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Fertility and Sex Choice in China

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Introduction

Research question

1. Do rural households decide to have a second child, in part, because their peers do so?
2. Do rural households choose to have a son, in part, because of peer pressure?

Background

Traditionally, Chinese families value male offspring relatively more than female offspring because male offspring:

- carry on the family name;
- inherit the family's wealth;
- take care of the parents in old age.

Therefore it has been a social convention that male heir must have at least one male offspring. This social obligation used to be fulfilled through polygamy or unlimited birth quota. Under a limited birth quota for each couple after the 1980s, the sex ratio of newborn boys to girls has become more imbalanced. Unwanted girls are believed to be treated with

- abortions (even though using ultrasound technology to detect fetal sex is illegal in China);
- female infanticide;
- giving for adoption;
- hiding females from officials (these girls do not have official registration as citizens – usually before attending school or getting married).

"Missing women" phenomenon

- Bhalotra & Cochrane (2010) estimate that 480,000 girls were aborted in China over the 1995 to 2005 interval;
- Abrevaya (2009) concludes that 2,000 Chinese and Indian girls went missing in the United States over the 1991 to 2004 period.

	Natural Level	Urban China	Rural China
Sex Ratio at Birth	1.03-1.07	1.18	1.22

World Economic Forum ranks China in the 149th position out of 149 countries in terms of the sex ratio at birth; It is estimated that there will be 30 million wifeless men in China by 2030.

Social problems of imbalanced sex ratio

- crime rate increases;
- spread of disease such as AIDS;
- increased gender (female) discrimination in the labor market;
- increased trafficking of women as brides.

Policy Background

- In 1979, the Chinese government announced the one-child policy;
- Since 1984, if both the husband and wife are each the only child in their families, they are allowed to have two children;
- Since 1985, 19 out of 34 provinces legalized the 1.5 child policy (a rural family can have a second child if the first child was a girl);
- Since 2014, as long as (only) one parent is the only child of his or her parents the couple can have two children;
- In 2016, the Chinese government removed all restrictions on having a second child;

Literature Review

- Unbalanced sex ratio across different regions and birth order of the child (*Hardee et al. 2003, Ding & Hesketh 2006, George 2006, Park & Cho 2009, Zhu et al. 2009*);
- Male births come about 0.34 years later than female births (*Ebenstein, 2010*);
- Previous sibling sex, availability and the use of ultrasound during pregnancy, and the education level of the parents influence gender choice (*Abrevaya, 2009; Bhalotra & Cochrane, 2010*);
- The average value of the first son being 1.85 times that of average family income, but only 0.43 for the first girl (*Ebenstein, 2011*); Tea planting region that value female labor more shows less gender discrimination at birth (*Qian, 2008*);
- Households face pressure via discrimination from their kinsmen to have a son (*Chan et al., 2002*);
- The pressure of having boys increases as the birth order of child is higher (*Abrevaya, 2009*);
- Previous fertility analysis ignores the factor of peer effects;

Model

Household utility function is

$$\mathrm{V}(\mathrm{y_i}) = \mathrm{x_i}\alpha\mathrm{y_i} + \mathrm{w_i}\mathrm{X}\delta\mathrm{y_i} + \gamma\mathrm{w_i}\mathrm{M}\mathrm{y_i} + \mathrm{u_g} + \epsilon(\mathrm{y_i}) \tag{1}$$

where

- $\mathrm{y_i}$: household decision on child planning:
  - Q1: $\mathrm{y_i} = 1$ if household i have a second child, $\mathrm{y_i} = -1$ if not;
  - Q2: $\mathrm{y_i} = 1$ they schedule a son as a second child, $\mathrm{y_i} = -1$ if not;
- $\mathrm{x_i}$: a $1 \times \mathrm{k}$ vector of control variables;
- X: a characteristic matrix $[\mathrm{x_1'}, \mathrm{x_2'}, ..., \mathrm{x_n'}]'$;
- $\mathrm{w_i}$: a $1 \times \mathrm{n}$ weight vector with each element $\mathrm{w_{ij}} > 0$ if i and j are connected and $\mathrm{w_{ij}} = 0$ if not;
- M: a $\mathrm{n} \times 1$ vector of heterogeneous expectations across different households. The element $\mathrm{M_j}$ is the expectation of neighbor j in terms of its child planning decision. M is solved by a system of equations:

$$\mathrm{M} = \tanh(\mathrm{X}\alpha + \mathrm{WX}\delta + \gamma\mathrm{WM} + \mathrm{u_g}) \tag{2}$$

- ϵ: follows a logistic distribution: $\Pr[\epsilon(-1) - \epsilon(1) < \mathrm{x}] = \frac{1}{1+\exp(-\beta\mathrm{x})}$.
- $\mathrm{u_g}$: group level dummies which is fixed within group g; captures correlated effects between group members.

Household i will have a second child if $\mathrm{V}(1) > \mathrm{V}(-1)$. The probability of household choosing $\mathrm{y_i}$ can be solved as:

$$\begin{aligned}\mathrm{Prob}(\mathrm{y_i} = 1) &= \frac{1}{1 + \exp[-2(\mathrm{x_i}\alpha + \mathrm{w_i}\mathrm{X}\delta + \gamma\mathrm{w_i}\mathrm{M} + \mathrm{u_g})]} \\ \mathrm{Prob}(\mathrm{y_i} = -1) &= \frac{1}{1 + \exp[2(\mathrm{x_i}\alpha + \mathrm{w_i}\mathrm{X}\delta + \gamma\mathrm{w_i}\mathrm{M} + \mathrm{u_g})]}\end{aligned} \tag{3}$$

use MLE to recover $[\alpha', \delta', \gamma]$.

$$\begin{aligned}\ln\mathrm{L}(\alpha, \delta, \gamma|\mathrm{y}, \mathrm{X}, \mathrm{W}) = \sum_{\mathrm{i}=1}^{\mathrm{n}} \{&\frac{1+\mathrm{y_i}}{2}\ln[\mathrm{Prob}(\mathrm{y_i} = 1)] \\ &+ \frac{1-\mathrm{y_i}}{2}\ln[\mathrm{Prob}(\mathrm{y_i} = -1)]\}\end{aligned} \tag{4}$$

- α': own characteristics effect
- δ': neighborhood characteristics effect
- γ: direct neighborhood outcome effect (endogenous/peer effect)

Results

Table 1:Dependent variable of Q1: having a second child

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
endogenous		0.460		0.281	0.388	0.521
		(0.069)		(0.110)	(0.146)	(0.083)
Own						
w_edu	-0.264	-0.036	-0.021	-0.025	-0.032	-0.040
	(0.057)	(0.006)	(0.007)	(0.007)	(0.009)	(0.008)
h_edu	0.122	0.017	0.017	0.019	0.019	0.013
	(0.056)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
income	0.000	0.010	0.048	0.033	0.069	0.063
	(0.021)	(0.020)	(0.024)	(0.022)	(0.028)	(0.024)
ag	0.262	0.241	0.087	0.097	0.102	0.123
	(0.063)	(0.058)	(0.066)	(0.064)	(0.080)	(0.069)
rural	0.389	0.336	0.377	0.367	0.340	0.385
	(0.058)	(0.051)	(0.060)	(0.059)	(0.074)	(0.063)
1_girl	0.102	0.093	0.081	0.114	0.341	0.355
	(0.062)	(0.056)	(0.065)	(0.068)	(0.084)	(0.077)
ag_hukou	0.280	0.154	0.326	0.259	0.370	0.423
	(0.076)	(0.073)	(0.080)	(0.074)	(0.091)	(0.083)
ag_hukou_1half_1g	0.650	0.571	0.689	0.697	0.669	0.520
	(0.090)	(0.080)	(0.093)	(0.095)	(0.126)	(0.111)
w_age_1child	-0.069	-0.042	-0.063	-0.064	-0.084	-0.066
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)
live with fa.	-0.099	-0.107	-0.139	-0.132	-0.127	-0.106
	(0.093)	(0.090)	(0.095)	(0.098)	(0.115)	(0.104)
live with mo.	0.127	0.105	0.115	0.138	0.124	0.180
	(0.073)	(0.074)	(0.075)	(0.080)	(0.098)	(0.090)
Contextual						
edu			-0.105	-0.065	-0.092	
			(0.018)	(0.021)	(0.030)	
income			-0.129	-0.094	-0.010	
			(0.053)	(0.048)	(0.073)	
1_girl			-0.518	-0.634	-0.373	
			(0.189)	(0.159)	(0.198)	
w_age_1child			0.076	0.064	0.064	
			(0.011)	(0.010)	(0.012)	
live with parent			-0.145	0.067	0.039	
			(0.225)	(0.294)	(0.260)	
constant	1.143	0.605	0.346	0.363	0.641	0.882
	(0.208)	(0.204)	(0.291)	(0.254)	(0.303)	(0.221)
Province FE	N	N	N	N	Y	Y

For space concern, I ignored the significance mark and the result for the second research question.

Conclusions

- We find significant peer effects and it is robust after we control for contextual affects and province fixed effects. Household do care what their neighbors are doing when they make the decision of having an extra child.
- For the result of the second research question about sex choice, we find significant peer effects for Model 2 and Model 4, but after we add province FE, peer effects becomes insignificant, which means the social common convention of having sons plays more significant role in sex selection at birth instead of a direct peer influence of observing neighbors to have sons.
- The higher the education of women, the lower the probability of having an extra child and conducting sex selection at birth. The education of husband plays an opposite role.
- The richer the family, the more likely that they have a second child and have a son.
- We fail to find any evidence of living with parents on child planning and sex selection choices.
- Household who rely on farming are more likely to have sons, which is consistent with previous literature.