

Prediction and Analysis of China's Future Population Based on the "Seventh National Census Data"

CHI Zihan¹, FENG Jingyi¹, LI Zongxuan^{2*}

1. Central University of Finance and Economics, Beijing 102206, China

2. International Leadership of Texas Private High School (ILTexas Private High School Garland), Texas 75082, United States

Abstract: Based on data from the Seventh National Population Census (Seventh Census), this study systematically forecasts and analyzes China's future population size, structure, and trends by integrating historical demographic shifts with policy contexts. Employing a population projection model that comprehensively considers multiple factors including fertility rates, mortality rates, and age structure, the study examines critical issues such as population aging and shifts in labor supply. Results indicate that China's population will peak at approximately 1.431 billion around 2028 before entering a phase of negative growth, with the population size projected to decline to around 1.28 billion by 2050. Concurrently, the degree of population aging will intensify, leading to a significant rise in the old-age dependency ratio.

Keywords: Seventh national census data; Population projection; Cohort-component method

I. Introduction

China's population structure is undergoing drastic changes as the country implemented the strict one-child policy in the past three decades. Data from the Seventh National Population Census (2020) indicates that the proportion of the elderly population in China has exhibited a consistent upward trend over time. China's total population stands at 1.412 billion, representing a 5.38% increase from 2010 with an average annual growth rate of 0.53%, reflecting a low-growth trend. Concurrently, significant shifts occurred in the population structure: the proportion of the population aged 0-14 increased by 1.35 percentage points, while the working-age population aged 15-59 decreased by 6.79 percentage points. The

share of those aged 60 and above rose by 5.44 percentage points, accelerating the aging process. Against this backdrop, scientifically forecasting future population trends holds critical importance for formulating population policies and refining the social security system.

II. Analysis of China's Current Population Status

From 2010 to 2020, fundamental changes did not occur in either population size or structure; however, the seeds of such changes have been sown. The four previous baby booms have determined the demographic structure for the next 30 to 50 years. With fertility rates continuing to decline and life expectancy increasing, an inverted

* All authors contributed equally and are listed in alphabetical order.

pyramid population structure is now inevitable.

First, China's population maintained a low growth rate over the past decade. In 2020, China's population reached 1.412 billion, an increase of 72.05 million people (5.38%) compared to the 1.34 billion recorded in the Sixth National Population Census of 2010. This represents an average annual growth rate of 0.53%, down 0.04 percentage points from the 0.57% average annual growth rate observed between 2000 and 2010.

Second, adjustments to the birth policy have yielded results, but the aging of the population has deepened further. Compared with the Sixth National Population Census in 2010, the proportion of the population aged 0-14 increased by 1.35 percentage points, while the proportion of those aged 15-59 decreased by 6.79 percentage points. The proportion of those aged 60 and above increased by 5.44 percentage points, and the proportion of those aged 65 and above increased by 4.63 percentage points, reaching 191 million. China's average age stands at 38.8 years, indicating a population that remains predominantly young and vigorous overall.

Third, the gender structure of China's population continues to improve. Among the national population, the male population is 723 million, accounting for 51.24%, while the female population is 688 million, accounting for 48.76%. The sex ratio of the total population (with females as 100, the ratio of males to females) was 105.07, which remained largely unchanged from the 2010 Sixth National Population Census, showing a slight decrease. The sex ratio at birth was 111.3, down 6.8 from 2010.

III. China's Future Population Projections

A. Projection Methodology and Assumptions

Based on data from the Seventh Census, this

paper employs a mainstream population projection method—the “cohort-component method”—to provide a simplified forecast of China's population structure from 2020 to 2050. This methodology utilizes a fundamental equation: Population in the next period = Population in the current period + Population increment - Population decrease. Population growth stems from births and net immigration, while population decline results from deaths and net emigration. When looking at age-specific populations, age changes can also bring about population increases and decreases. By setting parameters for mortality, fertility, and migration within this fundamental equation, we project how population size, structure, and growth would evolve under specified conditions.

Based on data from the Seventh National Population Census, we assume a sex ratio at birth of 111.3. Given widespread industry consensus that the fertility rate of Sixth Census was underestimated, we adjust the published Sixth Census fertility rate upward by 18% as our estimated fertility assumption. Mortality rates are assumed based on those from the 2010-2013 China Life Insurance Industry Experience Life Table. We assume no migration and no future migration, as migration currently represents a very small segment of China's population.

B. Projection Results

Based on the aforementioned methods and assumptions, this study projects China's total population size and population structure for the period 2020–2050.

Figure 1 illustrates the projected total population size of China in the coming years. China's population is expected to peak at 1.431 billion in 2028, after which it will enter a sustained decline. By 2050, the total population is projected to reach approximately 1.28 billion.

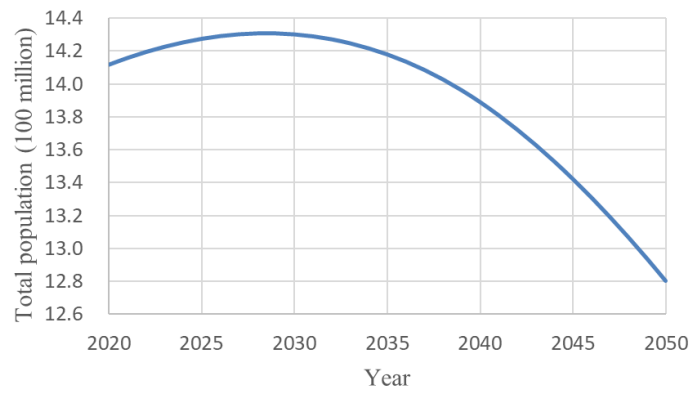


Figure 1 Projections of China's Total Population (2020 – 2050)

The population is divided into four age groups: 0–14 years, 15–59 years, 60 years and above, and 65 years and above. The population size of each age group over the next 30 years is estimated separately, with the results presented in Figure 2.

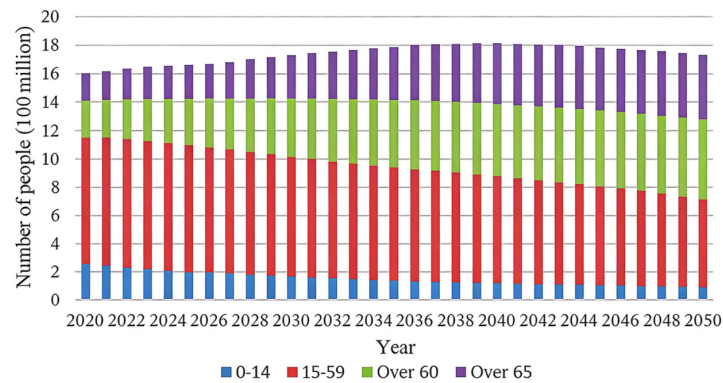


Figure 2 Projections of China's Age-Structured Population

Furthermore, the gender- and age-specific population structure for selected benchmark years is presented in Figure 3.



Figure 3 Population Structure of China in Selected Benchmark Years

As illustrated in Figures 2 and 3, China's population structure is deteriorating progressively, shifting toward an inverted pyramid shape, with the aging degree intensifying year by year. Based on the aforementioned population structure projections, China's old-age dependency ratio is expected to drop to 1.6 by 2050—meaning the number of working-age individuals supporting each person aged 65 and above will plummet from the current 5.08 to 1.6.

C. New Trends in Population Development

To summarize, based on data from the Seventh National Population Census and previous censuses, China's population development will exhibit two major trends in the upcoming period.

First, the total population is on the verge of peaking, with negative population growth imminent. Although the number of births rebounded slightly following the implementation of the universal two-child policy, population growth momentum has weakened further since 2020, mainly due to factors such as the shrinking size of the childbearing-age population. Projections indicate that the total population will peak between 2025 and 2030. This peak signifies that China has achieved a historic transition in population reproduction ahead of schedule, effectively alleviating the pressure of population on resources and the environment, and strongly promoting economic development and social progress. After peaking, China's total population will gradually begin to decline slowly, and negative population growth will become a reality in the near future.

Second, the demographic dividend from population quantity is drawing to a close, with population aging accelerating gradually. Between 2021 and 2030, both the total size and proportion of the working-age population will continue to decline at a relatively fast pace, while the total

dependency ratio will keep rising. Consequently, the demographic dividend derived from a low dependency ratio is progressively approaching its end. During the 14th Five-Year Plan period (2021–2025), China will transition from mild aging to moderate aging. As the “post-1960s” generation—born during the second baby boom—enters retirement, the growth rate of the elderly population will accelerate significantly, accounting for approximately 25% of the total population by 2030. Among this group, the increase in the elderly population aged 80 and above will be even more pronounced.

IV. Conclusions and Implications

Systematic projections based on data from the Seventh National Population Census (hereafter referred to as the “7th Census”) indicate that China's population development has entered a historic transitional phase, presenting a new normal characterized by low-speed growth coupled with deepening aging. This fundamental demographic structural transformation will exert far-reaching impacts on economic and social development, with the most direct and severe impact being on the current endowment insurance system.

The “inverted pyramid” trend of the population structure will inevitably subject the public pension system to sustained pressure. Actuarial reports have warned that the accumulated balance of the basic pension insurance fund may be depleted around 2035. Even if the system operates normally, the real replacement rate of China's basic pension insurance has been on a declining trajectory. Therefore, commercial endowment insurance should be positioned as a strategic and urgent choice to address the impending pension crisis. Over the next 10 to 15 years, China's 45-60 age group—

potential customers in the family life cycle with the most pressing demand for pension planning and relatively strong purchasing power—will maintain a large scale. This presents a “golden period” for the popularization and development of commercial endowment insurance.

The ultimate goal is to clearly construct a multi-level and multi-pillar old-age security system. In this system, basic endowment insurance plays a bottom-line role of “ensuring basic needs”, while commercial endowment insurance undertakes the core function of meeting personalized and high-quality pension demands. Through such a systematic and structural transformation from a reactive to a proactive approach, we can smoothly navigate this profound demographic structural change, effectively address various challenges of the “longevity era”, and ultimately achieve long-term balanced population development and social harmony and stability.

References

- [1] Li J, Wang S Z, Zhu Y. Prediction and analysis of China's Future population development trend[C]// Proceedings of the 7th International Conference on Information Science, Computer Technology and Transportation (ISCTT 2022). Berlin: VDE Verlag, 2022: 1-7.
- [2] Cheng Z, Yu C H. Current status and trends of the elderly population and disease burden in China from a global perspective[J]. Journal of Public Health and Preventive Medicine, 2025, 36(3): 1-6.
- [3] Wheldon M C, Raftery A E, Clark S J, et al. Reconstructing past populations with uncertainty from fragmentary data[J]. Journal of the American Statistical Association, 2013, 108 (501): 96-110.
- [4] Wheldon M C, Raftery A E, Clark S J, et al. Bayesian reconstruction of two-sex populations by age: estimating sex ratios at birth and sex ratios of mortality[J]. Journal of the Royal Statistical Society. Series A: Statistics in Society, 2015, 178 (4): 977-1007.
- [5] Guo X J, Zhang R, Xie N M, et al. Predicting the population growth and structure of China based on grey fractional-order models[J]. Journal of Mathematics, 2021: 7725125.
- [6] Akimov A V, Gemueva K A, Semenova N K. The seventh population census in the PRC: results and prospects of the country's demographic development[J]. Herald of the Russian Academy of Sciences 2021, 91(6):724-735.
- [7] Peng X Z. China's demographic history and future challenges[J]. Science, 2011, 333(6042): 581-587.

©2025. This article is copyrighted by the author and Hong Kong Science and Technology Publishing Group. This work is licensed under a Creative Commons Attribution 4.0 International License. <http://creativecommons.org/licenses/by/4.0/>



Open Access