Population Negative Momentum under Low Fertility in China

Zhuoyan Mao[1], Baochang Gu[2]

1. School of Labor Economics, Capital University of Economics and Business;

2. Center for Population and Development Studies, Renmin University of China

Backgrounds

Since the beginning of the 21st century, the population of entire world has been developed into the low fertility situation, population momentum will be the main driving force of the increasing population over almost all parts of the world. International research shows the tremendous effect of population momentum of negative growth under low fertility level (Lutz et al, 2003).

China has kept it's fertility below replacement for almost thirty years since the early 1990s. It's estimated population growth will turn negative after reaching its peak around 2030 (Wang & Wang, 2019). Obviously, population momentum is the main source of the past and the coming growth of China's population. However, it has been not well understood the effect of population negative momentum to the situation of China's population under low fertility. The paper will be examining the effects of population negative momentum under low fertility in China.

Data & Methods

According to the classic definition, population momentum is the growth that would occur in a population if replacement level fertility were achieved immediately.

The study used the functions raised by Preston and Guillot (1997) to calculate the value of population momentum in China, as the result of discrepancies between the relative age distribution of the current population and that of the ultimate stationary population.

Also, by calculating cross-sectional average length of life (CAL) put forward by Michel Guillot (2003, 2005), the study will decompose the death and birth effects of population momentum in China.

By using the data published by National Bureau of Statistics of China, the study tries to analyze China's and inter-regional population momentum, and its effect on China's population trends in the future. The main results are as below.

Main Results

As the table 1 shown, the value of population momentum in China declined from 1.34 in 1953 to 1.02-1.09 in 2010, demonstrating substantial weakening of intrinsic rate of natural increase, which means China's population is accumulating on population momentum of negative growth via a splitting speed and skyscraping extend. Because of thirty years accumulated population positive momentum has been still operating since 1990, its power is still hiding behind the phenomenon.

China will enter a critical phase of its demographic evolution soon. Around the year of 2020, the population began to generate "negative momentum", as suggested by the value of population momentum below 1. The gross population momentum of positive growth has been significantly falling down during recent 50 years, however, power on pushing the growth of population from the positive momentum is disappearing. And in the near future, effects of negative momentum will become significant, as the values of population momentum will be far from 1 from 2020 to 2050.

Since the 1980s, although momentum of the rural population was significantly higher than the one of the urban, the positive momentum of the urban and rural populations are both declining rapidly. The value of urban population momentum has dropped to below 1 in 2010 from 1.4 in 1982, which means negative, and suggests China's population growth was wholly attributable to the momentum of the rural population (Table 2).

The differences of population momentum among the provinces in China are narrowing rapidly since the 1980s (Table 3). At present, there are 12 provinces in which population momentum has become negative. Currently, the values of population momentum in Shanghai and Liaoning are lower than 0.8, which are much lower than the one in Europe around 2000 (about 0.96).

As the table 4 shown, China's population momentum of positive growth mainly is due to the dramatic decline in mortality in the 20th century, rather than entirely due to high fertility. The momentum generated by mortality change in China, either in the past or in future, is the driving force to prevent or delay the population taking on the momentum

of negative growth (Table 4).

Table1 The Value of Population Momentum in China: 1953-2050

Year	Population Momentum	Year	Population Momentum
1953	1.35	2020 (TFR=1.5)	0.87
1964	1.76	2020 (TFR=1.8)	0.92
1982	1.57	2020 (TFR=2.1)	0.96
1990	1.43	2030 (TFR=1.5)	0.78
1995	1.29	2030 (TFR=1.8)	0.84
2000	1.16	2030 (TFR=2.1)	0.89
2005	1.09	2040 (TFR=1.5)	0.71
2010 (TFR=1.18)	1.02	2040 (TFR=1.8)	0.78
2010 (TFR=1.5)	1.05	2040 (TFR=2.1)	0.85
2010 (TFR=1.8)	1.09	2050 (TFR=1.5)	0.67
		2050 (TFR=1.8)	0.75
		2050 (TFR=2.1)	0.84

Table 2 The Value of Population Momentum in China's Urban and Rural Areas: 1953-2010

Year	Urban	Rural
1982	1.40	1.59
1990	1.38	1.52
1995	1.15	1.37
2000	1.12	1.20

2005	1.00	1.09
2010	0.98	1.06

Table 3 The Value of Population Momentum by Province in China: 1982-2010

Province	Year				Province	Year			
	1982	1990	2000	2010		1982	1990	2000	2010
Beijing	1.31	1.09	0.92	0.84	Hubei	1.52	1.44	1.23	1.00
Tianjin	1.37	1.18	0.99	0.86	Hunan	1.58	1.45	1.20	1.07
Hebei	1.58	1.47	1.19	1.06	Guangdong	1.66	1.57	1.51	1.20
Shanxi	1.56	1.43	1.24	1.06	Guangxi	1.76	1.65	1.34	1.20
Inner Mongolia	1.66	1.44	1.11	0.88	Henan	-	1.67	1.52	1.24
Liaoning	1.52	1.25	0.96	0.75	Chongqing	-	-	1.01	0.98
Jilin	1.61	1.36	1.02	0.83	Sichuan	1.54	1.30	1.08	0.97
Heilongjiang	1.67	1.38	1.03	0.81	Guizhou	1.74	1.59	1.32	1.27
Shanghai	1.08	0.93	0.88	0.78	Yunnan	1.67	1.51	1.26	1.11
Jiangsu	1.54	1.34	1.06	0.93	Tibet	-	1.57	1.41	1.17
Zhejiang	1.51	1.31	1.04	0.91	Shaanxi	1.53	1.44	1.23	1.00
Anhui	1.68	1.55	1.29	1.11	Gansu	1.63	1.17	1.25	1.15
Fujian	1.70	1.58	1.30	1.07	Qinghai	1.71	1.51	1.32	1.13
Jiangxi	1.75	1.60	1.30	1.18	Ningxia	1.85	1.67	1.41	1.18

Shandong	1.45	1.42	1.08	0.98	Xinjiang	1.77	1.60	1.36	1.17
Henan	1.63	1.59	1.26	1.20					

Table 4 Decomposition of Population Momentum

in China and Selected Countries, Female

Countries	Year	CAL	e^0	Population Momentum	Mortality effects	Birth effects
China	2010	55.34	80.47	1.05	1.45	0.72
China	2000	50.68	73.33	1.16	1.45	0.8
India	2000	48.66	62.68	1.44	1.28	1.13
France	2000	76.01	82.92	1.04	1.09	0.95
Japan	1998	71.53	83.9	0.98	1.17	0.83
UK	1998	74.97	79.92	1.01	1.07	0.94
Norway	1998	77.34	81.12	1.06	1.05	1.01
Sweden	1998	77.59	81.86	0.99	1.06	0.94
Switzerland	1998	77.49	82.27	0.98	1.06	0.92
USA	1998	74.77	79.38	1.09	1.06	1.03

Notes: the data of the selected counties is from Michel Guillot, The Cross-Sectional Average Length of Life (CAL): A Cross-Sectional Mortality Measure That Reflects the Experience of Cohorts, *Population Studies*, Vol. 57(1) , 2003, 41-54, and Michel Guillot. 2008. "The momentum of mortality change," *Population Studies*: Vol 59:3,283-294.

References

Wang, Guangzhou, and Wang Jun. 2019. "Population Situation and Demographic Development Trends in Contemporary China," *Journal of Social Development* (Quarterly) 6(1): 1-20.

Lutz Wolfgang, Brian C. O'Neill, and Sergei Scherbov. 2003. "Europe's population at a turning point," *Science*: Vol 299: 191-192.

Samuel H. Preston and Michel Guillot, Population Dynamics in an Age of Declining Fertility, *Genus*

LIII no.3-4, 1997: 15-31.

Michel Guillot. 2005."The momentum of mortality change," *Population Studies*: Vol 59:3,283-294.

Michel Guillot.2003."The Cross-Sectional Average Length of Life (CAL): A Cross-Sectional Mortality Measure That Reflects the Experience of Cohorts," *Population Studies*, Vol. 57:1: 41-54,