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Abstract

We present lab-in-the-field experimental evidence of the effects of the Chinese one-child policy on individuals' preferences and behavior as adults. The experiments were conducted in three different provinces because the policy was not strictly implemented at the same time in all provinces. We measure risk and time preferences, as well as subjects' competitiveness, cooperation, and bargaining behavior, sampling individuals born both before and after the introduction of the policy. Overall, we do not find any sizeable or statistically significant effects of the one-child policy on preferences or behavior in any of the experiments. These results hold for heterogeneity in the timing of the implementation of the OCP in different provinces, for heterogeneity among individuals, and for various robustness checks.

Key words: one-child policy, lab-in-the-field experiment, China.

JEL codes: C91, D03, D10, I31, P30.

1. Introduction

The one-child policy (OCP) of China, introduced in 1979, is one of the most well-known family policies in modern times. China had many different family planning campaigns aimed at reducing high fertility rates before the OCP. In 1970, the fertility rate was 5.9 per woman, and in 1979, it was 2.7 (Hesketh and Zhu, 1997). The OCP could thus be seen as the last step in a long-term attempt to stop the increasing population growth, as a fertility rate of 2.1 is needed for a stable population size if there is no migration and the mortality rate is unchanged (OECD, 2018). Since 1991, the fertility rate has been below 2.1 or even substantially lower, at times as low as 1.6 (World Bank, 2018). The long-run effects of the OCP have been dramatic, and today 25% of all families in China have only one child, meaning that there are more than 100 million only children (Peng, 2011). Moreover, the OCP has had significant effects on increased sex-ratio imbalance (Bulte et al., 2010; Li et al., 2011). Today China has the world's largest sex-ratio imbalance, with around 1.2 males per female, due to an extremely high sex-ratio difference at birth together with excess female child mortality (Li, 2007).[1] In 2016, China changed the OCP to a two-child policy. The main reason for this policy change was a demographic imbalance, with an aging population and a lower proportion of the population at working ages.

One critical aspect of the OCP compared with other family planning campaigns in China is that the reduction was from having to not having siblings rather than reducing the number of siblings. The general wisdom and stereotype is that only children, in particular, are "little emperors", since they get undivided attention from their parents and grandparents, while at the same time facing strong expectations to excel in life. Apart from direct demographic effects on population size and gender composition, it is thus possible that the OCP has resulted in behavioral and social consequences for those who were born under the policy, both because of the policy per se and also because of the changed social environment with larger shares of one-child households and increased sex-ratio imbalance. The objective of this paper is therefore to investigate preferences and behavior among adults in China who were born just before and after the introduction in 1979 of the OCP, using economic experiments.

[1] The sex ratio at birth was around 1.05 males/females in China until 1982, which is comparable to estimates of the natural sex ratio of 1.06 males/females (Grech et al., 2002). The ratio then increased and peaked at around 1.20 males/females at birth in 2005 (Li, 2007). The ratio has started to decline since then and was 1.18 in 2011 (UNFPA, 2012).

There is a vast literature, mostly in sociology and psychology, on the differences between children brought up with and without siblings. The empirical findings on the effects are mixed. Chen and Goldsmith (1991) review a large number of studies on only children and their behavior and conclude that the findings are inconsistent and inconclusive: around half of the studies showed that only children have poorer social skills than children with siblings, whereas a few found the converse, and the remaining found no overall differences. In a meta-analysis summarizing 115 studies on only children in China and the United States, Falbo (1987) reports no support for the negative stereotypes of being an only child. However, the opposite was found for many outcomes and characteristics. Several studies in economics have found that only children are more selfish, competitive, and status-driven and less empathetic (Lampi and Nordblom, 2010). The choice to have only one child when it is possible to have more children is a potential selection issue that can affect observed behavior in the aforementioned studies. This is a reason to use family planning campaigns as exogenous instruments to limit the number of children in a family.

The empirical findings have also been inconclusive in the context of China. Studies focusing on China have found that only children are more self-centered (Peng, 2011) and that girls who are only children are more likely to experience depression (Tseng et al., 1988). On the other hand, Yang et al. (1995) find that only children in China are actually better off, having lower levels of fear, anxiety, and depression than children and adolescents with siblings. They have also had better achievements in school (Falbo 1987; Falbo and Poston, 1993). Although having only one child may increase human capital investments in that child (Becker, 1991), studies in economics have found no or at most a modest positive impact of being an only child, as a result of the OCP, on children's education (Rosenzweig and Zhang, 2009; Liu, 2014). Furthermore, Shen and Yuan (1999) find no evidence that only children in China are more "spoiled" than children with siblings. Falbo and Poston (1993) study academic, personality, and physical outcomes of Chinese schoolchildren from four Chinese provinces and conclude that the OCP has not created a generation of "little emperors". Peng (2011) argues that the differences between Chinese only children and those with siblings might not be as great as previously thought and that there is a lack of research on the societal impacts of the extent of only children.

An interesting study that investigates the impacts on adults of the OCP is Cameron et al. (2013); this is also one of the few studies in economics investigating the impacts of the OCP on people's preferences and behavior. They conducted four economic experiments (dictator, trust, risk, and competition experiments) with individuals who were born before and after 1979,[2] the year the OCP was introduced. They also used a survey to elicit personality traits. They find that compared with people born before the OCP was introduced, people born after the introduction of the policy had lower levels of trust and were less trustworthy, more risk-averse, less competitive, and more pessimistic, though not less altruistic. Thus their results mainly confirm the common view about the negative impacts of the OCP on preferences and behavior. Moreover, they find that these impacts are long-lasting, since the subjects were in their 30s at the time of the experiment.

Given the large scale of effects of the OCP on the Chinese economy, together with mixed empirical findings on the behavioral effects of being an only child, the objective of our paper is to investigate the impacts of the OCP on preferences and behavior of adults who were born at the onset of the policy. We focus on risk and time preferences and several behavioral measures: cooperativeness, competitiveness, and bargaining behavior. We sample individuals born before and during the OCP. Having only one child before 1979 could have been a couple's conscious choice, making it impossible to distinguish the effects of being an only child from the effects of different family background characteristics. Since the Chinese government implemented the OCP exogenously, it allows us to compare individuals born before and after the year 1979 and thereby separate the effects of the policy from unknown family effects. One feature of the OCP was that it was strictly enforced only on members of the Han majority who were employed residents in urban areas. Thus, we took a great care when creating our sample frame based on these three criteria to allow a clean test of the effects of the OCP on preferences and behavior. Importantly, the policy was less stringent when it was introduced in 1979, but it became more stringent in terms of enforcement and punishment. The timing of the introduction of the more stringent OCP differed across the country and typically started a couple of years later. We therefore conducted our study in three cities—Guilin, Wuxi, and Lanzhou—which are all in different provinces. These cities differ with respect to size, location, and the timing of when the policy became stricter. We will use the factor of timing to identify the effects of the policy on behavior and preferences.

The rest of the paper is organized as follows: Section 2 presents the family planning policies in China. A description of our experimental design appears in Section 3. Section 4 presents the

[2] They mainly include subjects born before 1979 (1975 and 1978) and after 1979 (1980 and 1983).

descriptive statistics, and the results are given in Section 5. Finally, Section 6 discusses our results and concludes the paper.

2. Family planning policies in China

2.1. The national policies

In the middle of the 1950s, Chinese authorities already had initiated a family planning campaign with the goal of reducing the population size. A second campaign was started in the 1960s, but this was suspended with the Cultural Revolution. A third was launched at the beginning of 1970s, known as the “later, longer, and fewer” campaign, which encouraged people to get married later in life, have fewer children, and have larger age gaps between the children (Peng, 2011). The third campaign resulted in a sharp reduction in fertility rates, from 5.9 children per women in 1970 to 2.7 in 1979 (Hesketh and Zhu, 1997).

In October 1978, the central government explicitly advocated the policy “one is best, two at most” and that the gap between two children should be at least three years. In June 1979, the compulsory family planning campaign was launched at the second meeting of the fifth People’s Congress, and we define this as the first stage of the OCP. The OCP included several types of penalties for having more than one child, but the penalties and when they were implemented varied among provinces and cities. Examples of penalties included different kinds of restrictions to health care and schooling for the second child and monetary punishments for parents in the form of withdrawn bonuses at work or no wage increases. For government employees and Communist Party members, additional political and disciplinary punishments were implemented, such as not being able to advance politically, and government employees could lose their positions. Conversely, families with only one child received economic support.

Although the OCP was specified as a national policy for the whole country, there were variations and flexibility in policy enforcements in response to local sociodemographic and economic conditions (Li et al., 2011; Zhang, 2017). In fact, the OCP was strictly enforced only on members of the Han majority who were employed residents in urban areas. In rural areas, people were allowed to have a second child if the first child was a girl and the age gap between the two children was at least four years. Furthermore, there were even fewer or no restrictions on families from ethnic minorities. The "family planning" was stipulated as the basic national policy at the twelfth meeting of Chinese Communist Party in 1982.

The OCP was one of several major policy reforms in China during the last decades of the 20th century, which also included economic reform in 1978 and educational reform in the late 1990s. The initiation of the OCP coincided with China's economic reform in 1978, which was important for the country's rapid economic development. However, subjects in our sample were at most two years old in 1978, and thus for those born between 1976 and 1986, it is not likely that there are differential impacts of the economic reform across age groups.[3] In 1997, in response to the economic downturn and unemployment due to the Asian financial crisis, China's central government proposed higher education reform through expanding college admissions. This higher education expansion policy was implemented in 1999 (Che and Zhang, 2018), and we discuss this further in Section 5.5.2.[4]

2.2. Implementation of the OCP in the three sampled cities

We conducted our study in three cities: Guilin, in Guangxi province (southern China); Wuxi, in Jiangsu province (eastern China); and Lanzhou, in Gansu province (western China). Figure 1 shows the locations of these cities.

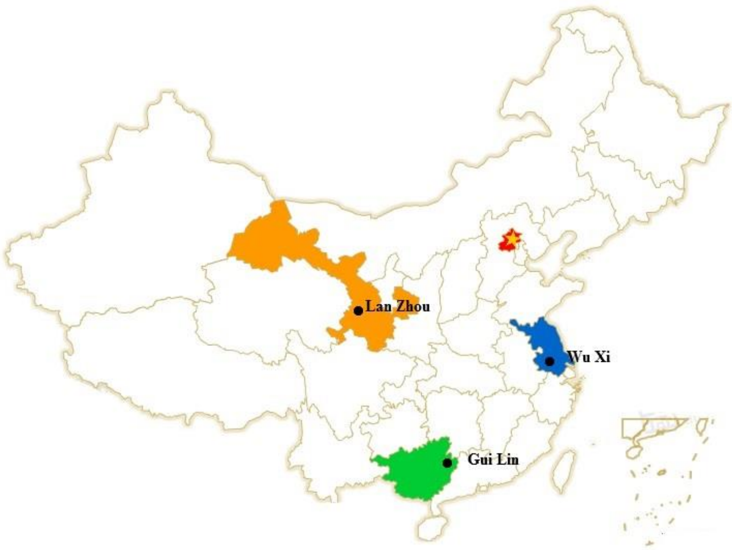

Figure 1. The locations of the three sampled cities

[3] There is, for example, evidence that experience of a recession when growing up affect individual support for government redistribution and political preferences (Giuliano and Spilimbergo, 2014).
[4] Although the central government's education policy had increased the number of college students from 0.4 million to 1.08 million between 1978 and 1998, the expansion in 1999 resulted in an increase of newly admitted students by around 40% (Li et al., 2014; Che and Zhang, 2018).

Table 1 summarizes the basic characteristics of the three cities. All three cities are large, but Wuxi is more developed than the other two, which explains the higher gross domestic product (GDP) per capita. Differences in the mean disposable annual income per capita and in the average annual salary of employees are smaller across the cities.

Table 1. Characteristics of three sampled cities

Variable	Guilin	Wuxi	Lanzhou
City area (km^2)[a]	565	1643	1574
City resident population[b]	1,507,200	3,613,800	2,659,700
GDP per capita (yuan)	34,859	126,389	54,771
Disposable annual income per capita (yuan)	26,811	41,731	23,030
Average annual salary (yuan)	45,194	68,187	51,928

Source: The data come from 2015 statistics yearbooks at both city and provincial levels.
[a] The total area of the city's main districts.
[b] Permanent residents who live in the city's main districts.

Although the three sampled cities implemented the national family planning policy around the same time in 1979, the timing of the implementation of the stricter OCP varied because of the different local administrative processes. Based on information from city family planning policy archives and chorography, we next summarize the implementation of the OCP in each of the three selected cities.

2.2.1. Guilin

On 20 September 1979, the Guilin municipal government issued the 118th document, titled The Provisional Regulations on Family Planning. This document stipulated the basic requirement of "one is best, two at most", with an age gap of at least three years between the first child and the second. The OCP became stricter with the 69th document, issued on 18 May 1981. Titled Supplementary Regulations on Family Planning and Control Population Increase", it clearly specified that each couple could have only one child. For families with more than one child, the salary of the parents would have 10% per month deducted until the second child was 7 years old, and the amount deducted would increase for each additional child. By contrast, couples who had only one child would be rewarded with childcare, medical services, parental leave, and pensions.

2.2.2. Wuxi

On 31 July 1979, the Wuxi government introduced the "one is best, two at most" policy. From 1 May 1980, couples who had three or more children (not including the second birth with twins) had to pay fines. From June 1982, Wuxi followed the provincial policy that government officials, employees, and citizens could have only one child. For families with more than one child, 10% of the parents' salary would be deducted for 7 years for the second child and 20% for 10 years for the third child. In addition, other welfare benefits would be suspended for couples with more than one child including the medical services, salary during parental leave, and possibilities to be promoted.

2.2.3. Lanzhou

On 14 July 1979, Lanzhou followed the provincial family planning policy, "one is best, two at most". Couples who had three or more children had to pay extra child fees. On 20 April 1982, the Lanzhou government issued supplementary announcements about implementing a provincial document titled The Regulations on the Specific Policies of Family Planning. Urban citizens could have only one child. If a family had a second child without being exempted, the mother's salary would be suspended, and both the father's and mother's salaries would be reduced by 10% until the child reached the age of 10. The fines would increase with the number of additional children a family had.

3. Experimental design and procedure

3.1. Experimental design

We conducted five economic experiments. The first two concerned uncertainty (risk and ambiguity) and time preferences, while the three other concerned behavior in a setting with strategic interaction: competitiveness in a tournament experiment, cooperation in a public good experiment, and bargaining in an ultimatum bargaining experiment. All experiments followed standard designs, but since they were implemented in the field, some modifications were made. The five experiments are described in detail in Appendix A. Here we just briefly present them.

In the uncertainty experiments, we elicited preferences for lotteries with probabilities of winning of 10%, 50%, and 90%. We used a choice list where subjects chose between a safe amount and a lottery with a certain probability of winning a fixed amount (e.g., Sutter et al., 2013). For each new row on the choice list, the safe amount was increased. We measure risk attitudes based on the choice when a subject switched from choosing the lottery to choosing the safe amount. The experiment with ambiguity was similar, but the distribution was unknown. For example, with a 10% winning probability, the subjects were told that in a large bag, there were many balls numbered from 1 to 10 but that the distribution of the numbered balls was unknown. They were then asked to bet on one number.

In the time preference experiment, subjects were asked to make repeated choices between a sooner payment that was fixed and a later payment that would increase. We were interested in the switching point from sooner to later payment in four different tasks where the subjects had to make decisions between (i) today and one week, (ii) one week and two weeks, (iii) today and two weeks, and (iv) two weeks and four weeks.

The experiment on competitiveness followed the design of Niederle and Vesterlund (2007). Subjects completed three tasks, but only one would be randomly selected as payoff relevant. Each subject was randomly matched with three other participants to form a group, but they did not know who the other group members were. The group composition was the same during the whole competition experiment, and in each group, two were men and two were women. In the experiment, subjects faced the task of calculating the sum of five randomly chosen two-digit numbers. There were three tasks. Task 1 was piece rate, and subjects were paid 3 yuan per problem solved if the task was randomly selected for payment. Task 2 was a tournament in which subjects had three minutes to solve the same type of math problems. The group member who solved the largest number of problems received 12 yuan per correct solution, while the other participants received no payment. For Task 3, subjects first had to choose the payment schedule, piece rate or tournament, and then again solve the same type of math problems.

The one-shot public good experiment used a strategy design similar to that of Fischbacher et al. (2001). Subjects made two contribution decisions: unconditional and conditional. Each unit invested in the public good generated an income of 0.4 for each of the four group members. In the unconditional decision, subjects decided how many tokens to invest in a public good. In the conditional decision, subjects decided how much to contribute to a public account conditional on a specific average contribution of the other group members.

In the ultimatum bargaining experiment, subjects were randomly matched in pairs as player 1 and player 2. Subjects did not know their roles beforehand, so they had to make decisions as both player 1 and player 2. The experiment worked as follows: Player 1 decided how to allocate an endowment of 40 yuan between the two subjects, and player 2 decided whether to accept or refuse the allocation. If player 2 accepted player 1's allocation, then player 1 and player 2 split the money according to player 1's allocation. If player 2 refused player 1's allocation, then neither player received anything.

3.2. Experimental procedure

We conducted the experiments in Guilin in June 2014, in Wuxi in November 2014, and in Lanzhou in December 2014. To identify and analyze the direct effects of the OCP, we aimed at a sampling frame that included only people who were born in 1976–86 in the sampled city, whose parents had an urban hukou at the time of their birth, and who belonged to the Han majority.[5] When defining the frame, we needed to consider available register data as well as what was practical and logistically feasible. Thus, the selection of subjects was done in several steps. First, we used the community registration system, which contains lists of all households in the city. The list includes people not eligible for our study, and hence we needed to remove them before making a random selection of participants. Since the cities are large (1.5–3.6 million inhabitants), it was not practical to go through all households in the register to create a sampling frame from which we would randomly select subjects. Instead, we drew a random sample from the register and then checked whether households were eligible according to our above three selection criteria. It should be noted that we stratified on gender to ensure gender balance in our study. The community coordinators helped us make an initial assessment based on our selection criteria.[6] After potential subjects were selected by the community coordinators, we contacted them by phone to make sure that they met the criteria for our study.[7] Eligible subjects were invited to participate in our study. Subjects were told that they would receive a show-up fee of 50 yuan and that they could earn more money during the study.[8]

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[5] Hukou refers to the Chinese household registration system. Since the policy was strictly applied to people with a city hukou, we had to make sure both parents had a city hukou.

[6] The community coordinators work with the community, so they are more familiar to the residents. They helped us introduce our survey to the eligible subjects and thus increased their trust in our study

[7] In the phone call, we introduced ourselves as researchers from Beijing University, referred to the contact they had with the community coordinator who had identified them as eligible, and asked three questions to confirm that they met our eligibility criteria.

[8] At the time of the experiment, 10 yuan = 1.6 USD.

When subjects arrived at the place where the study was conducted, we checked their identity to make sure that they had been invited and that the three criteria for participating in the study were fulfilled. If not, the subjects were not allowed to participate. The experimenter then introduced the study and explained key rules, such as that the show-up fee would be paid only if they completed the experiments and the questionnaire. Everything was done in one-on-one interviews, including the experiments that we will now describe.

The study was organized as follows: we first conducted the five experiments, then had subjects answer the questionnaire, and finally paid the subjects. The experiments were always conducted in the same order, since we wanted to reduce the risk of problems with implementation and because there are 120 different ways the five experiments could be ordered. No information about the outcome or any other type of feedback was given between experiments. After the experiments, the subjects answered questionnaires about their socioeconomic characteristics. The experiments and questionnaire took about 1.5 hours. Finally, the subjects were paid the 50 yuan show-up fee, as well as any earnings from the uncertainty and time preference experiments (if the subject had chosen payment today). Payment for the time preference experiment if a subject had chosen payment later was made via transfer to the subject's bank account on the specific date. For the three other experiments, tournament, public good, and ultimatum game, subjects were invited to come back at a specific date for payment, since payments depended on the decisions of others as well. For specific details on how the payoff decision was made in each experiment, see Appendix A.

4. Description of sample

4.1. Descriptive statistics

A total of 856 subjects participated in the experiments. In the postexperiment survey, we discovered that 72 subjects in the city of Guilin were not born as citizens of Guilin.[9] We also noticed that one subject in Guilin and one in Lanzhou had an invalid birth year. We dropped these 74 subjects, since it is essential for the research design to know in which city they were born. This leaves us with 782 subjects: 335 in Guilin, 200 in Wuxi, and 247 in Lanzhou. Table 2 presents descriptive statistics of the whole sample and for the three cities separately.

[9] The 72 subjects were actually born in what was now part of Guilin city, but it was not part of the city at the time when they were born.

Table 2. Descriptive statistics

Variable	Description	Whole sample	Guilin	Wuxi	Lanzhou	H_0: No difference between cities (p-value)
Female	= 1 if female subject	0.49 (0.50)	0.49 (0.50)	0.50 (0.50)	0.50 (0.50)	0.96
Have children	= 1 if subject has at least one child	0.65 (0.48)	0.55 (0.50)	0.81 (0.39)	0.65 (0.48)	<0.01
Number children	No. of children if subject has children	1.04 (0.19)	1.04 (0.20)	1.02 (0.16)	1.04 (0.19)	0.64
Married	= 1 if married	0.78 (0.42)	0.70 (0.46)	0.89 (0.32)	0.76 (0.42)	<0.01
Only child	= 1 if no siblings	0.73 (0.44)	0.71 (0.45)	0.82 (0.39)	0.70 (0.46)	0.01
Number siblings	No. of siblings if subject has siblings	1.25 (0.44)	1.14 (0.41)	1.32 (0.48)	1.34 (0.71)	0.03
Income	Own annual income in 10,000 yuan	4.83 (5.42)	3.77 (4.27)	6.51 (4.40)	4.89 (7.00)	<0.01
Household income	Annual household income in 10,000 yuan	13.0 (10.7)	10.38 (7.99)	18.52 (11.09)	12.05 (11.82)	<0.01
University	= 1 if university education	0.51 (0.38)	0.42 (0.41)	0.58 (0.35)	0.58 (0.36)	0.07
Number of individuals		782	335	200	247	

Note: We use chi-square test for binary variables and Kruskal-Wallis test for continuous data. Standard deviations in parentheses.

Women make up half of the sample, since this was a sampling criterion, and a large proportion are married. Of the 782 subjects, 73% are only children, and among those that have siblings, the average number of siblings is 1.25. Out of the 65% that have children, an overwhelming majority have only one child. The average yearly income is 48,300 yuan, and 51% have a university education.[10] If we compare the statistics across the three cities, we observe some differences. In Wuxi, both individual and household incomes are considerably higher, and a larger proportion of subjects grew up as only children, are now married, and have children. The number of siblings is considerably higher in Lanzhou.

4.2. Distribution of birth years and the implementation of the OCP

Table 3 reports the distribution of subjects across birth years for the whole sample and for each of the three cities separately.

[10] Using Chinese sixth census data for 2010, we calculate the share of people with a university education for the total population in the main districts we surveyed, and the share is 20% in Guilin, 28% in Wuxi, and 16% in Lanzhou. The census data include people who are 6 years and older, as well as elderly people who were not affected by the significant university expansion in 1999, whereas our sample includes people born between 1976 and 1986. Given the expansion in university education from 1999 in China, the shares we observe in our sample are not in any way extreme.

Table 3. Distribution of subjects across birth years

Birth year	Whole sample	Guilin	Wuxi	Lanzhou
1976	9.6%	8.4%	13.0%	8.5%
1977	9.3%	9.3%	10.5%	8.5%
1978	11.0%	11.3%	10.5%	10.9%
1979	7.4%	9.0%	6.5%	6.1%
1980	5.9%	6.0%	7.0%	4.9%
1981	8.1%	7.2%	8.5%	8.9%
1982	10.4%	10.5%	9.0%	11.3%
1983	10.5%	9.9%	9.5%	12.2%
1984	10.1%	9.9%	9.0%	11.3%
1985	8.1%	8.4%	8.0%	7.7%
1986	9.7%	10.5%	8.5%	9.7%
Number of individuals	782	335	200	247

As described in Section 2, before the introduction of the OCP in 1979, several family planning campaigns had been launched that aimed to reduce the number of children. According to Zhang (2017), the decrease in fertility was significantly smaller after the introduction of the OCP than during the early 1970s: the total fertility rate declined from 5.8 in 1970 to 2.7 in 1978, and the corresponding decline from 1978 to 1995 was from 2.8 to 1.8 children per woman. At the time the policy was introduced, fertility rates were dropping in urban areas in all three provinces we study, and the drop in fertility rates was even larger in our three study provinces than in Beijing (per our own calculations based on Coale and Li, 1987).

Note that in the early days of the OCP, instead of forbidding couples to have more than one child, it was strongly *recommended* that they have only one child. Therefore, we define the start of the "one is best, two at most" recommendation as the first stage of the OCP in this study. People born in July to September 1979 and onward, but before the policy became stricter, are classified as belonging to the first stage of the OCP. Clearly, we could think of other cutoff dates, and we investigate other cutoffs in a sensitivity analysis (Tables C1–C4 in Appendix C). We define the second stage, with a stricter implementation of the OCP, as when a financial penalty in terms of a salary cut was imposed on couples with more than one child. The policy was made stricter at varying times in the three cities: In Guilin, subjects born from May 1981 and onward are defined as born under a stricter OCP. In Wuxi and Lanzhou, the corresponding cutoffs are June 1982 and April 1982, respectively. The resulting distribution of subjects and the cutoff dates for the first and second stages of the OCP are presented in Table 4.

Table 4. Distribution of subjects based on implementation of the OCP in the three locations

	Whole sample	**Guilin**	**Wuxi**	**Lanzhou**
Before OCP	34.1%	34.0%	37.0%	32.0%
First stage OCP	16.5%	11.3%	23.0%	18.2%
Second stage OCP	49.4%	54.6%	40.0%	49.8%
Cutoff dates				
First stage OCP		20 Sept. 1979	31 July 1979	14 July 1979
Second stage OCP		18 May 1981	1 June 1982	20 April 1982

Table 5 presents descriptive statistics for the subjects, separated by the different stages of the OCP. The differences among the three groups are as expected. A larger share of those born before the OCP have siblings. Furthermore, more of them also have children themselves and are married, which is as expected, since these subjects are older.

Table 5. Descriptive statistics for subjects born before the OCP, during the first stage, and during the second stage

	Before OCP	First stage OCP	Second stage OCP	H_0: No difference between the different stages of the OCP
Female	0.51	0.55	0.46	0.16
	(0.51)	(0.50)	(0.50)	
Have children	0.84	0.73	0.49	<0.01
	(0.36)	(0.45)	(0.50)	
Number of children	1.04	1.03	1.03	0.61
	(0.21)	(0.18)	(0.16)	
Married	0.91	0.82	0.66	<0.01
	(0.29)	(0.40)	(0.48)	
Only child	0.47	0.81	0.89	<0.01
	(0.50)	(0.39)	(0.31)	
Number of siblings (if any)	1.31	1.17	1.07	0.01
	(0.60)	(0.48)	(0.34)	
Income	4.88	5.20	4.66	0.24
	(5.57)	(4.22)	(5.67)	
Household income	12.49	14.05	12.98	0.08
	(10.50)	(9.90)	(11.02)	
University	0.38	0.54	0.60	<0.01
	(0.49)	(0.50)	(0.49)	
Number of individuals	267	129	386	

Note: We use chi-square test for binary variables and Kruskal-Wallis test for continuous data. Standard deviations in parentheses.

To establish that the OCP and the increased strictness of the policy did affect the household composition, we estimate models explaining the likelihood of being an only child (binary probit) and the number of siblings (ordinary least squares), respectively. As independent variables, we include two indicator variables for the two stages of the OCP and controls for age, location fixed effects, and gender. Note that the two indicator variables for the policies are not perfectly correlated with age, since we are using the variation in implementation dates among the three cities. Results of the binary probit model and the OLS model are presented in Table 6.

Table 6. Regression models, the OCP and the likelihood of being an only child and the number of siblings, marginal effects for probit model

	Only child (probit)	No. of siblings (OLS)
First stage OCP	0.171***	-0.338***
	(0.039)	(0.076)
Second stage OCP	0.231***	-0.292***
	(0.087)	(0.112)
Age	Yes	Yes
Location	Yes	Yes
Gender	Yes	Yes
Number of individuals	782	782

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

The results show that the likelihood of being an only child is considerably higher for the subjects born during the first or second stage of the OCP. Similarly, the number of siblings is significantly lower for those born during the OCP than for those born before the policy. There are no differences between the two stages for being only child or number of siblings.

5. Results

We first investigate the effects of the two stages of the OCP on uncertainty and time preferences, as well as on behavior related to cooperation, competition, and bargaining. Then we explore whether the effects of the OCP depend on gender, differences among the cities, or other observable socioeconomic characteristics. Finally, we investigate whether our findings are robust to alternative cutoff times for the stages of the OCP, considering only firstborns, and the major university reform in 1999.

5.1. Risk and ambiguity preferences

Results from risk (with known probabilities) and ambiguity (with unknown probabilities) are shown in the upper panel of Table 7. To make attitudes comparable for different probabilities, we calculate the ratio between the certainty equivalent at the switching point and the expected value for each of the six lotteries, resulting in a standardized ratio. A ratio between the certainty equivalent and the expected value greater than one indicates that the subject is risk loving, while a ratio smaller than one indicates that the subject is risk averse. We report the results separately for before the OCP and the first and second stages of the OCP.

Table 7. Ratio between certainty equivalence and expected value in risk and ambiguity experiments

	Risk experiment			Ambiguity experiment		
	10%	50%	90%	10%	50%	90%
Before OCP	2.41	0.90	0.78	1.90	0.65	0.64
	(1.70)	(0.30)	(0.16)	(1.60)	(0.34)	(0.22)
First stage OCP	2.78	0.99	0.81	2.23	0.75	0.68
	(2.01)	(0.33)	(0.13)	(1.83)	(0.34)	(0.21)
Second stage OCP	2.49	0.98	0.80	2.29	0.73	0.66
	(1.82)	(0.34)	(0.13)	(1.96)	(0.37)	(0.21)
Number of observations	2346	2346	2346	2346	2346	2346
Number of individuals	782	782	782	782	782	782
H_0: No difference between OCP stages			P-values			
Before vs First	0.094	0.007	0.027	0.039	0.008	0.196
Before vs Second	0.606	0.005	0.145	0.017	0.018	0.264
First vs Second	0.149	0.601	0.222	0.820	0.350	0.610

Note: Standard deviations in parentheses.

Results show that subjects are risk loving for small probabilities and risk averse for large winning probabilities, while slightly risk averse when the probability of winning is 50%. If we compare ratios between the risk and ambiguity experiments, we find higher tolerance for risky outcomes than for ambiguous outcomes for a given probability—that is, subjects are on average ambiguity averse. These results are in line with previous findings (e.g., Kahneman and Tversky, 1979; l'Haridon et al., 2018).

In the lower panel of Table 7, we show the pairwise statistical tests (Kruskal-Wallis) between the ratios for different OCP stages. We find small differences in risk and ambiguity attitudes among the different stages. Overall, individuals who were born before the introduction of the OCP are less risk and ambiguity seeking than those born after the introduction of the OCP. In terms of economic significance, however, the differences are small.

We use the Benjamini and Hochberg (1995) correction to consider the fact that we make multiple comparisons, which Benjamini and Yekuteli (2001) recommend for most empirical settings.[11] We first order the observed p-values from the smallest to the largest. Then we sequentially test whether the following condition holds: $p_{(i)} \leq \frac{i}{m}\,\alpha$, where $p_{(i)}$ is the actual p-value to be tested, i is the order of that specific p-value (i.e., i for the smallest p-value is 1), m

[11] A stricter method is the Bonferroni correction (Dunn, 1961). For example, testing 18 comparisons, as in Table 7, would mean that for a difference to be statistically significant at the 10% level, *each* of the observed p-values must be lower than 0.0056 after the correction. However, Duflo et al. (2008) argue that Bonferroni corrections may not be that suitable for economic field experiments, since the control of Type I errors (false positives) comes at the cost of high Type II errors (less power). We therefore use the Benjamini-Hochberg correction instead.

is the total number of comparisons made, and α is the chosen significance level. In total, we make 18 comparisons, 9 for each experiment. After the Benjamini and Hochberg correction, 6 out of the 18 possible comparisons remain statistically significant at the 10% level.[12]

In Table 8, we present results from regression models controlling for location fixed effects and the age of the subjects. The regression results support the descriptive results that subjects are on average risk or ambiguity loving for low probabilities and averse for medium and high probabilities. Furthermore, the results of the statistical tests in the lower panel of Table 8 show that after the introduction of the controls, there are now only three statistically significant differences among the different stages of the OCP with respect to risk and ambiguity preferences at the 10% level. In summary, we find some evidence that those born during the first and second stages of the OCP are different from those born before the OCP. However, the fact that the policy became stricter later on (the second stage of the OCP) does not result in an additional change in risk preferences compared with the first stage of the OCP.

[12] All p-values less than 0.039 are considered as statistically significant after the correction.

Table 8. Regression model of risk and ambiguity preferences

	Risk	Ambiguity
Probability 10%	2.39***	1.85***
	(0.11)	(0.11)
Probability 50%	0.88***	0.61***
	(0.05)	(0.06)
Probability 90%	0.76***	0.60***
	(0.05)	(0.06)
Probability 10% × First stage OCP	0.38*	0.35*
	(0.21)	(0.20)
Probability 50% × First stage OCP	0.10	0.11
	(0.07)	(0.07)
Probability 90% × First stage OCP	0.03	0.05
	(0.06)	(0.07)
Probability 10% × Second stage OCP	0.13	0.49**
	(0.20)	(0.20)
Probability 50% × Second stage OCP	0.12	0.16
	(0.13)	(0.14)
Probability 90% × Second stage OCP	0.06	0.11
	(0.13)	(0.14)
Age	Yes	Yes
Location fixed effects	Yes	Yes
Number of observations	2346	2346
Number of individuals	782	782
H_0: No difference between OCP stages	P-values	
Probability 10%		
Before vs First	0.07	0.08
Before vs Second	0.51	0.02
First vs Second	0.25	0.51
Probability 50%		
Before vs First	0.13	0.13
Before vs Second	0.36	0.26
First vs Second	0.78	0.53
Probability 90%		
Before vs First	0.58	0.48
Before vs Second	0.63	0.43
First vs Second	0.69	0.44

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

5.2. Time preferences

The design of the time preference experiment allows us to estimate the beta-delta model by Laibson (1997). This is an exponential discounting model (δ) with a preference for immediately receiving a good or money (present bias), where any future event is given a lower value (β). We estimate the following regression model, based on Burks et al. (2012), which assumes an additive error term:

$$\ln(x) - \ln(y) = \ln(\beta)\, t_0 + \ln(\delta)\, (t_{later} - t_{sooner}) + \varepsilon,$$

where x is the sooner amount of payment, y is the later amount of payment, t_0 is a dummy variable equal to one if the sooner payment is today, β is the present bias parameter, δ is the discount parameter, and ε is the error term. In Table 9, we report the regression results.

Table 9. Regression model of time preferences

	Coefficient	
$\log(\beta)$	0.001	
	(0.004)	
$\log(\delta)$	-0.009***	
	(0.0005)	
$\log(\beta) \times$ First stage OCP	-0.005	
	(0.005)	
$\log(\delta) \times$ First stage OCP	0.0003	
	(0.001)	
$\log(\beta) \times$ Second stage OCP	-0.007	
	(0.007)	
$\log(\delta) \times$ Second stage OCP	0.002	
	(0.001)	
Age	Yes	
Location fixed effects	Yes	
Number of observations	3128	
Number of individuals	782	
H_0: β=1; H_0: δ=0	β^a	δ^a
Before OCP	0.998	0.976***
	(0.010)	(0.001)
First stage OCP	0.986**	0.977***
	(0.007)	(0.001)
Second stage OCP	0.982**	0.980***
	(0.008)	(0.001)
H_0: No difference between OCP stages	P-values	
Before vs First	0.257	0.595
Before vs Second	0.331	0.132
First vs Second	0.745	0.088

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.
[a] Test if different from one.

There is support for the presence of present bias, since the β-parameter is statistically significantly different from one for the later stages of the OCP. However, there are no statistically significant differences between the of the OCP. At the same time, there is a statistically significant discount effect of future payments (δ), since for all stages the discount factor is statistically significantly different from one. There is a statistically significant difference at the 10% level in impatience (δ) between subjects born during the first and second stages of the OCP. The differences are, however, small.

5.3. Cooperation, competition, and bargaining

In Table 10, we report average values from three behavioral experiments—public good (PG), competition, and ultimatum game—separated by the different stages of the OCP.

Table 10. Descriptive statistics of main variables in the three behavioral experiments

	PG	Competition		Ultimatum	
	Contribution (tokens)	Performance increase	Choose tournament	Offer	Min. acceptable offer
Before OCP	8.06	0.64	0.28	19.8	14.9
	(4.39)	(2.38)	(0.45)	(2.06)	(5.63)
First stage OCP	8.22	0.53	0.36	19.6	15.2
	(4.19)	(2.32)	(0.48)	(2.14)	(6.05)
Second stage OCP	8.10	0.66	0.32	19.5	15.4
	(4.86)	(2.13)	(0.47)	(2.14)	(5.61)
Number of individuals	782	782	782	782	782
H_0: No difference between OCP stages			P-values		
Before vs First	0.415	0.661	0.108	0.934	0.238
Before vs Second	0.712	0.931	0.353	0.059	0.107
First vs Second	0.269	0.610	0.339	0.154	0.943

Note: Standard deviations in parentheses.

The average unconditional contribution to the public good is about the same across the three OCP stages, and Mann-Whitney tests show that there are no statistically significant differences across the three groups. The maximum contribution was 20 tokens, meaning that the average contribution share is around 40%, which is within the range of what is typically found in this type of experiment (see, e.g., Chaudhuri, 2011; Fischbacher et al., 2001; Kocher et al., 2008: Martinsson et al., 2015). By using the responses to the conditional contribution table, subjects can be classified into contributor types such as free riders and conditional cooperators (Fischbacher and Gächter, 2010). Using a chi-square test, we investigate whether the distribution of contributor types is the same in all three stages, and we cannot reject this hypothesis (p-value = 0.894).

For the experiment on competitiveness, we focus on two measures. First, we look at the change in performance going from Task 1, piece rate, to Task 2, tournament. This is a measure of competitiveness at the intensive margin. Second, we look at the share of subjects choosing tournament when faced with a choice between piece rate and tournament. There is no clear pattern of differences in performance improvement among the three different stages of the OCP, and there are no statistically significant differences. The share of subjects choosing tournament is around 30%, and it is somewhat higher for those born after the OCP, but using proportion tests, there are no statistically significant differences among the three different stages. The share of subjects choosing tournament is considerably lower than what most other studies have found, including the original study by Niederle and Vesterlund (2007) (see also overview in Niederle, 2016).

In the ultimatum bargaining game, subjects played both roles, and we thus report both the amount offered and the minimum acceptable offer for all subjects. The amount offered is slightly below 50% of the endowment, and the average offer is about the same across the three groups. An offer of 50% is in line with previous experiments (see, e.g., Eckel and Grossman, 2001; Thaler, 1988). The averages across the three stages are similar. Using a Mann-Whitney test, we find one statistically significant difference at the 10% level in the amount offered, which is between those born before the OCP and during the second stage of the OCP. The minimum acceptable offer is around 38% of the endowment, which is also largely in line with previous findings (Güth and Kocher, 2014). The minimum acceptable offer is again similar in all three stages of the OCP, and there are no statistically significant differences among the three stages using a Mann-Whitney test.

The next step is to investigate differences in behavior across the three stages while controlling for the location and the age of the subject using a regression approach. The likelihood of choosing the tournament in the competition experiment is analyzed with a binary probit model, while all the other models are analyzed by using an OLS regression.[13] Table 11 shows that once we control for age and location fixed effects, there are no statistically significant differences in the public good, competition, or ultimatum game across the three different stages. To sum up, regarding the behavioral experiments, there is no evidence of a difference in behavior between subjects born before and during the OCP.

Table 11. Regression models of behavioral experiments

	PG	Competition		Ultimatum	
	Contribution	Performance increase	Choose tournament	Offer	Min. acceptable offer
First stage OCP	-0.353	0.006	0.069	0.121	0.364
	(0.635)	(0.311)	(0.067)	(0.291)	(0.782)
Second stage OCP	-0.945	0.265	0.001	0.306	0.996
	(0.932)	(0.456)	(0.094)	(0.427)	(1.149)
Age	Yes	Yes	Yes	Yes	Yes
Location dummies	Yes	Yes	Yes	Yes	Yes
Number of individuals	782	782	782	782	782

Note: Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

[13] Results remain the same if we estimate a two-limit Tobit model.

5.4. Heterogeneous effects

It is possible that the OCP affects different subgroups of our sample differently. The most obvious candidate is probably gender differences in preferences and behavior. Traditionally, women have been discriminated against in China (Hannum, 2005). A possible consequence of the OCP, with an increased and substantial sex-ratio difference after the introduction of the OCP, is that it might affect preferences and behavior among men and women differently. We also know from previous experiments that there might be differences in behavior between men and women; for example, some studies find that women are more risk averse than men (Croson and Gneezy, 2009), although this is far from a general finding (Filippin and Crosetto, 2016). We therefore conduct the same analyses as in Section 5.1 and 5.2, but separately for men and women. Results are reported in Tables B1–B3 in Appendix B. These analyses do not reveal any important differences between genders when it comes to preferences and behavior. Overall, there are only a small number of statistically significant differences across the stages of the OCP when we conduct the analyses separately for men and women.

The three cities differ in many dimensions, including the specific rules of the OCP. We therefore estimate separate models for each city. Results are reported in Tables B4–B6 in Appendix B. Overall, we find only a few differences among subjects born in the different cities. In the behavioral experiments, we find one clear result: In Wuxi, those born after the OCP offered more in the ultimatum game than those born before the OCP.

Finally, we also estimate all models in the main analysis but include the following variables: gender, whether they have children, whether they are married, household income, whether they have a university education, and whether any of their parents have a university education. Results are reported in Tables B7–B9 in Appendix B. We find that subjects with a university degree are more risk and ambiguity averse, are more impatient, and contribute less to the public good. There are no statistically significant differences in preferences due to parents' education or household income, with one exception: Those with higher incomes are more likely to choose tournament in the competition experiment. For risk and ambiguity preferences, there are also some differences between subjects born before and after the OCP when controlling for the additional set of socioeconomic variables. Subjects born before the OCP are now less risk loving and ambiguity seeking at a probability of 50% of winning, both for risky and ambiguous prospects.

5.5. Robustness checks

5.5.1. Using alternative cutoff dates and considering only firstborns

Since a pregnancy takes nine months, firstborns born close to any of the dates when the local authorities implemented the OCP are more likely to be only children. The gap between the date of birth and implementation of the two stages of the OCP is simply too tight for these children to have siblings. As a robustness check, we change the cutoff dates to be one year earlier than the dates used in the main analysis. In Table 12, we show the distribution of the subjects according to our main and alternative cutoff dates.

Table 12. Distribution of subjects based on implementation of the OCP with both cutoff dates in the three locations

	Guilin		**Wuxi**		**Lanzhou**	
Cutoff definitions	**Main**	**Alt.**	**Main**	**Alt.**	**Main**	**Alt.**
Cutoff between before OCP and second stage OCP	20 Sept. 1979	20 Sept. 1978	31 July 1979	31 July 1978	14 July 1979	14 July 1978
Cutoff between first and second stages OCP	18 May 1980	18 May 1979	1 June 1982	1 June 1981	20 April 1982	20 April 1981
Before OCP	34.0%	24.8%	37.0%	29.5%	32.0%	22.3%
First stage OCP	11.3%	15.5%	23.0%	21.0%	18.2%	17.8%
Second stage OCP	54.6%	59.7%	40.0%	49.5%	49.8%	59.9%

We reestimate the main models, and the results are shown in Tables C1–C4 in Appendix C. With the new classification, the likelihood of being an only child is 19 percentage points higher if a child was born during the first stage of the OCP policy, and it is almost as high as 30 percentage points if he or she was born during the second stage of the policy (Table C1). Overall, there are no significant differences compared with the main analysis, with a few exceptions: The effects of being born before the OCP on being less risk and ambiguity seeking are less prominent, and the results are now insignificant in most cases (Table C2). Subjects born after the second stage of the OCP are more patient and more likely to choose tournament than those born before OCP.

We also investigate the effects of the policy by considering only firstborns; firstborns before the policy would have been the only children if born after the OCP was implemented. The results are presented in Tables D1–D3 in Appendix D. Results are very similar to the ones in the main analysis.[14]

5.5.2. Investigating the effects of the 1999 university reform

Finally, we investigate the effects of the large university reform in 1999. People in China typically enroll into a university at 18 years old (Che and Zhang, 2018). Hence, subjects born after 1980 have benefitted from this reform. We conduct three analyses to investigate potential effects of this education reform on preferences and behavior. First, we use an indicator to identify post university-reform time in the regressions (Tables E1–E3 in Appendix E). The dummy variable for the university reform is sometimes statistically significant, but there are no sizeable differences compared with the main analysis. Second, we control for university education and estimate separate models for those with and without a university education (Tables E4–E6 in Appendix E). Third, using subjects born before the education reform, we estimate a model predicting the likelihood of getting a university education. This model is then used to predict university education for the sample born after the education reform. We then perform the same analyses as in the main section based on these two subsamples instead (Tables E7–E9 in Appendix E).

Overall, there are no large differences compared with the main analysis. The main difference is that we find a statistically significant difference only in risk and ambiguity preferences between those born before and during the OCP for those with a university education (see Tables E4 and E7 in Appendix E). Thus, the university reform might have had an impact on the distribution of risk and ambiguity preferences among the sample, but not on behavior in the domains we have investigated.

6. Discussion

The best-known family policy of all times, China's one-child policy (OCP), was implemented in 1979. The OCP led to an increased number of one-child families and an increased gender imbalance. An important question is whether the policy had an effect on people's preferences and behavior. Popular wisdom seems to be that it is in many ways negative, especially for different kinds of social skills, to be an only child. On the other hand, the overall conclusion from the literature indicates that the effects of being an only child on preferences and behavior

[14] The statistically significant difference in patience between the first and second stages of the OCP in Table 9 is insignificant in Table D2.

are not all evident. Moreover, there is a lack of studies investigating the effects of the OCP on preferences and behavior among adults. We have therefore conducted a lab-in-the-field experiment where we sampled subjects born before and after the implementation of the policy. We also used the fact that the OCP was introduced in two stages. The first stage was introduced in 1979; the second and stricter stage was introduced at different times in different Chinese cities after some years. Using economic experiments, we tested possible effects of the OCP on two broad groups of behavior, including individual decisions related to risk, ambiguity, and time preferences and interaction behavior focusing on cooperativeness, competitiveness, and bargaining decision.

We find very little support for effects of the policy on preferences. We find some small differences when it comes to risk and ambiguity preferences, but basically there is no evidence of effects on time preferences and behavior in three experiments. Moreover, our robustness analyses suggest that part of the effect on uncertainty preferences is probably due to the university reform and not the OCP. Even when including cities with different timings of the introduction of the stricter policy, we are not able to identify effects of the OCP on preferences and behavior.

Previous empirical studies on the effects of the OCP on preferences and behavior and the differences between only children and children with siblings do not show any consistent pattern. It is still interesting to contrast our results with those of Cameron et al. (2013), a study that also includes a set of economic experiments and uses a sample of subjects born before and after the policy was introduced in 1979. Since both their study and ours include risk and competition experiments, we can make a direct comparison for these experiments. They find that subjects born after 1979 were significantly more risk averse than those born before, whereas we find some evidence for the opposite. We find no significant differences in tournament entry decisions among the OCP stages, whereas they find a weakly significant difference in the likelihood to participate in a tournament between subjects born before and after the introduction of the OCP. Thus, as opposed to Cameron et al. (2013), we do not find any convincing evidence that the OCP has affected behavior or created “little emperors”. Alternatively, it might be the case that the “little emperor syndrome” does exist, but among most children being brought up in the urban areas of China. There is a large difference between rural and urban China, and previous research shows, for example, that making social identity in terms of the hukou identity salient decreased the performance of rural migrant students relative to their urban counterparts (Afridi et al., 2015).

Another possible explanation for the different conclusions between our study and that of Cameron et al. (2013) is that their subjects were living in Beijing, whereas ours were from three cities in three different provinces. Although Beijing is the capital and the largest city in China, with more than 21 million citizens, our cities are not small: Guilin and Wuxi both have over 4.7 million residents, and Lanzhou has 3.6 million. Cameron et al. (2013) speculate that the differences they find apply to cities other than Beijing, but we find little support for this conjecture. It seems more likely that Beijing is an exception. It is one of the four municipalities that are directly under the central government and is more developed than other cities in China. Moreover, Beijing already had a lower fertility rate than the other provinces before the OCP (Coale and Li, 1987). This suggests that, if anything, the policy should have had an effect in the provinces we studied but not in Beijing. In summary, we do not find any significant impact of the OCP among adults on uncertainty and time preferences or on different kinds of behavior. These results hold for heterogeneity in the timing of the implementation of the OCP in different provinces, for heterogeneity among individuals, and for various robustness checks.

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Appendix A. Description of experiments

Uncertainty preferences

In the uncertainty experiments, subjects made repeated choices between a fixed amount of money and a lottery, building on the design of Sutter et al. (2013). The uncertainty experiments included a risk and an ambiguity experiment, both of which had three tasks, and each task included 80 choices. Only one task, and only one choice of that specific task, was randomly selected to be played to determine how much money a subject would earn. We used a choice list where the subject chose repeatedly between a safe amount and a lottery with a certain probability of winning a fixed amount (e.g., Sutter et al., 2013).

In the risk experiment, subjects chose between a lottery with a chance to win 80 yuan and a safe amount of money increasing from 1 yuan to 80 yuan. The probability of winning was 50% in Task 1, 10% in Task 2, and 90% in Task 3. For each probability, subjects made repeated decisions between the lottery and the safe amount, with the safe amount increased by 1 yuan in each step. To make it a bit easier, subjects were instructed to draw a line between the rows where they started to prefer the safe amount.

The payout from the risk experiment was determined as follows (if the risk experiment had been randomly chosen to be payout relevant): If the subject chose the safe amount of money, the corresponding amount was paid. If the subject chose the lottery, the experimenter filled a red bag with 10 balls numbered from 1 to 10. Before drawing a ball, the subject told the experimenter five numbers between 1 and 10 in the case of a 50% probability of winning (one number if 10% and nine numbers if 90%), and then the subject drew a ball from the red bag. If the subject drew a ball with any of the chosen numbers, she received 80 yuan; otherwise, she did not receive anything.

The ambiguity experiment was similar to the risk experiment in that it also included three tasks with 80 choices in each task, but there was one important difference: The composition of 10 balls in a black bag was unknown. Subjects knew that a number between 1 and 10 was written on each ball, but not how many of each number were in the bag. The subjects needed to decide whether to draw a ball from the black bag with the chance of winning 80 yuan or to receive a safe amount of money increasing from 1 yuan to 80 yuan. Again, to make it easier, subjects were instructed to draw a line between the rows where they started to prefer the safe amount.

As in the risk experiment, the three tasks had different winning probabilities of 10%, 50%, and 90%.

Time preferences

In the time preference experiments, Subjects were asked to make repeated choices between a sooner payment that was fixed and a later payment that would increase. The experiment included four tasks, and each task had 20 choices. Only one task, and only one choice of that specific task, was randomly selected to be played to determine how much money subjects would earn. The four tasks meant making decisions between (i) today and one week, (ii) one week and two weeks, (iii) today and two weeks, and (iv) two weeks and four weeks. In all the tasks, the sooner payment was 40 yuan, and the later payment increased from 41 yuan to 60 yuan. As in the risk and ambiguity experiments, subjects were instructed to draw a line between the rows where they started to prefer a later payment. The payment date differed depending on the decisive choice: If the subjects chose payment today, they were paid via bank transfer within two hours after the experiment. If they chose a later payment, subjects were also paid via bank transfer, but on the specific date they had chosen (one week, two weeks, or four weeks). Whether they had chosen a sooner or later payment, the subjects each received a slip of paper with the amount earned and the payment date, which was signed by the project leader.

Competition experiment

The competition experiment followed the design of Niederle and Vesterlund (2007), with three tasks, only one of which would be randomly selected as payoff relevant. Each subject was randomly matched with three other participants to form a group, but they did not know who the other members were. The group composition was the same during the whole competition experiment, and in each group, two were men and two were women. Subjects faced the task of calculating the sum of five randomly chosen two-digit numbers. Subjects were not allowed to use a calculator, but they could write the numbers down and make use of pens and scratch paper that we provided. So that subjects could familiarize themselves with the task, they first had a one-minute trial round. After that, the formal tasks started.

For Task 1, which had a piece rate payment, subjects were asked to calculate the sum of five randomly chosen two-digit numbers and write their answers on an answer sheet. The time for this task was three minutes. The payment was 3 yuan per problem solved if the task was randomly selected for payment. Task 2 was a tournament in which subjects had three minutes to solve the same type of math problems. Now the payment depended on the subject's performance relative to that of other group members. The group member who solved the largest number of problems correctly received 12 yuan per problem solved, while the other participants received no payment. In case of a tie, the ranking between the members with equal performance was determined randomly. For Task 3, subjects first had to choose the payment schedule, piece rate or tournament, and then again solve the same type of math problems. If a subject chose the piece rate, payment was again 3 yuan per problem solved. If a subject chose tournament, her performance was evaluated relative to the performance of the other three group members in Task 2. If the subject solved more problems correctly than the other three group members, payment was 12 yuan per problem solved. Finally, subjects guessed their rank relative to other group members in Tasks 1 and 2. For each correct guess, they earned 3 yuan.

We needed to ensure that there were two men and two women in each group. Therefore, male and female subjects each drew a decision sheet from two separate boxes where each sheet had a letter from A to Z.[15] Two men and two women who had the same letter were placed in the same group. At the end of the experiment, each subject drew from a lottery with balls numbered 1 to 3 to decide which task would be used as the decisive task for payment.

Public good experiment

In the public good experiment, we use a design similar to that of Fischbacher et al. (2001), in which subjects made two contribution tasks. Each subject was endowed with 20 tokens, each token equivalent to 2 yuan. Subjects were in groups consisting of four members. They were asked to allocate the 20 tokens between a private account and a public account. The money in the private account was the subject's own money. The money in the public account would be shared by all the group members. For each group member, the income from the public account was equal to the total amount of money put into the public account by all group members multiplied by 0.4. By choosing a marginal per capita return from the public good below one, we created the incentive to free ride, but since the return from the public good would exceed one if all four group members contributed, it was socially optimal for all subjects to contribute. Each subject's total income was equal to the income from his private account plus his share of income from the public account. Before the decisions were made, we included three control questions to ensure that subjects understood how to calculate the total income. Only when

[15] After the 26 letters, we combined two different letters (AA, AB, AC, etc.).

subjects had answered all the control questions correctly were they allowed to continue with the formal decisions.

In Task 1, subjects decided how many of their tokens they wanted to put into the public account and into the private account. In Task 2, subjects decided how much to contribute to the public account conditional on a specific average contribution of the other group members. There were 21 possible average contributions that ranged from 0 to 20 tokens. Since subjects did not know beforehand the average contribution of the three other group members, they had to state their contribution for each of these potential average contributions by the other three group members. To make all choice incentives compatible, three group members were randomly selected for whom Task 1 was payout relevant. For the fourth subject, the average contributions of the other three members were used in the contribution table in Task 2 to determine the allocation to public good. Subjects did not know with whom they were matched or which of the tasks would be payout relevant at the time of making their allocation decisions. In practice, we determined the payoff from the game by having each subject draw a ticket from a box. Each ticket had a letter from A to Z,[16]along with the number 1 or 2. The letter determined which group the subject would belong to, and the number indicated which decision would be used for payment. Then groups were formed as described above and payment was calculated accordingly.

Ultimatum bargaining experiment

Subjects were randomly matched in pairs for the ultimatum bargaining experiment, and again they did not have any information about each other. This experiment included two roles, player 1 and player 2. Subjects did not know their role beforehand, so they had to make decisions as both player 1 and player 2. After the experiment, the role of each subject was determined by rolling a two-sided die. The experiment worked as follows: Player 1 decided how to allocate an endowment of 40 yuan between the two subjects, and player 2 decided whether to accept or refuse the allocation. If player 2 accepted player 1's allocation, then player 1 and player 2 split the money according to player 1's allocation. If player 2 refused player 1's allocation, then neither player received anything. The experiment consisted of four tasks: (i) In the role of player 1, the subject decided how to allocate the 40 yuan. (ii) In the role of player 2, the subject decided what would be the minimum amount she would accept. (iii) The subject guessed the average amount that all the other subjects allocated to player 2. (iv) The subject guessed the average

[16] Again, after the 26 letters, we combined two different letters (AA, AB, AC, etc.).

minimum amount of all other subjects when responding as player 2. The payoff from the experiment was determined in a stepwise manner. First, each subject drew a ticket, which was labeled either 1 or 2, to determine whether the subject would be paid as player 1 or player 2. Then the subjects were matched in pairs. For each pair, the experimenter compared the decisions of player 1 and player 2. If player 1's allocation was accepted by player 2, then both of them got the money according to player 1's decision. Otherwise, both of them did not get anything.

Appendix B. Heterogeneous effects of the policy

Table B1. Regression model of risk and ambiguity preferences by gender

	Risk		Ambiguity	
	Men	Women	Men	Women
Probability 10%	2.33***	2.45***	1.86***	1.85***
	(0.17)	(0.15)	(0.16)	(0.15)
Probability 50%	0.85***	0.91***	0.60***	0.63***
	(0.08)	(0.06)	(0.09)	(0.07)
Probability 90%	0.73***	0.80***	0.61***	0.60***
	(0.08)	(0.06)	(0.09)	(0.06)
Probability 10% × First stage OCP	0.40	0.36	0.25	0.44*
	(0.34)	(0.26)	(0.31)	(0.25)
Probability 50% × First stage OCP	0.07	0.14	0.09	0.13
	(0.09)	(0.10)	(0.10)	(0.10)
Probability 90% × First stage OCP	0.0001	0.07	0.02	0.08
	(0.08)	(0.09)	(0.10)	(0.09)
Probability 10% × Second stage OCP	0.20	0.06	0.58**	0.37
	(0.28)	(0.27)	(0.29)	(0.25)
Probability 50% × Second stage OCP	0.11	0.14	0.13	0.21
	(0.18)	(0.19)	(0.21)	(0.19)
Probability 90% × Second stage OCP	0.02	0.12	0.04	0.19
	(0.18)	(0.19)	(0.20)	(0.19)
Age	Yes	Yes	Yes	Yes
Location	Yes	Yes	Yes	Yes
Number of observations	1,188	1,158	1,188	1,158
Number of individuals	396	386	396	386

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table B2. Regression model of time preference by gender

	Men	Women
log(β)	0.003	-0.001
	(0.005)	(0.005)
Log(δ)	-0.009***	-0.009***
	(0.001)	(0.001)
log(β) × First stage OCP	-0.012*	0.001
	(0.007)	(0.007)
log(δ) × First stage OCP	-0.001	0.001
	(0.001)	(0.001)
log(β) × Second stage OCP	-0.008	-0.004
	(0.009)	(0.012)
log(δ) × Second stage OCP	0.001	0.002*
	(0.001)	(0.001)
Age	Yes	Yes
Location	Yes	Yes
Number of observations	1,584	1,544
Number of individuals	396	386

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table B3. Regression models of behavioral experiments by gender

	PG		Comp perform		Comp entry		Ultimatum Offer		Ultimatum accept	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
First stage. OCP	-0.0001	-0.58	-0.30	0.38	0.01	0.13	0.54	-0.31	1.97*	-1.16
	(0.97)	(0.81)	(0.43)	(0.45)	(0.10)	(0.09)	(0.44)	(0.38)	(1.11)	(1.12)
Second stage. OCP	-1.23	-0.68	-0.08	0.90	-0.01	-0.005	0.83	-0.22	2.04	-0.19
	(1.35)	(1.25)	(0.60)	(0.70)	(0.13)	(0.13)	(0.62)	(0.59)	(1.54)	(1.73)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of individuals	396	386	396	386	396	386	396	386	396	386

Note: Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table B4. Regression model of risk and ambiguity preferences by location

	Risk			Ambiguity		
	Guilin	Wuxi	Lanzhou	Guilin	Wuxi	Lanzhou
Probability 10%	2.20***	2.85***	2.36***	1.59***	2.55***	1.83***
	(0.16)	(0.22)	(0.20)	(0.16)	(0.22)	(0.20)
Probability 50%	0.81***	1.04***	0.96***	0.55***	0.86***	0.72***
	(0.07)	(0.09)	(0.09)	(0.08)	(0.10)	(0.11)
Probability 90%	0.73***	0.88***	0.83***	0.58***	0.77***	0.72***
	(0.07)	(0.11)	(0.09)	(0.08)	(0.09)	(0.10)
Probability 10% ✕ First stage OCP	0.17	0.32	0.68*	0.19	0.12	0.70*
	(0.37)	(0.33)	(0.40)	(0.31)	(0.34)	(0.38)
Probability 50% ✕ First stage OCP	-0.03	0.23	0.24*	0.03	0.20	0.23
	(0.09)	(0.15)	(0.3)	(0.10)	(0.16)	(0.14)
Probability 90% ✕ First stage OCP	-0.07	0.16	0.19	-0.02	0.16	0.18
	(0.07)	(0.14)	(0.12)	(0.08)	(0.15)	(0.14)
Probability 10% ✕ Second stage OCP	0.04	0.11	0.43	0.49	0.36	0.72**
	(0.29)	(0.40)	(0.37)	(0.30)	(0.31)	(0.36)
Probability 50% ✕ Second stage OCP	-0.08	0.25	0.39	-0.006	0.27	0.37
	(0.18)	(0.29)	(0.25)	(0.20)	(0.31)	(0.28)
Probability 90% ✕ Second stage OCP	-0.16	0.25	0.32	-0.09	0.30	0.29
	(0.18)	(0.29)	(0.24)	(0.19)	(0.30)	(0.27)
Age	Yes	Yes	Yes	Yes	Yes	Yes
Location fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,005	600	741	1,005	600	741
Number of individuals	335	200	247	335	200	247

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table B5. Regression models of time preference by location

	City		
	Guilin	Wuxi	Lanzhou
$\log(\beta)$	0.006	-0.011*	-0.009
	(0.005)	(0.006)	(0.006)
$\log(\delta)$	-0.009***	-0.004***	-0.010***
	(0.001)	(0.009)	(0.001)
$\log(\beta)$ × First stage OCP	-0.004	-0.004	-0.013
	(0.008)	(0.009)	(0.008)
$\log(\delta)$ × First stage OCP	-0.001	-0.0002	0.002*
	(0.001)	(0.001)	(0.001)
$\log(\beta)$ × Second stage OCP	0.001	-0.009	-0.020*
	(0.011)	(0.016)	(0.012)
$\log(\delta)$ × Second stage OCP	0.002	0.002	0.002
	(0.001)	(0.002)	(0.002)
Number of observations	1,340	800	988
Number of individuals	335	200	247

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table B6. Regression models of behavioral experiments by location

	PG	Competition		Ultimatum	
	Contribution	Performance increase	Choose tournament	Offer	Min. acceptable offer
	Guilin (Number of individuals = 335)				
First stage OCP	-0.658	0.432	0.176*	0.033	-0.952
	(0.960)	(0.454)	(0.106)	(0.402)	(1.195)
Second stage OCP	-0.640	0.508	0.090	0.085	-0.903
	(1.268)	(0.599)	(0.125)	(0.531)	(1.578)
	Wuxi (Number of individuals = 200)				
First stage OCP	-0.063	-0,707	-0.02	1.167**	1.353
	(.1.336)	(0.692)	(0.115)	(0.573)	(1.605)
Second stage OCP	-1.826	-0.690	0.011	2.493***	3.821
	(2.187)	(1.134)	(0.197)	(0.938)	(2.628)
	Lanzhou (Number of individuals = 247)				
First stage OCP	-1.240	-0.048	0.024	-0.357	2.276
	(1.195)	(0.585)	(0.127)	(0.628)	(1.488)
Second stage OCP	-2.929*	0.300	-0.174	-0.722	3.023
	(1.777)	(0.871)	(0.185)	(0.934)	(2.213)

Note: Age fixed effects in all models, except Lanzhou. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

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Table B7. Regression model of risk and ambiguity preferences with additional covariates

	Risk	Ambiguity
Probability 10%	2.55***	2.13***
	(0.13)	(0.14)
Probability 50%	1.04***	0.88***
	(0.09)	(0.10)
Probability 90%	0.92***	0.87***
	(0.09)	(0.10)
Probability 10% × First stage OCP	0.40*	0.38**
	(0.21)	(0.20)
Probability 50% × First stage OCP	0.12*	0.14
	(0.07)	(0.07)
Probability 90% × First stage OCP	0.06	0.08
	(0.06)	(0.07)
Probability 10% × Second stage OCP	0.16	0.53***
	(0.19)	(0.19)
Probability 50% × Second stage OCP	0.16	0.20
	(0.13)	(0.14)
Probability 90% × Second stage OCP	0.10	0.15
	(0.13)	(0.14)
Female	-0.08	-0.13**
	(0.05)	(0.05)
Have children	-0.08	-0.08
	(0.07)	(0.08)
Married	-0.01	-0.10
	(0.07)	(0.08)
Household income	0.00	0.00
	(0.00)	(0.00)
University	-0.16***	-0.16***
	(0.05)	(0.05)
Parent university	-0.02	-0.01
	(0.06)	(0.06)
Age	Yes	Yes
Location fixed effects	Yes	Yes
Number of observations	2346	2346
Number of individuals	782	782
H_0: No difference between OCP stages	P-values	
Probability 10%		
Before vs First	0.05	0.05
Before vs Second	0.40	0.01
First vs Second	0.26	0.48
Probability 50%		
Before vs First	0.06	0.04
Before vs Second	0.23	0.15
First vs Second	0.71	0.48
Probability 90%		
Before vs First	0.32	0.22
Before vs Second	0.45	0.28
First vs Second	0.63	0.39

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table B8. Regression model of time preference with additional covariates

	Coefficient
$\log(\beta)$	0.001
	(0.005)
$\log(\delta)$	-0.009***
	(0.0007)
$\log(\beta)$ × First stage OCP	-0.005
	(0.006)
$\log(\delta)$ × First stage OCP	-0.0001
	(0.0006)
$\log(\beta)$ × Second stage OCP	-0.006
	(0.007)
$\log(\delta)$ × Second stage OCP	-0.001
	(0.001)
$\log(\beta)$ × Female	0.0007
	(0.003)
$\log(\delta)$ × Female	-0.0002
	(0.0003)
$\log(\beta)$ × Have children	-0.0004
	(0.003)
$\log(\delta)$ × Have children	0.0005
	(0.0005)
$\log(\beta)$ × Married	0.0006
	(0.004)
$\log(\delta)$ × Married	-0.0005
	(0.0005)
$\log(\beta)$ × Household income	0.00008
	(0.0001)
$\log(\delta)$ × Household income	-0.00002
	(0.00001)
$\log(\beta)$ × University	-0.0029
	(0.0029)
$\log(\delta)$ × University	0.001**
	(0.0004)
$\log(\beta)$ × Parent university	0.003
	(0.003)
$\log(\delta)$ × Parent university	-0.0004
	(0.0004)
Age	Yes
Location	Yes
Number of observations	3128
Number of individuals	782

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, and * significant at 10% level.

Table B9. Regression models of behavioral experiments with additional covariates

	PG	Competition		Ultimatum	
	Contribution	Performance increase	Choose tournament	Offer	Min. acceptable offer
First stage OCP	-0.198	-0.052	0.065	0.073	0.408
	(0.636)	(0.312)	(0.068)	(0.293)	(0.789)
Second stage OCP	-0.795	0.196	-0.041	0.224	1.025
	(0.940)	(0.460)	(0.096)	(0.432)	(1.165)
Female	-0.840**	0.316*	-0.228***	0.026	-0.180
	(0.331)	(0.162)	(0.033)	(0.152)	(0.410)
Have children	-0.4791	0.444*	0.035	0.282	-0.201
	(0.482)	(0.236)	(0.048)	(0.222)	(0.598)
Married	0.016	-0.426	0.066	0.174	0.645
	(0.510)	(0.250)	(0.049)	(0.235)	(0.633)
Household income	-0.005	-0.012	0.004**	0.011	-0.020
	(0.017)	(0.008)	(0.002)	(0.008)	(0.021)
University	-0.706**	0.038	0.028	-0.183	-0.596
	(0.347)	(0.170)	(0.036)	(0.160)	(0.430)
Parent university	-0.140	-0.223	0.054	-0.160	-0.320
	(0.394)	(0.193)	(0.041)	(0.181)	(0.488)
Age	Yes	Yes	Yes	Yes	Yes
Location	Yes	Yes	Yes	Yes	Yes
Number of individuals	782	782	782	782	782

Note: Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Appendix C. Robustness checks with new cutoff dates (minus one year)

Table C1. Regression models, the OCP and the likelihood of being an only child and the number of siblings, marginal effects for probit model

	Only child	No. of siblings
First stage OCP	0.189***	-0.450***
	(0.033)	(0.068)
Second stage OCP	0.289***	-0.458***
	(0.087)	(0.103)
Time	Yes	Yes
Location fixed effects	Yes	Yes
Gender	Yes	Yes
Number of individuals	782	782

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table C2. Ratio between certainty equivalent and expected value in risk and ambiguity experiments with new cutoff dates (minus one year)

	Risk experiment			Ambiguity experiment		
	10%	50%	90%	10%	50%	90%
Before OCP	2.41	0.92	0.79	1.95	0.66	0.63
	(1.59)	(0.31)	(0.14)	(1.58)	(0.34)	(0.22)
First stage OCP	2.64	0.94	0.79	2.08	0.72	0.68
	(1.94)	(0.31)	(0.14)	(1.80)	(0.37)	(0.21)
Second stage OCP	2.51	0.97	0.80	2.26	0.72	0.66
	(1.86)	(0.34)	(0.14)	(1.93)	(0.36)	(0.21)
Number of individuals	782	782	782	782	782	782
H_0: No difference between OCP stages, P-values						
Before vs First	0.627	0.758	0.979	0.789	0.130	0.030
Before vs Second	0.943	0.130	0.467	0.145	0.051	0.091
First vs Second	0.608	0.318	0.501	0.363	0.938	0.297

Note: Standard deviations in parentheses.

Table C3. Regression model of time preference

	Coefficient	
$\log(\beta)$	0.002	
	(0.004)	
$\log(\delta)$	-0.009***	
	(0.0005)	
$\log(\beta) \times$ First stage OCP	-0.004	
	(0.004)	
$\log(\delta) \times$ First stage OCP	0.0002	
	(0.001)	
$\log(\beta) \times$ Second stage OCP	-0.006	
	(0.007)	
$\log(\delta) \times$ Second stage OCP	0.002	
	(0.001)	
Age	Yes	
Location	Yes	
Number of observations	3128	
Number of individuals	782	
	β [a]	δ [a]
Before OCP	0.998	0.976***
	(0.010)	(0.001)
First stage OCP	0.988*	0.976***
	(0.007)	(0.001)
Second stage OCP	0.984**	0.978***
	(0.006)	(0.001)
H_0: No difference between OCP stages	P-values	
Before vs First	0.307	0.664
Before vs Second	0.402	0.091
First vs Second	0.770	0.009

Note: Clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.
[a] Test if different from one.

Table C4. Average values of main variables in the three behavioral experiments with new cutoff dates (minus one year)

	PG	Competition		Ultimatum	
	Contribution	Performance increase	Choose tournament	Offer	Min. acceptable offer
Before OCP	8.04	0.70	0.26	19.94	15.04
	(4.17)	(2.33)	(0.44)	(1.76)	(5.68)
First stage OCP	8.07	0.49	0.33	19.64	14.53
	(4.54)	(2.51)	(0.47)	(2.24)	(5.85)
Second stage OCP	8.15	0.64	0.33	19.45	15.43
	(4.79)	(2.13)	(0.47)	(2.20)	(5.64)
Number of individuals	782	782	782	782	782
	P-value test hypothesis				
Before vs First	0.938	0.412	0.139	0.241	0.616
Before vs Second	0.819	0.800	0.060	0.012	0.252
First vs Second	0.925	0.485	1.000	0.418	0.104

Note: Standard deviations in parentheses.

Appendix D. Robustness checks with only firstborns

Table D1. Ratio between certainty equivalence and expected value in risk and ambiguity experiments with only firstborns

	Risk experiment			Ambiguity experiment		
	10%	50%	90%	10%	50%	90%
Whole sample	2.46	0.96	0.80	2.13	0.70	0.66
	(1.79)	(0.33)	(0.14)	(1.82)	(0.36)	(0.21)
Before OCP	2.22	0.90	0.78	1.66	0.62	0.63
	(1.59)	(0.29)	(0.15)	(1.26)	(0.33)	(0.22)
First stage OCP	2.75	0.99	0.81	2.29	0.74	0.67
	(2.00)	(0.34)	(0.13)	(1.92)	(0.34)	(0.20)
Second stage OCP	2.49	0.97	0.80	2.29	0.73	0.66
	(1.80)	(0.34)	(0.14)	(1.96)	(0.37)	(0.21)
No. of individuals	637	637	637	637	637	637
H_0: No difference between OCP stages (P-values)						
Before vs First	0.190	0.009	0.068	0.041	0.014	0.311
Before vs Second	0.594	0.005	0.150	0.019	0.017	0.381
First vs Second	0.153	0.620	0.234	0.826	0.375	0.495

Note: OLS regression and clustered at individual level. Standard deviations in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table D2. Regression model of time preferences with only firstborns

	Coefficient	
$\log(\beta)$	0.003	
	(0.005)	
$\log(\delta)$	-0.009***	
	(0.001)	
$\log(\beta) \times$ First stage OCP	-0.003	
	(0.005)	
$\log(\delta) \times$ First stage OCP	0.0005	
	(0.001)	
$\log(\beta) \times$ Second stage OCP	-0.005	
	(0.008)	
$\log(\delta) \times$ Second stage OCP	0.001	
	(0.001)	
Age	Yes	
Location fixed effects	Yes	
Number of observations	2548	
Number of individuals	637	
	β [a]	δ [a]
Before OCP	0.996	0.976***
	(0.011)	(0.002)
First stage OCP	0.989	0.977***
	(0.008)	(0.001)
Second stage OCP	0.984*	0.980***
	(0.009)	(0.001)
H_0: No difference between OCP stages	P-values	
Before vs First	0.541	0.530
Before vs Second	0.495	0.208
First vs Second	0.699	0.197

Note: Clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.
[a] Test if different from one.

Table D3. Average values of main variables in the three behavioral experiments with only firstborns.

	PG	Competition		Ultimatum	
	Contribution	Performance increase	Choose tournament	Offer	Min. acceptable offer
Before OCP	7.72	0.67	0.27	19.87	14.95
	(4.23)	(2.53)	(0.45)	(1.61)	(5.70)
First stage OCP	8.08	0.47	0.34	19.65	15.18
	(4.31)	(2.34)	(0.48)	(2.11)	(5.83)
Second stage OCP	8.02	0.63	0.31	19.43	15.48
	(4.80)	(2.13)	(0.46)	(2.18)	(5.55)
Number of individuals	637	637	637	637	637
	P-value test hypothesis				
Before vs First	0.631	0.465	0.290	0.952	0.257
Before vs Second	0.583	0.938	0.430	0.041	0.068
First vs Second	0.211	0.699	0.295	0.120	0.907

Note: Standard deviations in parentheses.

Appendix E. Robustness checks for university reform

Table E1. Regression model of risk and ambiguity preferences

	Risk	Ambiguity
Probability 10%	2.39***	1.83***
	(0.11)	(0.11)
Probability 50%	0.88***	0.59***
	(0.05)	(0.06)
Probability 90%	0.76***	0.58***
	(0.05)	(0.06)
Probability 10% × First stage OCP	0.37*	0.40*
	(0.21)	(0.20)
Probability 50% × First stage OCP	0.09	0.16
	(0.08)	(0.08)
Probability 90% × First stage OCP	0.03	0.10
	(0.08)	(0.08)
Probability 10% × Second stage OCP	0.12	0.60*
	(0.22)	(0.22)
Probability 50% × Second stage OCP	0.11	0.28
	(0.17)	(0.17)
Probability 90% × Second stage OCP	0.05	0.23
	(0.17)	(0.17)
University reform	0.01	-0.16
	(0.14)	(0.13)
Age	Yes	Yes
Location fixed effects	Yes	Yes
Number of observations	2346	2346
Number of individuals	782	782

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E2. Regression model of time preferences

	Coefficient
$\log(\beta)$	-0.002
	(0.002)
$\log(\delta)$	-0.010***
	(0.000)
$\log(\beta)$ × First stage OCP	-0.003
	(0.005)
$\log(\delta)$ × First stage OCP	0.001
	(0.001)
$\log(\beta)$ × Second stage OCP	-0.000
	(0.007)
$\log(\delta)$ × Second stage OCP	-0.001
	(0.001)
$\log(\beta)$ × University reform	-0.004
	(0.006)
$\log(\delta)$ × University reform	0.001*
	(0.001)
Age	Yes
Location fixed effects	Yes
Number of observations	3128
Number of individuals	782

Note: Clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E3. Regression models of behavioral experiments

	PG	Competition		Ultimatum	
	Contribution	Performance increase	Choose tournament	Offer	Min. acceptable offer
First stage OCP	-0.596	0.099	0.152	0.232	-0.174
	(0.692)	(0.339)	(0.197)	(0.317)	(0.852)
Second stage OCP	-0.151	0.478	-0.082	0.793	-0.247
	(1.113)	(0.553)	(0.320)	(0.517)	(1.390)
University reform	0.749	-0.284	0.113	-0.649*	1.688
	(0.850)	(0.416)	(0.240)	(0.390)	(1.047)
Age	Yes	Yes	Yes	Yes	Yes
Location dummies	Yes	Yes	Yes	Yes	Yes
Number of individuals	782	782	782	782	782

Note: Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E4. Regression model of risk and ambiguity preferences to test effects of university reform

	Risk		Ambiguity	
	No univ.	Univ.	No univ.	Univ.
Probability 10%	2.55***	2.03***	2.00***	1.52***
	(0.15)	(0.18)	(0.14)	(0.18)
Probability 50%	0.85***	0.85***	0.59***	0.55***
	(0.07)	(0.08)	(0.07)	(0.10)
Probability 90%	0.70***	0.78***	0.55***	0.59***
	(0.07)	(0.08)	(0.07)	(0.10)
Probability 10% × First stage OCP	0.29	0.60**	0.35	0.49*
	(0.32)	(0.27)	(0.31)	(0.25)
Probability 50% × First stage OCP	0.10	0.09	0.14	0.09
	(0.10)	(0.09)	(0.10)	(0.10)
Probability 90% × First stage OCP	0.06	-0.01	0.09	-0.00
	(0.09)	(0.08)	(0.10)	(0.09)
Probability 10% × Second stage OCP	0.14	0.26	0.38	0.66**
	(0.28)	(0.27)	(0.28)	(0.28)
Probability 50% × Second stage OCP	0.19	0.02	0.25	0.06
	(0.19)	(0.18)	(0.21)	(0.20)
Probability 90% × Second stage OCP	0.12	-0.06	0.18	-0.02
	(0.19)	(0.17)	(0.20)	(0.20)
Age	Yes	Yes	Yes	Yes
Location fixed effects	Yes	Yes	Yes	Yes
Number of observations	1140	1206	1140	1206
Number of individuals	380	402	380	402
H_0: No effect of university reform, Chow test p-value	0.031		0.009	

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E5. Regression model of time preferences to test effects of university reform

	No univ.	Univ.
$\log(\beta)$	-0.003	-0.002
	(0.003)	(0.004)
$\log(\delta)$	-0.010***	-0.010***
	(0.000)	(0.000)
$\log(\beta)$ × First stage OCP	-0.009*	-0.002
	(0.005)	(0.005)
$\log(\delta)$ × First stage OCP	-0.000	-0.000
	(0.001)	(0.001)
$\log(\beta)$ × Second stage OCP	-0.004	-0.004
	(0.004)	(0.004)
$\log(\delta)$ × Second stage OCP	-0.000	-0.001
	(0.001)	(0.001)
Age	Yes	Yes
Location fixed effects	Yes	Yes
Number of observations	1520	1608
Number of individuals	380	402
H_0: No effect of university reform Chow-test p-value	0.002	

Note: Clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E6. Regression models of behavioral experiments to test effects of university reform

	PG		Competition				Ultimatum			
	Contribution		Performance increase		Choose tournament		Offer		Min. acceptable offer	
	No univ.	Univ.	No univ.	Univ.	No univ.	Univ.	No univ.	Univ.	No univ.	Univ.
First stage OCP	-1.317	0.480	-0.590	0.769	-0.174	0.396	0.446	0.215	-0.812	0.613
	(0.995)	(1.000)	(0.471)	(0.490)	(0.291)	(0.273)	(0.369)	(0.516)	(1.192)	(1.223)
Second stage OCP	-0.190	-2.025	-0.133	1.152	-0.649	0.336	0.818	0.770	-2.227	1.287
	(1.652)	(1.550)	(0.841)	(0.760)	(0.493)	(0.427)	(0.637)	(0.799)	(2.060)	(1.896)
University reform	0.448	0.484	0.069	-0.728	0.483	-0.140	-0.500	-0.743	1.867	1.530
	(1.243)	(1.176)	(0.613)	(0.576)	(0.373)	(0.320)	(0.480)	(0.607)	(1.550)	(1.439)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
H_0: No effect of university reform, Chow test p-value	0.064		0.346		0.410		0.643		0.207	
Number of individuals	380	402	380	402	380	402	380	402	380	402

Note: Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E7. Regression model of risk and ambiguity preferences to test effects of university reform using predicted university education for those born 1981 and later

	Risk		Ambiguity	
	No univ.	Univ.	No univ.	Univ.
Probability 10%	2.59***	2.02***	2.05***	1.50***
	(0.14)	(0.18)	(0.14)	(0.18)
Probability 50%	0.89***	0.83***	0.64***	0.53***
	(0.06)	(0.09)	(0.07)	(0.10)
Probability 90%	0.74***	0.76***	0.60***	0.57***
	(0.06)	(0.09)	(0.07)	(0.10)
Probability 10% × First stage OCP	-0.02	0.89***	-0.01	0.82***
	(0.29)	(0.30)	(0.26)	(0.29)
Probability 50% × First stage OCP	-0.01	0.19**	0.03	0.18*
	(0.09)	(0.09)	(0.10)	(0.10)
Probability 90% × First stage OCP	-0.02	0.05	-0.01	0.07
	(0.09)	(0.08)	(0.10)	(0.09)
Probability 10% × Second stage OCP	-0.22	0.57**	0.16	0.88***
	(0.27)	(0.28)	(0.28)	(0.28)
Probability 50% × Second stage OCP	-0.01	0.20	0.03	0.25
	(0.18)	(0.19)	(0.20)	(0.21)
Probability 90% × Second stage OCP	-0.04	0.09	0.02	0.13
	(0.18)	(0.19)	(0.19)	(0.21)
Age	Yes	Yes	Yes	Yes
Location fixed effects	Yes	Yes	Yes	Yes
Number of observations	1344	1002	1344	1002
Number of individuals	448	334	448	334
H_0: No effect of university reform, Chow test p-value	0.168		0.193	

Note: OLS regression and clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E8. Regression model of time preferences to test effects of university reform using predicted university education for those born 1981 and later

	No univ.	Univ.
$\log(\beta)$	-0.003	-0.002
	(0.003)	(0.004)
$\log(\delta)$	-0.010***	-0.010***
	(0.000)	(0.000)
$\log(\beta)$ × First stage OCP	-0.005	-0.005
	(0.005)	(0.006)
$\log(\delta)$ × First stage OCP	-0.000	-0.001
	(0.001)	(0.001)
$\log(\beta)$ × Second stage OCP	-0.002	-0.006
	(0.004)	(0.005)
$\log(\delta)$ × Second stage OCP	-0.001*	-0.000
	(0.000)	(0.001)
Age	Yes	Yes
Location fixed effects	Yes	Yes
Number of observations	1792	1336
Number of individuals	448	334
H_0: No effect of university reform, Chow test p-value	0.616	

Note: Clustered at individual level. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table E9. Regression models of behavioral experiments to test effects of university reform using predicted university education for those born 1981 and later

	PG		Competition				Ultimatum			
	Contribution		Performance increase		Choose tournament		Offer		Min. acceptable offer	
	No univ.	Univ.	No univ.	Univ.	No univ.	Univ.	No univ.	Univ.	No univ.	Univ.
First stage OCP	-1.274	0.190	-0.494	0.772	-0.164	0.381	0.430	0.257	-0.425	0.297
	(0.947)	(1.017)	(0.473)	(0.483)	(0.287)	(0.278)	(0.396)	(0.514)	(1.119)	(1.219)
Second stage OCP	-0.751	-2.639	-0.096	1.272	-0.503	0.142	1.598	0.000	-0.200	-0.400
	(1.528)	(1.690)	(0.763)	(0.803)	(0.459)	(0.461)	(0.639)	(0.855)	(1.923)	(2.027)
University reform	0.746	0.538	0.321	-1.075	0.263	0.149	-1.337	0.100	1.123	1.923
	(1.150)	(1.272)	(0.574)	(0.604)	(0.348)	(0.344)	(0.481)	(0.643)	(1.449)	(1.523)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
H_0: No effect of university reform, Chow test p-value	0.160		0.054		0.029		0.298		0.302	
Number of individuals	448	334	448	334	448	334	448	334	448	334

Note: University education for subjects born in 1981 and later is based on prediction from a model explaining university education among those born before 1981. Standard errors in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.