeneity in policy implementation. We find that the LLF policies reduced the total fertility rate by 1.57 from 1969 to 1978, explaining about half of the decline in fertility during this period. Parents do not receive fewer financial support as a consequence, but they have fewer children living close by and receive fewer contacts and visits from children. We find that the impacts of the family planning policies on elderly parents' physical and mental well-being are drastically different: parents more exposed to family planning policies do not suffer from worse physical health status, but report more severe depression symptoms.

Keywords: "Later, Longer, Fewer" Campaign; Family Planning; Mental Health; Physical Health

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1 Introduction

The family planning policies of China are unprecedented in human history in many aspects. China is among the earliest countries to implement family planning, and the policies have been recognized as the most stringent in the world (Cleland et al., 2006). China initiated its stringent family planning policies in the early 1970s—a campaign named "Later, Long, Fewer" (or LLF), which preceded the well-known one-child policy (OCP henceforth) that came into effect in 1979. The total fertility rate (TFR) declined drastically from 5.7 in 1969 to 2.7 in 1978 (Figure 1).[1] The rapid decline in fertility within a short time period inevitably accelerates population aging. The Population Division of the United Nations projects that by the year 2050, China will have 365.6 million elderly individuals aged 65 or above, accounting for 26.0% of the total population.[2] Forty years after the initiation of the LLF campaign, the first group of the affected cohorts is entering their sixties. Different from their predecessors, they will have fewer offsprings who can take care of them; therefore, unveiling the long-term effects of LLF helps to understand the quality of life of this growing population.

[Figure 1 About Here]

It is theoretically unclear how LLF affects the quality of life in old age. There is no doubt that children play critical roles in providing old-age support in a developing country like China. However, the reduction in the number of children does not necessarily lead to a worsening situation for seniors for at least two reasons.[3] First, having fewer children spares resources that can be redirected to the parents. The reallocation of resources leads to an improved nutritional intake (Wu and Li, 2012) and higher body mass index (Canning and Schultz, 2012). Moreover, previous literature has documented both time and financial pressure of children for young parents (Milkie et al., 2009; Cáceres-Delpiano and Simonsen, 2012; Ruppanner et al., 2019). Having fewer children also reduces parents' burden of childbearing, which may benefit their physical and mental health. Secondly, parents can potentially turn to other measures of old-age support to substitute for having fewer children. It has been well documented that Chinese households increased their savings in response to the family planning policies (Banerjee et al., 2010; Curtis et al., 2015; Ge et al., 2018).

In this study, we examine the *long-term* consequences of China's LLF policies on the well-being of the elderly who are aged 60 and above. We examine a set of outcomes, including the living arrangements, the support received from children, the consumption, as well as the physical and mental health. To estimate the effect of LLF policies, we construct a policy exposure measure that varies at cohort-by-province level

[1] Total fertility rate aggregates the fertility behavior of a group of people at a given time. Women of child-bearing age (15–49 years) are divided 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 according to the fertility pattern of the current population.

[2] https://population.un.org/wpp/, accessed in January 2021.

[3] It is possible that family planning can affect the well-being of the elderly through other channels, e.g., increased usage of intrauterine device and abortions. We discuss those alternative channels in Section 6 and conclude that childbirths play the dominant role.

using differential establishment years of the Family Planning Leading Group—a government institution that was mainly responsible for implementing the LLF policies—in the early 1970s. In this sense, our empirical strategy is effectively a cohort difference-in-difference (DID) approach. We provide a set of evidence supporting the parallel-trend assumption—the identification requirement of DID. The establishment years are not associated with provincial economic conditions, and our results are robust to various functional specifications that control for heterogeneous trends. Our estimates are also robust to controls for various contemporaneous events, including the Cultural Revolution, the Send-down Movement, and economic development.

Previous studies largely refer to the 1979 one-child policy as an exogenous shock to the fertility rate. However, recent studies point out that the one-child policy has a fairly limited impact on lifetime fertility (McElroy and Yang, 2000; Wang et al., 2017; García, 2018). Instead, a majority of the fertility decline in China actually took place during the 1970s prior to the enforcement of the one-child policy. Figure 1 plots the time series of China's total fertility rate from 1949 to 2002. The fertility rate declined by three children from 5.7 in 1969 to 2.7 in 1978.[4] During the succeeding decade, however, the rate dropped only marginally to 2.5 children in 1988. Another advantage of utilizing earlier policy shocks is that it allows us to study the elderly that are "old enough." People aged 20 in 1979 would be only 52 in 2011. In contrast, people aged 20 in 1970 would be 61 in 2011—the age at which people are much more likely to be care-receivers rather than caregivers (to their grandchildren).

Using three waves (2011, 2013, 2015) of the panel data from the China Health and Retirement Longitudinal Study (CHARLS), our empirical analysis suggests that China's family planning policies have different effects on parents' physical and mental well-being. Regarding their physical well-being, we find that parents with a greater exposure to the family planning policies do not reduce household expenditures. Using a wide range of indicators, we find no evidence that parents' physical health status would deteriorate as a result of longer exposures to LLF. In contrast, the prospect of elderly parents' mental well-being is not so optimistic, especially for mothers. Parents receive less companion from children as a result of having fewer children. We also find that women more exposed to the family planning policies are more likely to be depressed. Our findings may be related to China's high elderly suicide rates (ESR), which are found to be four to five times higher than the general Chinese population and more than twice the global average (Li et al., 2009; Zhou et al., 2019). Why are the effects of family planning on the elderly's physical and mental well-being so different? Our theoretical framework offers some rationales to this stylized fact by assuming (1) the mental well-being of the elderly is more sensitive to children's psychological support than to the financial support, and (2) there exists no technology that can "save" children's companionship. Whereas parents can save their earned income when they are young to prepare for old age, they can never "save up" children's companionship. The

[4]Strictly speaking, the decline in TFR is not equivalent to smaller number of children. Because TFR aggregates the fertility behavior of a group of people at a given time, it is an integral of fertility behavior over a population at a given time. Number of children can be viewed as an integral of fertility behavior over time for a specific woman. Nevertheless, TFR and number of children yield similar information on the historical transition of the fertility behavior in China. We plot in the right panel of Figure 3 the average number of living children of each cohort. The number decline sharply from five children for cohort 1935 (aged 35 in 1970) to two children for cohort 1955 (aged 15 in 1970).

findings in our study thus call for greater attention to the elderly's mental health.

Our study contributes to two strands of literature. First and foremost, our paper contributes to the understanding of the consequences of China's "Later, Longer, Fewer" campaign. There is a huge literature estimating the effect of China's family planning policies on various outcomes, including the savings rate (Banerjee et al., 2010; Wei and Zhang, 2011; Curtis et al., 2015; Ge et al., 2018), marriage (Huang and Zhou, 2015), labor supply (Huang et al., 2021; Zhang, 2017), children's outcomes (Li et al., 2008; Qian, 2009; Li and Zhang, 2017; Qin et al., 2017), parental health (Wu and Li, 2012; Islam and Smyth, 2015),[5] rural-urban migration (Wang et al., 2017; Zhang, 2017), and female empowerment (Huang et al., 2021). However, the term "family planning policies" in those studies almost always refer to the "one-child policy." The effect of the "Later, Longer, Fewer" policies in the early 1970s, which arguably played a more important role in China's demographic transition than did the one-child policy (Figure 1), remains mostly unexplored with only few exceptions. Exploiting the provincial variation in the timing of the policy implementation, Babiarz et al. (2018) and Chen and Huang (2020) provide evidence that the LLF policies lead to reduced fertility, but they do not further investigate the long-term consequences when the affected parents get old.

Second, our study adds an important piece of evidence to the long-term consequences of family planning policies worldwide. Family planning policies are not unique to China. According to the World Population Policies Datasets published by the Population Division of the United Nations, the number of countries with direct government support for family planning reached 166 in 2015.[6] Plenty of studies have been devoted to the immediate or short-term effects of family planning policies; however, there are surprisingly few studies on the long-term consequences of the declining fertility as a result of family planning policies (Schultz, 2008).[7] Family planning benefits mothers in the short term in terms of BMI, health status, education, and earnings (Miller, 2010; Canning and Schultz, 2012; Joshi and Schultz, 2013) and benefits children in terms of mortality and education (Foster and Roy, 1996; Joshi and Schultz, 2013). However, the long-term effects of family planning can be very different from short-term ones if we view childrearing as a kind of investment when young in exchange for children's old-age support when old.

Our study is particularly relevant to Oliveira (2016). By using the same data as our study (CHARLS) and using first-born twins as instrument for the number of children, she finds that senior parents with

[5] Although our study also focuses on the effect of China's family planning on parents' well-being, it differs from Wu and Li (2012) and Islam and Smyth (2015) in at least two important ways. First, we study the effect of "Later, Longer, Fewer" campaign in the early 1970s, while a vast majority of existing studies (including Wu and Li (2012) and Islam and Smyth (2015)) focus on the one-child policy since 1979. This distinction is important in itself. The 1970s period witnessed a much greater decline in fertility but received much less attention than the one-child policy. Second, we focus on the *elderly* parents who are aged at least sixty. As will be described in Section 3, the welfare implication of family planning varies tremendously across the life-cycle. Wu and Li (2012) focuses on younger parents. Although Islam and Smyth (2015) include both middle and old age, they implicitly estimate the local effect on middle-age population because they use a survey in 2008, and their identification comes from the gender of the first child under one-and-half-child policy (a couple could have a second child if the first one is daughter) that started in 1984 (Ebenstein, 2010). Assume a couple had their first child at age 25 in 1984, they would only age 49 in 2008 when the survey took place.

[6] https://esa.un.org/poppolicy/wpp_datasets.aspx, accessed in January 2021.

[7] See Schultz (2008) and Miller and Babiarz (2016) for two comprehensive reviews of the effects of family planning (mostly short-term effects).

more children receive more financial transfers and are more likely to co-reside with adult children. Our study differs from Oliveira (2016) in two ways. First, while Oliveira (2016) focuses on support from children, we mainly focus on the well-being (such as physical and mental health) of elderly parents. In our framework, support from children is an intermediate outcome that helps us understand how LLF affects parental well-being. Second, the two studies look at different events (LLF versus twin births), and therefore, estimate different local average treatment effects. For example, the "Fewer" part of the LLF policy recommended that each couple have at most two children. Therefore, the LLF policies mainly targeted the prevention of high-order births. A reduction in high-order births has a limited impact on parents' co-residence decision.

The remainder of this paper is organized as follows. In Section 2, we provide the background information on China's family planning policies and the old-age support system. In Section 3, we build a simple theoretical framework that guides our empirical analysis. In Section 4, we introduce the datasets used in this study and discuss our empirical strategy. In Section 5, we present our main results, that is, the effect of the family planning policies on the quality of life in old age. In Section 6, we discuss how family planning may affect elderly parents' well-being through channels other than fewer childbirths. Finally, in Section 7 we conclude .

2 Institutional Background

2.1 China's Family Planning Policies during the 1970s

In this subsection, we briefly describe China's family planning policies during the 1970s, prior to the enforcement of the well-known one-child policy (see Zhang (2017) for a recent review of the one-child policy). China's family planning has a much longer history than that of the one-child policy; it dates back to December 1962 with the release of the Document No. [62]698 "Instructions on Seriously Advocating Family Planning" (*guanyu renzhen tichang jihua shengyu de zhishi*). In 1964, the State Family Planning Commission was established after which commissions at the province, city, and county levels were gradually set up. However, the outbreak of the Cultural Revolution in 1966 severely interrupted the government's functioning including the family planning institutions, most of which ceased to work in 1966.

In early 1970, Premier Enlai Zhou emphasized that the implementation of family planning policies should not stop. In 1971, the State Council released the Document No. [71]51, "Report on Better Implementing Family Planning Policy" (*guanyu zuohao jihua shengyu gongzuo de baogao*), 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 the implementation of family planning policies. A pilot run was initiated in 1969, and by 1975, all provinces had set up a leading group, an important and high-level provincial institution. In most cases, its leader was also the general secretary of the provincial Communist Party Committee.

One central responsibility of the leading group is to enforce the "Later, Longer, Fewer" (*wan, xi, shao*) policies. "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 at most two children. China's family planning campaign in the 1970s was technically voluntary, although there is anecdotal evidence suggesting that the campaign had several coercive elements (Whyte et al., 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 the parents' jobs.

The leading groups could not curb the fertility rate by simply "asking" people to have fewer children. They had to complement the LLF policies with concrete measures of birth control. Therefore, another responsibility of the leading groups was to provide technical support for birth control. This support included training technical staff to conduct research on contraception and sterilization measures, introducing technology and equipment for sterilization, and making contraceptive methods more widely available (e.g., distributing contraception pills) (Peng, 1997). National Family Planning Commission of China (1983) records the number of family planning operations, including intrauterine device (IUD) insertions, sterilization, and abortions from 1971 to 1982 (see Figure A1). IUD insertion experienced the most rapid increase in the early 1970s—almost tripled from 6.2 million in 1971 to 16.7 million in 1975 within mere five years. Interestingly, there was no rapid increase in abortions until the more stringent one-child policy came into play after 1979.

Figure 2 plots the geographic variation in the establishment years of the provincial Family Planning Leading Group. The data comes from the population chronicles in various provinces.[8] The groups were first established in 1969 in Guangdong and in 1970 in Shandong, and were last set up in Guizhou and Xinjiang in 1975. We present the details of policy documentation in Table A1.

[Figure 2 About Here]

2.2 Old-Age Support in China

China is well known for its Confucian model and filial piety family system (Whyte, 2005). The Classic of Filial Piety (*xiaojing*) is listed among the Thirteen Classics of the Confucian tradition, giving people advice on filial piety since the 4th century BC. One famous quotation from the Classic of Filial Piety is "there is no greater actions than the filial piety" (*renzhixing, mo dayu xiao*). Such value persisted into modern China, and filial piety is even written into the Chinese Constitution and its marriage law.[9] Traditions presume that children should respect and care for their elderly parents. Compared to western countries, where the social security system is more developed, China relies more heavily on families as the main providers of old-age support. In China, children's support for their parents mainly takes the form of co-residence (Logan and Bian, 1999; Zhang, 2004), financial or in-kind support (Lee and Xiao,

[8]Because the background of the "Later, Longer, Fewer" campaign was a policy shift to curbing fertility and recovering family planning functions from the chaos of the first few years of the Cultural Revolution, we view the establishment of a major leadership team as a symbol of such a recovery. We therefore define the first reference to the establishment (or recovery) of a provincial Family Planning Leading Group in the early 1970s as the years of policy implementation. Interested readers can refer to Chen and Huang (2020) for more policy details.

[9]Both Article 49 of the Chinese Constitution and Article 21 of the marriage law state: "Parents have the duty of raising and educating their minor children. Adult children have the duty of supporting and caring for their parents."

1998; Cai et al., 2006; Lei et al., 2012), and time transfer (or informal care) (Lee and Xiao, 1998; Lu et al., 2015).

It is true that filial piety may erode over time with economic development, and China is developing its public system of old-age support. The two most important systems of social support are the Basic Old Age Insurance (BOAI) for urban employees, the Resident Pension Scheme for non-employed residents.[10] In 2015, the former covered a population of 353.6 million and the latter covered a population of 504.7 million (Ministry of Human Resources and Social Security, 2016). Despite the wide coverage, the monthly pension per capita was as low as 119 RMB (19.1 USD) in 2015. Moreover, there are increasing concerns over the financial sustainability of the system as China is aging rapidly (Cai et al., 2006).[11] At this stage, the basic pension system is more supplementary than a substitute of family support for the elderly. Nursing homes also fail to accommodate an important share of the elderly. Chu and Chi (2008) estimate that only 1.49% of the Chinese older population lived in nursing homes in 2006. The dearth of nursing homes in China can originate both from the supply side and the demand side. On the supply side, administrative approval procedures are complicated and lengthy, and the threshold for private elderly care agencies remains high.[12] On the demand side, there is still a social stigma for parents to live in a nursing home because it signals a lack of their children's filial piety.[13]

To further understand the role of children in providing old-age support, we take one question from CHARLS: "If you were too old to work in the future, who do you think you can rely on financially for old-age support?" Figure A2 presents the answers in different waves for people aged 60 or above. The choices include: children, saving, pension, commercial insurance, and other. In urban areas, where the pension programs are more generous, the elderly report to rely financially more on a pension (67.0% in 2015). In contrast, children remain the dominant source for old-age support in rural China (72.8%), despite an increasing share of reporting to rely on pensions because of the expansion of China's public pension system (from 8.2% to 20.0%). It is important to note that the question only asks about "financial" old-age support. We believe children are playing even more important roles in non-financial old-age support, such as caring and companionship, because these cannot be easily substituted with the public pension system. To conclude, neither the government nor the market can fully replace children's role in the provision of elderly care in China in the foreseeable future.

3 Theoretical Framework

We build in this section a simple three-period life-cycle model to provide insights into two questions: (1) how having fewer children affects parental well-being in old age, and (2) why the effects differ for

[10] In 2014, the Resident Pension Scheme was created by merging the Urban Resident Pension Scheme (established in 2011) and the New Rural Resident Pension Scheme (established in 2009), respectively for urban and rural residents without a formal non-agricultural job. See Fang and Feng (2018) for a detailed account of the Chinese pension system.

[11] The revenue of the Basic Pension Insurance for Urban and Rural Residents failed to cover the expenses on pensions in 23 out of 31 mainland provinces in 2015 (Ministry of Human Resources and Social Security, 2016). The gap is expected to become even larger in the future along with China's aging process.

[12] http://www.chinadaily.com.cn/china/2017-03/29/content_28716504.htm, accessed in January 2021

[13] http://www.china.org.cn/english/2002/Mar/29603.htm, accessed in January 2021

physical and psychological well-being. Note that we only model one specific mechanism (which we believe is the most important) of the LLF policies—having fewer children. It is possible that family planning takes effect through other channels (e.g., later marriage and longer birth intervals). It is beyond the scope of this paper to incorporate all possible mechanisms of family planning in a unified model. In Section 6, we will empirically evaluate the relative importance of those channels.

We assume that forward-looking couples experience three periods: having children, young, and old. In the first period, a couple decides the number of children to have, which is subject to fertility restrictions. People do not derive direct utility in this period. In the second period (young), they earn labor income, raise children, and build up savings. In the third period (old), they retire from the labor market and receive financial transfers and care from their children. We do not model children's decisions for simplicity. In the latter two periods, the household derives utility from three sources: consumption, physical health, and mental health. Without loss of generality, we assume away discounting.

In the first period, a household plans to have a number of N children with quality q based on their expectation about the future. Family planning in China imposes a fertility restriction ($N \leq \overline{N}$). Given the number of children N, a representative household solves the following problem in the second period:

$$\begin{aligned} \max_{q, C_y} \; & U_y\left(C_y|N\right) = u\left(C_y\right) + \delta_1 h_{1,y} + \delta_2 h_{2,y} + U_o \\ s.t. \;\; & h_{1,y} = H_1\left(C_y\right), \; h_{2,y} = H_2\left(C_y\right), \\ & A_y = I - C_y - \tau N \cdot q. \end{aligned}$$

C_y is consumption when young. The consumption utility function $u(.)$ is a concave and strictly increasing production function. $h_{1,y}$ represents physical health and $h_{2,y}$ represents mental health when young with relative utility weights $\delta_1 > 0$ and $\delta_2 > 0$. Both types of health can be improved by more consumption according to health function H_j $(j = 1, 2)$ with $H_j' > 0$ and $H_j'' < 0$. $\tau N \cdot q$ represents the total resources devoted to raising children, where q represents the quality of children and τ is the price of per-child quality. Finally, I is the labor income, and A_y is the wealth that will be transferred to the next period, and U_o is the old age utility to be determined below.

In the third period (old), the couple solves the following problem

$$\begin{aligned} \max_{C_o} \; & U_o\left(C_o|N, q, h_{1,y}, h_{2,y}, A_y\right) = u\left(C_o\right) + \delta_1 h_{1,o} + \delta_2 h_{2,o} \\ s.t. \;\; & h_{1,o} = \lambda h_{1,y} + \left(1 - \lambda\right) H_1\left(C_o\right) + F_1\left(N \cdot q\right), \\ & h_{2,o} = \lambda h_{2,y} + \left(1 - \lambda\right) H_2\left(C_o\right) + F_2\left(N \cdot q\right), \\ & 0 = A_y + N \cdot T\left(q\right) - C_o. \end{aligned}$$

There are two notable differences from the second period. First, the health of the elderly is not only affected by current consumption. Health status when young partially persists into old age, with a persistence rate $0 < \lambda < 1$, and health in old age is further shaped by the total care received from the elderly's children according to function F_j $(j = 1, 2)$, which is determined by both quantity (N) and

quality (q). We assume $F_j' > 0$. Second, the elderly do not earn income from the labor market. Instead, they rely on their accumulated wealth (A_y) and the financial transfer from their children ($N \cdot T(q)$). High quality child may provide more transfer ($T' > 0$).

If the utility in the latter two periods is weighted equally, the optimal consumptions in the two period must satisfy the first-order condition that the marginal values of one additional unit of consumption should be the same in two periods, that is,

$$u'(C_y) + (1+\lambda)\left(\delta_1 H_1'(C_y) + \delta_2 H_2'(C_y)\right) = u'(C_o) + (1-\lambda)\left(\delta_1 H_1'(C_o) + \delta_2 H_2'(C_o)\right).$$

To let the model have a closed-form solution, we further assume functions $u(.)$, $H_1(.)$, and $H_2(.)$ to follow a quadratic form. More specifically,

$$u(C) = C - \frac{a_c}{2}C^2,$$
$$H_1(C) = C - \frac{a_{h_1}}{2}C^2, \text{and } H_2(C) = C - \frac{a_{h_2}}{2}C^2.$$

With the above assumptions, we can solve for optimal consumption by combining the first-order condition and lifetime budget constraint,[14]

$$\begin{aligned} C_y^* &= \frac{I - N\left[\tau \cdot q^* - T(q^*)\right]}{1+K}, \\ C_o^* &= K\frac{I - N\left[\tau \cdot q^* - T(q^*)\right]}{1+K}, \\ A_y &= \frac{K}{1+K}\left[I - \tau N \cdot q^*\right] - N \cdot T(q^*), \end{aligned}$$

where

$$K = \frac{a_c + (1+\lambda)\left(\delta_1 a_{h_1} + \delta_2 a_{h_2}\right)}{a_c + (1-\lambda)\left(\delta_1 a_{h_1} + \delta_2 a_{h_2}\right)} > 0.$$

With the above simple model, we can describe how parents' consumption and physical and mental health respond to an exogenous decrease in N as a result of family planning policies if the fertility constraint is binding. For consumptions in both period, we have

$$\begin{aligned} \frac{d\,C_y^*}{d\,N} &= -\frac{1}{1+K}\frac{d\left[N\left(\tau \cdot q^* - T(q^*)\right)\right]}{d\,N}, \\ \frac{d\,C_o^*}{d\,N} &= -\frac{K}{1+K}\frac{d\left[N\left(\tau \cdot q^* - T(q^*)\right)\right]}{d\,N}. \end{aligned}$$

Whether the consumption would increase or decrease depends on the lifetime resources associated with children ($N\left[\tau \cdot q^* - T(q^*)\right]$). One important implication here is that reduced financial transfer in old-age ($T(q^*)$) does not necessarily imply parents' lower level of consumption because raising children is

[14]The optimal quality of child q^* is harder to solve because it relies on the returns to children's quality in financial transfer ($T'(q)$) and caring ($F_j'(q)$). Nevertheless, all we need here is that such optimal quality exists and would respond to the quantity of children (N). We will empirically evaluate the importance of the possible quantity-quality tradeoff for parents' well-being.

costly when parents were young ($\tau \cdot q^*$). Rational parents do not make their consumption decision solely on transfer income when old. Instead, they take into account their lifetime resources and try to smooth their consumption through savings. A large body of literature documented that Chinese households increased their savings in response to the family planning policies (Banerjee et al., 2010; Curtis et al., 2015; Ge et al., 2018).

Regarding the health status of the elderly parents, for $j = 1, 2$, we have:

$$\begin{aligned}\frac{\partial h_{j,o}}{\partial N} &= \lambda H_j'\left(C_y^*\right)\frac{\partial C_y}{\partial N} + (1-\lambda)\, H_j'\left(C_o^*\right)\frac{\partial C_o}{\partial N} \\ &\quad + F_j'\left(N^* \cdot q^*\right)\left[q^* + N^*\frac{\partial q}{\partial N}\right].\end{aligned}$$

The above equation shows that how the number of children affect elderly parents health status depends on two effects: a consumption effect and a caring effect. The first two terms represent the consumption effect, and their signs depend on whether the transfers from children ($T(q^*)$) exceed their raising costs ($\tau \cdot q^*$). The third term captures the responses to the effective care from children ($N \cdot q$), which can be further decomposed into a quantity effect (fewer children to provide care) and a quality effect (the quality of children may increase).

Our model show that three factors jointly determine how number of children affects parents' health status: (1) whether the consumption increases or decreases; (2) the sensitiveness of parental health towards children's care ($F_j'\left(N^* \cdot q^*\right)$); and (3) the extent that better quality of children compensates the reduced number of children ($q^* + N^*\frac{\partial q}{\partial N}$). Although the model does not derive any concrete predictions here, it provides insights into understanding the consequences of family planning. For example, if we believe mental health is more sensitive to children's companionship than physical health does, we would observe stronger effects of family planning on mental health (holding other effects constant).

Another important takeaway from the model is the welfare implication of family planning policies that have some mandatory elements. If we view family planning as an effective constraint on the number of children a couple can have, the life-cycle utility has to decline if parents are rational decision makers. Interestingly, existing studies on China's family planning policies mainly find positive effects on parents. Wu and Li (2012) find that the one-child policy improved the nutrition-intakes of parents. Huang et al. (2021) even uncover a wide range of benefits (including education and income) of being exposed to stricter fertility restrictions.[15] So what are the costs of fertility restrictions? Our three-period model assumes that children bring benefits to parents when they become old by providing financial transfer and care, indicating the negative consequences of family planning are more likely to emerge in one's elderly life. Wu and Li (2012) and Huang et al. (2021) focus on the benefits of fertility restriction on *young* parents. In this sense, our finding of a negative impact on the mental health of elderly parents provides an important complementary, but hitherto missing piece of the puzzle to understand the life-cycle welfare implication of China's coercive family planning policies.

[15]The benefits in Huang et al. (2021) include better education, more white-collar jobs, delayed marriage, lower fertility rates, lower rates of residing with the elderly, higher household income/consumption/savings, and female empowerment.

4 Data and Empirical Strategy

4.1 Data and Variables

The main data used in this study is the China Health and Retirement Study (CHARLS), which is a nationally representative sample of Chinese residents aged 45 and older, and is the sister study of the U.S. Health and Retirement Study (HRS) (Zhao et al., 2013). The survey covers 150 counties/districts in 28 provinces in mainland China. Each wave includes about 10,000 households and 17,500 individuals. The individuals are followed up every two years. We use three waves of the panel data from CHARLS: 2011, 2013, and 2015.

Because we wish to understand the effect of China's family planning policies on a wide range of outcomes, we construct three levels of data accordingly: individual, household, and child. For this reason, the number of observations in our later analysis can vary based on the dependent variable. Some variables are naturally defined at the individual level such as health status, but others are more suitable to be defined at the household level such as consumption. We drop households with either spouse being an ethnic minority, as ethnic minority households are subject to less stringent policies compared with their *Han* counterparts (Peng, 1997). We further restrict our analysis to those who were ever married and aged 60 and above in the year 2011. The age restriction serves two purposes. First, we wish to alleviate the concern that elderly parents remain the caregivers instead of care-receivers. There is increasing evidence suggesting elderly parents in China are still helping their adult children through providing residence and taking care of the grandchildren (Chen et al., 2011; Zeng and Xie, 2014). Second, we wish to exclude the effect of family planning on parents' human capital accumulation and focus on the channel of having fewer children. Those who were aged 60 in 2011 would be at age 18 in 1969, by which time most of them had already completed their education.[16]

Individual-level data covers demographics (e.g., age, gender), socioeconomic status (e.g., *Hukou* status,[17] education), and health status including both physical and mental health. More specifically, we include the following 11 measures to proxy the elderly parents' physical and mental health status:

1. Body mass index (BMI): One important feature of CHARLS is that it provides a physical examination of the interviewees; as a result, we have access to measured numbers instead of self-reported numbers on anthropometric data (height and weight) and blood pressure. Body mass index is calculated by dividing one's weight in kilograms by the square of one's height in meters.
2. Underweight: This is a dummy variable indicating that a person's BMI is lower than 18.5.
3. Hypertension: Defined by either systolic pressure exceeding 140 mmHg or diastolic pressure exceeding 90 mmHg.

[16] According to a 1 percent sample of China's 1990 population census, only 2.2% of cohorts born between 1941 and 1950 received some post-secondary education. If an individual receives at most senior high education, he should have left school by the age of 19.

[17] *Hukou* system is a household registration system in China that categorizes people into urban or rural status based on their parents' place of origin. An individual's *hukou* status is directly tied to his/her eligible social welfare. It has been well documented that urban *hukou* holders enjoyed significantly better social welfare (Bian, 2002; Wu and Treiman, 2004).

4. Limitations in Activities of Daily Living (ADL): Our definition of ADL measures people's difficulty in doing the following daily activities: dressing, bathing and showering, self-feeding, getting into or out of bed, toilet hygiene, controlling urination and defecation. The original questions have four choices: no difficulty, have difficulty but can still do it, have difficulty and need help, cannot do it. Following the common practice in the literature, we define the latter two choices as having ADL limitations.
5. Limitations in Instrumental Activities of Daily Living (IADL): These include doing household chores, preparing meals, shopping for groceries, making phone calls, and taking medications. The definition of IADL limitation is the same as that of ADL limitation.
6. Number of chronic conditions: CHARLS asks about a list of 14 chronic conditions diagnosed by a doctor, including: hypertension, dyslipidemia, diabetes, cancer, lung disease, liver disease, heart problem, stroke, kidney disease, digestive disease, emotional problem, memory-related disease, arthritis, and asthma.
7. Self-perceived probabilities of living for another 11–15 years: CHARLS interviews the elderly at age a about their self-perceived chances of reaching age $a + x$, where x ranges between 11 and 15.[18] There are five options: 1 (almost impossible); 2 (not very likely); 3 (maybe); 4 (very likely); 5 (almost certain). For ease of interpretation, we convert those values to probabilities 0.1, 0.3, 0.5, 0.7, and 0.9, respectively.
8. Self-rated life satisfaction: CHARLS asks the interviewee how satisfied they are with their life as a whole. The variable ranges from 1 (completely satisfied) to 5 (not at all satisfied).
9. Self-rated health: Ranges from 1 (excellent) to 5 (poor).
10. Center for Epidemiologic Studies Depression Scale (CES-D scale): CES-D is a brief self-report questionnaire to measure the severity of depressive symptoms. CHARLS asks ten questions related to depression, eight of which are about negative behaviors and two of which are about positive behaviors.[19] For the eight negative behaviors, we assign 0 points to "rarely or none of the time"; 1 point to "some or a little of the time (1–2 days a week)"; 2 points to "occasionally or a moderate amount of the time (3–4 days a week)"; 3 points to "most or all of the time (5–7 days a week)." Points are assigned in the opposite order (from 3 to 0 points) for the two positive behaviors. Summing up the points from ten questions gives us the CES-D scale. Following the standard procedure (Andresen et al., 1994), we will code the scale to missing if two or more items are missing.
11. Depressed: This is a dummy variable indicating that a person's CES-D is equal to or above 10 (Andresen et al., 1994).

The left panel of Table 1 reports the summary statistics at the individual level. Note that there are variations in the number of observations. Such variations mainly originate from two reasons aside

[18] More specifically, CHARLS asks people aged 65–69 about their perceived probabilities of reaching age 80, and asks people aged 70–74 about their perceived probabilities of reaching age 85, etc.

[19] The eight negative behaviors include: was bothered by things that don't usually bother me; had trouble keeping my mind on what I was doing; felt depressed; felt everything I did was an effort; felt fearful; sleep was restless; felt lonely; could not get "going." The two positive behaviors are "felt hopeful about the future" and "was happy."

from "don't know" or "refuse to answer". First, respondents need to participate the physical examination provided by CHARLS to obtain the biomarker information (e.g., height, weight, blood pressure). Second, if the main respondent is absent, CHARLS allows the proxy to answer some questions (e.g., education), but not others (e.g., depression).

[Table 1 About Here]

The household level data covers age structure, net transfers (including in-kind transfers) from children, living arrangements, and household expenditures. Whereas the definition of age is straightforward at the individual level, defining the age at the household level is more complicated. Both the husband's and wife's age are important in household decision making. Moreover, we also need to take into account the possibility that one of the couple is deceased. Therefore, we use three variables to control for the age structure of the couple: widow or not, age of the oldest, and the age gap between the couple.[20] Living arrangement is defined as the number of children living within a locality (household, village/community, district/county). CHARLS also contains detailed information on household expenditures, the categories of which are generally consistent with the definition used by the National Bureau of Statistics in China.[21] We highlight three categories that may be especially important for the elderly: food expenditures, living expenditures (e.g., communication, transportation, utilities, household items), and health expenditures. The three categories together account for about 84.7% of the total household expenditures. The right panel of Table 1 reports the summary statistics at the household level.

CHARLS uses a loop structure to ask information about each child, allowing us to construct child-level data regardless of whether he/she co-reside with the parents. Our child level data covers children's demographics (e.g., age, gender), socioeconomic status (e.g., education and income),[22] net transfer to parents, and monthly frequency of contacting and visiting parents.[23] Table 2 reports the summary statistics at the child level.

[Table 2 About Here]

4.2 Empirical Strategy

To evaluate the effects of "Later, Longer, Fewer" policies, we first need to develop a measure of policy exposure. We define the exposure according to the province and mothers' birth cohort, regardless of

[20]Because CHARLS surveys information regarding the deceased spouse, this variable can be constructed for all those who ever get married.

[21]Total expenditures involve adding 23–24 variables (depending on the survey year). We code the total expenditures as missing if five or more items are not reported.

[22]Because it is difficult for parents to know children's income precisely, CHARLS asks the parents whether their children's annual income (in RMB) falls into one of the following ranges: none, under 2,000, 2,000–5,000, 5,000–10,000, 10,000–20,000, 20,000–50,000, 50,000–100,000, 100,000–150,000, 150,000–200,000, 200,000–300,000, above 300,000. We are aware that this measurement is quite coarse, but there are no better alternatives.

[23]Visiting is clearly a closer form of interaction with parents. Additionally, CHARLS only asks for the frequency of contacting if the child visit the parent less than once per week. Therefore, we choose the higher frequency of "visiting" and "contacting" in CHARLS to define the frequency of "contacting" in our study.

whether mothers are currently alive or not. Such approach alleviates the concern of endogenous timing of childbirth that would arise if we defined the exposure according to the children's year of birth. More specifically, we define the exposure to the "Later, Longer, Fewer" policies as follows:

$$\text{FPP}_{p,c} = \sum_{a=15}^{49} \left[\text{AFR}_p\left(a\right) \cdot I\left[c + a > T_p\right]\right]. \tag{1}$$

$\text{FPP}_{p,c}$ defines the exposure to the family planning policies for cohorts born in year c in province p. T_p is the establishment year of the Family Planning Leading Group, which can vary by province p. c indicates the birth year of cohort c and a is age. In equation (1), $I\left[\cdot\right]$ is an indicator function that takes a value of 1 if the argument is true and 0 otherwise. The argument $[c + a > T_p]$ means that the provincial leading group has been established when cohort c reach age a. $\text{AFR}_p\left(a\right)$ is the provincial age-specific fertility rate in 1969, *prior to* the enforcement of any effective family planning policy in any province. This measurement can be interpreted as the number of children a woman would have given birth to under the influence of the policy with the provincial fertility profile in 1969. The data source for the age-specific fertility rate is Coale and Li (1987), who computed the provincial fertility rate from 1940 to 1982 using China's 1982 One-per-thousand Sample Fertility Survey. Residents in a province which established the leading group earlier are more exposed to the LLF policies within a given cohort. The left panel of Figure 3 illustrates how exposure to the policy is computed, using the examples of Shandong and Beijing. The solid and dashed curves are, respectively, the AFRs by age in Shandong province and Beijing in 1969. Shandong formed its Family Planning Leading Group in 1970, while Beijing did it in 1973. Women born in 1945 would start being exposed to LLF in Shandong and in Beijing, respectively, when they were aged at 26 and 29 (counting 9 months of pregnancy). The left panel of Figure 3 shows that women born in 1945 are more exposed to the policies in Shandong than in Beijing because, first, Shandong formed its Family Planning Leading Group earlier than Beijing, and second, it had higher initial age-specific fertility rates.

[Figure 3 About Here]

The mean exposure to the LLF policies in our household level data is 3.46 with a standard deviation of 2.25. The policy exposure ranges from 0 to 6.705. A household would remain unaffected if the wife already passed the age of 49 prior to the enforcement of the family planning policies. On the contrary, a household would be fully exposed if the wife was younger than age 15 at the time of enforcement. The exposure equals the provincial total fertility rate in 1969 in this scenario.

After defining the exposure to family planning policies, we run the following cohort difference-in-difference regression:

$$y_{i,p,c,t} = \beta_0 + \beta_1 \text{FPP}_{p,c} + \boldsymbol{\beta}_2 \mathbf{X}_{i,p,c,t} + f\left(\text{Age}_{i,c,t}\right) + \text{Prov}_p + \text{Year}_t + \text{Prov\_Trend}_{p,c} + \varepsilon_{i,p,c,t}. \tag{2}$$

β_1 is the key parameter of interest. Note that the age effects, $f\left(\text{Age}_{i,c,t}\right)$, and the year fixed effects, Year_t, effectively capture the cohort effects. $\mathbf{X}_{i,p,c,t}$ represent a list of control variables. We control for

both province fixed effects (Prov_p) and province-specific linear cohort trends ($\text{Prov\_Trend}_{p,c}$). To avoid bad-control issues, we choose our control variables to only include those that are pre-determined before households make their fertility decision (education) or those that are important and are unlikely to be affected by family planning (e.g., *hukou* and widowhood). $y_{i,p,c,t}$, the dependent variable of interest, varies according the context.[24] Because province clusters contain individual clusters, clustering at the province level also addresses the possible serial correlation within an individual due to the panel design of CHARLS. Moreover, since our number of clusters ($\approx$30) is relatively small, we compute the clustered standard errors using the wild bootstrap method with 999 replications, as proposed by Cameron et al. (2008). Sample weight is applied in all regressions.

Following Miller (2010), we rely exclusively on a reduced-form approach because family planning may affect socioeconomic outcomes through pathways other than completed lifetime fertility, despite our best effort to rule out other channels. For example, we arguably rule out the channel of parental human capital accumulation through, first, controlling for parents' completed education, and second, restricting to cohorts who were most likely to have completed their education prior to the enforcement of the "Later, Longer, Fewer" policies. We will discuss other channels in Section 6.

4.3 Identification Requirements

We use a cohort DID approach that does *not* require the years in which the leading groups were founded to be random.[25] Instead, the core identification requirement is the parallel-trend assumption: in the absence of LLF, the cohort trends in outcome variable are not related to the policy exposure. We are therefore concerned about the potential heterogeneous trends. For example, provinces with different initial fertility pattern may exhibit different cohort trends.

Although the parallel-trend assumption is not testable, we take several approaches to alleviate the concerns about our identification. First, the right panel of Figure 3 provides some support to the parallel-trend assumption. For cohorts 1930 or older who were barely exposed to the policy, the number of children fluctuated at 4.5 children. For cohorts 1955 or younger whose policy exposure only rose mildly, the number of children also declined at a much slower speed. Only for cohorts 1930–1955, the policy exposure rose sharply and the number of children quickly declined to a level of two. Second, we introduce a term of province-specific linear cohort trends ($\text{Prov\_Trend}_{p,c}$) to capture the possible heterogeneous trends. Linear trend is an appropriate control form because the right panel of Figure 3 suggests that cohort exposure to LLF increases about linearly for cohort group 1930–1950 (where 85% of our final sample fall into). We examined the robustness if we adopt other forms of trends instead in Appendix B. Finally, we will show in the Appendix B that additionally controlling for exposure to other

[24] For ease of interpretation, we adopt a linear regression for all possible $y_{i,p,c,t}$. We also tried Probit models and computed the marginal effects if the dependent variables are binary. The results are both qualitatively and quantitatively similar, and they are available upon request from the authors.

[25] Nevertheless, 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, grain output per capita, share of the non-agricultural population, share of secondary industry in GDP, share of the tertiary industry in GDP, local intensities of the Cultural Revolution and the Send-down Movement (Appendix B introduces more detailed definitions of the local intensities). 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.

contemporaneous events, including the Cultural Revolution, the Send-down Movement, rural education expansion, and economic development, barely changes our estimates of the effect of LLF.

5 Empirical Results

We present our main results in three steps. In the first step, we provide evidence that the "Later, Longer, Fewer" campaign had powerful effects in reducing fertility. In the second step, we investigate the effect of the policy on parents' aggregate support from children as well as the per-child support. Thirdly, we look into a set of outcomes that proxy parents' well-being in old age, including consumption, subjective well-being, physical health, and mental health.

5.1 Effect on Completed Fertility

[Table 3 About Here]

Table 3 presents how households' exposure to family planning affects their number of children. Column (1) suggests that one unit exposure to the "Later, Longer, Fewer" policies reduces the number of currently living children by 0.454. Multiplying the coefficient by the sample average of policy exposure (3.46) yields a decline of fertility of 1.57, which explains about half the decline in fertility from 5.7 in 1969 to 2.7 in 1978. The magnitude of our estimated impact of LLF on fertility decline is comparable to Chen and Huang (2020), who used a different set of data (census and China Family Panel Study). Note that our identification rests on the provincial variation in policy implementation. Therefore, if there is any national-level progress in the "Later, Longer, Fewer" campaign, we will not be able to capture the effect. The national-level campaign may partially account for the remaining unexplained fertility drop. Socioeconomic factors, including improvement in health (for both women and children) and education, may also play important roles in this drastic fertility decline prior to the one-child policy.

All DID approaches estimate some local effects. Because the LLF periods witnessed a decline of TFR from about six children to about three, we expect the major fertility declines happen to high-order births in women's late thirties. Figure A3 compares the national age-specific fertility rates in 1979 to those in 1969 and finds the indeed largest decline in fertility happens in one's thirties. We further verify this conjecture in Table A2 by decomposing the lifetime childbirths to various age-specific childbirths. Table A2 shows that the policy effect in curtailing fertility is mostly accounted by fewer childbirths in the thirties.

Column (2) of Table 3 lends support to the accuracy of our measurement of policy exposure. A couple's ability to have children is more affected by the mother than by the father. In column (2), we add a household's exposure according to the father's birth cohort, and we find that father's exposure to LLF plays a much smaller role in determining childbirth. Column (3) clarifies the interpretation of the key parameter of interest (β_1 in equation (2)), which gives a cohort-weighted average treatment effect on the treated (ATT). Because there are multiple policy years in our study, biases of using units treated at different times could arise if the policy effects are different across years. Column (3) of Table

3 explores the heterogeneous effects across time and find no evidence for such heterogeneity. Columns (4) and (5) look into the policy's heterogeneous effects across region. LLF affects rural residents more than urban residents. This is probably because rural households had a much higher fertility rate before 1970 (6.2 in rural China versus 3.3 in urban China in 1969), and they needed to reduce child births more after the government recommended a maximum quota of two children.

Note that in this paper, we use the number of *living* children instead of *birth* children.[26] In principle, the two numbers could affect parents' well-being differently. While the latter affects more the resources that can be allocated to parents when they are young, the former is a more important determinant for the amount of care that parents can receive in old age (Chen and Lei, 2009). However, separately identifying the effects of the two numbers is a demanding task. The challenge not only comes from the high correlation between the two numbers (0.92 in our sample) but also from the fact that the gap between the two numbers generates a strong third effect—the early death of a child is undoubtedly a catastrophic shock to parents and therefore has a huge impact on them, both physically and emotionally. In the remainder of this paper, we will loosely use the term "number of children" to represent that of living children, without distinguishing the number of living children from that of birth children. We leave the identification of the two separate effects for future research.

5.2 Effect on Support from Children

Living Arrangements

Co-residence is an important form of old-age support (Logan and Bian, 1999; Zhang, 2004)—it enables children to provide care for elderly parents if necessary; however, only looking at co-residence (or living in the same dwelling) is not enough. Zimmer and Korinek (2008) show that a large fraction of Chinese elderly who do not live with their adult children have children living within the same neighborhood. Such living arrangement serves both the needs of privacy and that of family support. Therefore, we first divide children into co-residing children in the same dwelling and non-coresiding children. For non-coresiding children, we look into their numbers within a locality (within the same village/community, or within the same county/district).

[Table 4 About Here]

We estimate in Table 4 the effect of LLF policies on the elderly parents' living arrangements. Panel A suggests that family planning does not affect the number of children who would co-reside with parents, which means the reduction in total number of children is solely driven by non-coresiding children (panel B). Panels C/D respectively look into the number of non-coresiding children within a certain locality. The family planning reduces the number of non-coresiding children by 0.29 (-0.0844×3.46) in the village/community; and by 0.82 in the county/district.

[26] Because the two numbers are highly correlated, using the number of birth children unsurprisingly yields almost identical findings. The results are available upon request.

We would like to emphasize that the intensive margin of living arrangement (how many children are living nearby) is also important in addition to the extensive margin (whether having at least one child living nearby). Elderly care is a demanding task, and more children can better guarantee parents' need in case of emergency. Even if parents are healthy and do not need any care, more children may bring more financial transfers and emotional companionship (visits and contacts)—two variables we are delving into in the next step.

Intergenerational Transfers

Children's financial support plays an important role in elderly's old-age support, especially in rural China (Lee and Xiao, 1998; Cai et al., 2006; Lei et al., 2012). Figure A2 shows that about 80% of rural elderly parents are still financially relying on their children. In columns (1)–(3) of Table 5, we estimate the effect of LLF policies on inter vivos transfers.[27] Panel A presents the parents' perspective and explores aggregate net transfers from children. Column (1) of panel A suggests that the magnitude of the effect is small and statistically insignificant—LLF actually increases annual transfers from children by 223 (64.54×3.46) RMB, about 11% of the sample average.

[Table 5 About Here]

Why a smaller number of children does not reduce the inter vivos transfers? The only explanation is that per-child transfers increase as a response. Panel B looks into how children's transfers to parents respond to the policies from the children's perspective. The results suggest that per-child transfers slightly increase, especially for the urban children, and therefore offset the negative effect of fewer children. Two reasons can potentially explain the increase in per-child transfers. The first is children's quantity-quality tradeoffs.[28] Family planning can improve the quality of children by reducing the family size. Children of higher quality can earn more and therefore can better support their parents. The second possibility is children's behavioral adjustments. For example, children born under the LLF policies realize they have fewer siblings, and they need to take greater responsibilities in taking care of their parents. Panel C probes the two possibilities by additionally controlling for children's characteristics, including education and income. The difference between the two panels reflects the quantity-quality tradeoff, and the remaining effect in panel C reflects the behavioral adjustment. The coefficient estimated in column (1) of panel C falls by more than half when compared to that in panel B, suggesting that children's quantity-quality tradeoffs play an important role in understanding children's financial support to parents.

Visits and Contacts from Children

Whereas the existing literature has paid great attention to children's financial transfers to parents, few studies have focused on the role of children's companionship. In the model section, we highlight

[27]Note that we define the rural/urban status solely according to the parents' *hukou* status, regardless of where the children live. For example, if an urban child send money to his/her rural parents, we still put him/her in the rural sample.

[28]For evidence of quantity-quality tradeoffs in China, see Li et al. (2008); Li and Zhang (2017); Qin et al. (2017).

two potential risks in old age when parents have fewer children: lower transfers, $N \cdot T(q)$, and less companionship from children, $F_j(N \cdot q)$. Children's companionship can be a more important determinant of parents' mental health status, such as depression, because children play vital roles in parents' social network and in preventing loneliness in old age (Bures et al., 2009).

In columns (4)–(9) of Table 5, we show that the exposure to the "Later, Longer, Fewer" policies reduce total visits from children by 11.35 (3.28×3.46) times per month and contacts by 17.3 times per month (5.00×3.46). While we find some compensating behaviors of children regarding financial transfer (per-child transfers increase in response to a reduction in the number of children), we find no such pattern for psychological support (columns (4)–(9) of panel B). Children are not increasing their visits and contacts to parents. Controlling for children's characteristics (panel C) yield similar findings. The differential responses probably indicates that it is harder for children to spare more time to keep their parents company than to send more money. Young cohorts are generally better educated and earn higher wages, which can increase the opportunity costs of visiting their parents.

5.3 Effect on Parental Well-being in Old Age

Consumption

[Table 6 About Here]

In Table 6, we report the influence of LLF policies on household expenditures in old age. We restrict our sample to the elderly parents who are not co-residing with their children. In the case of co-residency, we will not be able to distinguish the expenditures of the parents from those of their children. Table 4 suggests that the LLF policies do not affect the decisions of co-residing, suggesting the non-coresidence restriction should not bias our estimation. An alternative approach is to divide the household consumption by the OECD equivalence scale to proxy individual consumption.[29] By doing so, we can have an idea about the consumption of elderly parents even when they live with their children (at the cost of poorer measurement). We report in the appendix (Table A3) the corresponding regression.

Panel A of Table 6 looks into the overall policy effect on household expenditures. The coefficient is positive but statistically insignificant—the LLF increases annual household expenditure by 2,849 RMB (823.5×3.46). Because different types of expenditures can have different welfare implication (e.g., higher level of health expenses may indicate poorer health), panels B, C and D looks into different categories of expenditures, including food expenditure, living expenditure, and health expenditure. We find the positive effect on total expenditures mainly comes from food expenses and living expenses that are welfare-improving, although the coefficients are statistically insignificant. Overall, we find no evidence that LLF reduces the consumption of elderly parents. Two possible reasons may account for this result. First, LLF does not reduce the financial transfer from children, as suggested in Table 5. Second, parents

[29]The OECD equivalence scale assigns a value of 1 to the first household member, of 0.7 to each additional adult and of 0.5 to each child (OECD, 1982).

can increase their savings in responses to family planning before turning old, which has been widely discussed in the literature.

Physical Health

[Table 7 About Here]

In Table 7, we report the effect of LLF on a wide range of health-related outcomes that generally fall into three categories.[30,31] The first category includes more objective health measures, such as anthropometric information (height and weight) and blood pressure. The second category includes several self-rated measure (self-rated survival chances/life satisfaction/health) that can be viewed as a mixture of physical and mental health. The last category includes CES-D scale—a widely used indicator for depression and mental health. Because Table 7 involves more than ten outcome variables, we are subject to the issue of multiple hypothesis testing. We add one row reporting the p-value under multiple hypothesis testing using the method proposed by Clarke et al. (2020).[32]

The first three rows in Table 7 look at the most objective health measure from physical examination. All coefficients are statistically insignificant and their sizes are small if compared with the sample mean. Those results suggest that LLF is not making elderly parents thinner or having hypertension. Columns (4)–(7) report a set of self-reported health conditions. Although none of the numbers show statistical significance, the coefficients for mothers' limitations in daily activities (columns (4) and (5) in panel B) have relatively larger magnitude when compared to the mean. Columns (8) and (9) suggest that LLF has no significant impact on elderly parents' life satisfaction and self-perceived health. To summarize, we find no evidence that parents' physical health status turn into a worse situation.

Mental Health

The most surprising finding from Table 7 is that family planning greatly worsens mothers' symptoms of depression measured with the CES-D scale (column (10) in panel B) and they are more likely to exceed the threshold of depression (column (11) in panel B). What factors drive this results? We argue that

[30]To address the possibility that LLF affects elderly parents' through mortality selection (e.g., some parents with poor health survive into an old age because of the policy), we report in columns (1) and (3) of Table A4 the results using whether the parent is deceased in the following wave of survey as the dependent variable. We find no statistical evidence that exposure to LLF is strong enough to predict survival probabilities of people aged 45 for above. However, we may be still concerned about the mortality selection before age 45 because the sample of CHARLS mainly cover people aged 45 or above. For example, fewer childbirth mechanically reduced maternal mortality in delivery for women. However, the maternal mortality rate in China was 0.15% in the early 1950s (`http://www.stats.gov.cn/ztjc/zthd/sjtjr/d10j/70cj/201909/t20190906_1696329.html`). This rate should be even smaller in the early 1970s when the "Later, Longer, Fewer" campaign initiated. Even if LLF mechanically reduce the risk of maternal mortality, this small proportion is unlikely to lead to severe sample selection issue and bias our results.

[31]The sample size in Table 7 varies according to the outcome variable because of the differential missing patterns. Table A5 presents the results that restrict to a consistent sample without missing values in any health outcome. Coefficients in Table A5 are very close to those in Table 7, albeit a lack of statistical significance because we lose about 40% of our sample with the no-missing-variable restriction.

[32]Clarke et al. (2020) execute the Romano-Wolf correction that asymptotically controls the familywise error rate and takes into account the dependence structure of the test statistics by resampling from the original data.

reduced companionship from children is an important factor. Sociologists stress the importance of children within a social network of elderly parents (Bures et al., 2009) and identify social isolation as an important risk factor for depression (Cappeliez and Flynn, 1993). Several pieces of findings support this hypothesis. First, our finding that the negative consequences of family planning mainly takes place on women's mental health (but not on men's) favor this conjecture. Psychological literature shows that women are more likely to feel negative emotions (Else-Quest et al., 2012) and react more negatively to unpleasant experiences (Grossman and Wood, 1993; Bradley et al., 2001). Therefore, if we view China's coercive family planning as an unpleasant experience that restricts households' ability to have their desired number of children, women can react more negatively to the policies. Second, we show that the mental health of socially isolated parents is more vulnerable to the less companionship from children. Columns (2) and (4) of Table A4 show that widowed parents are more negatively affected by LLF. Without their spouses, they rely more on their children for psychological support. More specifically, whereas LLF does not make an average father more depressed (Table 7), it makes widowed father mentally worse-off (columns (2) of Table A4). The negative effect on the mental health of widowed mothers is also statistically larger on that of non-widowed mothers. We also find that having children nearby in the village or community can alleviate the negative impact of LLF, although the coefficients are not statistically significant.

6 Mechanisms Other Than Fewer Births

So far, we interpret the effect of LLF policies as the effect of having fewer children. However, the LLF policies are a policy *bundle* that may directly affect households through channels other than childbirths. For example, as the name of the policy indicated, "Later" (marriage) caused people to get married at an older age, and "Longer" (birth interval) prolonged the spacing between the births. In this section, we propose several potential channels of LLF other than the number of children that may impact the parents' well-being in old age. For each channel, we first discuss why it may, or may not, affect parents' well-being and then provide empirical evidence.

Rigorously separating the contributions of different mechanisms is challenging because of endogeneity issues; thus, our discussion here is more suggestive rather than conclusive. To the best of our knowledge, none of the existing empirical strategies that exploit exogenous variations in the number of births can *separately* identify the roles of marriage age, birth interval, and total births. For example, studies using twin births as the source of variation for the number of children mechanically imply no spacing of the two births. Even family planning policies without explicit requirements on marriage age and birth interval can simultaneously affect those two variables—once knowing their lifetime births are rationed, people will reschedule their birth plans, including the age of marriage and fertility.

Before proceeding, we would like to argue that "Fewer" (births) was the most important policy target among the "Later, Longer, Fewer" bundle. "Later" and "Longer" are two practical methods to achieve the goal of "Fewer." Two pieces of anecdotal evidence support this claim. First, population control was the main target of the family planning policies in the early 1970s. The instruction from

the central government (Document [71]51, "Report on Better Implementing Family Planning Policy") set a target to slow down the natural population growth in the fourth Five-Year Plan (1971–1975): by 1975, the population growth rate should not exceed 1% in urban areas and not exceed 1.5% in rural areas. There was no such goal for marriage age or birth spacing. Second, in 1979, when China initiated the more-stringent version of family planning—the one-child policy—the requirement of "Later" and "Longer" was no longer emphasized. One interesting fact is that the age of first marriage experienced a sharp reduction after 1980 (Whyte et al., 2015).

"Later" (Marriage) and "Longer" (Birth Interval)

Medical research has explored the relationship between the timing of first marriage/birth and late-life physical health. World Health Organization (WHO) recommends mothers wait at least 24 months before attempting to conceive again, believing that a longer birth interval is beneficial to women. Birth intervals shorter than 18 months (or twin births) are shown to be associated with poor self-rated health and higher mortality risks among elderly women (Read et al., 2011; Grundy and Kravdal, 2014).

We statistically evaluate the influence of "Later" and "Longer" with an instrumental variable (IV) framework. First, we estimate an IV regression, treating the number of children ($N_{i,p,c,t}$) as the endogenous variable and instrumenting it with the policy exposure $\text{FPP}_{p,c}$:

$$y_{i,p,c,t} = \gamma_0^{(1)} + \gamma_1^{(1)} N_{i,p,c,t} + \boldsymbol{\gamma}_2^{(1)} \mathbf{X}_{i,p,c,t} + f\left(\text{Age}_{i,c,t}\right) + \text{Prov}_p + \text{Year}_t + \text{Prov\_Trend}_{p,c} + \varepsilon_{i,p,c,t}. \quad (3)$$

Next, we add proxies for other potential mechanisms W ("Later" and "Longer" here) into the above equation:

$$y_{i,p,c,t} = \gamma_0^{(2)} + \gamma_1^{(2)} N_{i,p,c,t} + \delta W_{i,p,c,t} + \boldsymbol{\gamma}_2^{(2)} \mathbf{X}_{i,p,c,t} + f\left(\text{Age}_{i,c,t}\right) + \text{Prov}_p + \text{Year}_t + \text{Prov\_Trend}_{p,c} + \varepsilon_{i,p,c,t}. \quad (4)$$

The identification of IV estimation requires an exclusion restriction: The policy exposure should not affect the outcome variable through channels other than number of children. To be an important mechanism of family planning, the variable W needs to satisfy two conditions. First, W should be powerful in explaining the variation in the outcome variable. This condition can be tested with the statistical significance of δ. Second, exposure to family planning ($\text{FPP}_{p,c}$) should be related to W. If family planning policies affect the outcome variables through important channels other than number of children, adding the new variable W should move the estimated coefficient $\widehat{\gamma}_1^1$ towards zero. For space consideration, we focus on two outcomes that are most worrisome: fewer visits from children and mothers' self-reported depression.

[Table 8 About Here]

Table 8 reports results from this approach, with columns (2) and (6) additionally controlling for mother's age at first birth and children's average age gap. Note that we have to restrict the sample to households with at least two children in order to define the birth interval. Despite a sharp decline in the

number of children, a majority (91.46%) of the households in our sample still have at least two children, and we confirmed that this restriction does not change our main results. Because of the endogeneity in fertility history, the coefficients of age at first birth and birth intervals should be interpreted with caution. Column (6) suggests that later childbirths are positively associated with parents' mental health (with lower CES-D), which implies the "Later" part of the LLF policy bundle is unlikely to explain parents' deteriorated mental health in old age. As a consequence, the coefficient in front of the number of children becomes larger in column (6). We also find no evidence that "Later" and "Longer" parts can explain fewer visits from children (column (2)).

Direct Impact of Birth Control Methods

The decline in childbirths as a consequence of family planning is usually accompanied by more frequent usage of birth control methods, e.g., abortion. It is possible that using birth control method directly affects elderly parents' well-being. In 2014, CHARLS carried out a life history survey, including pregnancy history. There are 1,871 women who report being pregnant at least once from 1965 to 1990. Figure A4 plots how each pregnancy is ended. The rate of induced abortion rose from 6% in 1970 to 11% in 1975, but it was still significantly lower than the rate of 20% after the 1979 implementation of the one-child policy. If a pregnancy was ended in induced abortion, CHARLS further asked the reason. Figure A4 suggests that prior to the year 1975, unwanted birth remains the dominant reason for induced abortion. After 1979, as the family planning policies became more stringent, policy-related abortions accounted for over two-thirds of total abortions.

Columns (3) and (7) of Table 8 additionally control for the numbers of two types of abortion that the mother experienced. Both types of abortion are positively associated with depression (column (7)). Family planning induced abortions are more positively correlated with mother's depression symptoms, albeit weaker statistical significance because of a larger standard error. Nevertheless, the coefficient of the number of children ($\widehat{\gamma}_1$) remains quite stable after controlling for abortions. This can probably be explained by the fact that there was not a significant increase in abortions during the LLF period, as shown in Figure A1. Unsurprisingly, column (3) suggests that the abortion experience is not associated with monthly visits from children.

Aside from abortion, they are other birth control measures, such as condoms, oral pills, sterilization, and an intrauterine device (IUD), which CHARLS does not cover. Those are more lenient methods and have arguably smaller direct effects on health. Among those methods, IUDs require further attention because their usage expanded rapidly during the LLF period (Figure A1). Worly et al. (2018) reviewed 26 studies to look for an association between progestin-only contraception (IUD included) and depression and concluded that the evidence does not yet support an association. When discussing the effect of an IUD, they argue in an *ex ante* way that "because the hormone in this device acts locally rather than systemically, it might also be expected to have fewer systemic effects, including depression."

Children's Gender Composition

Sons and daughters may provide support to their parents differently. If the family planning policies distorted the sex ratio at birth, which has been shown to be the case for the one-child policy (Ebenstein, 2010; Li et al., 2011), it may affect children's support to parents and parents' well-being through children's gender composition. Interestingly, one advantage of using the LLF campaign in the early 1970s as policy shocks is that it had limited impacts on the sex ratio because the gender selection technology (mainly Ultrasound B) did not become prevalent in China until the late 1980s (Chen et al., 2013).

Columns (4) and (8) of Table 8 report the results with the additional controls of children's gender composition. Both columns show that sons are playing more important roles in supporting parents in the patriarchal society of China. More sons are associated with more frequent visits from children (column (4)) and lower level of depression (column (8)). Despite the strong association between children's gender composition and support to parents, the main coefficient of interest ($\widehat{\gamma}_1$) remains almost unchanged, which can be explained by the limited impacts of LLF policies on the sex ratio.

7 Conclusions

The "Later, Longer, Fewer" policies in the early 1970s witnessed the start of China's rigorous family planning—a controversial policy that affected several generations in a large county with over one billion population. A comprehensive understanding of the effect of such an important policy is not only crucial for China to design its future population policies, but also provides valuable lessons for other countries that are contemplating their own family planning policies. By exploiting the provincial heterogeneity in the implementation of the "Later, Longer, Fewer" policies, we evaluate how policy exposures change parents' life in old age. Previous studies generally find positive effects of family planning policies on parents' consumption and health status when they are still young, either because the policies reduce a mother's risk during childbirth or because they free up family resources as a result of having fewer children to raise. However, the negative side gradually emerges as parents turn older—there are fewer children that can take care of and provide companionship to the elderly parents. This may negatively affect the elderly's physical and mental well-being.

Our empirical analysis brings both good and bad news. The good news is that the physical well-being of the elderly does not become worse as a consequence of LLF. We find no evidence that elderly parents with greater exposure to the family planning policies would reduce household expenditures. Using a wide range of indicators, we also find no evidence that parents' physical health status would deteriorate as a result of LLF. Why does a smaller number of children not necessarily threaten elderly parents' material well-being? Because there are two channels that can neutralize the effect of having fewer children. The first channel is the change of children's behavior. The financial support from each child actually increases—probably because children are anticipating that they have fewer siblings to share the burden of parents' old-age support, and because parents with fewer children invested more in their quality. The second channel is parents' self-insurance through higher savings. Anticipating

that they will receive fewer support from children, parents can save more when young to prevent the downfall of consumption in old age. The bad news is that the mental well-being of the elderly parents becomes worse. The situation is especially worrisome for mothers. We argue that less companionship and emotional support from children is an important driving force. To conclude, our study calls for greater attention on elderly people's social network and mental health status.

Our research has its own limitations. The empirical analysis mainly provides reduced-form estimations without a comprehensive analysis of the mechanisms. Our study involves many variables, whose mechanisms can vary tremendously from each other. Future studies need to solve two challenges to better understand how family planning affects people's well-being in old age. First, many outcomes in old age are cumulative ones (e.g., health). Strictly speaking, any event that takes place when a person is still young can have persistent effects into his or her old age. Second, it is not sufficient to study only the elderly people themselves if we wish to understand fully their well-being status. We also need to unveil the complex parent-child interactions. Ideally, we need to know not only parents' responses to the policy changes, but also how children respond to their parents' responses, parents' higher-order responses to their children's responses, etc. These are exciting avenues for future research.

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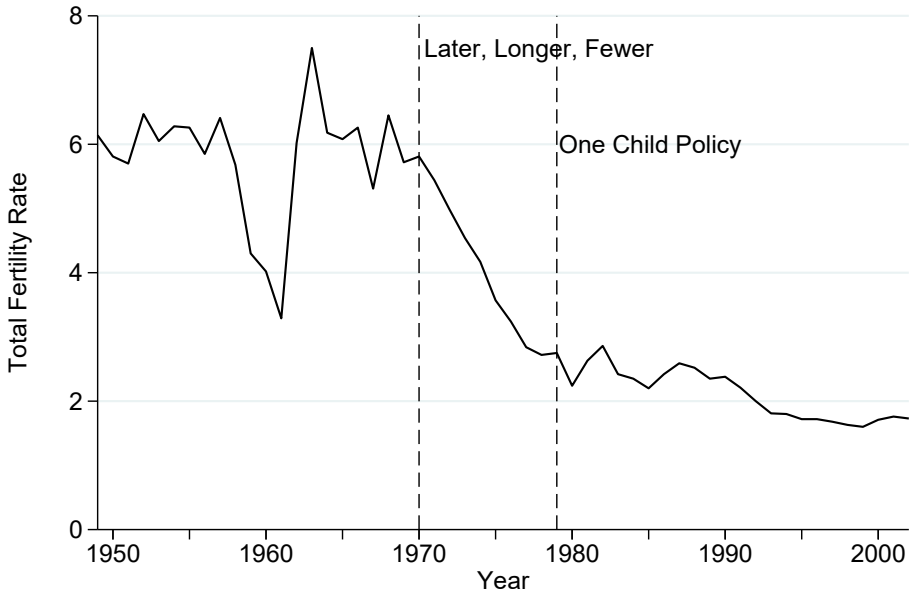
Figure 1: National Total Fertility Rate of China, 1949–2002



Data source: Lu and Zhai (2009) "Sixty Years of New China Population."

Figure 2: Years of Establishment of Provincial Family Planning Leading Group

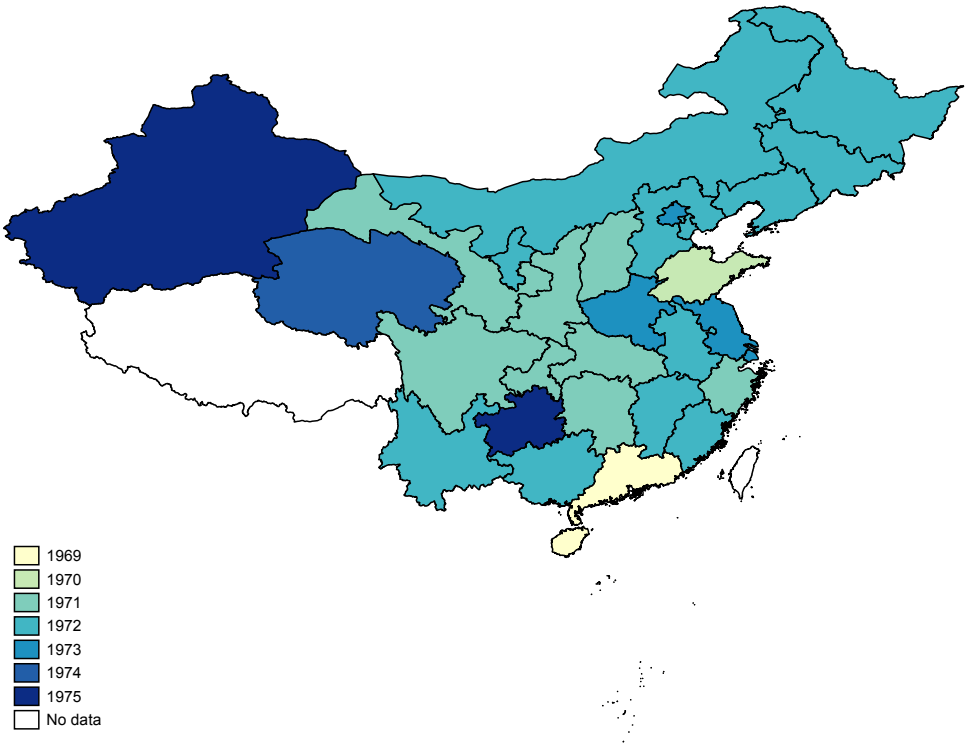


Figure 3: Example of Policy Exposure Construction and its Cohort Average

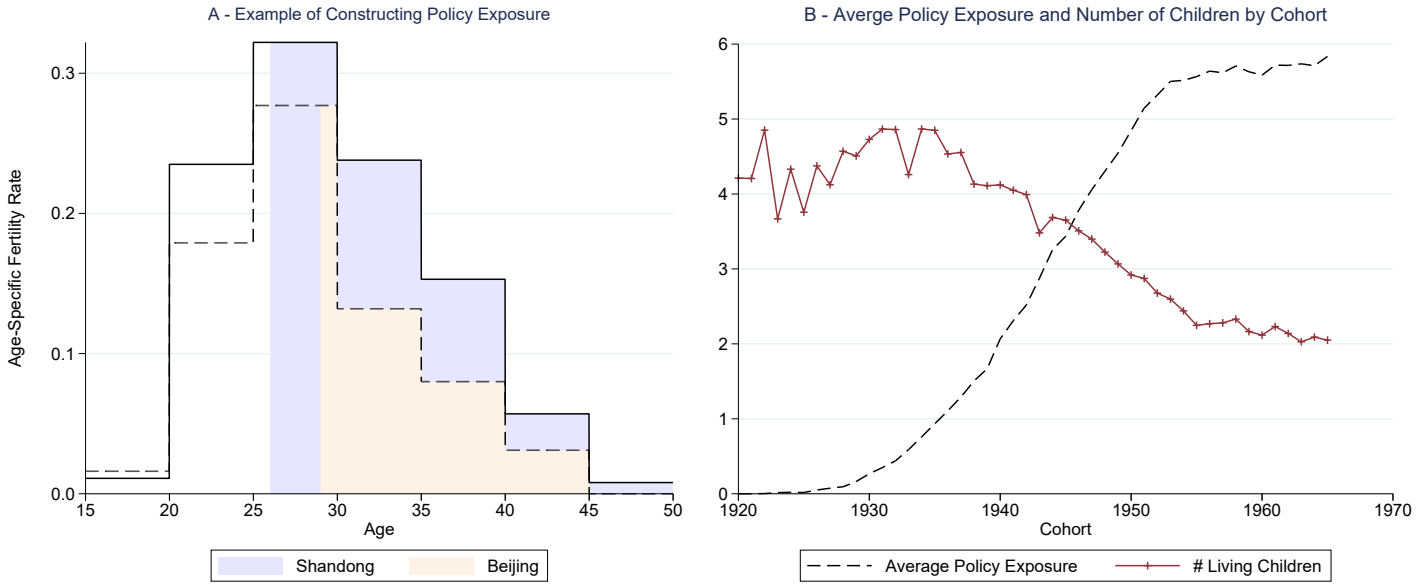


Table 1: Summary Statistics of Parents

Level	Individual			Level	Household		
Variables	Mean	S.D.	Obs.	Variables	Mean	S.D.	Obs.
Age	70.064	6.959	16326	Widow	0.298	0.458	11322
Male	0.461	0.499	16326	Couple's Age Gap	3.09	4.185	11322
Education				Urban *Hukou*	0.278	0.448	11322
Illiterate	0.374	0.484	16326	Number of Living Children	3.528	1.751	11322
Some Elementary School	0.191	0.393	16326	Annual Net Transfer from Children (RMB)	1969.7	3448.6	11096
Elementary School	0.250	0.433	16326	Monthly Visits from Children	22.227	27.726	11322
Middle School	0.116	0.320	16326	Monthly Contacts from Children	27.773	29.19	11322
High School and Above	0.068	0.252	16326	***Living Arrangement***			
Self-rated Life Satisfaction				Children in Home	0.564	0.707	11322
Completely satisfied	0.038	0.192	14436	Total Number of Non-coresiding Children	2.964	1.845	11322
Very satisfied	0.276	0.447	14436	Non-coresiding Children in Village/Community	0.993	1.222	11322
Somewhat satisfied	0.576	0.494	14436	Non-coresiding Children in County/District	2.035	1.598	11322
Not very satisfied	0.087	0.281	14436	***Annual Household Expenditure***			
Not at all satisfied	0.023	0.149	14436	Total Expenditure (RMB)	23147.4	25152.8	9247
Self-rated Health				Food Expenditure (RMB)	9442.1	11550.3	9247
Excellent	0.034	0.182	15935	Living Expenditure (RMB)	7439.2	14344.7	9247
Very good	0.101	0.302	15935	Health Expenditure (RMB)	2722.738	8393.527	9247
Good	0.300	0.458	15935				
Fair	0.370	0.483	15935				
Poor	0.194	0.395	15935				
Measures of Health							
BMI (Body Mass Index)	23.150	3.471	12672				
Underweight	0.081	0.272	12672				
Hypertension	0.326	0.469	13103				
Limitations in Activities of Daily Living (ADL)	0.210	0.787	16326				
Limitations in Instrumental Activities of Daily Living (IADL)	0.502	1.145	16326				
Number of Chronic Conditions	1.677	1.524	15521				
Changes of Living 10–15 More Years	0.484	0.257	12699				
Center for Epidemiologic Studies Depression (CES-D) Scale	8.521	6.259	14641				
Depressed (CES-D Scale≥10)	0.366	0.482	14641				

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority.

Table 2: Summary Statistics of Non-coresiding Children

Level	(Non-coresiding) Children		
Variables	Mean	S.D.	Obs.
Age	43.192	9.316	28646
Male	0.454	0.498	29871
Annual Net Transfer to Parents (RMB)	587.6	1165.7	28638
Annual Income of Child and Child-in-law	34015.303	37484.395	19697
Education			
Illiterate	0.084	0.277	29528
Did Not Finish the Elementary School	0.143	0.35	29528
Elementary School	0.262	0.44	29528
Middle School	0.305	0.46	29528
High School and Above	0.206	0.404	29528
Living Arrangement			
In Village/Community (not at home)	0.359	0.48	28083
In County (not in illage/Community)	0.382	0.486	28083
Outside County	0.259	0.438	28083
Frequency of Visiting Parents			
Almost every day	0.208	0.406	28513
2–3 times a week	0.073	0.26	28513
Once a week	0.084	0.278	28513
Every two weeks	0.086	0.28	28513
Once a month	0.121	0.326	28513
Less than once a month	0.387	0.487	28513
Almost never	0.041	0.197	28513
Frequency of Contacting Parents			
Almost every day	0.232	0.422	29417
2–3 times a week	0.133	0.339	29417
Once a week	0.176	0.381	29417
Every two weeks	0.131	0.338	29417
Once a month	0.152	0.359	29417
Less than once a month	0.149	0.356	29417
Almost never	0.027	0.161	29417

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to the non-coresiding children of elderly parents aged at least 60 in 2011 and are not ethnic minority.

Table 3: Effect of Family Planning on Fertility, Household-level Analysis

Sample	All			Rural	Urban
	(1)	(2)	(3)	(4)	(5)
Mother's Exposure to LLF	-0.454***	-0.355***	-0.468***	-0.490***	-0.341**
	(0.0888)	(0.0745)	(0.0832)	(0.0654)	(0.157)
Father's Exposure to LLF		-0.127			
		(0.108)			
Mother's Exposure to LLF			-0.0385		
× Deviation of Policy from the Mean			(0.0620)		
Observations	11,322	10,109	11,322	8,225	3,096
Sample Mean	3.560	3.426	3.560	3.766	3.015
Other Controls	✓	✓	✓	✓	✓
Age FE	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variable is the number of living children. The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

Table 4: Effect of Family Planning on Living Arrangements, Household-level Analysis

Sample	All	Rural	Urban
	(1)	(2)	(3)
Panel A: Number of Coresiding Children			
M's Exposure to LLF	0.0308	0.0464	0.0234
	(0.0460)	(0.0474)	(0.0451)
Observations	11,322	8,225	3,096
Sample Mean	0.556	0.584	0.480
Panel B: Total Number of Non-coresiding Children			
M's Exposure to LLF	-0.485***	-0.536***	-0.364**
	(0.110)	(0.0882)	(0.175)
Observations	11,322	8,225	3,096
Sample Mean	3.004	3.181	2.535
Panel C: Number of Non-coresiding Children in the Village/Community			
M's Exposure to LLF	-0.0844	-0.128	0.0194
	(0.0949)	(0.0809)	(0.124)
Observations	11,322	8,225	3,096
Sample Mean	0.989	1.103	0.684
Panel D: Number of Non-coresiding Children in the County/District			
M's Exposure to LLF	-0.238*	-0.217	-0.184
	(0.133)	(0.159)	(0.140)
Observations	11,322	8,225	3,096
Sample Mean	2.049	2.166	1.739
Other Controls	✓	✓	✓
Age FE	✓	✓	✓
Year FE	✓	✓	✓
Province FE	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables are parents' living arrangements (number of children in a locality). The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

Table 5: Effect of Family Planning on Support from Non-coresiding Children, Household-level (Panel A) and Child-level (Panel B & C) Analysis

Dependent Variables	Annual Net Transfer to Parents			Monthly Visits to Parents			Monthly Contacts with Parents		
Sample	All	Rural	Urban	All	Rural	Urban	All	Rural	Urban
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: (Parents' Perspective) Total Amount from Children									
M's Exposure to LLF	64.54	194.6	-305.0	-3.277**	-3.400**	-4.150**	-4.996***	-5.748***	-3.635*
	(111.0)	(212.5)	(248.8)	(1.194)	(1.632)	(1.566)	(0.998)	(1.174)	(1.863)
Observations	11,096	8,129	2,966	11,322	8,225	3,096	11,322	8,225	3,096
Sample Mean	1951	2026	1748	21.82	22.28	20.61	27.30	27.44	26.95
Panel B: (Children' Perspective) Amount to Parents									
M's Exposure to LLF	52.16**	10.04	109.1	0.302	0.278	-0.193	-0.418	-0.799	0.263
	(22.50)	(30.93)	(77.20)	(0.373)	(0.507)	(0.566)	(0.564)	(0.512)	(0.592)
Observations	28,638	22,267	6,371	28,501	21,803	6,698	29,417	22,515	6,902
Sample Mean	587.1	578	618.9	7.791	7.544	8.595	9.539	9.077	11.05
Panel C: (Children' Perspective) Amount to Parents (conditional on children's characteristics)									
M's Exposure to LLF	20.88	-33.16	99.84	0.194	0.258	-0.371	-0.174	-0.524	0.305
	(26.79)	(30.95)	(91.03)	(0.373)	(0.401)	(0.717)	(0.576)	(0.569)	(0.692)
Observations	27,168	21,028	6,139	27,155	20,668	6,486	28,016	21,330	6,685
Sample Mean	596.6	588.9	623.3	7.826	7.573	8.636	9.611	9.137	11.12
Other Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Age FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). Panel A restricts the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. Panels B and C use their non-coresidence children as sample. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables are parents' received support (financial transfer and companionship) from children and children's provision of support to parents. The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table. Children's characteristics in panel C include age, gender, education, and income.

Table 6: Effect of Family Planning on Household Expenditures (conditional on not co-residing with children), Household-level Analysis

Sample	All	Rural	Urban
	(1)	(2)	(3)
Panel A: Annual Total Expenditure			
M's Exposure to LLF	823.5	921.1	75.82
	(569.6)	(633.5)	(1,628)
Observations	5,121	3,543	1,573
Sample Mean	11101	8824	16230
Panel B: Food Expenditure			
M's Exposure to LLF	536.4	605.2***	424.3
	(387.4)	(212.2)	(711.6)
Observations	5,121	3,543	1,573
Sample Mean	4823	3578	7612
Panel C: Living Expenditure			
M's Exposure to LLF	399.0	147.9	594.4
	(431.2)	(498.2)	(1,070)
Observations	5,121	3,543	1,573
Sample Mean	3267	2704	4540
Panel D: Health Expenditure			
M's Exposure to LLF	-31.08	249.1	-1,065
	(328.0)	(323.3)	(688.1)
Observations	5,121	3,543	1,573
Sample Mean	1696	1432	2297
Other Controls	✓	✓	✓
Age FE	✓	✓	✓
Year FE	✓	✓	✓
Province FE	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. We further restrict the sample to parents who are not co-residing with children. Table A3 presents the corresponding table without such restriction. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables are household consumption divided by the OECD equivalence scale (OECD, 1982). The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

Table 7: Effect of Family Planning on Parents' Health Status, Individual-level Analysis

Dependent Variables	BMI	Underweight	Hypertension	ADL	IADL	Number of Chronic Conditions	Chances of Living 11–15 More Years	Self-Rated Satisfaction[a]	Self-Rated Health[b]	CES-D Scale	Depressed (CES-D≥10)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Father											
M's Exposure to LLF	-0.136	-0.0115	0.0108	-0.0133	0.0692	-0.0887	-0.00287	0.00201	0.0756	0.0685	-0.00332
	(0.224)	(0.0142)	(0.0260)	(0.0325)	(0.0502)	(0.0570)	(0.0199)	(0.0370)	(0.0410)	(0.272)	(0.0242)
	<0.9848>	<0.9640>	<0.9949>	<0.9949>	<0.7690>	<0.6943>	<0.9981>	<0.9981>	<0.5527>	<0.9955>	<0.9981>
Observations	6,060	6,060	6,245	7,704	7,704	7,321	6,272	6,946	7,577	7,059	7,059
Sample Mean	22.69	0.0851	0.291	0.180	0.394	1.602	0.502	2.772	3.520	7.457	0.293
Panel B: Mother											
M's Exposure to LLF	-0.215	-0.00528	-0.0495	0.309	0.246	0.175	0.0304	0.128	0.0684	2.178**	0.194**
	(0.312)	(0.0429)	(0.0523)	(0.107)	(0.144)	(0.164)	(0.0352)	(0.0959)	(0.102)	(0.613)	(0.0465)
	<0.8605>	<0.9040>	<0.8534>	<0.1296>	<0.5690>	<0.8474>	<0.8534>	<0.7468>	<0.8605>	<0.0465>	<0.0175>
Observations	6,618	6,618	6,868	8,638	8,638	8,215	6,437	7,504	8,373	7,596	7,596
Sample Mean	23.58	0.0739	0.345	0.215	0.533	1.746	0.463	2.780	3.657	9.589	0.437
Other Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Age FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. We report in the parenthesis the standard errors clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008) and in the angle brackets the p-value under multiple hypothesis testing using the method proposed by Clarke et al. (2020). */**/*** represents statistical significance at 10%/5%/1% level under multiple hypothesis testing. The outcome variables are parents' physical and mental health status. Please refer to Section 4 (pp.XX) for detailed definitions of the listed dependent variables. The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

a. This variable is reverse scaled (from 1=completely satisfied to 5=not a all satisfied). b. This variable is reverse scaled (from 1=excellent to 5=poor).

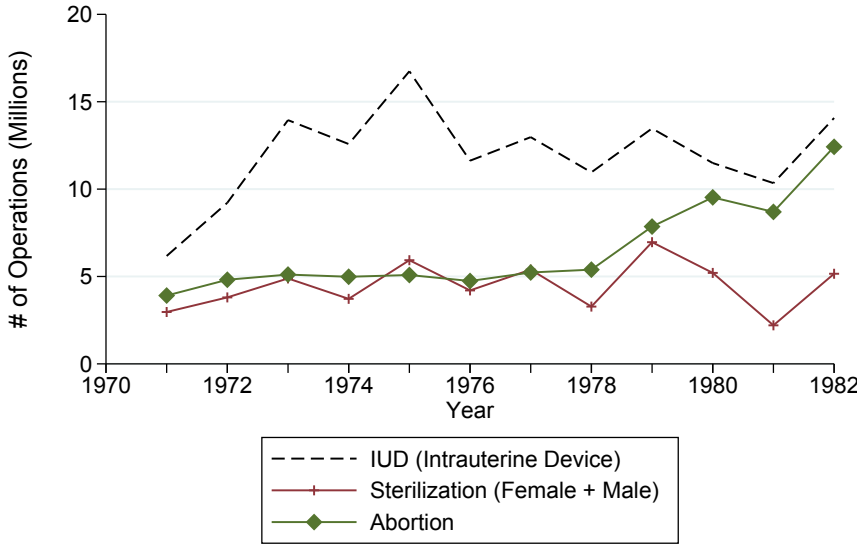
Table 8: IV Estimation of the Effect of Children after Controlling for Other Possible Channels

Dependent Variables	Monthly Visits from Children (mean = 24.376)				(Mother) CESD Scale (mean = 9.575)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Children	6.769***	7.419***	6.776***	7.107***	-1.450***	-1.898**	-1.386***	-1.594***
	(2.383)	(2.286)	(2.336)	(2.448)	(0.501)	(0.828)	(0.485)	(0.537)
M's Age at First Child-birth		-0.342				-0.320**		
		(0.359)				(0.124)		
Children's Mean Age Gap		-0.195				-0.229		
		(0.346)				(0.168)		
M's Abortions Due to			1.008				0.759	
Family Planning			(1.280)				(0.795)	
M's Abortions Due to			0.262				0.357**	
Unwanted Birth			(0.534)				(0.145)	
Share of Children being Son				14.44***				-2.332***
				(3.176)				(0.796)
Observations	10,348	9,817	10,348	10,348	7,596	7,055	7,596	7,528
First-stage F value	17.06	20.95	16.79	17.65	25.55	21.87	25.80	22.90
Other Controls	✓	✓	✓	✓	✓	✓	✓	✓
Age FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables are monthly visits from children and mother's CES-D scale. The main independent variable is the number of living of children using our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1) as the instrumental variable. Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

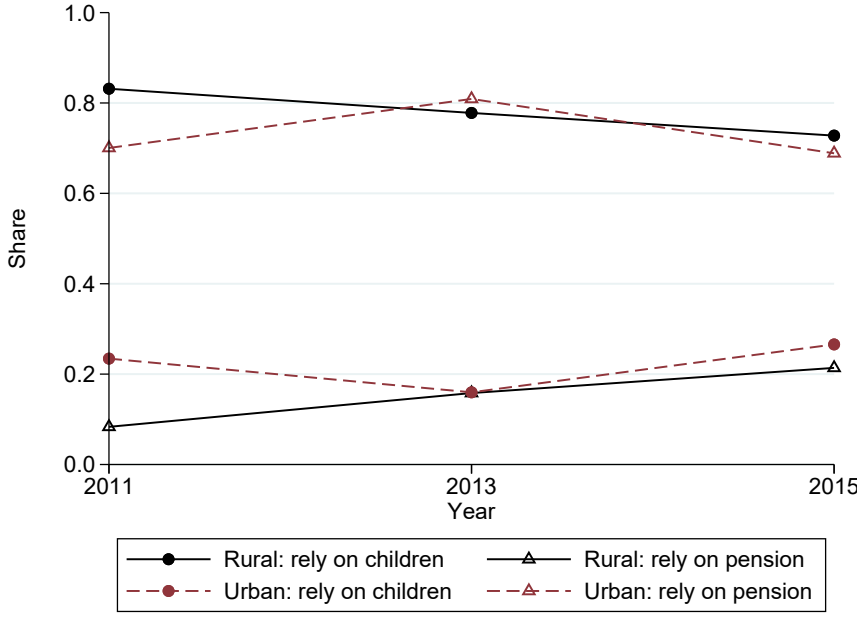
Appendix A: Additional Tables and Graphs

Figure A1: Different Methods of Birth Control



Data source: National Family Planning Commission of China (1983).

Figure A2: Answers to "Who do you think you can rely on financially for old-age support?"



Source: authors' calculations based on CHARLS.

Figure A3: National Age-specific Fertility Rate, 1969 versus 1979

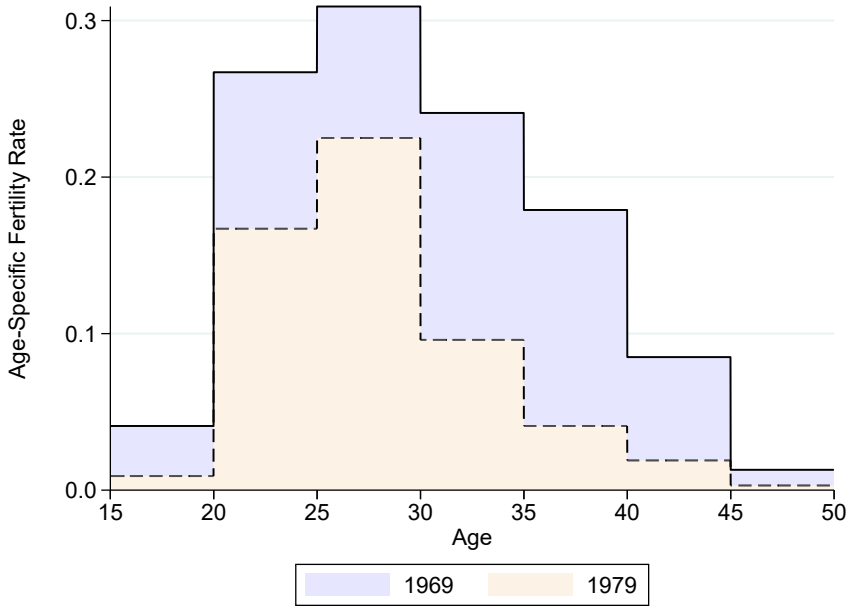
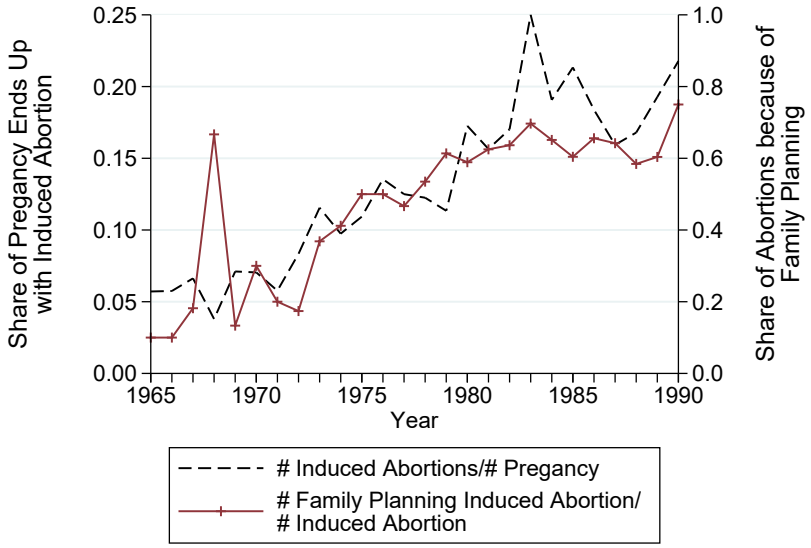


Figure A4: Women's History of Abortion



Source: authors' calculations based on CHARLS.

Table A1: The establishment years of the FPLG

Province	Policy Year	Details
Beijing	1973	In 1973, the FPLG (or Commission) was formed at various levels (city/district/county/bureau/office/department/firm).
Tianjin	1972	In April 1972, the Tianjin Family Planning Commission was established (later changed to FPLG)
Hebei	1972	In February 1972, the Hebei FPLG was formed.
Shanxi	1971	In May 1971, the FPLG of the Shanxi Revolutionary Committee was formed.
Inner Mongolia	1972	Between 1972–1973, the FPLG and Office of Family Planning (now renamed as the Family Planning Commission) of Inner Mongolia were formed.
Liaoning	1972	On December 31, 1972, the Liaoning Revolutionary Committee rebuilt the provincial family planning commission (renamed as FPLG in 1975).
Jilin	1972	In 1972, the provincial FPLG was formed.
Heilongjiang	1972	On October 4, 1972, an agreement was made to establish the family planning commission.
Shanghai	1973	In 1973, the same year as the State Council rebuilt the FPLG and the Office of Family Planning, Shanghai restored the corresponding organizations.
Jiangsu	1973	In September 1973, the FPLG of the Jiangsu Revolutionary Committee and its offices were established.
Zhejiang	1971	In July 8, 1971, the State Council issued document [1971]51. The Zhejiang Revolutionary Committee issued the document on September 4... The current main target was to:... restore and reinforce the FPLG.
Anhui	1972	In September 12, 1972, The Anhui Revolutionary Committee issued "A Notice on Adjusting and Replenishing Family Planning Commission," increasing the commission members from 15 to 25. The committee was renamed as FPLG in 1977.
Fujian	1972	In 1972, the provincial revolutionary committee rebuilt the FPLG and established an office in the province sanitary bureau.
Jiangxi	1972	In March 13, 1972, the Jiangxi Revolutionary Committee issued the document to establish the Family Planning Commission and attached its office to the sanitary bureau.
Shandong	1970	In June 1970, the Shandong Revolutionary Committee decided to form the Shandong FPLG.
Henan	1973	In August 1973, the Henan Family Planning Commission was rebuilt (changed to FPLG in 1977).
Hubei	1971	On August 11, 1971, the Hubei Revolutionary Committee decided to establish a FPLG.
Hunan	1971	In May 12, 1971, the provincial revolutionary committee issued "A Notice on Forming Provincial Family Planning Leading Group," which restored once-incapacitated family planning institutions.
Guangdong	1969	On September 10, 1969, the Guangdong FPLG was established.
Guangxi	1974	In July 1974, the FPLG of the autonomous region was established.
Sichuan	1971	In July 1971, Sichuan decided to immediately form a family planning commission.
Guizhou	1975	In 1975, family planning commissions (or offices) were set up at various levels (province, prefecture, and county)
Yunnan	1972	On June 24, 1972, the province-level FPLG was restored.
Shaanxi	1971	In December 1971, the Shaanxi Family Planning Commission was restored (changed to FPLG in 1973).
Gansu	1971	In November 1971, the FPLG of the Gansu Revolutionary Committee was formed.
Qinghai	1974	On January 16, 1974, the Qinghai Revolutionary Committee issued a document to establish the Qinghai FPLG.
Ningxia	1972	The Family Planning Commission was formed in 1972.
Xinjiang	1975	In 1975, FPLGs were established at various level of the autonomous region.

Source: Chen and Huang (2020)'s collection from population chronicles in various provinces and from the "Encyclopedia of Chinese Family Planning" (Peng, 1997).

Table A2: Effect of Family Planning on Age-Specific Childbirths, Household-level Analysis

Age Range	<20	20–29	30–39	40–49
	(1)	(2)	(3)	(4)
M's Exposure to LLF	-0.0187	0.0343	-0.363***	0.00790
	(0.0310)	(0.0996)	(0.0667)	(0.0202)
Observations	11,322	11,322	11,322	11,322
Sample Mean	0.234	2.104	0.855	0.101
Other Controls	✓	✓	✓	✓
Age FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Province FE	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variable is the number of children born in each mother's age range (<20, 20–29, 30–39, 40–49). The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

Table A3: Effect of Family Planning on Household Expenditures (all sample), Household-level Analysis

Sample	All	Rural	Urban
	(1)	(2)	(3)
Panel A: Annual Total Expenditure			
M's Exposure to LLF	-101.5	-27.02	-1,220
	(364.6)	(433.1)	(902.0)
Observations	9,246	6,665	2,581
Sample Mean	10421	8604	15113
Panel B: Food Expenditure			
M's Exposure to LLF	247.8	446.0**	-341.5
	(229.0)	(186.7)	(440.8)
Observations	9,246	6,665	2,581
Sample Mean	4315	3327	6865
Panel C: Living Expenditure			
M's Exposure to LLF	-297.4	-586.3**	-158.8
	(198.2)	(240.9)	(498.3)
Observations	9,246	6,665	2,581
Sample Mean	3255	2793	4449
Panel D: Health Expenditure			
M's Exposure to LLF	-36.20	80.29	-595.2
	(182.2)	(202.3)	(379.5)
Observations	9,246	6,665	2,581
Sample Mean	1365	1177	1850
Other Controls	✓	✓	✓
Age FE	✓	✓	✓
Year FE	✓	✓	✓
Province FE	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. This table corresponds to Table 6 without restricting the sample to parents who are not co-residing with children. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables are household consumption divided by the OECD equivalence scale (OECD, 1982). The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

Table A4: Additional Results on Parents' Mortality Selection and Mental Health Status

Sample	Father		Mother	
Dependent Variables	Deceased (aged 45+)	CESD Scale (aged 60+)	Deceased (aged 45+)	CESD Scale (aged 60+)
	(1)	(2)	(3)	(4)
M's Exposure to LLF	0.00654	0.0771	-0.00421	2.213***
	(0.00395)	(0.262)	(0.00653)	(0.609)
M's Exposure to LLF		0.262*		0.350**
×Widowed		(0.153)		(0.159)
M's Exposure to LLF		-0.00909		-0.152
×Have Children in Village/Community		(0.0435)		(0.0918)
Observations	11,982	7,059	14,320	7,596
Sample Mean	0.0153	7.457	0.0106	9.589
Other Controls	✓	✓	✓	✓
Age FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Province FE	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables are whether the interviewees pass away in the next wave and the CES-D scale. The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

Table A5: Effect of Family Planning on Parents' Health Status, Individual-level Analysis (consistent sample)

Dependent Variables	Chances of Living 11–15 More Years	BMI	Underweight	Hypertension	ADL	IADL	Number of Chronic Conditions	Self-Rated Satisfaction[a]	Self-Rated Health[b]	CES-D Scale	Depressed (CES-D≥10)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Father											
M's Exposure to LLF	-0.00417	-0.0568	-0.00855	0.00324	0.0207	0.0405	-0.0904	0.0166	0.0447	0.0827	-0.00539
	(0.0226)	(0.197)	(0.0171)	(0.0341)	(0.0239)	(0.0398)	(0.0984)	(0.0391)	(0.0804)	(0.291)	(0.0252)
	<0.9983>	<0.9983>	<0.9961>	<0.9983>	<0.9720>	<0.9601>	<0.9689>	<0.9963>	<0.9961>	<0.9983>	<0.9983>
Observations	4,607	4,607	4,607	4,607	4,607	4,607	4,607	4,607	4,607	4,607	4,607
Sample Mean	0.503	22.79	0.0799	0.288	0.0949	0.250	1.595	2.767	3.495	7.354	0.285
Panel B: Mother											
M's Exposure to LLF	0.00981	-0.0666	0.00716	-0.0299	0.0289	0.135	0.102	-0.0537	-0.202	2.580	0.206
	(0.0385)	(0.492)	(0.0596)	(0.0692)	(0.0424)	(0.162)	(0.387)	(0.101)	(0.168)	(0.927)	(0.0734)
	<0.9974>	<0.9974>	<0.9974>	<0.9931>	<0.9875>	<0.9741>	<0.9974>	<0.9931>	<0.8947>	<0.1854>	<0.1854>
Observations	4,504	4,504	4,504	4,504	4,504	4,504	4,504	4,504	4,504	4,504	4,504
Sample Mean	0.471	23.66	0.0717	0.334	0.119	0.365	1.778	2.760	3.650	9.594	0.441
Other Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Age FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province FE×Cohort Trend	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. This table corresponds to Table 7 and further restricts to a consistent sample without missing values in all health outcomes. We report in the parenthesis the standard errors clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008) and in the angle brackets the p-value under multiple hypothesis testing using the method proposed by Clarke et al. (2020). */**/*** represents statistical significance at 10%/5%/1% level under multiple hypothesis testing. The outcome variables are parents' physical and mental health status. Please refer to Section 4 for detailed definitions of the listed dependent variables. The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table.

a. This variable is reverse scaled (from 1=completely satisfied to 5=not a all satisfied). b. This variable is reverse scaled (from 1=excellent to 5=poor).

Appendix B: Robustness Checks

This appendix provides two sets of robustness checks. The first set focuses on the parallel-trend assumption, which is the core identification requirement in our cohort DID specification. Although the assumption is not directly testable, we show several pieces of evidence in its favor. The second set examines the possible influence of confounding factors.

Parallel-Trend Assumption

One placebo test is to look at cohorts without variation in policy exposure. The right panel of Figure 3 plots the average cohort exposure to LLF and suggests two groups of cohort who are potential eligible for a placebo analysis. The first group are cohorts 1920–1929, who had almost completed their fertility by the time LLF came into effect. The main issue of this group is that they were too old—they aged at least 80 in 2011 when the first wave of CHARLS took place. Therefore, the group have a small sample size and are highly selective. About 85% of our final sample are of cohorts 1930–1950. The second group are cohorts 1957–1966 who aged 45–54 in 2011. This group of younger people are almost fully exposed to LLF because the policy became effective by the time they reached the fertility age. This group of people do not show up in our final sample (because we focus on even more senior elderly), but we can use them as a placebo test. To create pseudo policy variations for this group, we move the policy years backward by 10 years. Column (2) of Table B1 presents this placebo exercise. We find no pseudo effect on the three outcomes on which we find LLF have significant effects for the elderly parents.

Admittedly, the above placebo test is probably not enough to support our identification because there are no clean unaffected group. We therefore include in our main specification a term of province-specific linear trend to alleviate the concern of heterogeneous trend. We justify this choice by showing in the right panel of Figure 3 that cohort exposure to LLF increases about linearly for cohorts 1930–1950. This choice may be subject to debate. As a robustness check, we show in column (3) of Table B1 an alternative way of controlling for trends—the interaction between cohort dummies and provincial base TFR in 1969. The coefficients in column (3) are close to those in column (1), but the standard errors are much larger, suggesting linear trend is a more efficient way of controlling heterogeneous trend.

We also did a robustness check suggested in Bilinski and Hatfield (2020). They propose a "one step up" method: (1) reporting treatment effect estimates from a model with a more complex trend difference than is believed to be the case and (2) testing that that the estimated treatment effect falls within a specified distance of the treatment effect from the simpler model. If we treat the specification with province-specific linear trend as the "simpler" model, we estimate in column (4) of Table B1 a more complicated model that allows for quadratic trend. The results with a quadratic-trend control are almost indistinguishable from those with a linear-trend control, suggesting that controlling for linear-trend is an ideal setting for our study.

Possible Confounding Factors

The first confounding factor is the contemporaneous events that took place around the implementation of the "Later, Longer, Fewer" campaign in the early 1970s. There were two other important events in that period: the Cultural Revolution and the Send-down Movement.[33] As introduced in the back-

[33]Another important event was the rural school expansion. From the late 1960s to the middle 1970s, the Chinese government implemented a rural school expansion program (mainly at the junior-high level), whose goal was to achieve universal education through junior high school and to increase rates of progression to senior high school for rural children (Pepper, 1990). Whereas there is no doubt that such an expansion would improve teenagers' education, which is an important socioeconomic factor for fertility level, the program is unlikely to affect our main results because our empirical approach purposefully excluded the channel of education. First, our study focuses on the cohorts who are old enough (60 or above in 2011)—they mostly had completed their education by the time the LLF came into play. Second, we consistently

ground section, China's family planning can trace back to the early 1960s but its course was interrupted by the outbreak of the Cultural Revolution in 1966. 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). The establishment of the Family Planning Leading Group is a symbol of recovery of the related government work in family planning from this turmoil. On the one hand, the Cultural Revolution can be related to the establishment of the leading group because it negatively impacted the government functioning including family planning. On the other hand, the violence and uncertainty brought by the Cultural Revolution could suppress the desire to have children. A related consequence of the Cultural Revolution is the Send-down Movement. The movement attempted to end the urban unrest with the outbreak of the Cultural Revolution and was, in part, to discharge the Red Guards (Bernstein, 1977).[34] 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. It is possible that the Send-down Movement directly affected people's fertility behavior (Zhou and Hou, 1999).

To evaluate the impact of the Cultural Revolution, we proceed as follows. First, we construct the exposure to the Cultural Revolution (1966–1976) in a similar way as we construct the exposure to the "Later, Longer, Fewer" policies. More specifically, we define

$$\text{EXPO CulturalRevolution}_{p,c} = \text{Intensity}_p^1 \times \sum_{a=15}^{49} \text{AFR}_p(a)\, I\left[1966 \leq c+a \leq 1976\right].$$

The number $\sum_{a=15}^{49} \text{AFR}_p(a)\, I\left[1966 \leq c+a \leq 1976\right]$ can be interpreted as the number of children a woman would have given birth to during the period 1966–1976 with the provincial fertility profile in 1969. To generate provincial heterogeneity in the severity of the Cultural Revolution (Intensity_p^1), we proxy the provincial intensity with the provincial aggregate fatalities during the revolution, which are taken from Walder (2017), as a share of the 1965 population.

Using the same procedure, we define the exposure to the Send-down Movement as

$$\text{EXPO SendDown}_{p,c} = \text{Intensity}_p^2 \times \sum_{a=15}^{49} \text{AFR}_p(a)\, I\left[1968 \leq c+a \leq 1978\right],$$

and proxy the provincial intensity of the Send-down Movement (Intensity_p^2) by the total number of people who were sent down to the countryside during the movement, which is taken from Gu (2009), as a share of the provincial population who were born between 1945 and 1960 (calculated based on census 1982).

Column (5) of Table B1 shows that coefficients of family planning are barely affected, suggesting the two events are unlikely to bias our estimated effects of the LLF policies. A lack of statistical association between two local densities and the establishment years of FPLG, as indicated in footnote 25, best explains this result.

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control for a list of education dummies throughout our study.

[34]The Red Guards were formed by teenagers, most of whom were junior or senior high school students. They were used as a political weapon to fight those opposed to Mao's policies during the first few years of the Cultural Revolution. However, the revolution spiraled out of control and turned into "red terror." To resolve the violence, Chairman Mao issued instructions to send millions of urban youth down to the countryside for "re-education."

Economic Development

Economic development is a decisive socioeconomic factor for fertility decision. People may concern that a fast developing economy can simultaneously reduce fertility and affect outcome variables (such as health status). However, the main policy variation in our study took place in the early 1970s. It is well-known that the Chinese economy started to boom in 1978, following its Reform and Open-up Policy. The Chinese economy somewhat staggered in the early 1970s partially due to the Cultural Revolution. Nevertheless, we try to control the impact of economic development with the following measure:

$$\text{Economic}_{p,c} = \frac{\sum_{a=15}^{49} \text{AFR}\,(a) \times Y_{p,c+a}}{\sum_{a=15}^{49} \text{AFR}\,(a)},$$

where $Y_{p,c+a}$ represents an indicator of economic performance of province p in year $c+a$. This measure can be interpreted as the average level of economic development during a woman's fertile period weighted by the age-specific fertility rate. We choose following variables as economic indicators: GDP per capital, share of non-agricultural population, grain output per capita, and share of GDP in the second and third industry, respectively. Column (6) of Table B1 presents the result with those economic control variables.

Other than secular variations in economic development, there are also spatial variations. We define the policy exposure to LLF at province-by-cohort level. However, the economic development and the implementation of family planning policies can vary within a province. We therefore control locality FEs at a finer level (community level) in column (7). The main coefficients of interest in columns (6) and (7) either stay about the same or become slightly larger.

Table B1: Robustness in Empirical Specifications

Robustness	Baseline	Parallel Trend			Other Possible Factors		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Number of Living Children							
M's Exposure to LLF	-0.454***		-0.520***	-0.449***	-0.501***	-0.613***	-0.487***
	(0.0888)		(0.139)	(0.0881)	(0.0913)	(0.0975)	(0.0907)
M's Placebo Exposure for younger Cohorts		0.147					
		(0.0868)					
Observations	11,322	8,436	11,321	11,322	11,322	11,322	11,316
Sample Mean	3.560	2.114	3.560	3.560	3.560	3.560	3.560
Panel B: Monthly Visits from Children							
M's Exposure to LLF	-3.277**		-4.572	-3.288**	-3.403***	-4.798***	-3.496***
	(1.194)		(3.200)	(1.189)	(1.086)	(1.114)	(0.986)
M's Placebo Exposure for younger Cohorts		1.454					
		(1.089)					
Observations	11,322	8,436	11,321	11,322	11,322	11,322	11,316
Sample Mean	21.82	5.875	21.82	21.82	21.82	21.82	21.82
Panel C: (Mother) CESD Scale							
M's Exposure to LLF	2.178***		1.974**	2.182***	2.378***	2.484***	2.223***
	(0.613)		(0.800)	(0.614)	(0.673)	(0.780)	(0.657)
M's Placebo Exposure for younger Cohorts		0.0405					
		(0.728)					
Observations	7,596	7,515	7,596	7,596	7,596	7,596	7,587
Sample Mean	9.589	8.414	9.589	9.589	9.589	9.589	9.590
Other Controls	✓	✓	✓	✓	✓	✓	✓
Age FE	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	
Province FE×Cohort Linear Trend	✓	✓			✓	✓	✓
TFR in 1969×Cohort Dummies			✓				
Province FE×Cohort Quadratic Trend				✓			
Historical Events					✓		
Economic Controls						✓	
Community FE							✓

Note: Data source is CHARLS (waves 2011/2013/2015). We restrict the sample to elderly parents aged at least 60 in 2011 and are not ethnic minority. */**/*** represents statistical significance at 10%/5%/1% level. Standard errors are clustered at the provincial level using the wild cluster bootstrap method (Cameron et al., 2008). The outcome variables include: the number of living children, monthly visits from children, and mother's CES-D scale. The main independent variable is our constructed policy exposure to the "Later, Longer, Fewer" campaign (equation 1). Other control variables include widow, couple's age gap, *hukou*, education, and a set of fixed effects listed at the end of the table. This table presents a set of robustness checks. Column (1) serves as the benchmark. Column (2) estimates the effect of a placebo policy exposure (by shifting the policy year ten years later) on younger cohorts (1957–1966). Column (3) adopts an alternative method to address possible heterogeneous trends by controlling for the interaction between provincial baseline TFR in 1969 and cohort dummies. Column (4) uses a more complex form of provincial trends (quadratic trend). Column (5) additionally include some contemporaneous events (the Cultural Revolution and the Send-down Movement). Column (6) controls for lifetime provincial-level average economic variables, including: GDP per capital, share of non-agricultural population, grain output per capita, and share of GDP in the second and third industry, respectively. Column (7) controls for the community fixed effects.

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