

Very preliminary and incomplete

## **Has the Family Planning Policy Improved the Quality of the Chinese New Generation?<sup>†</sup>**

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### **Abstract**

One of the most influential social policies which are still being implemented in China is family planning policy, also known as one-child policy. The policy was enacted in the late 1979, and was written into the 1982 Chinese Constitution. The Official objectives of the family planning policy are to slow the population growth, improve the quality of population, and facilitate economic growth. In this project, we will answer an important question: Has the family planning policy improved the quality of the Chinese new generation, as measured by education level?

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**Key Word:** One-Child Policy, Quantity-Quality Trade-offs, Natural Experiment,  
Twins

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## **I. Introduction**

One of the most influential social policies which are still being implemented in China is family planning policy, also known as one-child policy. The policy was enacted in the late 1979, and was written into the 1982 Chinese Constitution (see Article 25, 48, 89 and 107 of the Constitution). The Official objectives of the family planning policy are to slow the population growth, improve the quality of population, and facilitate economic growth. Please refer to Greenhalgh (2003, 2005) for some background information on China's family planning policy.

In this project, we will answer an important question: has the family planning policy improved the quality of the Chinese new generation, as measured by education level?

This paper attempts to make three contributions to the literature.

First, it directly evaluates the one-child policy in term of whether it improves the educational level of Chinese population or not. Rosenzweig and Zhang (2006) recently also studies similar issue. They use twin survey from Kunming municipality, and we use 1990 and 2000 Chinese censuses.<sup>1</sup> Though Rosenzweig and Zhang's data has more variables, it only covers one city. Censuses have few variables, but they can capture the significant regional difference in China better. Qian (2005) also studies the effect of number of siblings on the children's educational outcomes. While Rosenzweig and Zhang (2006) find negative relationship between family size and children's outcome, Qian (2005) shows the relationship is positive. Our study provides some new evidence to this debate.

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<sup>1</sup> Kunming is the capital city of Yunnan Province, which locates in the south-west of China. It is a relatively poor province with a large population of minorities.

Second, it adds new evidence to the discussion on the quantity and quality trade-off of children, such as Caceres (2004), Lee (2004), Black, Devereux and Salvanes (2005), and Angrist, Lavy and Schlosser (2006).

Third, the family planning policy is a national wide mandatory policy, and general equilibrium effect of the policy may be potentially significant, see Heckman, Lochner and Taber (1998). This paper illustrates the importance of taking general equilibrium effect into account when evaluating a nation wide public policy.

## **II. Empirical Strategy**

When economists study the quantity and quality trade-off model, they often worry about the family size may reflect the parents' preference and other unobservable factors, and it an endogenous variables. The estimates from Ordinary Least Squares may suffer from simultaneous bias or/and omitted variable bias.

Following the approach of Rosenzweig and Wolpin (1980a, b), we will use the exogenous event of twin-birth event as natural experiment to control for the possible endogeneity of family size.

Since twin family (after 1980) has two kids and is not binding by the one-child family planning policy. The twin families are acted as comparison group, and the families with only one child are the treated group. The effect of family planning on the outcome of the child can be estimated as the mean difference of treated group and comparison group, or through instrumental methods, such as two-stage least squares estimator.

Following is the basic model used in the paper:

$$y_i = x_i\beta + \delta s_i + \varepsilon_i$$
$$s_i = \gamma z_i + \mu_i$$

where  $y_i$  is the outcome variable,  $x_i$  are exogenous explanatory variables,  $s_i$  is the number of siblings, and  $z_i$  is instrumental variable for  $s_i$ . The main instrumental variable is twin-birth event; we will also explore other possibilities later.

However, there is one caveat to utilize the twin approach; namely since the family planning policy is a national wide mandatory policy, general equilibrium effect of the policy may be potentially significant. Approach which can accommodate general equilibrium effect, such as the one in Heckman, Lochner and Taber (1998) will be used to address this issue.

### **III. Data**

The data sets used in this project is 1% sample of 1990 Chinese Population Census and 0.095% sample of 2000 Chinese Population Census. The data have information on the year and month of the birth. We will use this information to identify twin families.

In our analysis, we only include people living in a household and exclude institutional dwellers, further more, we exclude people in Tibet area from our analysis since Tibet is exempted from the mandatory one-child policy. We rely on information of date of birth to identify the twins. In order to minimize the bias resulting from the children moving out from their parents' home, we restrict our attention on the children with age from 6 to 18.

Table 1 and 2 are characteristics of children in twin and non-twin families from 1990 census and 2000 census, respectively. It is clear from the descriptive statistics in both 1990 and 2000 that twin-family has larger household size and more number of siblings. The means of all other variables are not significantly different for twin and non-twin samples. This provides the first evidence to support using twinning as instrumental variables. It is an exogenous event and has a strong correlation with the family size.<sup>2</sup>

#### **IV. Empirical Results**

Table 3 and 4 presents relationship between the event of twin-birth and the number of siblings.

Twin-birth event results to 0.7 to 0.8 additional siblings in the twin-family. These estimates are very significant and relatively stable across different populations: rural, urban, Han nationality and minority populations.<sup>3,4</sup> The estimates from 1990 census and 2000 census are also similar. Angrist, Lavy and Schlosser (2006) show that twin-birth event increase the number of siblings in the range of 0.45 to 0.63 in Israel.

Table 5 is the results from Ordinary Least Squares (OLS) and two-stage least squares (2SL) estimators from 1990 census on educational outcome.

The main explanatory variable focused in this paper is the number of siblings. Both from OLS and 2SL, estimates show that the family size has significantly

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<sup>2</sup> Rosenzweig and Zhang (2006) argue that twinning may also affect the children's outcome through birth-weight since twins usually weight less than non-twin children.

<sup>3</sup> We divide the observations into rural and urban two group according to China's household registration system, not according to whether the observation lives in urban area or rural area.

<sup>4</sup> In 2005, Han nationality accounts for 90.56% of total Chinese population.

negative effect on the educational outcome of the children, though the magnitude is small. Lee (2004) and Rosenzweig and Zhang also find negative relationship for Korea and China, respectively, but Qian (2005) shows a positive impact of number of siblings on the education outcome.

For rural sample, the estimated coefficients from OLS and 2SL are quite similar. For urban sample, the coefficient of number of sibling is reduced from -0.059 in OLS to -0.030 in 2SL.

Our results also show that Han nationality and urban children have more education. It is worth noting that girls tend to have less education in rural area, but in urban area, gender is not a significant factor.

Estimates from 2000 census are in Table 6. These estimates also show similar significant negative relationship between family size and education outcome in rural sample. However in urban sample, it is still negative, but no longer significant. In both rural sample and urban samples, the magnitude of coefficients estimated from 2SL is less than the ones estimated from OLS.

## **V. General Equilibrium Effect**

In progress

## **VI. Conclusion Remarks**

One of the most influential social policies which are still being implemented in China is family planning policy, also known as one-child policy. In this paper, we will

answer an important question: Has the family planning policy improved the quality of the Chinese new generation, as measured by education level?

Using twin-birth event as natural experiment, we find that additional the family size has a significant negative effect on the education outcome in rural population, but the scale is not large. For urban population, though the relationship is negative and significant from 1990 census, it is no longer significant from 2000 census.

Comparing OLS estimates with 2SL estimates, both estimators show negative relationship, and in general, the effect is smaller from 2SL than from OLS.

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**Appendix:** Links for two Chinese laws related to one child policy

[http://www.gov.cn/banshi/2005-08/21/content\\_25059.htm](http://www.gov.cn/banshi/2005-08/21/content_25059.htm)

<http://w.51sobu.com/policy/38821342004314311080715984171.html>

**Table 1. Characteristics of Children (6 to 18yrs Old) in 1990**

Variables	All Family		Non-twin Family		Twin Family	
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A. All Sample</b>						
Age	12.16	3.79	12.17	3.79	11.77	3.83
Female	0.48	0.50	0.48	0.50	0.50	0.50
Han Nationality	0.90	0.29	0.90	0.29	0.92	0.28
Urban	0.14	0.35	0.14	0.35	0.18	0.38
Household Size	5.09	1.57	5.08	1.57	5.74	1.56
No. of Siblings	2.84	1.24	2.83	1.24	3.53	1.24
Percentage of Boy	0.53	0.31	0.53	0.31	0.51	0.30
All Children Born After 1980	0.20	0.40	0.20	0.40	0.21	0.41
All Children Born Before 1980	0.48	0.50	0.48	0.50	0.51	0.50
No. of Observations	2478759		2457807		20952	
<b>Panel B. Rural Sample</b>						
Age	12.17	3.78	12.17	3.78	11.72	3.83
Female	0.48	0.50	0.48	0.50	0.50	0.50
Han Nationality	0.90	0.30	0.90	0.30	0.91	0.28
Urban	0.00	0.00	0.00	0.00	0.00	0.00
Household Size	5.23	1.55	5.23	1.55	5.91	1.57
No. of Siblings	2.97	1.22	2.96	1.22	3.68	1.24
Percentage of Boy	0.53	0.29	0.53	0.29	0.51	0.28
All Children Born After 1980	0.19	0.39	0.19	0.39	0.20	0.40
All Children Born Before 1980	0.46	0.50	0.46	0.50	0.49	0.50
No. of Observations	2122951		2105872		17079	
<b>Panel C. Urban Sample</b>						
Age	12.20	3.80	12.20	3.80	12.08	3.79
Female	0.48	0.50	0.48	0.50	0.50	0.50
Han Nationality	0.93	0.26	0.93	0.26	0.92	0.27
Urban	1.00	0.00	1.00	0.00	1.00	0.00
Household Size	4.20	1.38	4.19	1.38	4.95	1.27
No. of Siblings	2.05	1.08	2.04	1.08	2.84	1.03
Percentage of Boy	0.51	0.39	0.51	0.39	0.50	0.36
All Children Born After 1980	0.27	0.44	0.27	0.44	0.27	0.45
All Children Born Before 1980	0.61	0.49	0.61	0.49	0.62	0.48
No. of Observations	347622		343849		3773	

**Table 2. Characteristics of Children (6 to 18yrs Old) in 2000**

Variables	All Family		Non-twin Family		Twin Family	
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A. All Sample</b>						
Age	11.98	3.41	11.99	3.41	11.54	3.37
Female	0.48	0.50	0.48	0.50	0.52	0.50
Han Nationality	0.90	0.30	0.90	0.30	0.92	0.28
Urban	0.17	0.37	0.17	0.37	0.19	0.39
Household Size	4.46	1.26	4.45	1.26	5.13	1.18
No. of Siblings	2.22	1.02	2.21	1.01	2.96	0.99
Percentage of Boy	0.53	0.35	0.53	0.36	0.49	0.32
All Children Born After 1980	0.95	0.23	0.95	0.23	0.95	0.21
No. of Observations	172510		169982		2528	
<b>Panel B. Rural Sample</b>						
Age	11.95	3.38	11.95	3.38	11.54	3.35
Female	0.48	0.50	0.48	0.50	0.53	0.50
Han Nationality	0.89	0.31	0.89	0.31	0.91	0.28
Urban	0.00	0.00	0.00	0.00	0.00	0.00
Household Size	4.62	1.23	4.61	1.23	5.31	1.19
No. of Siblings	2.36	1.00	2.35	1.00	3.11	1.00
Percentage of Boy	0.53	0.34	0.53	0.34	0.49	0.30
All Children Born After 1980	0.94	0.24	0.94	0.24	0.95	0.22
No. of Observations	143161		141125		2036	
<b>Panel C. Urban Sample</b>						
Age	12.21	3.54	12.22	3.54	11.59	3.46
Female	0.49	0.50	0.49	0.50	0.47	0.50
Han Nationality	0.92	0.28	0.92	0.28	0.93	0.26
Urban	1.00	0.00	1.00	0.00	1.00	0.00
Household Size	3.64	1.05	3.63	1.05	4.38	0.79
No. of Siblings	1.52	0.77	1.50	0.76	2.31	0.60
Percentage of Boy	0.51	0.44	0.51	0.44	0.53	0.39
All Children Born After 1980	0.97	0.18	0.97	0.18	0.97	0.16
No. of Observations	28461		27983		478	

**Table 3. The Effect of Twinning on the No. of Siblings in 1990 Census**

Variables	All Family		Rural Family		Urban Family		Han Nationality Family		Minority Family	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	2.83	0.00	2.96	0.00	2.04	0.00	2.77	0.00	3.46	0.00
Twin Dummy	0.70	0.00	0.72	0.00	0.80	0.00	0.70	0.00	0.80	0.00
R-squared	0.003		0.003		0.006		0.003		0.002	
No. of Observations	2478759		2122951		347622		2243169		235590	

**Table 4. The Effect of Twinning on the No. of Siblings in 2000 Census**

Variables	All Family		Rural Family		Urban Family		Han Nationality Family		Minority Family	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	2.21	0.00	2.35	0.00	1.50	0.00	2.18	0.00	2.54	0.00
Twin Dummy	0.74	0.00	0.75	0.00	0.80	0.00	0.74	0.00	0.80	0.00
R-squared	0.008		0.008		0.018		0.008		0.006	
No. of Observations	172510		143161		28461		154718		17792	

**Table 5. Effect of No. of Siblings on the Education Outcome  
Using 1990 Census**

Variables	OLS		2SL	
	Coef.	P-value	Coef.	P-value
	(1)	(2)	(3)	(4)
<b>Panel A. All Sample</b>				
Constant	1.091	0.000	1.077	0.000
No. of Siblings	-0.049	0.000	-0.044	0.000
Age	0.097	0.000	0.097	0.000
Female	-0.135	0.000	-0.135	0.000
Han Nationality	0.169	0.000	0.172	0.000
Urban	0.334	0.000	0.337	0.000
Percentage of Boy	-0.128	0.000	-0.126	0.000
All Children Born After 1980	-0.032	0.000	-0.030	0.000
Both Before and After 1980	-0.033	0.000	-0.036	0.000
Adjusted R-squared	0.386		0.386	
No. of Observations	2393025		2393025	
<b>Panel B. Rural Sample</b>				
Constant	1.261	0.000	1.248	0.000
No. of Siblings	-0.055	0.000	-0.050	0.000
Age	0.084	0.000	0.084	0.000
Female	-0.148	0.000	-0.148	0.000
Han Nationality	0.186	0.000	0.189	0.000
Percentage of Boy	-0.129	0.000	-0.126	0.000
All Children Born After 1980	-0.031	0.000	-0.030	0.000
Both Before and After 1980	-0.036	0.000	-0.040	0.000
Adjusted R-squared	0.317		0.317	
No. of Observations	2062051		2062051	
<b>Panel C. Urban Sample</b>				
Constant	-0.011	0.134	-0.069	0.000
No. of Siblings	-0.059	0.000	-0.030	0.002
Age	0.211	0.000	0.209	0.000
Female	-0.001	0.793	0.001	0.801
Han Nationality	-0.005	0.166	0.012	0.054
Percentage of Boy	-0.038	0.000	-0.032	0.000
All Children Born After 1980	0.289	0.000	0.302	0.000
Both Before and After 1980	0.072	0.000	0.047	0.000
Adjusted R-squared	0.67		0.669	
No. of Observations	330974		330974	

**Table 6. Effect of No. of Siblings on the Education Outcome  
Using 2000 Census**

Variables	OLS		2SL	
	Coef.	P-value	Coef.	P-value
	(1)	(2)	(3)	(4)
<b>Panel A. All Sample</b>				
Constant	0.747	0.000	0.674	0.000
No. of Siblings	-0.063	0.000	-0.042	0.001
Age	0.141	0.000	0.141	0.000
Female	-0.031	0.000	-0.031	0.000
Han Nationality	0.124	0.000	0.131	0.000
Urban	0.263	0.000	0.281	0.000
Percentage of Boy	-0.054	0.000	-0.045	0.000
All Children Born After 1980	0.038	0.000	0.056	0.000
Adjusted R-squared	0.528		0.527	
No. of Observations	168942		168942	
<b>Panel B. Rural Sample</b>				
Constant	0.918	0.000	0.849	0.000
No. of Siblings	-0.056	0.000	-0.036	0.006
Age	0.125	0.000	0.125	0.000
Female	-0.033	0.000	-0.033	0.000
Han Nationality	0.142	0.000	0.149	0.000
Percentage of Boy	-0.037	0.000	-0.026	0.003
All Children Born After 1980	0.020	0.000	0.036	0.002
Adjusted R-squared	0.48		0.48	
No. of Observations	140994		140994	
<b>Panel C. Urban Sample</b>				
Constant	0.281	0.000	0.122	0.153
No. of Siblings	-0.096	0.000	-0.037	0.220
Age	0.213	0.000	0.213	0.000
Female	0.035	0.008	0.034	0.010
Han Nationality	0.020	0.075	0.034	0.010
Percentage of Boy	-0.026	0.081	-0.022	0.144
All Children Born After 1980	-0.014	0.468	0.051	0.172
Adjusted R-squared	0.669		0.667	
No. of Observations	27948		27948	