Fertility Policy: Evidence of the Impacts of The Two-Single Two-Child Policy and The Single Two-Child Policy on Birth Rates in China

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Abstract

This paper examines the impacts of the Two-Single Two-Child policy and the early stage in urban areas of the Single Two-Child policy on the birth rates in China. Where the Two-Single Two-Child policy represents that if the couple are all the only child in their families, the couple can have two children; the Single Two-child policy means if one of the couples are the only child in his/ her family, this couple are able to have a second child. These two policies all based on the One-Child policy, which was implemented in urban areas of China since 1979 to allow each couple to have only one child in their life. Using data from the 1% population sample survey of 1987, 1995,2005 and 2015 and two difference-in-difference approaches, we find that the birth rates had raised in the policy-implemented areas and that people did not change their preference to have a first child too much, but that they changed them to have a second child.

1.Introduction

To control the rapid growth of its population, China implemented the One-Child policy in the urban areas starting in 1979 to force each couple can have only one child in their life. Meanwhile, Chinese government also practiced the Two-Single Two-Child policy as an additional policy to the One-Child policy, which allowed the couple to have a second child if the couples are all the only one child in each family. However, different provinces implemented the Two-Single Two-Child policy in different times due to their provinces' population conditions. Then the mainly fertility policy in China was the One-Child policy. Since the One-Child policy was sublimated to a basic national policy from 1982 to 2014, this fertility policy had affected millions of people for over 30 years in China. The birth rates of China had kept declining during the One-Child policy implemented period. In 2014, the Chinese government abolished the One-Child policy and the Two-Single Two-Child policy to raise the birth rates. From 2014 to 2016, China practiced the Single Two-Child policy, where as long as one of the parents is an only child, they can have a second child. Starting in 2016 to now, the Universal Two-Child policy has come to practice, every parent can have two children in total.

This paper analyzes the impact of the Two-Single Two-Child policy and the Single Two-Child policy to see how these policies will influence the birth rates. We use as our data source the 1% Population sample surveys of 1987, 1995, 2005 and 2015 in 18 different provinces, municipalities for both urban and rural areas as our data sources. This paper also analyzes the impact of the Single Two-Child policy on the birth rates in urban areas using across-province variation in the number of months the policy had been implemented before the 2015 survey.

We find that the birth rates had increased in the policy-implement areas, and that

Single Two-Child policy led to a higher birth rate than the Two-Single Two-Child policy along with the One-Child policy. Furthermore, people did not change their preference to have the first child too much, but changed their preference to have the second child.

China is the country with the largest population globally; China's population condition and fertility policy in China have received widespread attention from researchers. Some studies discussed the economic outcomes which caused by the One-Child policy (Huang, 2017; Liao, 2013; Cao,2019; Zhang, 2017). Other studies from the perspective of women and children looked at the influence of the One-Child policy (Li & Zhang, 2017; Jiang, 2020; Zhao & Zhou, 2018). After China has changed its fertility policy to the Two-Single Two-Child policy and the Universal Two-Child policy, many scholars showed their interest in the impact of the Two-Child policies (Yin et al., 2014; Liu & Liu, 2018; Shen & Jiang, 2020; Wu et al.,2018).

This paper will be structured as follow: Section 2 reviews the history of the fertility policy change in China and the current related literature. Section 3 introduces the data and the policy data. Section 4 shows the empirical strategy. Section 5 presents the main results, and then the last section provides the conclusion.

2.Background

2.1 The history of China's fertility policy change

In 1949 when the People's Republic of China was founded, the population of China had reached 540million. In the early 1950s, due to the motive of "development of production" and under the influence of relevant Soviet policies, the main idea of population fertility in this period was to encourage fertility. Then the population

appeared a rapid growth trend. Therefore, the state adopted stricter restrictions on "sterilization" and "abortion" in medical and health care.

In the eight years from 1949 to 1957, China's birth rate was more than 30‰, and an average couple had more than six children. By 1957, the Chinese population had exceeded 640 million. The population had increased by 100 million in eight years. In comparison, the United States only had 172 million people at the same time. Although the population problem was very prominent at that time, it did not attract much government attention. According to the second national census results in 1964, China's total population reached 720 million, and the population of Mainland China reached 694 million, approaching 700 million. In the eight years from 1962 to 1970, the population increased by another 170 million.

Due to the sustained rapid growth of population, especially under the planned economic system, the government was unable to meet the nursery, school, food, daily necessities, housing, transportation, employment and other needs. The population problem was becoming more and more evident. In December 1962, the Chinese government pointed out that advocated birth control in cities and densely populated rural areas, and appropriately controlled the population's natural growth rate, let the fertility problem had gradually changing from an unplanned state to a planned state. The concept of the One-Child policy was the first time came into Chinese society. It was believed that the One-Child policy was an established policy in China's socialist construction. However, Chinese government had not issued a corresponding complete policy during that time and was not implemented thoroughly. Moreover, Chinese Government still tried to find the most suitable fertility policy for China at that time to deal with the population problem.

Then in an era of a shortage economy, the country was unable to meet the enough supply of goods and services to sustain a large population. From the demand side, only by reducing the rate of population growth, the population problem could be solved then

the contradiction between supply and demand could also be eased to a certain extent. For this reason, starting in the 1970s, the Chinese government decisively put forward a population policy that fully implemented family planning and strictly controlled excessive population growth. Compared with a couple having 2 to 6 children before, in the 1970s the allowance became two children per couple, spaced by 4 to 5 years. Then the State Council issued an ambitious "One-Child Policy" in late 1979. The policy requirement was more stringent than in 1962 with the strict forced abortion system when women had more than one child.[1]

After three years in 1982, the family planning program was raised to the status of a basic national policy. In September 1982, the 12th National Congress of the Communist Party of China determined that "family planning is a basic national policy of China." So that the population growth could be adapted to the economic and social development plan. Simultaneously, since the rural villages began implementing the joint production contract responsibility system and agricultural production was changed from the original collective economy to the family economy. The family became an independent production unit; and labor becomes one of the primary sources of family production and family wealth, and even the only source. Therefore, the family economy was significantly strengthening the farmer's willingness to bear children. Only one child in rural area was not enough, and people expected to have more children, especially in rural production conditions. Farmers were more willing to give birth to a boy.

After the "One–Child policy" had been implemented for a short time, the government felt that the "universal one child" policy proposed by the state was run counter to the expectations of people. The gap in the number of children was too large. To make the policy more acceptable to the masses, the central government proposed a new policy that allowed people in rural areas with specific difficulties to have a second child. In this way, in most rural areas, couples whose first child was a girl were allowed to have

[1] "One–Child policy" as practiced in urban China has never been enforced among minority ethnic groups. Most minorities can have two children.

another child.

To avoid another rapid population growth and to meet demand of some families for more than one child, the government introduced the "Two-Single Two-Child policy". This policy came to practice at different times in each province in rural and urban areas due to conditions that varied across the provinces. "Two–Single Two-Child policy" is: if both spouses are the only child in their families, they can have two children. This policy started in 1982 in some provinces, and the urban area of Henan province was the last one to implement it in 2011.

In the 1980s to 1990s, many people lived in rural areas and relied on land to survive in China. With more people to have a second child's expectation, the policy gradually changed from the "Two-Single Two–Child" policy to the "Single Two-Child policy" in most provinces' rural areas, but not in urban areas. Unlike the "Two–Single Two-Child policy", the "Single Two-Child policy" is more comprehensive, allowing that if one in the couple is the only child in his/her family, this couple can have two children in total. Thus, in most rural areas of China, it is widespread that a couple usually has two children. Since 1996, mainland China has maintained a stable low fertility rate and always kept the fertility rate at below 1.8 children per woman in average. The Statistical Bulletin previously published by the National Bureau of Statistics showed that at the end of 2012, the working-age population aged 15 to 59 years old in Mainland China was 937.27 million, a decrease of 3.45 million from the end of the previous year, accounting for 69.2% of the total population, and a decrease of 0.6 percentage points from the end of the previous year. The results show for the first time in many years that the absolute number of the working-age population in China has declined in a long time.

After observing this change, the Chinese government once again focused on the fertility policy. In November 2013, China adopted a new policy of "Single Two–Child". At the beginning of 2014, most provinces and cities across the country introduced a single two-child policy in their urban areas. On January 1st, 2016, the "Universal Two-Child"

was implemented, which means that the "One-Child" policy officially ended, and compulsory contraception would become history. Therefore, every parent can have two children rather than only one child in their life.

2.2 Literature review

Since China is the country with the largest population globally, and after the "One-Child policy" had been implemented, China's population condition and fertility policy in China has received widespread attention from society and scholars. The studies in this area can be divided mainly in two types.

The first type is the discussion of the "One-Child Policy", which has affected millions of people for over 30 years. Some studies talked about the One-Child policy from an economic point of view. Huang (2017) suggested that the One-Child policy had large and long-lasting impacts on many aspects of both the economy and society. He indicated that the One-Child policy significantly curbed population growth but there was no solid evidence that this policy contributed to human capital accumulation; and the One-Child policy was associated with an unbalanced sex ratio, increased crime, and individual dissatisfaction toward the government such significant problems. Liao (2013) used a calibrated general equilibrium model that indicated that the implementation of the One-Child policy affected labor income. The author showed that the implementation of the policy reduced the skill premium and income inequality and reduced the future supply of unskilled labor, then the skill premium and income inequality would be smaller.

After looking at the fertility facts in the rural areas, Cao (2019) provided evidence on the causal effect of fertility on maternal labor in rural China from the One-Child policy, he found that the labor supply of mothers whose husbands are rural-to-urban migrants is the most sensitive to having an additional child because it is more difficult to balance

farming and childcare; he also found that labor supply is not reduced by fertility for mothers living in three-generation families, since grandparents can support money and time to help with childcare. Moreover, Zhang (2017) focused on the One-Child policy's effect on family outcomes. The author found the One-Child policy affected the outcome of child education, the results suggested that the One-Child policy increased children's schooling attainment by at most 4 percent, the probability of attending college by less than 9 percent, school grades by 1 percent.

To evaluate the influence of the One-Child policy from the perspective of children, Li and Zhang (2017) provided evidence of the causal effect of child quantity on child quality by exploiting regional differences in the enforcement intensity of the One-Child policy as an exogenous source of variation in family size. They found that with stricter enforcement of the One-Child policy, the family size had experienced larger declines and children's education had greater improvement; they also suggested that China's One-Child Policy made only a modest contribution to the development of its human capital.

Furthermore, by studying the health consequence of the One-Child policy, Zhao and Zhou (2018) examined whether only children have poor vision. They found that being an only child increases the incidence of myopia by 9.1 percentage points. Since under the One-Child policy, the only child as the only hope in a household and receive higher expectations from parents in terms of academic performance and future educational attainment, which contribute to the increased myopia. From a women's perspective, Jiang (2020) studied the relationship between fertility and educational attainment of the mothers of China's "sibling-less generation" by using a difference-in-difference approach. The author found that the One-Child policy had a positive and significant effect on women's education.

The second type of study discusses China's fertility policies' future after the One-Child policy. For example, Yin et al. (2014) evaluated the degree of family planning policy

implementation and analyzed basic trends in the policy fertility rate, the actual fertility rate, and the degree of policy implementation. They found that most provinces' fertility levels have reached a low level and have continued to decline, with some even falling to an extremely low level. In their opinion, with the interaction of multiple factors in the context of economic, social and cultural development, the number of those who did not want to have children, delayed having children or had them unusually late is increasing while the contraceptive effects of development continued to proliferate. Then the overlapping contraceptive effect of policies and development led to a continuous decline in fertility rates. Moreover, they thought the One-Child policy was difficult to stabilize the fertility rate at a reasonably low level. Thus, they thought the fertility policy needs to adjust to maintain the fertility rate.

Wu et al. (2018) built a nonlinear integer programming model to propose an appropriate reforming path for China's fertility policy. Their results indicated that the Universal Two-Child fertility policy could not effectively deal with population aging; and that the new policy will deteriorate the demographic dividend before 2050 because the proportion of the working age population will decrease. Demographic dividend refers to the fact that a country's working-age population accounts for a large proportion of the total population, and the dependency rate is relatively low, which creates favorable demographic conditions for the economic economy's growth. They suggested that China continue implementing the current strict fertility policy before 2032, then during the period 2036-2041 begin to gradually relax the fertility policy and cancel it after 2065.

Liu and Liu (2020) used the Logit model and constructed a three-period overlapping generation model by taking the inherent mechanism of fertility choice into account to explore the effectiveness of the fertility policy. Their results showed a significant U-shaped relationship between female income and two-child fertility choice, the higher the female income, the less is the willingness of fertility. After analyzing the effectiveness of the universal two-child policy, they found that the extended policy just

exerted little influence on fertility choice. Then they suggested that future fertility policy should be further relaxed to improve the fertility rate.

Shen and Jiang (2020a) focused on 26 professional mothers with two children from the same place and examined their work-life transitions and labor market outcomes. The results showed that those mothers faced a lack of institutional childcare support, a low paternal participation and an increased physical and cognitive childcare burden. They thought the state should ensure family-friendly work environments and promote paternal participation to reduce women's work-life conflict and address gender inequality. Furthermore, Shen and Jiang (2020b) explored why highly educated, employed urban women born during the transformation of China's family planning policy gave birth to two children. They explained that these highly educated women's reproductive choices resulted from the intersection between state policy interventions and individual choices.

From the above literature, we can see that fertility policy has influenced Chinese society in many aspects, like women's fertility choice, children's health, children's education and labor incomes, etc. This paper focuses on the impact of some recent and so far understudied policy changes -- the Two-Single Two-Child policy and the Single Two-Child policy -- on the birth rates.

3.Data

3.1 1% population sample survey

We study from the Chinese 1% Population sample survey. China completed the first 1% population sample survey in 1987 and finished another three surveys in 1995, 2005 and 2015. The surveys content mainly includes name, gender, age, ethnicity, education level, industry, occupation, migration, social security, marriage, births, deaths and housing

situation, etc.; they covered all of mainland China's all 31 provincial administrative regions.

We use the survey data on women of different childbearing ages, from 15 years old to 49 years old, and on birth order of the children (first child, second child, etc.) in 1987,1995, 2005 and 2015 with 18 different provinces (or province-level municipalities) for both urban and rural areas from these 31 provincial administrative regions. We divided these data into seven age groups:15-19, 20-24, 25-29,30-34, 35-39, 40-44, and 45-49. We mainly focus on the four 20-24, 25-29, 30-34 and 35-39 these four age groups, which include most of the births. We have at least two years' survey data in these 18 provincial administrative regions since some provinces did not conduct the 1% population sample survey in all these four years. Thus, we have 118 observations in total from these 18 provincial administrative regions including rural and urban areas.

We use the data on the total number of women of all ages and the total number of births (in the year before the survey or from November of the year before the survey to November of the survey year) to calculate the total birth rate; the number of women in different age groups and the number of births in these age groups to calculate different age group's birth rates; and the total number of the first child births, the total number of the second child births and the total number of women to calculate different birth rates by birth order.

3.2 Policy data

Since China implemented the Two-Single Two-Child policy in urban and rural areas of different provinces in different years, we define a dummy variable equal to "1" when any of these four year's 1% population sample surveys were in the implemented period, and equal to "0" otherwise; this variable is named "Shuang". The Single Two-Child policy was coded in the same way as the Two-Single Two-Child policy and named

"Dan". [2]

We also define a third variable that captures some variation in the precise timing of policy change in urban areas. Since 1982, the urban areas of mainland China were mainly implementing the One-Child policy, along with the Two-Single Two-Child policy for those who were eligible. However, starting in January 2014, many provincial administrative regions began to switch from these two policies into the Single Two-Child policy in urban areas. This change announced that the One-Child policy and the Two-Single Two-Child policy would become the history of China's fertility policy. As of September 17, 2014, all the 31 provincial administrative regions of China had implemented the Single Two-Child policy. The Single Two-Child policy lasted for nearly two years, which started from January 2014 to December 2015. Since our 2015's 1% population sample survey data included the data from November 2014 to October 2015, and then we code as "1" to those provincial administrative regions as a treated province if they had implemented the Single Two-Child policy for more than 20 months starting from their implemented date until October 2015; and as "0" if the regions had implemented the policy less than 20 months.

4. Empirical Strategy

This paper will measure the impact of different fertility policies on the birth rate. First, we would like to compare the birth rates of the Two-Single Two-child policy and the Single Two-Child policy to the One-Child policy by using the panel data in 1987, 1995, 2005 and 2015, which contain the information from periods and provinces before and after each policy was implemented. Second, by this interest, we would like to see how the Single Two-Child policy influenced the birth rates in the policy's early stages. Since this policy changed at this time mainly focused on the urban areas of China, we only use 2005 and 2015 urban data to compare.

[2] "Shuang" means "double" in English; "Dan" means "single"

We choose the difference–in–difference strategy to see how the Two-Single Two-Child policy and the Single Two-Child policy affect the birth rate by controlling for province, year and area fixed effect.

The basic equation in this paper is as the following

$$br_{apy} = \beta_0 + \beta_1 Shuang_{apy} + \beta_2 Dan_{apy} + \gamma_2 Province_2 + \gamma_3 Province_3 + \gamma_4 Province_4 + \gamma_5 Province_5 + \gamma_6 Province_6 + \gamma_7 Province_7 + \gamma_8 Province_8 + \gamma_9 Province_9 + \gamma_{10} Province_{10} + \gamma_{11} Province_{11} + \gamma_{12} Province_{12} + \gamma_{13} Province_{13} + \gamma_{14} Province_{14} + \gamma_{15} Province_{15} + \gamma_{16} Province_{16} + \gamma_{17} Province_{17} + \gamma_{18} Province_{18} + \delta_1 Year_{1995} + \delta_2 Year_{2005} + \delta_3 Year_{2015} + \varepsilon_1 area_1 + \zeta_{apy} \quad (1)$$

br_{apy} represents the birth rate. $Shuang_{apy}$ is a dummy variable that is equal to 0 when the Two – Single Two-Child policy was not implemented in an area (urban or rural), province and year; it is equal to 1 when this policy was implemented. Dan_{apy} is also a dummy variable which is equal to 0 when the area (urban or rural), province and year did not have the Single Two-Child policy; it is equal to 1 when this policy was implemented. $Province_i$, $Year_i$ and $area_i$ are province, year and area fixed effects. ζ_{apy} is the error term.

Second, we use another difference – in – difference strategy to see how the Single Two-Child policy works soon after implementation, using variation in the precise timing of policy change in urban areas across provinces. We use the panel data immediately after 2005 and 2015, which are the time before and after the implementation of the Single Two-Child policy.

The equation can be written as follow:

$$br_{pt} = \beta_0 + \beta_1 Treated_p + \beta_2 Time_t + \beta_3 Did_{pt} + \delta_{pt} \quad (2)$$

Here br_{pt} indicates the birth rate. $Treated_p$ is the treatment group variable, it is equal to 1 when the province is in the treatment group for whom the Single Two-Child policy was implemented for more than 20 months, starting from their implemented date until October 2015; it is equal to 0 when the province is in the control group. $Time_t$ is a

dummy variable equal to 0 when the year is 2005, and it is 1 when the year is 2015. Did_{pt} is the interaction term of the treatment dummy variable and time-variable, which equals $Treated_p$ * $Time_t$. It is equal to 1 if the province is in the treatment group after the Single Two-Child policy put into practice, and 0 otherwise. δ_{pt} represents the error term. This idea behind this specification is to check whether fertility responds to policy change in the short term; if people are exposed to the policy for more than 20 months, does fertility rise?

5. Results

5.1 Descriptive data

All of the data were collected from seven age groups in urban and rural areas across 18 different province and municipalities, and we have 118 observations in total. This paper mainly focuses on the four age groups of 20-24, 25-29, 30-34 and 35-39 years old, these four age groups.

Table 1 shows different age groups with their total number of women (nw), the total number of births (nb), the total birth rates (tbr), the total number of first childbirth (ftc), the first childbirth rates (fbr), the total number of the second childbirth (sdc) and the second childbirth rates (sdr). These three birth rates (each of which represent the rate in the year before the survey or from November of the year before the survey to November of the survey year) are our dependent variables in this paper.

Table 1 Descriptive statistics by age group

(1) Total (2) 20-24 (3) 25-29 (4) 30-34 (5) 35-39

	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev
nw	9641.97	10360.4	10234.4	10850.1	10302.9	11489.76	10324.1	10562.0	9769.8	9931.23
nb	411.7525	761.243	1151.576	1208.24	920.973	946.751	415.205	511.7594	122.352	184.534
tbr	0.0438	0.0634	0.1192	0.0675	0.0965	0.0403	0.0406	0.0341	0.0109	0.0093
ftc	262.482	536.122	906.788	891.201	492.495	557.369	112.872	195.084	27.7227	58.6152
fbr	0.029	0.0494	0.0969	0.0498	0.0516	0.02237	0.0131	0.0306	0.0024	0.0028
sdc	149.4744	279.8442	221.4569	345.6929	343.1304	409.9698	217.265	272.8144	59.92233	96.61442
sdr	0.014	0.0204	0.0206	0.0001	0.034	0.0272	0.0193	0.0127	0.0048	0.0039

Source: Chinese 1% population sample survey (1987, 1995, 2005, 2015)

Unit: number of women, number of births during the previous year or from November of the year before the survey to November of the survey year, number of births per woman during the previous year or from November of the year before the survey to November of the survey year,

5.2 Two-Single Two-Child policy VS Single Two-Child policy by age group

In this paper we focus on how will the Two- Single Two-Child policy and the Single Two-Child policy influence the birth rates; the Two-Single Two-Child policy were implemented with the One-Child policy from 1980s to 2014 and there was only the Single Two-Child policy from 2014-2015. We will just use “the Two-Single Two-Child policy” to represent the total effect of the Two-Single Two-Child policy implemented with the One-Child policy in the rest of the paper. As discussed above, identification comes from the fact that each of these two-child policies were implemented at different times in different provinces and areas.

Table 2 shows the results of equation (1) for the influence of Two-Single Two-Child policy and Single Two-Child policy on the total birth rates by four different age groups and controlling for year, province and area from equation (1). As we can see from table

2, the Two-Single Two-Child policy does not show any statistically significant effect on birth rates for any group of ages. In contrast, the Single Two-Child policy has a statistically significant effect on the 30-34 and 35-39 age groups.

Column (1) shows that the total estimated difference in the birth rate between the regions with the Two-Single Two-Child policy & the One-Child policy and the regions that just had the One-Child policy is 0.007 births per woman during the previous year. The same difference of the Single Two-Child policy is 0.011 births per woman. The Single Two-Child policy is statistical significance at a 10% level (p-value=0.085). From these numbers, it seems that the Single Two-Child policy's birth rates' real influence is more significant than the Two-Single Two-Child policy. After the fertility policy became broader, more and more families were no longer limited to the policy restriction that each couple can only have one child but have two children. Then the birth rates went up in those policy-implemented places.

Column (2) shows the results in 20 to 24 years old. From **Table 1,** we can see that women in this age group occupied a large proportion of the population. However, the difference in women's birth rates in the Two-Single Two-Child policy is -0.0034 births per woman which is statistically insignificant. This number may be caused mainly by the impact on the One-Child policy as one reason. The One-Child policy was fully implemented in 1982. Before this year, most Chinese family had at least two children. In addition, the legal age of marriage stipulated in China's 1950 Marriage Law was 20 for males and 18 for females; then it was adjusted so that males must not be younger than 22 years old, and females must not be younger than 20 years old in mainland of China until now. Since our data were collected in 1987, 1995, 2005 and 2015, only a part of the families satisfied the Two-Single Two-Child policy and could have two children in the policy-implemented regions; therefore, the birth rates will not rise too much. Meanwhile, before the One-Child policy came to practice in the unimplemented regions, their population base was larger than in other places, so that the birth rates were higher. This is the case for Henan province, the most populous province in the country,

which had over 70 million people in the 1940s and 1950s. And at the same time, China had around 540 million people in 1949. The urban area of Henan was the last region to introduce the Two-Single Two-Child policy, which happened in 2011 due to its large population. Another reason indicates that why the difference of the birth rates was very low, might be the strict implementation of the Hukou system. If the birth of the child was born as illegal, the child's name would not appear on their family's Hukou book. As a result, some birth data were missing. As for the Single Two-Child policy, the difference in this age group is 0.012 births per woman. Although it is non-statistical significance, it showes that the Single Two-Child policy let the birth rate rise compared to the regions that did not have this policy since more people met the policy. Column (3), it shows the influence of these two policies on the 25 to 29 years old. The effect of the Two-Single Two-Child policy on the birth rate was 0.0091 births per woman, and the effect of the Single Two-Child policy was 0.017 births per woman; these (though statistically insignificant) numbers showed that the birth rates in policy-implemented areas are higher than the policy- unimplemented areas.

It is worth talking about columns (4) and (5), which are the results for the 30-34 and 35-39 these two age groups. For the 30-34 years old, we have 118 observations, and the Two-Single Two-Child policy effect is 0.0238 births per woman, which is the largest difference among the age groups, although it is not statistically significant. Moreover, the difference estimated difference in the birth rate between the family regions with the Single Two-Child policy and the family regions that did not have this policy is 0.0237 births per woman, which is statistically significant at the 5% level (p-value = 0.027). From 30 to 34 years old may be the best time to give birth to another child. Furthermore, the Single Two-Child policy came to practice in 2014, and the One-Child policy had been implemented for more than 30 years. There is a large number of people in the 30-34 this age group who grew up under the One-Child policy, who satisfied the Single Two-Child policy and were willing to give birth to another child. So, the difference in the birth rate in the policy implemented areas is higher than in the unimplemented areas.

Column (5) shows the results for the 35-39 years old. The number of observations is 105; 13 observations are missing because no birth information was reported for this age group in some provinces, areas and years. The difference was only 0.0015 births per woman for the Two-Single Two-Child policy. In this age group, most people had siblings and women's fertility choices were restricted by the One-Child policy. For then the difference was not very big. However, the difference in birth rate on the Single Two-Child policy is 0.007 births per woman, which is higher than the Two-Single policy and is statistically significant at the 5% level (p-value=0.02). The reason maybe the same as for the 30-34 age group. When the broader policy opened, more families had a chance to have their second children.

Above all, the results in table 2 show that all the estimated differences in the Single Two-Child policy's birth rates are bigger than the difference in the Two-Single Two-Child policy. This indicates that the most families prefer to have more than one child and the Single Two-Child policy worked to raise the birth rates.

Table2 Effects of Two-Single Two-Child & Single Two-Child policy on birth rate, by age group

	（1） Total	（2） 20-24	(3) 25-29	(4) 30-34	(5) 35-39
Shuang	0.0074	-0.0034	0.0091	0.0238	0.0015
	(0.0073)	(0.0069)	(0.0089)	(0.0153)	(0.0016)
Dan	0.0114*	0.0126	0.0167	0.0237**	0.0066**
	(0.0065)	(0.0104)	(0.0105)	(0.0101)	(0.0027)
Year	✓	✓	✓	✓	✓
Province	✓	✓	✓	✓	✓
Area	✓	✓	✓	✓	✓
Observations	118	118	115	118	105
R^2	0.653	0.896	0.7785	0.3384	0.4339

Note: Robust standard errors adjusted for clustering on province-area.

*0.1>p>0.05, **p<0.05

Source: Chinese 1% population sample survey (1987, 1995, 2005, 2015)

5.3 Two-Single Two-Child policy VS Single Two-Child policy by birth order

Table 3 measures how the Two-Single Two-Child policy and the Single Two-Child policy influence on the birth rates by using equation (1), but the dependent variable change to the birth rate by birth order (first child or second child) and still controlling for the year, the area and the province. The outcome indicates non-statistical significance of the Two-Single Two-Child policy on both the first and second child. However, it is statistically significance for the Single Two-Child policy on the second child.

For column (1), the result is the same as the column (1) in table 2 since they are the total estimated effect with the same data. For the first child, the estimated difference in the Two-Single Two-Child policy's birth rate is 0.0044 births per woman, and the Single Two-Child policy is 0.004 births per woman, both of these two numbers are not

statistically significant. It is noticed that the result of the latter policy is close to the one of the former policies, which may be because any Two-Child policy will not influence the willingness of family to have their first child. Regarding the second child, the Single Two-Child policy's estimated difference is 0.0039 births per woman which is statistically significant at a 10% level (p-value=0.088). It is bigger than the Two-Single Two-Child policy's difference which is equal to 0.0024 births per woman. Although our 2015's sample data just included the data for which the Single Two-Child policy was not implemented for the whole period, just for about one year (depending on the area), the results show that the birth rate had risen after the policy had switched. Many people showed their preference for having two children in their families.

In summary, we can find from **Table 3** that as the policy changed, people did not change much their preference to have the first child, but they changed them to have the second child.

Table 3 Effects of the Two-Single Two-Child & Single Two-Child policy on birth rate, by birth order

	(1) Total	(2) First Child	(3) Second Child
Shuang	0.0074	0.0044	0.0024
	(0.0073)	(0.0063)	(0.017)
Dan	0.0114*	0.004	0.0039*
	(0.0065)	(0.0038)	(0.0022)
Year	✓	✓	✓
Province	✓	✓	✓
Area	✓	✓	✓
Observations	118	118	118
R^2	0.653	0.4148	0.7096

Note: Robust standard errors adjusted for clustering on province-area.

*0.1>p>0.05, **p<0.05

Source: Chinese 1% population sample survey (1987, 1995, 2005, 2015)

5.4 Single Two-Child policy by age group

Table 4 reports the results for equation (2) which uses the difference-in-difference method to find how the Single Two-Child policy in the treated provinces in the early period influenced the birth rates by age groups in the urban areas only. This policy was implemented in urban not long before the 2015 population survey, but at different times in different provinces. Here we use only two years of data (2005 and 2015) and include a dummy variable for whether the policy had been implemented for more than 20 months. The interaction term is denoted as "Did". From **Table 4**, we can see that none of the estimated coefficients are statistically significant, but they are still worth discussing.

Column (1) is the total results. The effect of Did equals 0.018 births per woman which means that the treated provinces in the early period have higher birth rates than the non-treated province. It suggests that the people who were affected by the policy showed their enthusiasm for the Single Two-Child policy that allowed them to have a second child. Therefore, the birth rates were higher. Similar results are shown for the 20-24, 25-29 and 30-34 of these three age groups where the effect of their Did variables are respectively 0.036 births per woman, 0.04 births per woman and 0.0347 births per woman. These results are not much different; the numbers indicate that the Single Two-Child policy in the early treated province had an almost identical effect on the birth rates across age groups. The birth rates were all higher than those in the non-treated provinces. Compared to the average birth rates for these three age groups in table 1, these are relatively large. As it can be seen in **Table 1**, the total birth rates for the 20-24 years old were 0.119 births per woman, for the 25-29 years old they were 0.097 births per woman and for the 30-34 years old were 0.041 births per woman. Compared to these three age groups, the Did variable's coefficient for the 35-39 age group is much smaller. It indicates a 0.012 births per woman.

Table 4 shows that after the Single Two-Child policy came into practice, it raised the birth rates to some degree.

Table 4 Effect of the Single Two–Child Policy by age group

	(1) Total	(2)20-24	(3)25-29	(4)30-34	(5)35-39
Time	-0.0041	-0.059	-0.0169	0.0083	0.0072
	(0.0017)	(0.008)	(0.0059)	(0.002)	(0.0016)
Treated	0.0008	-0.0025	0.0002	0.0047	-0.0011
	(0.0029)	(0.0025)	(0.0097)	(0.0045)	(0.0016)
Did	0.0177	0.036	0.04	0.0347	0.0117
	(0.0138)	(0.024)	(0.0396)	(0.0326)	(0.0086)
Constant	0.0249	0.0797	0.0739	0.0261	0.0072
	(0.0021)	(0.0069)	(0.0068)	(0.0034)	(0.0014)
Observations	31	31	31	31	25
R^2	0.0795	0.227	0.0379	0.111	0.3999

Note: Robust standard errors adjusted for clustering on province-area

*0.1>p>0.05, **p<0.05

Source: Chinese 1% population sample survey (1987, 1995, 2005, 2015)

5.5 Single Two-Child policy by birth order

After comparing the birth rates on the Single Two-Child by age groups, we compare this policy by birth order as shown in **Table 5**. The Did variables are still not statistically significant but are still worth to be mentioned. Column (1) is the result same as in **Table 4** as the total results. For the first child, it has 0.011 births per woman in the policy implemented areas that the Single Two-Child had implemented more than or equal to 20 months in our data; for the second child, there is a 0.004 births per woman. The

results from the second child can be explained by the fact that after the Single Two-Child policy came to practice, families in the treated areas were more willing to have a second child. Moreover, the result shows that the second child's birth rates are lower than the birth rates in the first child, which is consistent with the data in **Table 1,** where the average birth rates for second child is 0.014 births per woman, and the average birth rates for first child is 0.029 births per woman.

Table 4 and Table 5 show the not statistically significant results which mainly because our data was restricted the number of observations as for one reason. The Single Two-Child policy was lasting about 2 years from January 2014 to January 2016, but the Chinese 1% Population sample survey in 2015 only observed from November 2014 to November 2015. Another reason may be caused by the change of the society, since the housing and childcaring in urban areas become more and more expensive, only a part of people can afford the expense to have a second child.

Table 5 Effect of Single Two–Child Policy on birth rate, by birth order

	(1) Total	(2) First Child	(3) Second Child
time	-0.0041	-0.0065	0.0017
	(0.0017)	(0.001)	(0.0007)
Treated	0.0008	-0.0002	0.001
	(0.0029)	(0.0019)	(0.0013)
did	0.0177	0.011	0.0039
	(0.0138)	(0.0092)	(0.0035)
constant	0.0249	0.0199	0.005
	(0.0021)	(0.0012)	(0.001)
observations	31	31	31
R^2	0.0795	0.0453	0.158

Note: Robust standard errors adjusted for clustering on province-area

*0.1>p>0.05, **p<0.05

Source: Chinese 1% population sample survey (1987, 1995, 2005, 2015)

6. Conclusion

China's fertility policy is a hot topic in the society. Many studies investigated that the impact of the One-Child policy, the Single Two-Child policy and the Universal Two-Child policy in different areas. However, there is limited research on the impact of the Two-Single Two-Child policy and the Single Two-Child policy on the birth rates. In this paper, we use data from 18 of mainland China's 31 provincial administrative regions to find how the Two-Single Two-Child policy along with the One-Child policy and the Single Two-Child policy influenced people's behavior in terms of their birth rates in the policy-implemented areas.

We found that the Single Two-Child policy's effect on birth rate is higher than that of the Two-Single Two-Child policy along with the One-Child policy in most age groups;

the birth rate of the second child had increased much more than in the areas where the policies were not implemented. Moreover, our results show that people did not change their preference to have the first child too much, but changed them to have the second child. Above all, our findings suggest that the Two-Child policies has raised the birth rates.

After China had implemented the One-Child policy, which influenced people's fertility choices for over 30 years in the urban areas, the population structure has changed during this policy implemented. China has then changed the fertility policy to the Universal Two-Child policy starting in 2016. After the Universal Two-Child policy came into effect and until 2020, the statistical results showed that this policy's influence seems not to have met the government's expectations that the birth rates would increase a lot. To change the demographic structure and promote economic development, China may adjust to a broader fertility policy which will have no restrictions on the number of the birth in the future.

7.References

Cao, Y. (2019). Fertility and labor supply: evidence from the One-Child Policy in China *Applied Economics,* Vol. 51(9), pp.889-910

Huang, W. (2017). How does the one child policy impact social and economic outcomes? *IZA World of Labor*, September, p.1-11

Jiang, X. (2020). Family Planning and Women's Educational Attainment: Evidence from the One-Child Policy. *Contemporary Economic Policy*, Vol.38(3), pp.530-545

Li, B., Zhang, H. (2017). Does population control lead to better child quality? Evidence from China's one-child policy enforcement. *Journal of Comparative Economics*, Vol.45 (2), pp.246-260

Liao, P. (2013). The one-child policy: A macroeconomic analysis. *Journal of Development Economics,* Vol.101(1), p.49-62

Liu, J., Liu, T. (2018). Two-child policy, gender income and fertility choice in China. *International Review of Economics and Finance*, Vol.69, pp.1071-1081

Shen, Y., Jiang, L. (2020a). Labor Market Outcomes of Professional Women with Two Children after the One-Child Policy in China. *Journal of Social issues*, Vol.76(3), pp.632-658

Shen, Y., Jiang, L. (2020b). Reproductive Choice of Highly Educated Employed Women with two Children Under the Universal Two-child Policy. *Journal of Family Issues*, Vol.41(5), pp.611-635

Wu, P., Wu, C., Wu, Y. (2018). Reforming Path of China's Fertility Policy in Stabilizing Demographic Dividends Perspective. *Social Indicators Research,* Vol.137(3), pp.1225-1243

Yin, W., Yao, Y., Li, F. (2014). Evaluation of Fertility Levels and Adjustment of Fertility Policy: Based on the Current Situation of the Chinese Mainland's Provincial Fertility Levels. *Social Sciences in China,* Vol. 35(2), pp.83-105

Zhang, J. (2017). The Evolution of China's One-Child Policy and Its Effects on Family Outcomes. *Journal of Economic Perspectives,* Vol.31(1), pp.141-60

Zhao, L., Zhou, M. (2018). Do only children have poor vision? Evidence from China's One-Child Policy. *Health Economics (United Kingdom)*, Vol.27(7), pp.1131-1146