

Peer Effects in Fertility and Son Preference in China

Jixuan (Edie) Yao and Michael S. Delgado

Department of Agricultural Economics
Purdue University

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Introduction: Research focus

This paper is about China, and whether and to what extent “peer effects” influence the decision to have a second child, and whether or not to have a son.

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

Lots to unpack... “peer effects”, Chinese culture and policies, socioeconomic importance, our analysis (identification/estimation) and findings

Definition of Peer Effects (Brock and Durlauf, 2001)

“... the utility or payoff an individual receives from a given action depends directly on the choices of others in that individual’s reference group...”

- ▶ These models are inherently spatial econometric models

“When these spillovers are positive in the sense that the payoff for a particular action is higher for one agent when others behave similarly, the presence of social interactions will induce a tendency for conformity in behaviour across members of a reference group.”

Quite simply: we want to find out whether the fact that more of my neighbors have a second child (or a son) makes it more likely for me to choose the same.

Road Map

1. Introduction

2. Background

- ▶ Cultural background in son preference
- ▶ Policy evolution

3. Literature Review

4. Model

- ▶ Structural binary choice model which allows for peer effects
- ▶ Identification of peer effects

5. Data

- ▶ China Family Panel Studies (survey year: 2016)

6. Results

7. Conclusion

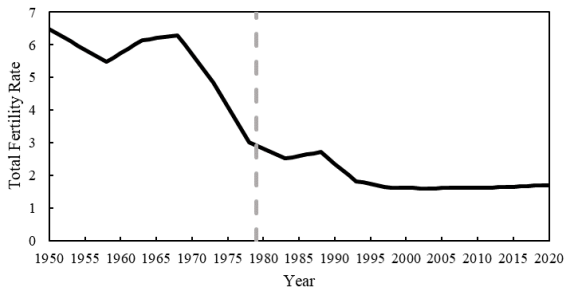
Introduction: Preference for male offspring in China

It is well-known that Chinese families traditionally have a preference for sons:

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

Traditionally, each family will have (at least) one son, and “the more (children/sons) the merrier”.

Total Fertility Rate in China (1950 - 2020)



Source: United Nations - World Population Prospects

Introduction: preference for male offspring in China

Of course, the infamous “one-child-policy” made it difficult to follow these two traditions:

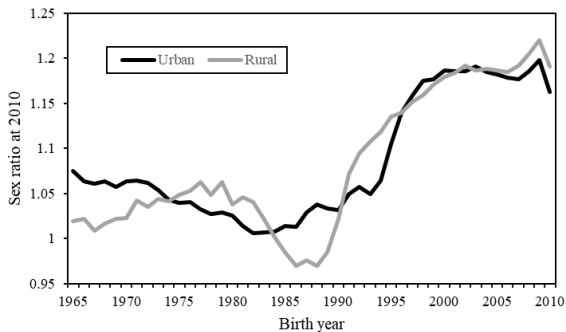
- ▶ Multiple children
- ▶ At least one son

To make sure a desired son is born within the strict birth quota (usually less than two), there has been rampant sex-selection including

- ▶ sex-selective abortion (ultrasounds to detect fetal sex is illegal in China)
- ▶ female infanticide
- ▶ female adoption
- ▶ hiding females from officials (no citizenship registration until school age)

... which leads to a high gender imbalance and the problem of “missing women”.

Introduction: Preference for male offspring in China



Source: 2010 China Population Census

Figure 1: Sex ratio by birth year at 2010

Introduction: Importance

And these lead to real, economic consequences:

- ▶ increase in crime rates
- ▶ increased spread of disease such as HIV
- ▶ soaring “bride price” and increased savings for sons
- ▶ increased trafficking of women as brides

Understanding the motivation of fertility decision and sex selection is of vital importance in social stability and the well-being of both males and females.

Introduction: Relevant cultures

Cultural background different from the western:

- ▶ Wives leave their parents and cling to the husbands, but husbands still keep a strong connection to their parents.
- ▶ Inter-generational tension: bargaining power of the parents-in-law of the female in family decisions is strong.
- ▶ Females do not change the family name after marriage, and conventionally children take the father's family name.
- ▶ “keep up with the Zhanges”: not widely discussed in economic literature related to family planning but anecdotally exists. → a potential peer effects in fertility and son preference

Introduction: Channels of peer effects

We focus on estimating peer effects in two family planning decisions: (1) having a second child; (2) having a son. Why would a family care what their peers are doing?

- ▶ **Cultural reason:** having a son (or/and more children) is a signal of fulfilling a social obligation. If a family fails to have a son (or/and more children) while most of their peers do, it generates a pressure in their daily life.
→ Having a son gives a family pride while not having a son as their peers do brings shame.
- ▶ **Competition for intra-family resource allocation:** having a son increases the probability of more inheritance and other resource allocation (e.g., nutrition intake, education, housing) from grandparents.
→ the motivation of having a son is intensified if a man's brother has sons but he does not.

Introduction: Channels of peer effects

(...continue) Why would a family care what their peers are doing?

- ▶ **Competition for local resource allocation:** having a son (more children) as human capital to compete for more local resources such as being elected as local officials and other related economic benefits.
→ In general having a son or more children (especially in rural area) brings more respect and power.
- ▶ (for females) **Increase the intra-family bargaining power.**
→ The willingness to have a son can be triggered/manifested by expecting their sister-in-law (wives of her husband's brothers) to have sons

Background: Child-bearing policies in China

- ▶ In 1979, the government announced the “one-child policy”
- ▶ In 1984, two children if both parents are each an only child
- ▶ 1985 – 2011, 19 out of 34 provinces legalized the “1.5 child policy” – a rural family can have a second child if first child is a girl
 - ▶ 18 of the 19 provinces implementing before 2003
- ▶ In 2014, two children if only one parent is an only child
- ▶ In 2016, removed all restrictions on a second child

Background



Figure 2: The national stamp in 1980 and 2016 (Year of the Monkey)

Background: Family structure

Most families have one or two children because of the birth quota.

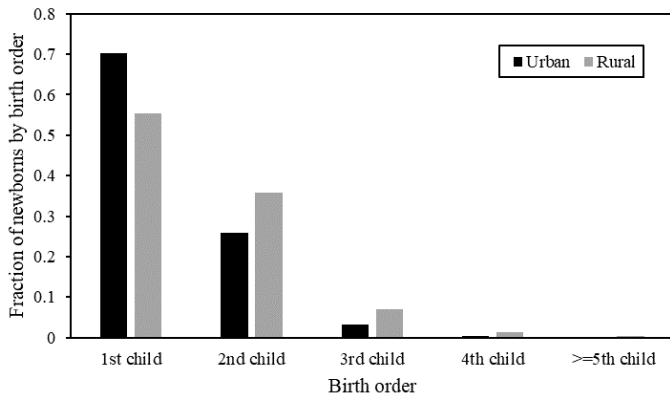


Figure 3: Fraction of newborns by birth order

Source. 2010 China Population Census: Nov. 1st, 2009 - Oct. 31st, 2010

Background: Imbalanced sex ratio

From the China Nationwide Census of 2010:

	Natural Level	Urban China	Rural China
Sex Ratio at Birth	1.03-1.07	1.16	1.19

The World Economic Forum ranks China in the 153rd position out of 153 countries in terms of the sex ratio at birth

Conventional wisdom: “30 million wifeless men in China by 2030”

- ▶ Roughly $4.5 \times$ the population of Indiana

Background: Imbalanced sex ratio

- ▶ The pressure of having a son increases by birth order.
- ▶ Previous sibling's sex influences the fertility decision in having an additional child.

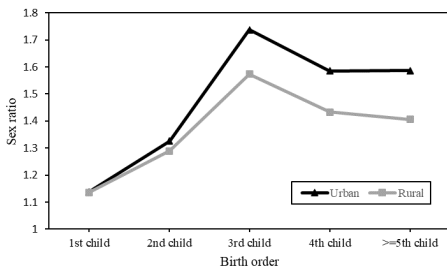


Figure 4: Sex ratio by birth order

Source. 2010 China Population Census: Nov. 1st, 2009 - Oct. 31st, 2010

- ▶ Sex ratio is higher for urban area compared to rural area, mostly because of the more flexible birth quota in the rural area.

Background: Prenatal sex selection

Ultrasound technology has been widely used since 1980s (*Chen et al. 2013, Almond et al. 2019*).

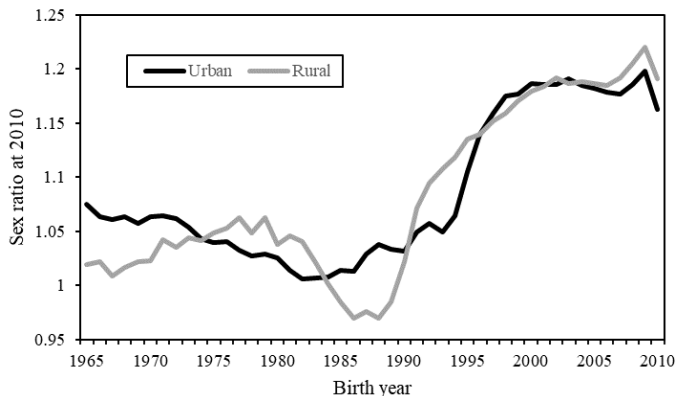


Figure 5: Sex ratio at 2010 by birth year

Source. 2010 China Population Census: Nov. 1st, 2009 - Oct. 31st, 2010

Background: Late registration for early ages

- ▶ Age 1: no registration until one year old; small difference between sex.
- ▶ Age 6: school age; large difference between sex.
- ▶ Age 21: marriage age; very mild difference between sex.

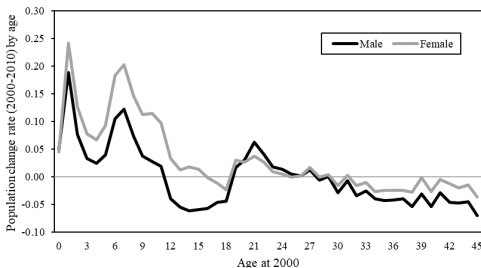


Figure 6: Population change rate from 2000 to 2010 by age

Source. 2000 and 2010 China Population Census

Literature Review: Imbalanced sex ratio

Discussion of the phenomenon of imbalanced sex ratio:

- ▶ Many papers have empirically documented the unbalanced sex ratio in China (e.g., *Ding & Hesketh 2006, Zhu et al. 2009*), as well as in India (e.g., *Gupta 1987, Griffiths et al. 2000*) and South Korea (*Park & Cho 2009*).
- ▶ Mortality rate was higher for female offspring (*Zhang 1990*);
- ▶ Male births come about 0.34 years later than female births(*Ebenstein 2010*);
- ▶ 480,000 girls were aborted in China over the 1995 to 2005 interval (*Bhalotra & Cochrane 2010*).

Literature Review: Reason of imbalanced sex ratio

This documented evidence of son preference stimulates discussion on the reasons for this phenomenon:

- ▶ **Boys are more economically valuable than girls through the labor market.**
 - ▶ Land reforms in 1978 intensified son preference as farming is heavy labor and families prefer having son(s). (*Almond et al. 2019*)
 - ▶ *Qian 2008* shows that when females bring more income into the household from the female-preferred labor market of tea-leaf harvesting, sex selection at birth is less frequent.
 - ▶ The average value of a first son in China is 1.85 times the annual family income, whereas the value of a first girl is only 0.43 times the annual family income (*Ebenstein 2011*).
 - ▶ The recent 2016 two-child policy may worsens the sex ratio as females have been crowded out of the labor market and have less economic values (*Zeng & Hesketh 2016*).

Literature Review: Reason of imbalanced sex ratio

▶ **Education of parents.**

- ▶ Highly educated women prefer a smaller family size and have statistically weaker preference for sons (*Zhang & Spencer 1992, Abrevaya 2009*).
- ▶ No evidence that highly educated women have fewer children in rural China (*McElroy & Yang 2000*).

▶ **Widely accessible ultrasound technology**

- ▶ By 1985, Chinese residents in more than 60 percent of counties had access to ultrasounds for prenatal testing (*Chen et al. 2013*).
- ▶ By 1985, ultrasound technology was available in all provincial capitals, such that families could travel to their provincial capital for an ultrasound (*Almond et al. 2019*).

Literature Review: Reason of imbalanced sex ratio

- ▶ **Cultural reasons: peer effects and social norm.**
 - ▶ No son leads to shame, especially in rural areas; households face enormous pressure to have a son (*Chan et al. 2002*).
 - ▶ A higher female suicide rate in rural areas of China is linked to low female status in family decision-making under traditional patriarchal structure (*Chan et al. 2002, Meng 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*)
 - ▶ Shame caused from deviating from others would push people to align with the majority (*Bedford & Hwang 2003*)

Literature Review: Peer effects and social norm

- ▶ **A classification of peer effects and social norm.**

Example:

- ▶ **Peer effects:** a family that the wife is at her reproductive age expects other peers to have sons → have a son as well to keep up with their peers.
 - ▶ **Social norm:** the regional culture teaches a girl (or a boy) from childhood to have a son → have a son after the girl reaches reproductive age (or the boy gets married in the future), regardless of what their peers are doing.
-
- ▶ 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** (e.g. *Qian 2008, Abrevaya 2009, Ebenstein 2010, Ebenstein 2011*)

Literature Review: Social impacts of imbalanced sex ratio

Social impacts of this high ratio and associated population control policies:

- ▶ A high sex ratio is correlated with higher marriage rates for women and lower female participation in the labor market (*Angrist 2002*)
- ▶ A high sex ratio motivates household saving, as Chinese families with sons anticipate a more competitive marriage market for their son (*Wei & Zhang 2011*).
- ▶ One-child policy increased the education and health conditions of the post-policy generation as a result of increased human capital investment on each child (*Rosenzweig & Zhang 2009*).
- ▶ Ways to avoid punishment of having extra children beyond the birth quota: late registration of unwanted daughters (*Shi & Kennedy 2016*) and fake twins (*Huang et al. 2016*).

Model: Some basic ideas

1. These models are essentially spatial econometric models
 - ▶ “Network” structure, but this is basically “distance” or “space”
 - ▶ Often grounded in game theory to establish micro-foundations
 - ▶ But notice that “my outcome, y_i ” depends on “your outcome, y_j ”
2. The model is a system of simultaneous equations model
 - ▶ With observational data, we get an observed equilibrium
 - ▶ Identification is important
3. As it turns out, the spatial structure and other nonlinearities (e.g., binary choice probability function) somewhat generally facilitate identification

Model: Spatial Structure

Define peers of a family as other families living within the same county.

1. Peer-to-peer network data is not available
2. Much social interaction in China occurs at the county level
 - ▶ Particularly true in rural areas
 - ▶ Lots of local economic activity is in the county
 - ▶ In China, cities > counties > villages

So, this means that all individuals interact equally with all others in their county.

Model: Identification of Peer Effects

Identification of peer effects requires that we can control for relevant factors that can also generate equilibrium-patterns in child choice (or child gender).

Contextual effects: characteristics of the group (network)

- ▶ e.g., average level of education/income in the group

Correlated effects: regional-level common factors

- ▶ e.g., local laws, regulations, or culture
- ▶ In China, the relevant level is province

Individual effects: characteristics of the individual

- ▶ e.g., individual income, family background, occupation

Model: Household Utility

Brock and Durlauf (2001) and Lee et al. (2014) propose utility-based models of binary choice under peer influences

- ▶ Binary choice structure has inherent nonlinearities that are convenient in terms of identification
- ▶ Starting from a utility function allows us to separate peer effects from other factors, and then work towards an empirical model

Model: Household Utility

Define household utility as

$$V(y_i) = x_i\alpha y_i + w_iX\delta y_i + \gamma w_iM y_i + u_g y_i + \epsilon(y_i) \quad (1)$$

- ▶ $y_i = 1$ denotes the decision to have 2nd child (a son)

$$y_i = 1 \text{ if } V(1) > V(-1)$$

- ▶ $x_i\alpha y_i$ is private component of utility (x are control variables)
- ▶ $w_iX\delta y_i$ is public “environmental” part
 - ▶ w_i is the spatial vector, and = 1 if peers, = 0 if not peers
- ▶ $\gamma w_iM y_i$ is public “endogenous” part (peer effect)
- ▶ u_g are province level dummies (correlated effects)
- ▶ ϵ follows a logistic distribution

Model: Endogenous Social Component

$$V(y_i) = x_i\alpha y_i + w_iX\delta y_i + \gamma w_iM y_i + u_g + \epsilon(y_i) \quad (2)$$

Individuals make a choice depending on the choices their peers make

- ▶ In a static model, a household forms an expectation as to the decision that others make
- ▶ M is a vector of expectations about the decisions others will make
 - ▶ Thus, w_iM is the average expected decision of my peers
 - ▶ M is solved by a system of equations through

$$M = \tanh(X\alpha + WX\delta + \gamma WM + u_g) \quad (3)$$

- ▶ M depends on unknown parameters from the utility function, and so we need to solve the utility function and M iteratively.

Model: ML Estimation

Under the logistic distribution, and given that $y_i = 1$ if $V(1) > V(-1)$, the probability of household choosing y_i can be solved as:

$$P_1 = P(y_i = 1) = \frac{1}{1 + \exp[-2(x_i\alpha + w_iX\delta + \gamma w_iM + u_g)]}$$
$$P_{-1} = P(y_i = -1) = \frac{1}{1 + \exp[2(x_i\alpha + w_iX\delta + \gamma w_iM + u_g)]} \quad (4)$$

and we can use MLE to estimate $\theta = [\alpha', \delta', \gamma]$

$$\ln L(\theta | Y, X, W) = \sum_{i=1}^n \left(\frac{1 + y_i}{2} \ln P_1 + \frac{1 - y_i}{2} \ln P_{-1} \right) \quad (5)$$

Data: Data source and sample selection

China Family Panel Studies (CFPS), survey year is 2016

Sample 1 (2,206): For the second child question, focus on all families for which

- ▶ wives are between 45 to 54 years old when the survey was conducted (born 1962-1971)
- ▶ have 1-2 children
- ▶ no minority provinces (more than 10 percent of population are minorities, such as Tibet and Xinjiang)

Sample 2 (3,348): For the sex choice question, focus on all families for which

- ▶ wives are between 45 to 54 years old when the survey was conducted (born 1962-1971)

Data: Summary statistics

Table 1: Summary Statistics of Sample I

Variable	Mean	Standard deviation	Min	Max
<i>Individual controls</i>				
Mother's education years	5.85	4.59	0	18
Father's education years	7.82	4.12	0	18
Annual family income in unit of 50,000 <i>yuan</i>	1.43	1.2	0.06	8.7
Whether engaged in ag production	0.57	0.49	0	1
Rural indicator	0.51	0.5	0	1
First child is a girl	0.45	0.5	0	1
Either of parent has ag <i>hukou</i>	0.76	0.43	0	1
Qualified for 1.5 child policy	0.22	0.42	0	1
Mother's age at first birth	23.64	7.35	16	45
Living with father-in-law of the mother	0.1	0.3	0	1
Living with mother-in-law of the mother	0.18	0.38	0	1
<i>Contextual controls</i>				
Education years of peers	6.8	1.96	0	13.44
Annual income of peers in unit of 50,000 <i>yuan</i>	1.42	0.62	0.26	5.83
% of peers with firstborn daughter	0.45	0.14	0	1
Mother's age at first birth of peers	23.61	1.41	19.75	33
% of peers living w/ either in-law of the mother	0.21	0.12	0	1
<i>Other descriptive statistics</i>				
Number of households in each county	20.02	7.35	1	36
Age of the 1 st child	25.72	4.46	1	37
Age of the 2 nd child if applicable	21.65	6.03	1	34

Data: Summary statistics

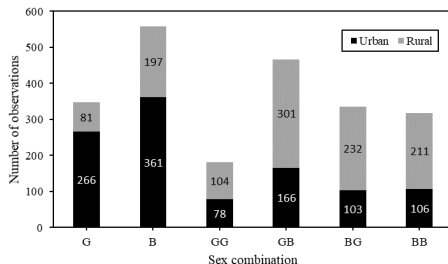


Figure 7: Sex composition of children for single and two children families

- ▶ The number of GB families doubles GG families in urban area and triples in rural area.
- ▶ Part of the GG families are those who have given up trying to have sons; part of GB families are those who have succeeded.

Data: Summary Statistics

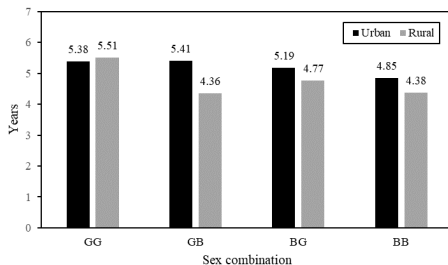


Figure 8: Age gap between two children (if applicable) in sample I

- ▶ Boys actually come sooner than girls if the first child is a girl!
 - ▶ Rural households schedule a second child earlier when they have firstborn daughters.
 - ▶ Some rural GG families may have had sex-selective abortions before another unwanted girl was tested and they gave up.

Data: Summary statistics

Table 2: Summary Statistics of Sample II

Variable	Mean	Standard deviation	Min	Max
<i>Individual controls</i>				
Mother's education years	5.51	4.55	0	18
Father's education years	7.47	4.16	0	18
Annual family income in unit of 50,000 <i>yuan</i>	1.39	1.18	0.06	9.29
Whether engaged in ag production	0.62	0.49	0	1
Rural indicator	0.56	0.5	0	1
Either of parent has ag <i>hukou</i>	0.8	0.4	0	1
Mother's age at first birth	23.4	3.29	16	45
Living with father-in-law of the mother	0.1	0.3	0	1
Living with mother-in-law of the mother	0.17	0.37	0	1
Province indicator with 1.5 child policy implemented	0.71	0.46	0	1
Province indicator of minority > 10%	0.17	0.38	0	1
<i>Contextual controls</i>				
Education years of peers	6.42	1.91	1.15	13.44
Annual income of peers in unit of 50,000 <i>yuan</i>	1.38	0.55	0.43	5.83
Mother's age at first birth of peers	23.36	1.2	20	32.5
% of peers living w/ either in-law of the mother	0.21	0.1	0.03	1
<i>Other descriptive statistics</i>				
Number of households within a county	23.66	7.44	1	37
Age of 1st child	26.06	4.42	1	37

Data: Summary Statistics

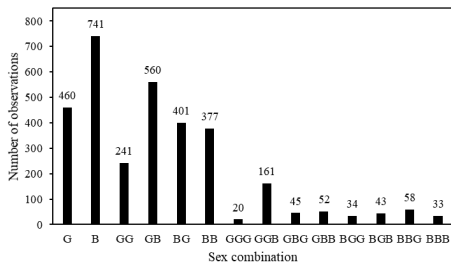


Figure 9: Sex composition of children for families with less than 4 children in sample II

- ▶ Before a boy is born to a family, sex ratio on the next parity is very high; but once a boy is born, sex ratio on later parities appears more balanced.

Result: Regression of having a second child

Table 3: Whether to have a second child

	(1)	(2)	(3)	(4)	(5)	(6)
Peer effects			0.464*** (0.064)	0.250** (0.118)	0.516*** (0.091)	0.388*** (0.146)
<i>Individual controls</i>						
Mother's edu years	-0.031*** (0.007)	-0.021*** (0.007)	-0.036*** (0.006)	-0.021*** (0.007)	-0.041*** (0.008)	-0.032*** (0.009)
Father's edu years	0.017** (0.007)	0.017*** (0.007)	0.017** (0.007)	0.016** (0.007)	0.009 (0.008)	0.019** (0.008)
Annual family income per 50,000 <i>yuan</i>	0.002 (0.022)	0.048 (0.024)	0.014 (0.019)	0.053** (0.023)	0.075*** (0.026)	0.069** (0.028)
Whether engaged in ag production	0.256*** (0.063)	0.087 (0.066)	0.231*** (0.057)	0.079 (0.064)	0.123* (0.075)	0.102 (0.080)
Rural indicator	0.387*** (0.059)	0.377*** (0.060)	0.336*** (0.052)	0.347*** (0.059)	0.367*** (0.068)	0.340*** (0.074)
First child is a girl	0.065 (0.062)	0.081 (0.065)	0.090 (0.058)	0.062 (0.068)	0.403*** (0.080)	0.341*** (0.068)
Either of parent has ag <i>hukou</i>	0.297*** (0.077)	0.326*** (0.080)	0.158** (0.066)	0.257*** (0.075)	0.389*** (0.087)	0.370*** (0.091)
Qualified for 1.5 child policy	0.726*** (0.092)	0.689*** (0.093)	0.573*** (0.080)	0.618*** (0.094)	0.655*** (0.122)	0.669*** (0.126)
Mom age at 1st birth	-0.063*** (0.008)	-0.063*** (0.008)	-0.042*** (0.007)	-0.060*** (0.008)	-0.068*** (0.009)	-0.084*** (0.009)
Living with fa-in-law of the mother	-0.166* (0.093)	-0.139 (0.095)	-0.114 (0.091)	-0.127 (0.097)	-0.122 (0.113)	-0.127 (0.115)
Living with mo-in-law of the mother	0.173** (0.074)	0.115 (0.075)	0.100 (0.077)	0.103 (0.098)	0.188* (0.097)	0.124 (0.080)

Result: Marginal effects of having a second child

Table 5: Marginal effects of having a second child in percentage points

	(1)	(2)	(3)	(4)	(5)	(6)
Peer effects			42.53	23.70	45.83	35.08
<i>Individual controls</i>						
Mother's education years	-1.47	-1.01	-1.71	-1.00	-1.85	-1.46
Father's education years	0.81	0.79	0.83	0.75	0.40	0.85
Annual family income in unit of 50,000 <i>yuan</i>	0.08	2.25	0.66	2.53	3.42	3.12
Whether engaged in ag production	12.06	4.14	10.99	3.75	5.65	4.65
Rural indicator	18.03	17.65	15.80	16.36	16.60	15.29
First child is a girl	3.05	3.81	4.23	2.92	17.99	15.15
Either of parent has ag <i>hukou</i>	14.34	15.81	7.61	12.44	18.46	17.43
Qualified for 1.5 child policy	29.19	28.24	24.27	25.95	25.59	25.75
Mother's age at first birth	-2.96	-2.98	-1.99	-2.85	-3.08	-3.78
Living with father-in-law of the mother	-8.00	-6.73	-5.51	-6.16	-5.68	-5.91
Living with mother-in-law of the mother	7.89	5.34	4.65	4.79	8.20	5.44
<i>Contextual controls</i>						
Education years of peers		-4.96		-3.48		-4.17
Annual income of peers in unit of 50,000 <i>yuan</i>		-6.12		-4.86		-0.46
% of peers with firstborn daughter		-24.33		-24.99		-16.91
Mother's age at first birth of peers		3.59		3.11		2.87
% of peers living w/ either in-law of the mother		-6.98		-7.05		1.75

For continuous variable, the marginal effects is the change of probability in having a second child (in percentage points) if the continuous variable increases by one unit; for discrete variable, the marginal effects is the difference between the probabilities of having a second child when the discrete variable changes from zero to one; for the endogenous effects, the marginal effects is the difference between the probabilities of having a second child when the leave-out mean of peer's outcome expectation M changes from -1 to 1 , as the way it is defined.

Results of having a second child: Interpretation

To interpret these estimates, we need to translate the estimates into changes in $Prob(y_i = 1)$

Complete change: $y_j = -1$ to $y_j = 1$ for all j

Our estimate of $\hat{\gamma} = 0.388$ implies a change in $P(y_i = 1)$ of $\approx 35\%$

Marginal change: one more peer has a second child

At the average, 19 neighbors and 11 have a second child:

$11/19 \approx 60\%$ current status

$12/19 \approx 63\%$ marginal change

Our estimate of $\hat{\gamma} = 0.388$ implies a $\approx 1.8\%$ increase in probability

Results of having a second child: Interpretation

Change of the marginal two-child family in a peer effects model versus in a model absent peer effect.

- ▶ a marginal two-child family in a model absent peer effect (indifferent in having a second child)
→ not a marginal family in the peer effects model; and this family would choose to have a second child.

Some potential welfare-influencing effects of the dependence in decision-making:

- ▶ **Intra-household resource allocation between both children, consumption, and savings.**
Single daughter of a marginal family in the model absent peer effects → may ended up having a younger brother
 - ▶ This elder daughter could have less resource allocation (e.g. education, personal-development, nutrition intakes).

Results of having a second child: Interpretation

(Continue...) Some potential welfare-influencing effects:

- ▶ **Female labor market participation.**

Single-child family on the marginal of trading off having a second child and wife changes to part-time/quits the labor market in the model absent peer effects

→ have a second child and wife changes to part-time/quits the labor market in a peer effects model

- ▶ potential direction in the change of female labor market participation may be further manifested under the two-child policy.

Results of having a second child: Interpretation

From the population policy perspective, a significant peer effect interacts with policy objectives and eventually could facilitate to achieve policy goals.

- ▶ **When the government aims at a population control** (e.g., one-child policy in 1980s):
More households choose to have single child
→ keep up with the peers
- ▶ **When the government aims at a population growth** (e.g., two-child policy since 2016):
More households choose to have two children
→ keep up with the peers

Result: Regression of whether to have a son

Table 6: Whether to have a son during reproductive age

	(1)	(2)	(3)	(4)	(5)	(6)
Peer effects			0.445*** (0.109)	-0.053 (0.240)	0.441*** (0.128)	-0.059 (0.268)
<i>Individual controls</i>						
Mother's edu years	-0.028*** (0.006)	-0.016*** (0.006)	-0.027*** (0.006)	-0.014** (0.006)	-0.025*** (0.007)	-0.011 (0.007)
Father's edu years	0.011* (0.006)	0.017*** (0.006)	0.013** (0.006)	0.014** (0.006)	0.013* (0.007)	0.013* (0.007)
Annual family income per 50,000 <i>yuan</i>	0.044** (0.020)	0.050** (0.022)	0.038** (0.017)	0.049** (0.020)	0.083*** (0.022)	0.073*** (0.023)
Whether engaged in ag production	0.128** (0.058)	0.106* (0.060)	0.111** (0.056)	0.100 (0.061)	0.161* (0.064)	0.063 (0.069)
Rural indicator	0.160*** (0.055)	0.130** (0.056)	0.152*** (0.050)	0.130** (0.056)	0.097* (0.056)	0.117* (0.065)
Either of parent has ag <i>hukou</i>	0.299*** (0.066)	0.283*** (0.068)	0.221** (0.065)	0.317*** (0.072)	0.292*** (0.075)	0.321*** (0.084)
Mother's age at first birth	-0.028*** (0.007)	-0.018*** (0.007)	-0.020*** (0.006)	-0.021*** (0.007)	-0.031*** (0.007)	-0.030*** (0.007)
Living with fa-in-law of the mother	0.029 (0.085)	0.036 (0.086)	0.032 (0.084)	0.042 (0.087)	-0.005 (0.094)	0.001 (0.098)
Living with mo-in-law of the mother	0.065 (0.066)	0.032 (0.066)	0.024 (0.066)	0.041 (0.067)	0.076 (0.073)	0.053 (0.074)
Province indicator with 1.5 child policy	0.194*** (0.048)	0.216*** (0.052)	0.142*** (0.038)	0.236*** (0.066)		
Province indicator of minority > 10%	-0.142** (0.058)	-0.215*** (0.058)	-0.096** (0.042)	-0.247*** (0.074)		
			⋮			

Result: Regression of whether to have a son

Table 7: Continued... Whether to have a son during reproductive age

	(1)	(2)	(3)	(4)	(5)	(6)
			⋮			
<i>Contextual controls</i>						
Edu years of peers		-0.099*** (0.016)		-0.098*** (0.029)		-0.122*** (0.036)
Annual income of peers per 50,000		-0.020 (0.046)		-0.017 (0.046)		-0.020 (0.069)
Mother's age at first birth of peers		0.044*** (0.008)		0.045*** (0.014)		0.056*** (0.017)
% of peers living w/ either in-law		-0.056 (0.227)		-0.101 (0.231)		-0.040 (0.282)
Constant	0.869*** (0.185)	0.217 (0.239)	0.519*** (0.176)	0.270 (0.246)	0.810*** (0.215)	0.446 (0.288)
Province FE					Y	Y
Number of obs.	3,348	3,348	3,348	3,348	2,811	2,811
log-likelihood	-1,587	-1,569	-1,584	-1,569	-1,270	-1,263

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Contextual controls are leave-i-out mean of peers' characteristics for each individual. Province indicator with 1.5 child policy implemented and province indicator of minority population accounts for more than 10 percent of population are removed from control list when province FE are added.

Result: Marginal effects of whether to have a son

Table 8: Marginal effects of ever having a son in percentage points

	(1)	(2)	(3)	(4)	(5)	(6)
Peer effects			35.00	-3.07	33.07	-3.22
<i>Individual controls</i>						
Mother's education years	-0.87	-0.49	-0.84	-0.42	-0.71	-0.33
Father's education years	0.34	0.50	0.40	0.43	0.37	0.37
Annual family income in unit of 50,000 <i>yuan</i>	1.34	1.50	1.16	1.48	2.39	2.10
Whether engaged in ag production	3.99	3.25	3.47	3.06	3.54	1.83
Rural indicator	4.97	3.95	4.75	3.98	2.81	3.36
Either of parent has ag <i>hukou</i>	10.19	9.46	7.37	10.77	9.35	10.34
Mother's age at first birth	-0.87	-0.54	-0.62	-0.63	-0.90	-0.87
Living with father-in-law of the mother	0.88	1.06	0.96	1.24	-0.14	0.04
Living with mother-in-law of the mother	1.93	0.96	0.72	1.22	2.12	1.48
Province indicator with 1.5 policy	7.71	6.89	4.55	7.59		
Province indicator of minority $\hat{\iota}$ 10%	-4.59	-7.07	-3.09	-8.25		
<i>Contextual controls</i>						
Education years of peers		-3.00		-2.96		-3.48
Annual income of peers in unit of 50,000 <i>yuan</i>		-0.62		-0.52		-0.57
Mother's age at first birth of peers		1.34		1.35		1.60
% of peers living w/ either in-law of the mother		-1.72		-3.17		-1.16

For continuous variable, the marginal effects is the change of probability in ever having a son (in percentage points) if the continuous variable increases by one unit; for discrete variable, the marginal effects is the difference between the probabilities of ever having a son when the discrete variable changes from zero to one; for the endogenous effects, the marginal effects is the difference between the probabilities of ever having a son when the leave-out mean of peer's outcome expectation M changes from -1 to 1 , as the way it is defined.

Results of having a son: Interpretation

We did not find that the peer effects are significant for the choice to have a son.

- ▶ In that model, it seems the driving factor are the **individual** and **contextual effects**.
 - ▶ **Individual effects:** Income, ag hukou, mother's age
 - ▶ **Contextual effects:** Peers' education, age of peer mothers

One year increase of education in the peer group decreases the probability of having a son by 3.48 percent!

Recall, the (insignificant) peer effect in this model is $\hat{\gamma} = -0.059$

- ▶ Complete change computation: $\Delta Prob(Y_i = 1) = -3.22$
- ▶ This is a very small effect (and, again, is not statistically significant)

Conclusion

- ▶ We believe understanding the role that peer effects plays in Chinese family planning is important
 - ▶ Social considerations, economic considerations
- ▶ Complex social phenomenon
 - ▶ Difficult to disentangle
 - ▶ Hope to have made a good first step in this regard
- ▶ We find that peer effects matter for the decision to have a second child, but not for the decision to have a boy.

Future work and extension

- ▶ Compare on intra-family resource allocation on the elder daughter if she has a younger sister with a younger brother.
- ▶ Whether the two-child policy decreases labor demand on women and/or enlarges the gender wage gap.
- ▶ The bargaining power women gain by children taking the mother's family name.
 - ▶ Couples with the same common family names (e.g. Zhang, Li, Wang, etc.) form a natural experiment where children effectively take the mother's family name.
- ▶ Compare economic behaviors in expenditures (e.g., beauty treatment, entertainment, car, relationship building), and housework allocation between a couple for families with sons with families without a son.
- ▶ Whether an increasing dowry (groom's family pays to the bride's family) could reduce the sex ratio.

Thank you!