

The Multilevel Analysis on the Determinants of Fertility Desire in China

Jing Xu

Center for Population and Development Studies

Renmin (People's) University of China

Introduction

1. The past and present of fertility rate in China

China has experienced the conspicuous fertility decline since 1970's due to fertility control policy implemented. The fertility control policy aimed to keep the fertility level down and decrease the total population amount. The total fertility rate declined from 4.95 in 1972 to 2.72 in 1979 sharply, added up to decrease 56 million population of birth during this time. The TFR kept the decline trend with fluctuation and went down to 2.35 in 1989 and to 2.31 in 1990. China came to low fertility countries of the world since 1991. The TFR sneaked into the replacement level in 1992 and dove to 1.82 which was below the replacement level in 1997. Then, it remained 1.8 or so in 2000.

The official and demographers can not figure out the accurate TFR about the low fertility level in China since 2000, because the quality of fertility data had deteriorated. Most TFR estimations show that China now has a below replacement fertility ranged

Jing Xu

Doctoral Candidate

Center for Population and Development Studies,

Renmin (People's) University of China

No.59 Zhongguancun Street, Haidian District, Beijing 100872, P.R. China.

Tel: 86-13811857532; 86-10-62518758

Email: xujing1023ruc@gmail.com; xujing20040331@126.com

from approximately 1.6 to 1.8 (Zeng, 2007^[1]). But, the current official reports reveal that the low fertility is lower than estimated. So, the latest estimation indicates that TFR has been reached between 1.4-1.6 (Morgan & Guo, 2009^[2]).

[Table 1 about here]

2. Fertility desire of women of childbearing age since 1990's

Fertility desire is a value that develops under certain socioeconomic cultural and political conditions, reveals people's wills and desires on the number of children, quality of children, childbearing time and children's gender and reflects objective factors which influence childbearing. As a social phenomenon, fertility desire or childbearing behavior has "Three-Dimensional Characteristics": quantity, timing and gender (Baochang Gu, 1992^[3]).

Desired number of children means is an expectation of the number of children in one's lifetime under certain socioeconomic, cultural and political situations, which is also called "ideal number of children", "expected number of children", "desire of childbearing amount", "expected childbearing amount", is an important indicator to measure fertility desire. Desired childbearing gender means that people expect to have a boy or a girl, which is a desire or need on children's gender, that is to say, a sex preference of parents who wanted to. Desired timing of childbearing includes the ideal age at first childbearing and ideal interval of childbearing between 1 parity and 2 parity. Ideal age at first childbearing is the ideal age that couples want to have their first child; ideal interval of childbearing between 1 parity and 2 parity is the time between the birth of the first child and the birth of the second child.

National Survey on Population and Reproductive Health in 1997, National Survey on Family Planning and Reproductive Health in 2001 and National Survey on Population and Family Planning in 2006 hosted by National Population and Family Planning Commission in China cooperated with relevant governmental agencies, which reflect

"the conditional fertility desire" used under the Family Planning Policy data. However, National Urban-Rural Resident Fertility Desire Survey in 2002 and National Social Conditions and Public Opinion Polls on Fertility Desire in 2007 hosted by Department of Publicity and Education at National Population and Family Planning Commission in China cooperated with specialized social investigation organization--"Zero Point Index and Information Consultation Co. Ltd." or some domestic universities, which reflect the true fertility desire of women of childbearing age in China in a certain extent used under or without Family Planning Policy data, rather than "conditional fertility desire" under the Family Planning Policy (Xiaochun Qiao, 1999^[4]) .

Table 2 shows that desired number of children kept the range of 1.6-1.9 under or without the Family Planning Policy calculated by 1997, 2001, 2002, and 2007 National Surveys. The results indicate that two children is ideal number of children most couples wanted and fertility desire kept relative stabilization to some extent in a short period.

[Table 2 about here]

The proportion of desired parity among women of childbearing age calculated from 1997, 2001, 2002, 2006 and 2007 National Surveys also show that two children are the ideal number of childbearing in most couples (See Figure 1). Under the Family Planning Policy, the proportion of desired 2 parity among women of childbearing age kept the ranged of 48.0% – 69.1%; without the Family Planning Policy, the proportion of desired 2 parity among women of childbearing age kept the ranged of 57.7% – 66.1%, which are higher than the proportion of desired 1 parity among women of childbearing age kept the ranged of 18.3% – 38.2%. And, National Urban-Rural Resident Fertility Desire Survey in 2002 and National Social Conditions and Public Opinion Polls on Fertility Desire in 2007 indicate that one son with one daughter is the ideal sex structure of childbearing which are most couples expected (Jing Xu, 2009^[5]).

[Figure 1 about here]

3. Divergence between desired fertility rate and observed fertility rate

Childbearing behavior diverges from fertility desire at the modern developed and developing countries which located the different demographic transition period, which demonstrates that the observed level of fertility exceeded desired fertility level in the early or middle stages of population transition of many countries, in reverse, the observed level of fertility was lower than desired at the end of transition used the survey in 42 developing and 12 developed countries (Bonggarts, 2001^[6]).

Fertility Desires are the most proximate determinants of actual childbearing behavior (Fishbein, 1973^[7]; Pritchett, 1994^[8]). Many studies show that there is a positive relation existed between observed fertility level and desired fertility level. (Coleman, 1996^[9]; Westoff, 1991^[10]; Westoff et al. , 1987^[11]). The empirical experience thought that individual intentions about future fertility are significant predictors of future behavior (Bumpass, 1987^[12]; Rindtuss, Morgan, & Swicegood, 1988^[13]; Thomson, 1997^[14]; Westoff & Ryder, 1977^[15]; Hermalin et al. , 1979^[16]) . The latest research indicated that fertility intention will mediate the effect on childbearing behavior by other factors, which is a significant predictive power on childbearing behavior. (Schoen et al. , 1999^[17]) . However, meta-analyses have shown that intentions alone are not sufficient to predict behavioral change satisfactorily (Sheeran, 2002^[18]), as they leave large amounts of behavioral variance unexplained. This phenomenon has been labeled “Intention–Behavior Gap” (Urte Scholz et al., 2008^[19]).

Childbearing behavior diverged desired fertility among women of childbearing age in China since 1990's (Juhua Yang, 2008^[20]) , which represent the widening gap between low fertility level and desired fertility level. There is a certain gap between the desired fertility rate of women of childbearing age obtained from the results of 1997, 2001, 2002, 2006 and 2007 National Surveys and the observed fertility rate published by official reports For example, the desired fertility rate of women of

childbearing age is 1.88 in 2007, and the observed fertility rate is 1.43, the difference of both is 0.45.

[Figure 2 about here]

4. The Community Culture Factors affect Fertility Desire in China

The formulation of fertility desire not only be affected by macro socioeconomic factors, political factors and individual and family factors, but also influenced by the characteristics of community which individual live in. Female individuals and her family members who live in the same community share the same cultural identity (Chun Luo, 1996^[21]). Therefore, their fertility desires represent convergence.

In the developing countries, especially in China, fertility conception in broad rural areas have been changing gradually (Jiehua Lu, 1996^[22]), since the carrying out of fertility control policy and the enhancement of propaganda. From the compulsory Fertility Control Policy in the 1970s to the lately "Action on Care for Girl Children", community is helpful to achieve the goal of controlling population and becomes one of the most important factors that affect individual childbearing behavior. Added to maintainability on the traditional culture or convention, fertility desire presents strengthened convergence at the same community.

Owing to infusing the same propaganda on fertility control policy, women and their family members display the same fertility conception because of the socioeconomic and cultural homogeneity community which they live in. So, fertility desire from the same communities reveals intensive convergence. However, fertility desire from the different communities displays considerable differences. Community bridges macro analysis and micro analysis and is an indispensable analytical level.

So, decomposing the determinants of fertility desire and quantifying the effect on fertility behavior by fertility desire is very hot research to demographers in the world.

In China, research on the comprehensive analysis about the determinants of fertility desire will be significant to the low fertility level adjustment and formulation and enforcement of Family Planning Policy which is beneficial to the social stability and national peace.

This research attempts to make an empirical analysis on the determinants of "Three Dimensional Characteristics of Fertility Desire" used multilevel generalized linear model for decomposing the multidimensional factors from the micro and macro levels, which makes good to deepen, consummate and examine the analytical framework of fertility desire research.

Literature Review

In China, most of former researches on fertility desire belong to descriptive statistics analysis, or just include line regression models with several variables, which, however, have limitations in variable selections and results for the reason of incomplete data. Furthermore, most surveys on fertility desire are district sampling survey, for example, Fertility Desire Survey in Zhejiang (Wenyao Yin etc., 2000^[23]), Survey on Only-child's Fertility Desire in Beijing (Yafei Hou, Xiaohong Ma 2002, 2008^[24] and Jiayan Li 2003^[25]), Survey on Fertility Desire in Jiangsu at the low fertility level (Panel of the research on fertility desire and childbearing behavior in Jiangsu, 2008^[26]) and so on. There are two surveys on fertility desire in national area, which was conducted by Department of Publicity and Education at National Population and Family Planning Commission in 2002 and 2007. 2002 Fertility Desire Data has been used widely by researchers, including research on rural residents' fertility desire (Lixia Mo, 2005^[27] and Caixia Chen, Chunyuan Zhang, 2003^[28]), definition on the indicators of fertility desire (Fulin Zhou, 2005^[29]) and analysis about fertility desire in urban area and rural area (Fulin Zhou, 2005^[30]), longitude district survey on fertility desire and other obtained comprehensive researches based on the national data (Zhenzhen Zheng, 2004^[31]).

Of course, there are some inferential statistics analysis on the fertility desire researches. Some of them use discrete choice models and introduce "altruistic factor" to analyze the determinants of Chinese women's fertility desires (Yu Chen, Changrong Deng, 2006^[32]), some use Poisson Regression Model to examine the factors of fertility rate and childbearing behaviour (Zhigang Guo, Xiwei Wu, 2006^[33]), some use Easterlin's model to test the mechanism of socioeconomic variables and medium variable affecting fertility rate (Wei Chen, Mei Shi, 2002^[34]), and some use log linear model to do empirical researches on the determinants of marginal fertility decision on the Leibenstein's Theory (Qiang Ren, Qiang Fu, 2007^[35]). Moreover, some scholars use "penalty amount of exceeded the stipulated limit of the birth-control policy" as an indicator of operational intensity of fertility control policy and introduce it into linear regression model to estimate the influences that birth control plays on fertility rate (Tao Yang, Marjorie McElroy, 2000^[36]).

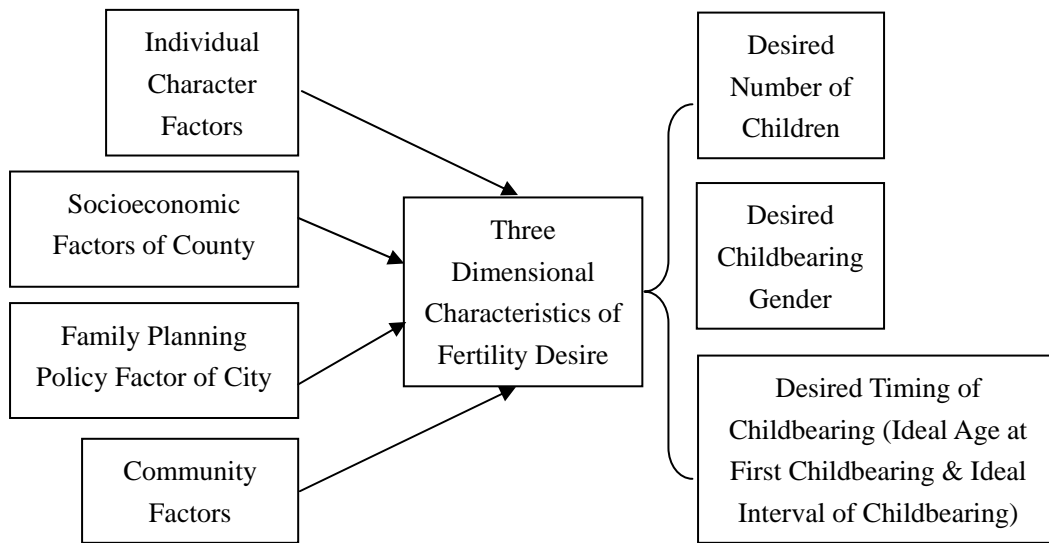
Theoretical Foundation

Theory of Planned Behavior (TPB) is a social-psychological model to study reproductive decision-making process with macro and micro perspectives. This research attempts to decompose the multi-dimensional determinants of fertility desire among women of childbearing age used Theory of Planned Behavior (TPB) for understanding and analyzing the complex decision-making process.

Analytical Framework

Research Question and Objective

The objective of this research is "Three-Dimensional Characteristics of Fertility Desire" of women of childbearing age including desired number of children, desired childbearing gender and desired timing of childbearing composed of ideal age at first childbearing and ideal interval of childbearing between 1 parity and 2 parity.



Graph 1 Analytical Framework of the Multilevel Determinants of Fertility Desire

The aim of this research is to study the multidimensional effects on fertility desire of women of childbearing age in China at macro and micro levels. Analytical framework of "Three-Dimensional Characteristics of Fertility Desire" (See Graph 1) shows that multidimensional factors affect fertility desire of women of childbearing age at macro, maso and micro levels in China.

Research Hypotheses

This research assumes that multidimensional factors influence fertility desire of women of childbearing age in China, which are in individual, community, socioeconomic of county and Family Planning Policy of city levels. This paper attempts to decompose the determinants of fertility desire of women of childbearing age at micro and macro level in China and will test the hypotheses.

The specific objectives of the study are as follows:

To examine the effect of macro socioeconomic factors more than the effect of Family Planning Policy on the fertility desire of women of childbearing age in China.

To identify characteristics of community which individual or couples lived in as a

important factors which reflect the influence of culture

To analyze reasons and characteristics of fertility desire in China

To explore the negative relations between education and desired number of children or ideal age at first childbearing among women of childbearing age in China

Methodology

Data Sources

The dataset for this research combined three parts, which are below:

1. Individual and community indicators came from National Social Conditions and Public Opinion Polls on Fertility Desire in 2007 hosted by Department of Publicity and Education at National Population and Family Planning Commission in China. National Fertility Desires Survey in 2007 was carried out in 26 provinces, except Beijing, Shanghai, Tianjin, Xinjiang, Tibet, Taiwan, Hong Kong, and Macao, including 177 districts, 355 counties or towns and 562 communities. The total number of household is 41,552, and the N is 147,590, with 53,447 females. 63.6% of women who are 15~49 years old are fertile ones. The sex ratio of is 52.1:47.9.
2. Socioeconomic indicators came from "Provinces and Cities of China Statistics Yearbook in 2008" and "China County Statistical Yearbook in 2008" as macro level indicators for matching individual data.
3. Policy Fertility Rate in different cities of China are based on weighted estimated results by Professor Zhigang Guo (Guo, 2003^[37]) as one of the macro level indicators. The research uses the reciprocal of policy fertility rate as the indicator of Fertility Planning Policy to measure intensity. It shows that the more high Policy Fertility Rate, the less intensity of Fertility Planning Policy in China.

Method

The research use Hierarchical Generalized Linear Models to decompose the multidimensional determinants of "Three-Dimensional Characteristics of fertility

desire" at macro and micro levels, which quantify the different effects of socioeconomic, cultural, family planning policy and other factors for explaining the reproductive decision-making process. To be specific, in analysis of quantitative dataset, Multilevel Generalized Poisson Regression, Multilevel Multinomial Logit Regression, Multilevel Linear Regression, will be used to analyze the determinants of "Three-Dimensional Characteristics of fertility desire" of women of childbearing age in China. The research also used Maximum Likelihood Estimation (MLE) and multi parameter likelihood ratio (LR) to test the dataset.

Variables

Dependent Variables

Model 1: Desired Number of Children Multilevel Generalized Poisson Regression

Model 2: Desired Childbearing Gender Multilevel Multinomial Logit Regression

Model 3 and Model 4: Desired timing of childbearing

Ideal age at first childbearing Multilevel Linear Regression

Ideal interval of Childbearing between 1 parity and 2 parity

Multilevel Linear Regression

Independent Variables

Micro Level --Individual Variables and Community Variable

Macro Level--County Variables and City Variable

Note that the definition of two levels in this research because of the particularity and deficiency of dataset.

Expected Findings

This research attempts to make an empirical analysis on the multidimensional determinants of "Three-Dimensional Characteristics of fertility desire" of women of childbearing age in China, which quantify the different effects from socioeconomic, cultural, family planning policy and other factors for explaining the reproductive

decision-making process.

The results show that the micro and macro determinants have independent and significant influence on fertility desire of women of childbearing age in China, which will make good to perfect the framework of fertility desire research comprehensively.

Fertility control policy has made great contribution to fertility decline in the past of China. However, in the post-demographic society, Family Planning Policy has been replaced by the social and economic development, which is no longer dominated factor in China. Socioeconomic factors will be the dominant determinants affecting fertility desire of women of childbearing age in China with the continued weakening influence of the policy factor or even fade away.

This research reveals the convergence of fertility desires of women of childbearing age in the context of same community. So, Community culture is an indispensable determinant affect fertility desire of women of childbearing age because it is an effective way to propagandize and administer under Family Planning Policy in China, which can not be ignored.

Education and the number of current survived children are two important factors affect fertility desire of women of childbearing age respectively in China.

Tables and Figures

Table 1 The Official Reports on Total Fertility Rate in China Since 1990

year	1990	1992	1995	1997	2000	2001	2005	2006
	National Census	National Bureau of Statistics Survey on Fertility	National 1% Sample Survey	National Survey on Population and Reproductive Health	National Census	National Survey on Family Planning and Reproductive Health	National 1% Sample Survey	National Survey on Population and Family Planning
1990	2.31	2.17	2.04	2.29	2.37	2.29		
1991		2.01	1.65 (1.66)	1.75	1.80	1.77		
1992		1.86*	1.52 (1.47)	1.57	1.68	1.59		
1993		1.71*		1.51	1.57	1.52		
1994		1.60		1.32	1.47	1.41		
1995		1.46	1.43	1.33	1.48	1.45		
1996		1.55		1.35	1.36	1.36		
1997		1.49			1.31	1.27		
1998		1.49			1.31	1.34		
1999		1.47			1.23	1.29		
2000		1.22			1.22	1.45		
2001		1.39						
2002		1.38						
2003		1.40						
2004		1.44						
2005		1.33					1.33	1.74
2006		1.38						
2007		1.43						
2008		1.47						

Data Sources: TFR of National Bureau of Statistics calculated by age-specific fertility rate in <

China's Population Statistics Yearbook > (1991 ~ 2006) and <China Statistical Yearbook of Population and Employment> (2007 ~ 2009). TFR of 1992 National Sample Survey on Fertility calculated by Zeng and Yu & Yuan according to 1992 National Sample Survey on Fertility Data (Zeng Yi, 1995^[38]; Jingyuan Yu, Jianhua Yuan, 1996^[39]). TFR of 1997 National Survey on Population and Reproductive Health calculated by Guo according to 1997 National Survey on Population and Reproductive Health Data (Zhigang Guo, 2000^[40]). TFR of 2000 National Census calculated by Guo used Matching Method of Mother-Child according to National Census 1 % Data, TFR* estimated by Guo used Interpolation Method on the National Bureau of Statistics data from 1991 to 1994 (Zhigang Guo, 2004^[41]). TFR of 2001 National Survey on Family Planning and Reproductive Health calculated by Ding according to 2001 National Survey on Family Planning and Reproductive Health Data (Junfeng Ding, 2003^[42]). TFR of 2006 National Survey on Population and Family Planning obtained from <2006 National Survey on Population and Family Planning Data Collection> (edited by Weiqing Zhang et al.).

Table 2 National Fertility Desire of Women at Age-Specific in China

Year Family Planning Policy Age Group	1997	2001	2002		2007	
	<u>under the Family Planning Policy</u>	<u>under the Family Planning Policy</u>	<u>under the Family Planning Policy</u>	<u>without the Family Planning Policy</u>	<u>under the Family Planning Policy</u>	<u>without the Family Planning Policy</u>
16~19	1.58	1.48	1.21	1.61	1.86	1.80
20~24	1.55	1.48	1.27	1.58	1.81	1.73
25~29	1.68	1.62	1.43	1.65	1.85	1.79
30~34	1.76	1.72	1.59	1.80	1.89	1.87
35~39	1.76	1.78	1.75	1.96	1.90	1.89
40~44	1.81	1.81	1.80	2.08	1.93	1.95
45~49	1.84	1.87	1.93	2.19	1.95	1.96
Total	1.71	1.70	1.61	1.89	1.89	1.88

Data Sources: Calculated by the author from National Survey on Population and Reproductive Health in 1997, National Survey on Family Planning and Reproductive Health in 2001, National Urban-Rural Resident Fertility Desire Survey in 2002, National Social Conditions and Public Opinion Polls on Fertility Desire in 2007.

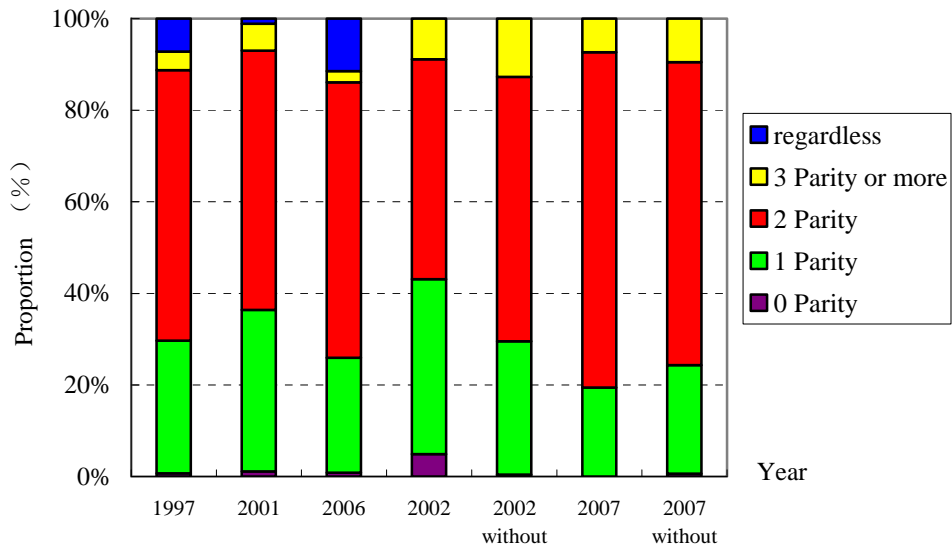


Figure 1 Proportion of desired parity among women of childbearing age in China

Source: Produced by the author. Data calculated from National Survey on Population and Reproductive Health in 1997, National Survey on Family Planning and Reproductive Health in 2001, National Urban-Rural Resident Fertility Desire Survey in 2002, National Survey on Population and Family Planning in 2006, National Social Conditions and Public Opinion Polls on Fertility Desire in 2007.

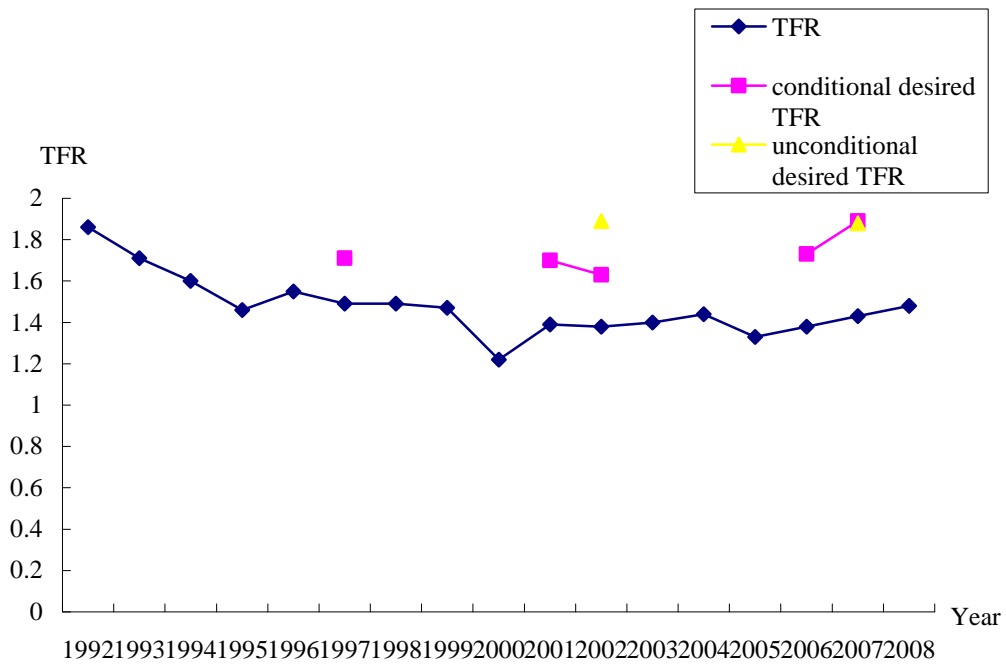


Figure 2 The Gap between Fertility Desire and Childbearing Behavior

Source: Produced by the author. TFR data came from <China Population Statistics Yearbook> (1993 ~ 2006), <China Population and Employment Statistics Yearbook> (2007 ~ 2009), 2000 National Census, and 2005 National 1% Population Sample Survey. Desired TFR data calculated from National Survey on Population and Reproductive Health in 1997, National Survey on Family Planning and Reproductive Health in 2001, National Urban-Rural Resident Fertility Desire Survey in 2002, National Survey on Population and Family Planning in 2006, and National Social Conditions and Public Opinion Polls on Fertility Desire in 2007.

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