Peer effects in Fertility and Son Preference of China

Jixuan (Edie) Yao [1] Michael S. Delgado [1]

Email address of Jixuan (Edie) Yao: yao149@purdue.edu [1]Purdue University, Department of Agricultural Economics

Introduction

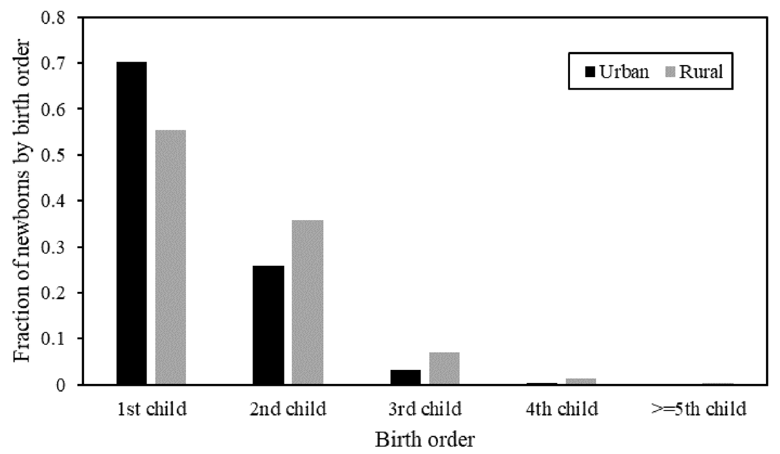
Research question

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

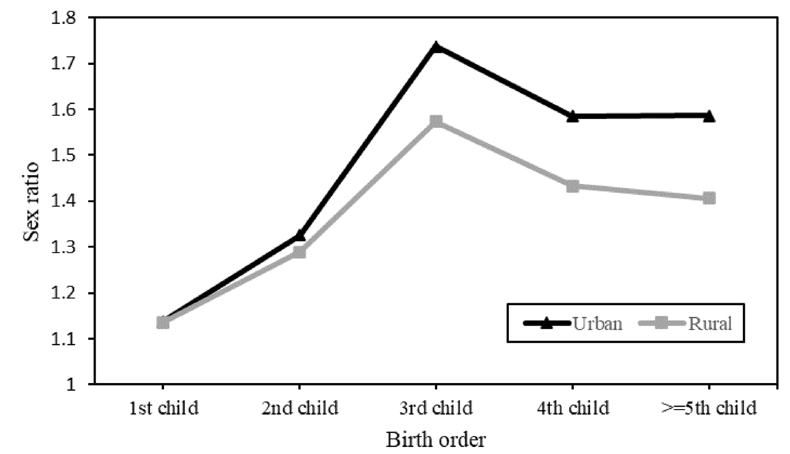
Cultural Background

Traditionally, Chinese families value male offspring relatively more than female offspring because male offspring carry on the family name,inherit the family's wealth and take care of aged parents.

Therefore it has been a social convention that male heir must have at least one male offspring. This tradition has been under challenge due to a series of child policies implemented since 1979, after which the sex ratio of newborn boys to girls has become more imbalanced. Unwanted girls are believed to be treated with abortions, female infanticide, etc.



% of newborns by birth order



Sex ratio by birth order

- 70% urban newborns and 55% rural newborns are firstborn; 26% of urban newborns and 36% of rural newborns are second child based on the 2010 census (see the left graph);
- Sex ratio increases by birth order as families who schedule a second or third child are usually because their previous children are girls (see the right graph).

Policy Background

- In 1979, the Chinese government announced the one-child policy;
- Since 1984, if parents are each the only child in their families, they can have two children;
- Since 1985, 19 out of 34 provinces legalized the 1.5 child policy (a family with agricultural type of registered residence (*hukou*) can have a second child if the first child is a girl);
- Since 2014, if one parent is the only child of his or her family, the couple can have two children;
- In 2016, the Chinese government removed all restrictions on having a second child;

Literature Review

- Male births come about 0.34 years later than female births (*Ebenstein 2010*).
- Boys are more economically valuable than girls through the labor market (*Almond et al. 2019, Qian 2008, Ebenstein 2011, Zeng & Hesketh 2016*). Highly educated women prefer a smaller family size and have statistically weaker preference for sons (*Zhang & Spencer 1992, Abrevaya 2009*).
- Widely accessible ultrasound technology (*Chen et al. 2013*). By 1985, ultrasound technology was available in all provincial capitals and 60 percent of counties (*Almond et al. 2019*).
- No son leads to shame, especially in rural areas; households face enormous pressure to have a son (*Chan et al. 2002*). Woman with a firstborn son has higher bargaining power inside the family, lower probability to be underweight, and better nutrition intakes (*Li & Wu 2011*)
- Nevertheless, while peer pressure is believed to play an important role in child planning in China, it has not been widely modeled in family planning-related economic literature.

Model

We take the first research question of having a second child as an example. Following Brock & Durlauf (2001) and Lee et al. (2014), household utility of having a second child takes the form

$$V(y_i) = x_i\alpha y_i + w_i X\delta y_i + \gamma w_i M y_i + u_g y_i + \epsilon(y_i) \quad (1)$$

- y_i: whether to have a second child. $y_i = 1$ if household i have a second child, $y_i = -1$ if not;
- x_i: a $1 \times k$ vector of control variables including income, education, occupation etc.;
- X: a characteristic matrix $[x_1', x_2', ..., x_n']'$ for contextual effects;
- w_i: a $1 \times n$ weight vector with each element $w_{ij} > 0$ if i and j are connected and $w_{ij} = 0$ if not;
- M: a $n \times 1$ vector of heterogeneous expected behavior of all households. M_j is the expectation of neighbor j in terms of its child planning decision. M is solved by a system of equations such that the expected outcome M equals to the calculated behavior $E(y_i)$ under our setting.

$$M = tanh(X\alpha + WX\delta + \gamma WM + u_g) \quad (2)$$

- ϵ: follows a logistic distribution: $Pr[\epsilon(-1) - \epsilon(1) < x] = \frac{1}{1+exp(-\beta x)}$.
- u_g: province level FE which controls for correlated unobservables between group members.

Household i will have a second child if $V(1) > V(-1)$. The probability of household choosing y_i is:

$$P(y_i = 1) = \frac{1}{1 + exp[-2(x_i\alpha + w_i X\delta + \gamma w_i M + u_g)]}$$
$$P(y_i = -1) = \frac{1}{1 + exp[2(x_i\alpha + w_i X\delta + \gamma w_i M + u_g)]} \quad (3)$$

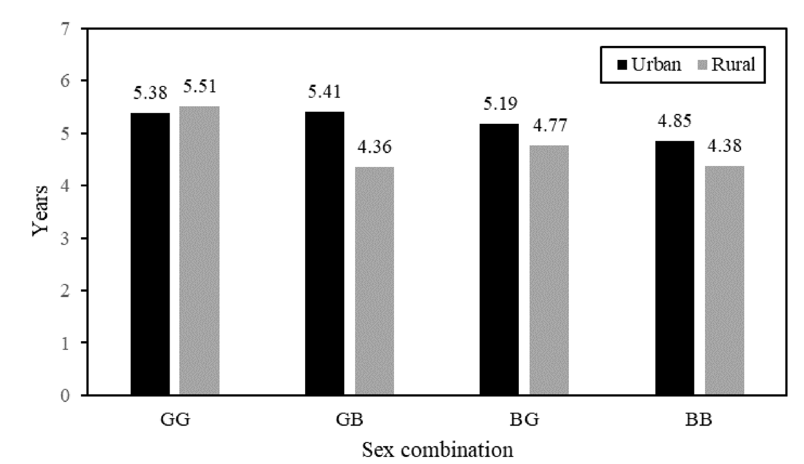
Use the maximum likelihood estimator (MLE) to recover $[\alpha', \delta', \gamma]$.

$$lnL(\alpha, \delta, \gamma | y, X, W) = \sum_{i=1}^{n}\{\frac{1 + y_i}{2} ln[P(y_i = 1)] + \frac{1 - y_i}{2} ln[P(y_i = -1)]\} \quad (4)$$

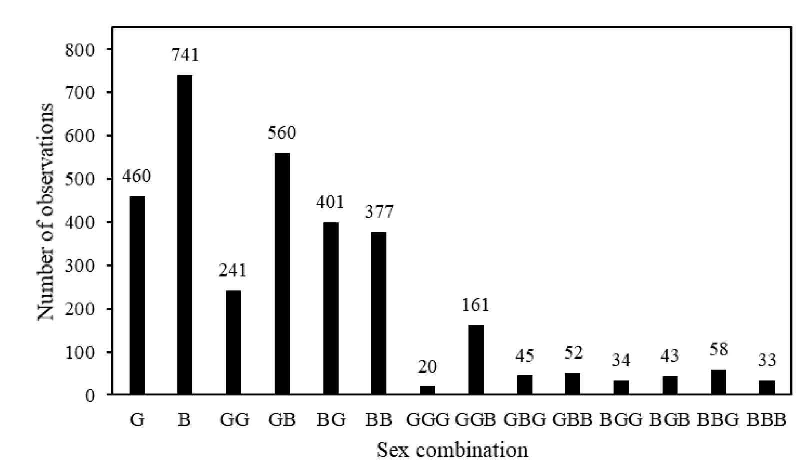
- α': own characteristics effects (exogenous effects);
- δ': neighborhood characteristics effect (contextual effects);
- γ: direct neighborhood outcome effect (endogenous/peer effect);

We define peer group as families living in one county. County in China is a lower level than city.

Data



Age gap between two kids for Q1



sex composition of kid(s) for Q2

We use the 2016 survey of China Family Panel Studies focusing on a 10-year cohort with wives age 45-54 at 2016. It enables us to focus on women who had completed their fertility planning by 2016, but not overage such that their children were born before any child policy was implemented.

- Rural families who strive to have a son as a second child wait shorter for the second pregnancy.
- Before a boy is born to a family, sex ratio on the next parity is very high.

Results

Table 1:Dependent variable: Whether to have a second child

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
peer effects			0.464	0.250	0.516	0.388
			(0.064)	(0.118)	(0.091)	(0.146)
Own						
w_edu_year	-0.031	-0.021	-0.036	-0.021	-0.041	-0.032
	(0.007)	(0.007)	(0.006)	(0.007)	(0.008)	(0.009)
h_edu_year	0.017	0.017	0.017	0.016	0.009	0.019
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
income	0.002	0.048	0.014	0.053	0.075	0.069
	(0.022)	(0.024)	(0.019)	(0.023)	(0.026)	(0.028)
Contextual						
edu_year		-0.105		-0.073		-0.092
		(0.018)		(0.022)		(0.030)
income		-0.129		-0.102		-0.010
		(0.053)		(0.048)		(0.073)
Province FE	N	N	N	N	Y	Y

Note: Income is in unit of 50,000 *yuan*. Control variables include Whether engaged in ag production, Rural indicator, First child is a girl, Qualified for 1.5 child policy, Either of parent has ag *hukou*, Mother's age at first birth, Living with father-in-law and/or mother-in-law of the mother.

Table 2:Dependent variable: Whether to have a son during reproductive age

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
peer effects			0.445	-0.053	0.441	-0.059
			(0.109)	(0.240)	(0.128)	(0.268)
Own						
w_edu_year	-0.028	-0.016	-0.027	-0.014	-0.025	-0.011
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
h_edu_year	0.011	0.017	0.013	0.014	0.013	0.013
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
income	0.044	0.050	0.038	0.049	0.083	0.073
	(0.020)	(0.022)	(0.017)	(0.020)	(0.022)	(0.023)
Contextual						
edu_year		-0.099		-0.098		-0.122
		(0.016)		(0.029)		(0.036)
income		-0.020		-0.017		-0.020
		(0.046)		(0.046)		(0.069)
Province FE	N	N	N	N	Y	Y

Note: Income is in unit of 50,000 *yuan*. Control variables include Whether engaged in ag production, Rural indicator, Either of parent has ag *hukou*, Mother's age at first birth, Living with father-in-law and/or mother-in-law of the mother.

Conclusions

- Peer effects in having a second child is significant, and it is robust after we control for contextual affects and province fixed effects. If a family lives with peers all having a second child versus single child, the probability for this family to have a second child will increase by 38.8 percent.
- A significant peer effect in having a second child motivates households to align with the group average behavior and facilitates the effectiveness of policies that encourage a larger family size (e.g., the two-child policy).
- Peer effects in son preference is insignificant after we add contextual effects. Instead, son preference is largely driven by the contextual effects captured by neighborhood characteristics.
- Increasing the education level of the next generation has a great potential in reducing the imbalanced sex ratio. One more year of education in the peer group decreases the probability of having a son by 3.48 percent.
- Highly educated women are less likely to have a second child but highly educated men prefers a larger family, which reflects a conflict in fertility preference between highly educated couples.
- Richer families are more likely to have a second child and having a son, as they could afford raising another child and also extra cost/penalty of sex selection/breaking the birth quota.