

**Children composition and next birth- A parity progression
analysis**

Introduction

Since the early 1990s, China's fertility has dropped below the replacement level and remained low ever since. While the census figures showed that the total fertility rate (TFR) was 1.22 in 2000 and 1.18 in 2010, this is generally considered to be underreported. The adjusted TFR according to researchers is estimated to be about 1.5 since 2000 (Retherford et al., 2005; Cai, 2008; Guo, 2012; Morgan et al., 2009; Cai, 2013). In 2013, the Chinese government relaxed the birth policy allowing couple whom either of them was an only child to give birth to a second child. In 2016, the policy was further relaxed to a universal two-child policy allowing all couple to give birth to two children. But the relaxation of this birth policy did not bring the expected baby boom. If anything, the TFR further declined in 2017 and 2018.

The number and the sex of children already had will affect a woman's fertility (Chen, 2011). In addition, the China's birth policy also places a limit on the number of children a woman could have. While some researchers include the number of children in the fertility indexes (Kohler and Ortega, 2002; Bongaarts and Sobotka, 2012; Feeney and Yu, 1987; Ma et al., 1986), only a few include the sex of children.

In China, the sex of the child(ren) a woman already has may affect her decision to have another child. Women with strong son preferences are unlikely to have another child if her first child was a son (Li et al., 2017), but the sex selection becomes serious if the first child was a girl (Wei et al., 2005). In this article, we will use both the number of children and their sex to construct a new indicator to analyze the fertility level in China.

Method

$W_{i,j}(a)$ indicates the number of women with i births and j sex which takes on the values between 0-3. $j=0$ if a woman has no child, $j=1$ if the child(ren) is boy(s), $j=2$ if the child(ren) is girl(s) and $j=3$ if the children include both boy(s) and girl(s).

$B_{i+1,j}^k(a)$ indicates the $(i+1)$ th birth by women $W_{i,j}(a)$ where the sex of the child is k . $k=1$ if the birth is a boy, $k=2$ if the birth is a girl and $k=x$ for either boy or girl. $h_{i+1,j}^k(a)$ indicates the ratio of women $W_{i,j}(a)$ who have another birth.

$$h_{i+1,j}^k(a) = \frac{B_{i+1,j}^k(a)}{W_{i,j}(a)} \quad (1)$$

the percentage of women who have i births and its sex structure is j is $R_{i,j}(a)$.

$$R_{0,0}(a) = \prod_{i=15}^{a-1} (1 - h_{1,0}^x(i))$$

$$R_{1,1}(a) = \sum_{n=15}^{a-1} \left(h_{1,0}^1(n) \prod_{i=15}^{n-1} (1 - h_{1,0}^x(i)) \prod_{j=n+1}^{a-1} (1 - h_{2,1}^x(j)) \right)$$

$$R_{1,2}(a) = \sum_{n=15}^{a-1} \left(h_{1,0}^2(n) \prod_{i=15}^{n-1} (1 - h_{1,0}^x(i)) \prod_{j=n+1}^{a-1} (1 - h_{2,2}^x(j)) \right) \quad (2)$$

$f_{i+1,j}(a)$ indicate the parity progression rate of women $W_{i,j}(a)$ who have another birth,

$$f_{i+1,j}(a) = R_{i,j}(a) h_{i+1,j}^x(a) \quad (3)$$

$F_{i+1,j}(a)$ is the cumulative of $f_{i+1,j}(a)$, indicate the cumulated parity progression rate of women $W_{i,j}(a)$ who have another birth.

Data

Use the 2000 micro census data in China.

Results

The proportion of women with no child was only 5%, and for woman with parity, most of them had their first child before the age of 35 years. Although sex selection was not so pronounced at the aggregated national level, but a decomposition by city, township and village levels showed some degree of sex selection among women in the

city and township, but not for women in the village.

Fewer proportion of women gave birth to second child if their first child was a boy (cumulated parity progression rate with the sex j of children already had was 0.10 at 35), and if having a second child, there was little or no sex selection. On the other hand, a woman was more likely to give birth to a second child if her first birth was a girl (cumulated parity progression rate with the sex j of children already had was 0.21 at 35), and the sex of the second child was more likely to be a boy.

In general, very few proportion of women who already had two children gave birth to another child, especially in the city. But for the women in the township, this is only true if they already had two boys. In both the township and village, there was high likelihood to give birth to another child who is a boy if two previous births were girls. Furthermore, there was little of sex selection for the subsequent birth if previous births consist of at least a boy and a girl. But there is a tendency for women in the village to have another birth that is a girl if two previous births are boys.

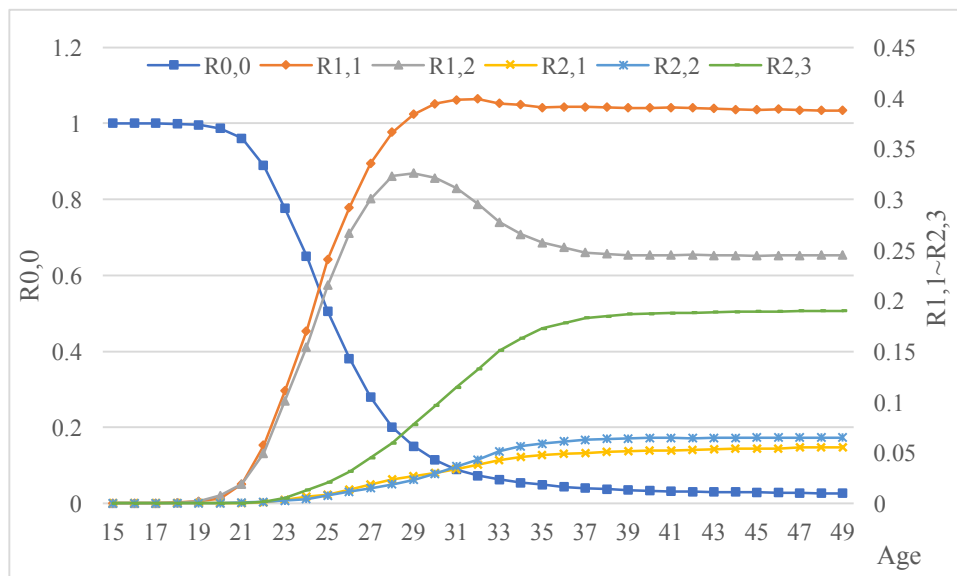


Figure 1 The percentage of women with i births and their sex structure is j .

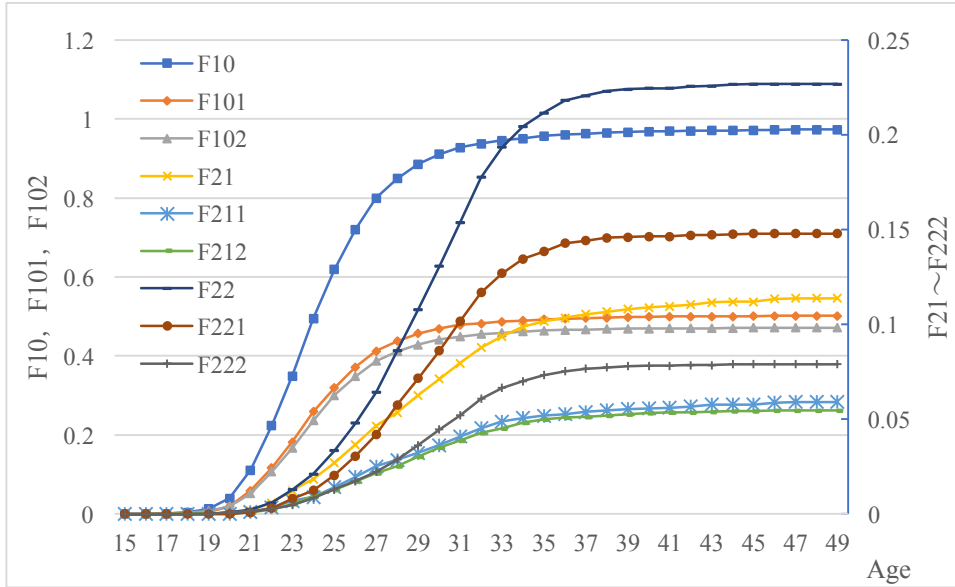


Figure 2 The cumulated parity progression rate with the sex j of children already has

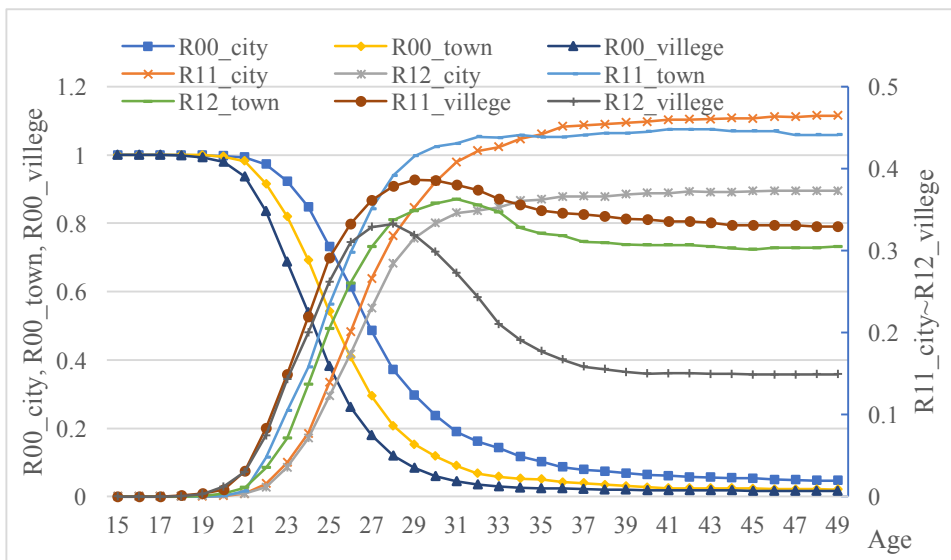


Figure 3a The percentage of women with i ($i=0$, or 1) births and their sex structure is j in city, town and village

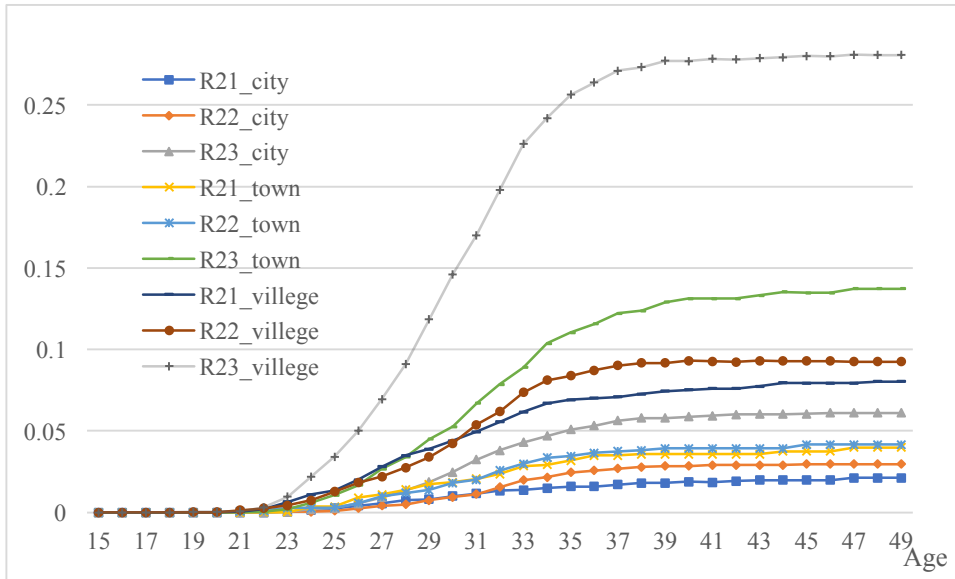


Figure 3b The percentage of women with i ($i=2$) births and their sex structure is j in city, town and village

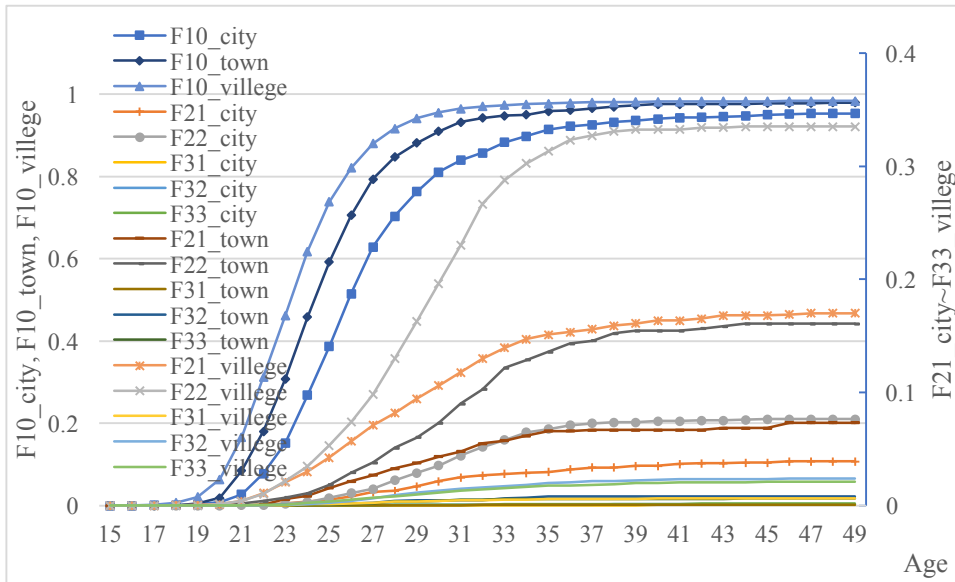


Figure 4a The cumulated parity progression rate with the sex j of children already has in city, town and village

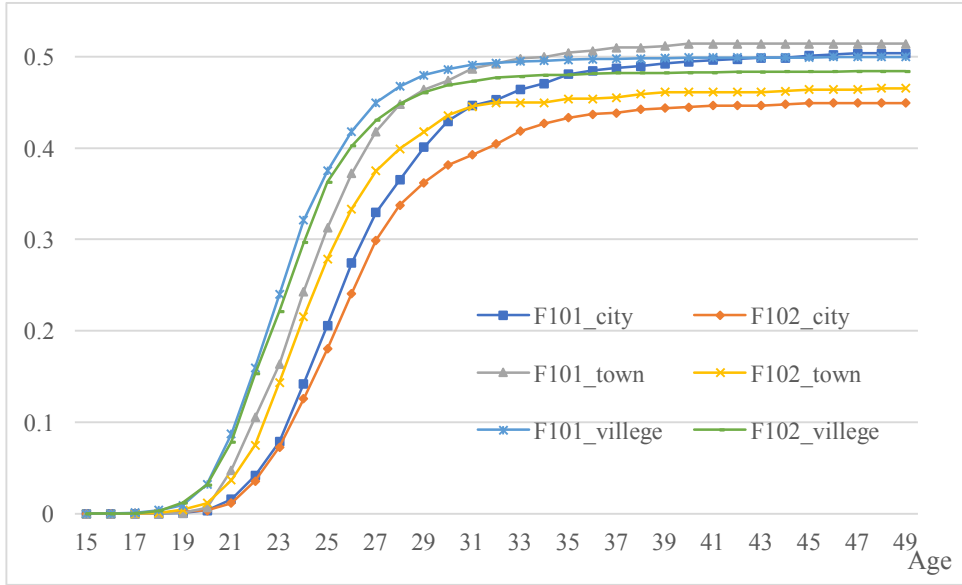


Figure 4b The cumulated parity ($i=1$) progression rate with the sex j of children already has in city, town and village

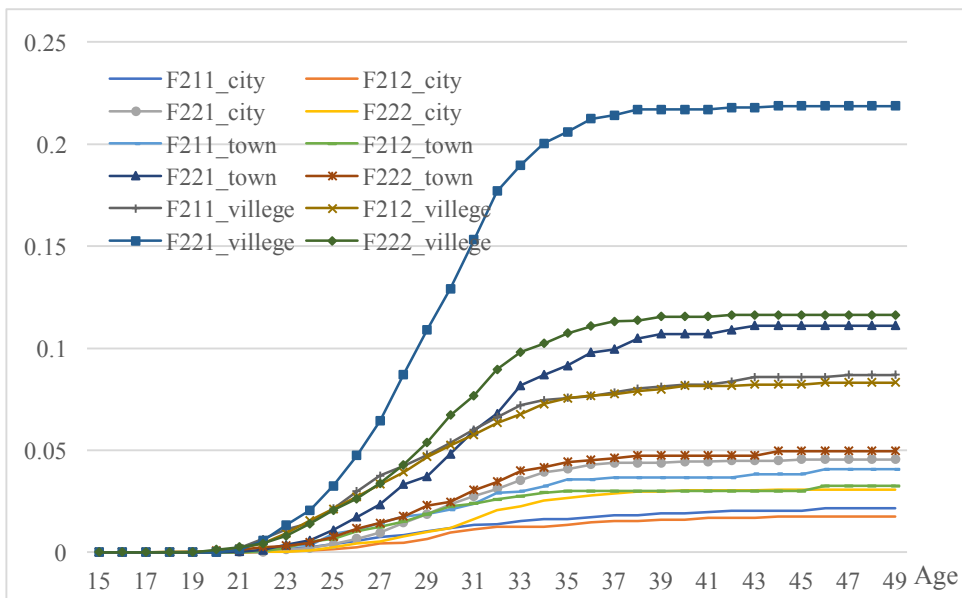


Figure 4c The cumulated parity ($i=2$) progression rate with the sex j of children already has in city, town and village

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