THE INFLUENCE OF ONE CHILD POLICY (OCP) OF CHINA UPON THE SEX RATIO OF NEW BORN (SRNB) IN JIANGSU PROVINCE

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By

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ABSTRACT

One Child Policy (OCP) has been launched by Chinese government since 1980s, with the aim to control the rapid growth of Chinese population and save resources for economic reform. While OCP has contributed to Chinese economic take-off, its negative impact has loomed in recent years: birth control causes sex-selective abortions, leading to imbalanced sex ratio in most provinces in China. The imbalanced sex ratio further leads to social problems (like rape and prostitution) which impact social security.

Our research takes Jiangsu Province as an example, collects data from Jiangsu Statistics Bureau, aiming to find out and test the causal effect of OCP upon the variation of sex ratio in Jiangsu Province. Also, based on the regression and causality test results, we plan to bring up policy advice to Jiangsu provincial government to loosen OCP for social stability.
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INTRODUCTION

In May 2015, Baidu News, one of the most popular News portal in China, quoted from Jiangsu Bureau of Statistics: Until April 2015, there had been 530,000 unmarried males at marriage age in Jiangsu province, which is an vivid example of the problems caused by imbalanced sex ratio under strict birth control of OCP.

Specifically, the imbalance of male and female populations made it harder for males to find spouses, as the male population is unproportionately larger than that of female. Imbalanced sex ratio has gone beyond a fertility phenomenon and has raised social debates since OCP has started to generate influence in the 1990s, which was launched in the 1970s and aimed to control the rampant growth of Chinese population.

It is pointed out in One Child Policy and Its Influence on China’s Demography(Weipin Liu, 2014)that Chinese government’s conservatism and the ensuing policy viscosity has led to the long live of birth control under OCP, which should have been called off by early 00s, when the sex ratio had gone imbalanced.

One of the most direct negative influence of OCP on demography is that as second child is prohibited, families now are smaller than before OCP. And this constraint on family size led to sex choice behavior which (like abortion and abandoning) is illegal and would interfere natural Sex Ratio of New Born (SRNB).

This research focuses on OCP’s influence on SRNB and picks Jiangsu province as the research object, where the enforcement of OCP is the most strict in China, and that ensures the isolation of our theoretical model from other interfering variablesl. Another reason for choosing
Jiangsu province is that the official demographic database of Jiangsu province is one of the most comprehensive in China so that less missing values would there be in our regression analysis.

To sum up, despite the contribution of OCP on overall economic growth, our research is to find out statistical correlation between OCP and the imbalance of SRNB. Finally, we will bring up policy advice with the aim to mitigate the imbalance of SRNB.
BACKGROUND

One Child Policy (OCP) has been the basic national policy of China since 1980s, as an important supplement of the Reform and Opening Up which aims to accelerate the modernization and economic growth of China. Under OCP, couples can only have one child despite its sex, and having additional kids would be fined an amount which equal average workers' salaries for half a year. Central government believed that by controlling the population growth, resources could be saved to support the economic development, and people’s living standard could also be raised when less people share limited resources.

OCP worked in controlling population growth and boost economy. It is estimated that the OCP has decreased 40 million new born in Jiangsu since it was launched, and the indexes of civil income, education and health care have hugely increased since 1978.

On the other hand, OCP has generated side effects since it manipulates sex ratio by political will. Under OCP, couples can only have one child and it has not been relaxed until 2014, when imbalanced sex ratio and aging society had caused social problems and were heatedly discussed during the Two Meetings\(^1\).

The constrained family size led to a social problem. In traditional Chinese culture, especially in Jiangsu, one of the origin of Chinese philosophy, boys are preferred to girls because they can feed the family and even more importantly, only boys are able to continue the family line. So when only one child is allowed by law, couples, supported by other family members, would illegally bribe hospitals to do B Ultrasound to test the sex of embryos. Once the test result is

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\(^1\)Two Meetings is the annual plenary sessions of the national or local People's Congress and the national or local committee of the Chinese People’s Political Consultative Conference. It is used to discuss and figure out solutions for important social economic issues of China.
female, some couples would choose to abort and try next time for a male.

Both due to the increase of sex selective abortion and government’s loose control over abortion, male population has been widening its size gap between female population in Jiangsu. Till now, there are still sex selective abortions and it could not be eliminated in a short time, even though OCP has been relaxed and second child is allowed conditionally.

“Imbalanced sex ratio could cause a series of social problems”, said Qu Liang, a Chinese social scientist, in a media interview, “The most direct impact of imbalanced sex ratio on civil life is that it is harder for females to find spouses. Once one cannot find a spouse for marriage, pressure from family could lead to anxiety and other mental disorders; If one lower his standard and get married with one he would not marry otherwise, possibility is higher that there will be conflicts or even divorce.”

To sum up, the imbalanced sex ratio is potentially a side effect of OCP and we would dig deeper into their statistical correlation in our following research part.
LITERATURE REVIEW

One Child Policy (OCP) was launched in the 1980s, with the aim to control the rapidly growing population of China and to support the economic transformation and development, which was sensible under the specific background. When it comes to the new century, the cumulative negative side of OCP loomed: the sex ratio has become so imbalanced that it could lead to various social problems, including large unmarried population and the ensuing social disorders and criminals. So since 2000, there have been demographic studies on the impact of OCP upon Chinese demography and even economics, which set the foundation of our study yet with some blanks and vagueness for us to fill in and clarify.

Academic studies on the impact of One Child Policy on demography was launched by Chinese central government since 2000, when the sex ratio of China had been skewed and the government started to realize the negative influence of the basic national strategy on society. International studies also goes back to early 2000s, which supplement domestic studies on the influences of OCP on demography.

Aboluo Zheng (2016) in his *A Statistical Analysis on the Influence of One Child Policy* ran a regression of SRNB in China between 2000 to 2010 on the fertility rate as a proxy variable of OCP. While it was a inspiring methodology of figuring out the statistical correlation between OCP and SRNB, it failed to take covariates which also influence the sex ratio into consideration, and this omission would lead to the upward bias of the explanatory power of OCP on the variation of SRNB.

Li Liu (2016) concluded in *Family Planning at the Turning Point in China* that Family
Planning and its vital component, OCP, has come to a point when it is urgent for the central government to loosen birth control in China in order to gain momentum for the next economic growth peak by 2035. In the research, he applied the Demographic Growth Model to calculate the GDP of China in 2035 and brought up a working age population of about 1 billion, which requires a more flexible population policy. His research set a economic and demographic base for our policy implications.

In The Tendency of Sex Ratio and its Demographic Implications -- Take Jiangsu as an Example, Faping Yang (2015) argued that according to the data she acquired through official websites, the sex ratio of Jiangsu has gone imbalanced since late 1990s which is mainly due to the implementation of OCP. Then she inferred the potential outcomes of the imbalanced sex ratio basing on sociology knowledge. The outcomes she brought up was mainly in mental disorders and family sizes, without talking about broader social issues.

A. Ebenstein (2013) concluded in The “Missing Girls” of China and the Unintended Consequences of the One Child Policy that, by 2014, the female population of China is 34 million lower than it should be for a balanced sex ratio, by “balanced” he meant a sex ratio that is self-adjusted and is free of large-scale social problems. To define the balanced sex ratio, he applied the Dynamic Population Balance Model, but failed to treat the different provinces or at least districts of China separately.

T. Hesketh (2010) mentioned in Family Size and Fertility Preferences in China in the Era of the One Child Family Policy: Results from National Family Planning and Reproductive Health Survey that there exists for long fertility preferences in most areas of China. Specifically, most families prefer boys than girls due to higher family status of males in traditional Chinese family
structure.

In *Can China Afford to Continue its One Child Policy*, Feiyue Zhang (2008) collected data from China Population Census Reports and argued that there has been social economic problems arising in China caused by OCP, which include the imbalanced sex ratio. But Zhang did not dig deeply into imbalanced sex ratio and failed to bring up possible policy treatments against the imbalanced sex ratio and the problems it caused.

T. Hesketh (2005) argued in *The Effect of China's One-Child Family Policy after 25 Years* that the population gap between males and females would be even widened for the next 10 years based on the data till 2005, which has been proved. Moreover, he argued for political intervention to loosen the OCP, in order for China to utilize human resource as new economic growth engine.

In 1999, Xinguang Ge published *The Research on the Influence of Family Planning on the Female Population of China*, in which he first mentioned in China that the lower female population would lead to bigger unmarried population and cause social crisis even worse. In his analysis he did not predict the specific unmarried population.

Previous studies have figured out the general pattern of how OCP has caused the sex selection of new born and the origin of imbalanced sex ratio of China. Also, some of the scholars have pointed out that there could be social problems resulting from the imbalanced sex ratio in China. However, the previous studies have methodological flaws or leave some blank space for us to fill in.

Firstly, previous studies were mainly at national level, which could be less convincing when we consider the diversity of cultures in China. Secondly, previous studies are more qualitative, which may lead to the conclusions less accurate and convincing. Furthermore, few previous
studies focus on the statistical correlation between OCP and SRNB (sex ratio of the new born), which is a major demographic index. Even there is, the models did not involve other covariates that would influence the accuracy of estimation of OCP’s effect. Last but not least, previous studies failed to bring up constructive policy suggestions to help mitigate the negative influence of OCP.

Our research focuses on the Influence of OCP upon SRNB in Jiangsu Province. By collecting official data and regression SRNB on the proxy variable of OCP, we will come to a statistical conclusion about the correlation between OCP and the sex ratio of new born of China since 2000. Such a research would most importantly fill in the blank of statistical studies on the correlation between OCP and SRNB. Also, we would bring up policy suggestions for Jiangsu government to mitigate the impact of imbalanced sex ratio, thus resolving potential social problems.
CONCEPTUAL FRAMEWORK & HYPOTHESIS

The null hypothesis of our research is: One Child Policy (OCP) has a statistically significant influence upon the sex ratio of newborn (SRNB) in Jiangsu province from 1985 to 2015. We decided on this null hypothesis due to its demographic rationality, strong policy relevance and its practicability.

Demography justifies our hypothesis in the first place. Firstly, birth control would lead to sex selection of the new born, especially in China, a country with a prolonged culture of preferring boys than girls. And the more strict the control is, the more sex selections there would be, even though many sex selective behaviors are illegal. There are different sex selective behaviors, including abortion and abandonment. And in China, abortion is the major type of sex selective behavior (accounting for more than 75% of all sex selective practices), and it will lead to smaller female new born population than it should be, which is around 1/2 of total new born.

Furthermore, according to Zhiyuan Lu (2005), it takes at least 12 years for a birth birth control to generate statistically obvious impact on sex ratio of newborn, due to the diversity of people and their fertility inertia, even if it is a strict one. And considering that OCP officially came into force in the 1980s, 2000 to 2015 could be a good time span for our study to find out the impact of OCP as long as there is.

Our hypothesis is based on our research objective, and it has its strong policy relevance. The goal of our research is to prove that OCP caused the imbalanced sex ratio of the new born in Jiangsu province and bring up correspondent policy advice to narrow the sex ratio gap of newborn. So we decided to study the causal effect of OCP on imbalanced sex ratio of new born, and
the positive answer would set the theoretical foundation of policy interventions.

In recent years, imbalanced sex ratio has become a heatedly discussed social topic and OCP is widely blamed as the origin of it, which, according to most of the demographic and social studies, is not totally wrong at least. So since 2008, Chinese Central Government has worked to loosen OCP (allowing the second child for couples in which at least one is single child, for example) in order to rebalance Chinese sex ratio and solve the social problems originated from it, which worked to some degree. Our study is to find out the potential causal effect of OCP and the sex ratio gap of new born and basing on the finding, bring up policy advice that fits the current demographic situation of China.

Further, our hypothesis is practical because (1) There have been previous statistical researches on relevant topics (we discussed them in Literature Review), which set the theoretical foundation for our study and (2) The related demographic data (fertility rate, sex ratio of new born and other social economic covariates) are already accessible in Jiangsu Bureau of Statistics and Jiangsu provincial government.

Specifically, as we are studying the influence of OCP on imbalanced sex ratio of new born, we will run regressions to prove this causal effect. In our conceptual model, the explained variable would be the sex ratio of new born in Jiangsu since 2000. The explanatory variable is OCP. Also, in our conceptual model, covariates are needed, which may also contribute to the imbalanced sex ratio of new born but are not of our research interest. The lack of covariates is also one of the main flaws of previous studies as mentioned.
DATA& METHODOLOGY

The population of our research is the new born registered in Jiangsu Bureau of Family Planning from 1985 to 2015, and we got access to the database of Jiangsu Statistics Bureau under the name of Shandong University of Science and Technology. Also, we downloaded the government work report of Jiangsu for related social economic indexes (GDP, Education and Health Care).

In the statistical analysis, we used Stata and ran a Ordinary Least Square (OLS) regression to test the causal effect of OCP on the imbalanced sex ratio of new born in Jiangsu. The reason for adopting OLS is that (1) The dependent variable in our model is the sex ratio of new born in specific years from 1985 to 2015, not the probability of being a male or female for an individual which requires using logit or probit models; (2) Based on the researches of the correlation between OCP and sex ratio between 1990 and 2000, we believe that there is a linear correlation between these two variables.

The regression model of our research is formulated like below:

\[ SRNB_t = \alpha + \beta FR_t + \delta X_t + u_t \]

In this linear model, SRNB is sex ratio of new born in Jiangsu province; FR is fertility rate, the proxy variable of OCP; X is the set of covariates that are considered to be correlated with the dependent variable; u is the error term which originates from measurement error; t represents respective years (1985, 1986, ..., 2014 and 2015).
DATA DESCRIPTION

Table 1: Statistical Features of Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRNB</td>
<td>31</td>
<td>115.4152</td>
<td>2.5881</td>
<td>109.08</td>
<td>118.75</td>
</tr>
<tr>
<td>FR(‰)</td>
<td>31</td>
<td>11.6242</td>
<td>3.111</td>
<td>9.03</td>
<td>20.54</td>
</tr>
<tr>
<td>PPP</td>
<td>31</td>
<td>24098.6</td>
<td>26652.25</td>
<td>1053</td>
<td>88085</td>
</tr>
<tr>
<td>NHESPTP</td>
<td>31</td>
<td>103.152</td>
<td>86.113</td>
<td>19.2</td>
<td>234.1</td>
</tr>
<tr>
<td>NBHPTP</td>
<td>31</td>
<td>2.4687</td>
<td>1.186</td>
<td>92</td>
<td>5.15</td>
</tr>
<tr>
<td>UR(%)</td>
<td>31</td>
<td>39.8677</td>
<td>16.695</td>
<td>17.7</td>
<td>66.2</td>
</tr>
</tbody>
</table>

We downloaded Jiangsu Statistics Annual Reports (from 1985 to 2015) from Jiangsu Statistics Bureau, finding that there were 18 sections in the comprehensive reports, each one described statistics in a specific social/economic section, including demography, education, health care, sanitation, industries, etc.

According to our theoretical model, the dependent variable of our study interest is the Sex Ratio of New Born (SRNB) of Jiangsu Province, Fertility Rate (FR), and covariates representing economic, educational and medical factors that also influence SRNB.

Figure 1: SRNB of Jiangsu Province from 1985 to 2015
Specifically, we collected the SRNB from 1985 to 2015 from Jiangsu Statistics Bureau, finding that the average SRNB in Jiangsu is 115, with a 2.59 S.D. And we found that the SRNB had been on a rising trend till 2008 while starting from 2009, SRNB has been decreasing for 7 years.

![Figure 2: Fertility Rate of Jiangsu Province from 1985 to 2015](image2)

The independent variable is Fertility Rate (FR), which is the proxy variable of One Child Policy. The mean FR from 1985 to 2015 is 11.62, with a S.D. of 3.11, mean of 9.03 and max of 20.54. We found that the FR has been decreasing significantly since 1990, which corresponds to the time period of OCP came into effect.

![Figure 3: GDP Per Capita of Jiangsu Province from 1985 to 2015](image3)
Figure 4: Number of High Education Students Per Thousand Population of Jiangsu Province from 1985 to 2015

Figure 5: Number of Beds in Hospital Per Thousand Population of Jiangsu Province from 1985 to 2015
Figure 6: Urbanization Rate of Jiangsu Province from 1985 to 2015

Also, to improve the precision of our regression, we added covariates into our model, which may also explain the trend of our dependent variable. Our covariates are GDP Per Capital (PPP), Number of Higher Education Students Per Million Population (NHESPMP), Number of Beds in Hospitals Per Thousand Population (NBHPTP) and Urbanization Rate (UR).

We found it surprising that the fertility rate peak in Jiangsu Province was the year 1990, which is over 10 years after OCP had come into force control in China. This may be due to the reason that it was announced by central government that starting from 1991, OCP would be reformed and the enforcement would be enhanced. More people chose to have children in 1990 to avoid potential risk of the unknown change of OCP.

In the original Annual Reports, there was no Urbanization Rate. According to the definition, we divided the urban population and total population of Jiangsu Province from 1985 to 2015 respectively, and figured out the UR for our dataset.

We ran a regression of SRNB on FR and the covariates, the coefficient on FR was -.209, indicating that holding other variables constant, a 1% lower fertility rate is associated with a .209
higher sex ratio of newborn in Jiangsu Province at 10% significant level. This further indicates that OCP to some degree has a negative influence upon the sex ratio balance in Jiangsu Province.
REGRESSION & CAUSALITY TEST

As described in Conceptual Framework & Hypotheses, our null hypothesis is “One Child Policy (OCP) has a statistically significant influence upon the sex ratio of new born (SRNB) in Jiangsu province from 1985 to 2015”. So our model consists of SRNB as the dependent variable, Fertility Rate (FR, as the proxy of OCP) being the explanatory variable, and other control variables (GDP Per Capita, Number of Higher Education Students Per Thousand People, Number of Beds in Hospitals Per Thousand People and Urbanization Rate) that may explain part of variation in SRNB of Jiangsu Province from 1985 to 2015.

We collected SRNB, FR and control variables of Jiangsu Province from 1985 to 2015, formatted a complete STATA data file and ran a OLS regression basing on our theoretical model. The following picture shows the results:

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>176.623391</td>
<td>5</td>
<td>35.3246781</td>
<td>Prob &gt; F</td>
<td>0.0000</td>
</tr>
<tr>
<td>Residual</td>
<td>24.3314098</td>
<td>25</td>
<td>.973255391</td>
<td>R-squared</td>
<td>.8789</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adj R-squared</td>
<td>.0547</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Root MSE</td>
<td>.9854</td>
</tr>
</tbody>
</table>

| srnb | Coef.          | Std. Err. | t     | P>|t|    | [95% Conf. Interval] |
|------|----------------|-----------|-------|--------|---------------------|
| FR   | -.208794       | .1041163  | -2.01 | 0.056  | -.4232255 - .0056375|
| ppp  | -.0004959      | .0000613  | -0.10 | 0.000  | -.0006221 - .0003698|
| nhesptp | .5421106   | .1578667  | 3.56  | 0.002  | .336978 - .8872481 |
| nhbhtp | 9.77024       | 1.618654  | 6.04  | 0.000  | .491696 - 13.0392 |
| ur   | -.191922       | .1042376  | -1.84 | 0.077  | -.4066032 - .027593 |
| _cons| 107.5267       | 2.462804  | 43.66 | 0.000  | 102.4545 - 112.599 |

Figure 7: OLS regression results

According to the regression result, there is a negative correlation between SRNB and FR,
with a p-value of .056. To be specific, holding other variables constant, any additional one thousandth decrease in fertility rate is associated with an increase of .21 more boys given 100 new born girls.

This result matched the demographic intuition that as OCP comes into force (FR decreases), more families in Jiangsu Province choose sex selections to have boys instead of girls, making new born boys more than girls and the SRNB imbalanced.

When we go back to the tendency graphs of SRNB and FR and try to find out how well the two variables are correlated, we found the negative correlation is clear before 2007. After 2007, the SRNB has been on a decreasing trend, indicating there have been more new born girls since 2007 compared with before, and the SRNB of Jiangsu Province is getting back to a normal track. And that is the reason why our p-value is not smaller than .05.

Also, our R-squared is .8789, and adjusted R-squared is .8547, indicating our model has adequate explanatory power. Specifically, our R-squared means our model explains 87.89% of the variations in SRNB of Jiangsu Province since 1985, which means our model is sound. All the coefficients of controlled variables are significant at .05 level (except for Urbanization Rate at 10% level), which means SRNB is correlated with average income, education, health care and urbanization level of Jiangsu Province.

The two economic control variables, PPP and UR has small but negative significant influence on SRNB. Specifically, the increases in GDP Per Capita and Urbanization Rate are associated with the decreased and more balanced Sex Ratio of New Born. It is understandable that especially in the latest 10 years, with the improvement of income and life standard, people are gradually changing their opinions on giving birth. Especially, as the income and life standard increase, the
basic consideration of couples when deciding to give birth is not for their older ages. Thus, less people will do sex selections to have male babies to “carry on their family blood”, and so a lower Sex Ratio of New Born is expected.

What is to be paid attention is the huge positive correlation between SRNB and NBHPTP, which means the Sex Ratio of New Born will change in the same direction with Number of Beds in Hospitals Per Thousand People, and it is against our intuition that better medical services should lessen peoples’ financial burdens and reduce sex-based selections.

The first probability of this regression result lies in the nature of medical care improvements. Unlike income increase which could benefit all the people in a short time, it takes time for people to recognize the improvements in medical care system. In Jiangsu Province, the medicare reform stated in 1990s. According to a research conducted by Jinling Daily in 2004, 52% of the citizens in 4 cities of Jiangsu Province said they did not benefit a lot from the medicare reform; In 2013, Jinling Daily redid the survey. This time more than 77% of the citizens recognized the improvements in medicare service quality in Jiangsu Province and more than half of them said the improved medicare had lessened their financial burdens. In this case, it took several years for people to realize the benefit of medicare improvements, leading to a lag of the effect of medicare service improvement upon sex ratio of new born.

Another possibility for the positive correlation between NBHPTP and SRNB is that higher medical service level may lead to more bribes and sex-based selections. According to Jiangsu Medical Survey Report 2000, before 1995, the price of B-scan was relatively high and there was not so many imported B-scanners in Jiangsu Province, especially in county and rural level hospitals and clinics. And the lower-income population have higher motivation to know infants’
sex before birth and do sex-based selection (like abortion) to have male babies. In the past 15 years, the medicare service of China has been increasingly making progress, which can be reflected by the increasing number of beds in hospitals for per thousand population and also, the more high-accuracy medical equipment like B-scanners. Under this condition, more people would choose B-scans to know the sex of infants in advance and abort the female fetuses before they were born. As a result, the improved medical service quality (NBHPTP) served as an accomplice of sex-based selective behaviors, unbalancing the sex ratio of new born of Jiangsu Province.

To sum up, holding other variables constant, there is a statistically significant negative correlation between SRNB and FR. This has answered my research question: “Is there statistically significant correlation between OCP and the sex ratio of new born (SRNB)?” But I would like to go deeper and test whether there is causality between OCP and SRNB, in order to set the more solid foundation for policy implications and my policy advice.

Although we have proved the statistical correlation between OCP and SRNB, we cannot say OCP has led to a imbalanced SRNB in Jiangsu Province, because our regression did not rule out the possibility of the opposite causality that it is SRNB that influenced OCP, although it does not make much sense intuitively. There is another possibility that there are compounds influencing both FR and OCP. Whatever the truth is, we need to do a Granger Causality Test to verify the causality between OCP and the variations in SRNB.

By setting the variable Year to a time series an setting the lag to 2, we Granger causality tested FR and SRNB. According to the Granger Causality Wald Test, FR is the cause of the variations in SRNB with a chi-squared of 15.555; SRNB does not cause the variations in FR at the
5% significance level. This result echoes with our assumption that it is the enforcement of OCP that influenced the SRNB of Jiangsu Province.

![Granger causality Wald tests](image)

**Figure 8: Granger Causality Test results**

According to our statistical analysis, from 1985 to 2015, the implementation of One Child Policy (OCP) led to the imbalanced Sex Ratio of New Born (SRNB) in Jiangsu Province. And as we discussed in the introduction part, the imbalanced SRNB since 1985 has caused serious social problems like huge unmarried population and the ensuing family friction, prostitution and even rapes.

Chinese central government has taken measures in loosening OCP, both to prompt population replenishment and more importantly, to mitigate the aforesaid problems resulting from OCP. In the 1990s, 7 provinces in China (including Jiangsu Province) relaxed the OCP and regulated that for couples both husband and wife have no siblings in their family, it is allowable to have the second children; also, some minorities (like Dulong, Qiang, Buyi, etc.) are permitted to have two or even three kids.
In December 2013, the State Council released *Opinions on Adjusting the Birth Policy*, allowing couples of which at least one has no siblings in his/her family to have the second kid starting from January 2014, which is called Dan Du Er Hai (DDEH) policy.

As estimated by demographers, the DDEH policy would generate broad effect in 2015 and prompt the new-born population to 17 million. But surprisingly, the 2015 new-born population decreased by half a million compared with 2014. Some other demographers argued that it is because couples were faced with higher life and work pressures than before, which prevent them from having another kid. And as the cost of education and rearing kids keep rising, the young couples who just graduated from universities and joined the workforce tend to work for at least 3 years before having a kid, both to make up for the tuition fees and to save more money for rearing kids. As a result, couples nowadays tend to choose late childbirth due to higher economic pressures, leading to low fertility rate in 2015 and the failure of DDEH policy.

As the previous policies loosening OCP were not as successful, a new policy is needed to adjust OCP to the current social economic situation and incentivize couples to have the second kids. According to demographers, the main hinder of couples in having the second kid is economic. In a 2016 social survey held by Jiangsu Population and Family Planning Commission on married couples with one kid, over 65% couples would love to have more than one kid; among them only 23% plan to have a second kid in 2 years. And when asked about what deter them from having a second child, over 55% said finance was the main hinder (low income, unstable jobs, high cost of rearing kids, etc.). In this case, there exists a breach for policy makers to incentivize couples to have second kids financially, in order to expand family sizes and reduce sex selections, which is prevalent when only one child is permitted.
Firstly, unconditional Two Child Policy (TCP) should be launched in Jiangsu Province. As discussed before, DDEH and other loosened OCP policies did not work well. The basic reason for their failures is the narrow scale of target population. Under TCP, every couple is allowed to have two kids, not including multiple births (for multiple birth families, they cannot have more births). Having additional kids over 2 would be fined progressively.

The second incentive is banning discrimination against women. There has been latent discriminations in China for decades against women in workforce: Women older than 25 face a lower chance of getting a job on average; many pregnant gets fired for various excuses. We are all clear that the reason behind the discrimination is that employers (especially companies) worry that the legalized maternity leave would reduce the working progress of companies and increase companies’ operation costs. What should the central government do in this case, is not to interfering the recruitment by setting compulsory quotas for female employees, which will lead to the discontent of private sectors and inefficiency.

We suggest the government enhance the enforcement of *Regulation on Sexual Discrimination* by clarify the responsibility of local Human Resources and Social Security Bureaus (HRSSB), which are responsible for the sexual discrimination in workforce. Specifically, the local HRSSBs should take the responsibility to make regular interviews to female employees on their situations in their companies and whether they feel discrimination based on their sex; also, local HRSSB is the government agent to accept and investigate in the reports of sex-based discriminations in the workforce. If according to the *Regulation on Sexual Discrimination*, a company is found guilty, then the local HRSSB is also accountable for the execution of penalty.
Further, for the sake of supervision, local governments should share with HRSSBs the access to local professional reporting database, keeping track of the processes of sex-based discrimination cases and regularly interview the discriminated employees of the real processes of their cases. Once local governments find corruptions and malpractices between enterprises and local HRSBB, both participants would be punished according to respective laws.

Thirdly, government should lessen the burden of taking 9-year compulsory education. Another major consideration of couples when deciding whether to have the second kid is the higher cost of education. Although the 9-year education from primary school to high school is nominally free, large expenses still exist when parents want to send their children to a school in another school district. Also, many teachers would let students buy certain type of exercise books, sharing the profit with bookstores. There are other kinds of indirect educational expenses, like gifts to teachers and compulsory high-priced school things.

To reduce the educational cost, government should solve the problem of arbitrary charges in compulsory education. Specifically, local education bureaus should open up and accept reports of arbitrary charges from students and parents. Supervising groups should be sent to different schools randomly and interview students and their parents alone, without the accompany of teachers. Once a school is caught arbitrarily charging parents, both the school and teachers involved would face punishment according to the Education Law of China.

Although the Education Law has manipulated that compulsory education is a basic right of people and no one should make profits from it, it is so vague and will bring about difficulties when deciding on the punishment of the violators. So in this sense, comprehensive and detailed legislation against arbitrary educational charges is needed to set the legal foundation of regulating
education charges. Furthermore, we need enforcement agents to make sure most schools and teachers are obeying the new law and the violators get caught and properly punished for their deeds.

Last but not least, government should take steps in improving the quality of domestic food and nutrition, deceasing the unreasonably high demand of expensive foreign food and nutrition (like milk powder and compound nutrition pills). As reported by China Daily, now 77% of the mid-income families choose imported milk powders or nutrition supplements for their kids, instead of buying domestic brands. It is estimated that for a family with a 3-year-old kid in Jiangsu Province (regardless of sex), it costs 62% higher in food and nutrition if all of them are imported foreign brands, compared with buying domestic high-quality brands instead, which causes significantly higher cost of child rearing.

It is undeniable that the food safety accidents of some domestic milk powder brands have severely impacted the sales of domestic foods and nutrition for kids, while there are still high-quality domestic brands with relatively low prices. But unfortunately, their sales also decreased due to the scandals of few domestic brands and parents are paying more to buy imported foods for kids for the sake of their kids’ health.

Food security has always been among the most important issues of social management. And in this case, it is also related to parents’ financial burden and their willingness to have the second kid. In this case, our government should on the one hand enhance the enforcement of Food Security Law and regulations on the food security of dairy products and nutrition foods; on the other hand, government could consider economic methods to moderate the need for imported dairy products and nutrition foods. For example, in marketing, high-quality brands could have
advertisement subsidy when promoting their brands on TV or internet; also, preferential tax policies could be created to promote the development of domestic child food brands; higher tariff on the imported child foods is possible, but it should be conducted carefully to avoid excessive government interference into market.
CONCLUSION

In this paper, we first showed the reports of the imbalanced sex ratio of Jiangsu Province and its ensuing social problems, which is the motivation of our research. And as we go through former studies on the sex ratio problem in China, OCP has been proved the major factor impacting its balance. Then we raised our research question: Is there correlation between OCP and the imbalanced Sex Ratio of New Born (SRNB) in Jiangsu Province?

Previous study of Aboluo Zheng set theoretical foundation of our research by introducing regression model of SRNB and OCP and Fertility Rate (FR) as the proxy variable; A. Ebenstein (2013) and T. Hesketh concluded that OCP has led to less female new born during the past decades; Liu Li (2016) used Demographic Growth Model to analyze the population growth rate of China and argued that it is time for the government to loosen OCP to gain back population dividend; other previous studies also shed light on our study, in terms of theoretical frameworks, data resources and model designing.

The limitations of previous studies mainly lie in the lack of focus on Jiangsu Province and ignorance of other social economic variables that could influence SRNB, and that will lead to upward bias of explanatory power of OCP on the variations of SRNB.

We collected data of SRNB (dependent variable), FR (independent variable) and other social economic variables (GDP Per Capita, Number of Higher Education Students Per Thousand Population, Number of Beds in Hospitals Per Thousand Population and Urbanization Rate, which are control variables), transformed the data into a Stata Do File and ran a regression of SRNB on the rest of variables. We found there is a statistically significant correlation between SRNB and
FR, indicating OCP and SRNB are correlated. Then we ran a Granger Causality Test and found that FR significantly caused the variation in SRNB. Finally we came to the conclusion: OCP has significantly caused the imbalanced SRNB in Jiangsu Province based on the data from 1985 to 2015.

Basing on the statistical conclusion, we brought up four policy suggestions to Jiangsu government, with the aim to loosen birth control in China and lessen economic burdens of child rearing. The policy advice include launching Two Child Policy (TCP), banning sex-based discrimination in workforce, controlling compulsory education cost and controlling nutrition cost in child rearing.
## APPENDIX

### Detailed Variable Values of Our Study

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