

Research on the Aging Pressure and Declining Birth Rate in the Pension System

Jincheng Peng

*Gaston Day School Shanghai Shangde, Shanghai, China
2474399061@qq.com*

Abstract. With the global aging population and declining fertility rates, pension systems are facing unprecedented pressure. As the proportion of the working-age population shrinks year by year, the shrinking number of contributors and the surging number of pension recipients create a sharp contradiction, leading to current pension revenue and expenditure shortfalls in some countries, even forcing them to rely on fiscal subsidies to barely maintain operations. Among existing pension systems, the pay-as-you-go system, based on the principle of "intergenerational support," is most significantly impacted by demographic changes. The balance between pension rights accumulated during youth and actual benefits received in old age is being disrupted, posing a serious challenge to sustainability. This article analyzes the impact of population aging and low fertility on pension systems, examines the sustainability of the existing pension system, and proposes policy recommendations, including raising the retirement age, optimizing pension investment structures, implementing fertility policies, and promoting the development of a multi-pillar pension system. Raising the retirement age must be accompanied by flexible adjustments to the job market to avoid exacerbating employment difficulties for older individuals. Optimizing the investment structure requires expanding diversified asset allocation while maintaining manageable risks to enhance long-term returns. The study concludes that only comprehensive institutional reforms and policy adjustments can effectively address the pension payment crisis brought about by demographic changes.

Keywords: aging, declining fertility rate, pension system, sustainability, policy adjustment

1. Introduction

In recent years, significant demographic shifts have reshaped global demographics, marked by accelerated aging and persistently declining birth rates that pose substantial challenges to pension systems worldwide. According to the United Nations 'World Population Prospects (2023)', the proportion of people aged 65 and over is projected to rise from 9.3% in 2020 to 16% by 2050. Meanwhile, the global total fertility rate (TFR) has dropped from 4.86 in 1950 to 2.42 in 2020, with some developed nations experiencing rates below 1.5. China's situation stands out particularly: its population aged 60 and above reached 19.8% in 2023, while the TFR stood at merely 1.09 [1].

The core of the pension system lies in intergenerational transfer payments, where contributions from the current working population fund pensions for retirees. However, under the dual pressures

of an aging workforce and declining birth rates, the shrinking labor force has created a funding gap between contributors and beneficiaries, placing immense financial strain on pension systems. This paper aims to analyze the root causes, impacts, and potential solutions to this critical issue.

2. Population aging and its challenges to pension systems

2.1. A surge in pension expenditures

With advancements in healthcare and extended life expectancy, the proportion of elderly individuals continues to rise, prolonging the duration of pension payments. In China, for example, the average life expectancy reached 77.3 years in 2020. Under the current retirement age system (60 for men, 55 for female civil servants, and 50 for female workers), this means each pensioner will receive benefits for over 17 years on average [1]. The proportion of pension expenditures in GDP has been increasing annually. In 2022, China's basic pension fund accounted for 4.1% of GDP, and projections indicate it will exceed 8% by 2050. As society develops and medical technology advances, people's health has significantly improved, directly accelerating population aging. The growing elderly population not only raises demands on social pension systems but also poses challenges to sustainable economic development. Against this backdrop, the pension system faces unprecedented pressure. Rising pension expenditures not only strain government budgets but also threaten the stability and sustainability of the entire social security system. In China's case, extended life expectancy means longer pension dependency periods for retirees. According to World Health Organization data, the average life expectancy in China reached 77.3 years in 2020. Under the current retirement age system, this translates to each retiree relying on pensions for over 17 years on average. This phenomenon has led to a steady annual increase in pension expenditures in national fiscal budgets. According to World Bank projections, China's pension spending is expected to exceed 8% of GDP by 2050—a projected rise that will undoubtedly have profound implications for the nation's economic and social development. Consequently, addressing the surge in pension expenditures caused by population aging has become an urgent priority for governments worldwide. This challenge requires not only fiscal policy adjustments but also collaborative efforts across society to develop sustainable pension system reforms. Such initiatives aim to ensure elderly welfare while maintaining stable economic growth.

2.2. Labor population decline and shrinking contribution

Base China's pension system operates under a "pay-as-you-go" model, where current working-age individuals support retirees' pensions through their contributions. However, the declining birth rate has reduced the proportion of the working-age population in the labor force. Since peaking in 2011, China's working-age population aged 15-64 has been steadily decreasing. According to UN projections from 2023, this age group will see a reduction of 150 million people by 2050 compared to 2020 levels [1]. This demographic shift—fewer contributors and more beneficiaries—has created a severe imbalance between pension fund revenues and expenditures. With fertility rates continuing to decline, China's labor market faces unprecedented challenges. The shrinking young population not only affects workforce size but also threatens long-term economic growth potential. A dwindling labor force means fewer workers supporting an expanding retiree population, which not only strains pension systems but may undermine the sustainability of the entire social security framework. Additionally, labor market contraction could lead to wage hikes, impacting corporate cost structures and competitiveness. Recognizing the severity of this issue, the government has implemented

measures such as raising retirement ages, encouraging childbirth, and adopting more automation and AI technologies to boost productivity. However, these measures require time to take effect, and their benefits may not be immediately apparent. Therefore, in the short term, the pressure on the pension system is likely to continue to increase, and it will take a long-term solution through joint efforts of the government and all sectors of society.

3. The impact of low fertility rates on the pension system

As the global population dynamics shift, the implications for the future sustainability of pension systems become increasingly apparent.

3.1. Declining fertility exacerbates inter-generational imbalance

The total fertility rate (TFR) is a crucial indicator of a country's future demographic trends. A TFR below 2.1 signifies that the population is not replacing itself, leading to a shrinking population in the long term. Nations such as Japan, South Korea, and Italy have experienced TFRs dropping below 1.3, signaling a profound demographic challenge. In China, the situation is even more striking, with a TFR of only 1.09 recorded in 2023. This figure is alarmingly below the threshold necessary to maintain population stability, which is typically around 2.1. The repercussions of such low fertility rates are far-reaching, particularly concerning the labor market and pension systems. A dwindling labor force in the coming years will likely result in a shortage of workers, which in turn poses a significant threat to the sustainability of pension systems. As fewer individuals enter the workforce, the burden on those who do work to support pension systems will increase, potentially leading to a crisis in funding and benefits.

3.2. Changes in family structure affect pension mode

The traditional family-based elderly care model, which has been the backbone of pension support in many societies, is facing unprecedented challenges due to the declining birth rate, particularly in countries like China. This model, which relies on multiple children sharing the responsibility of caring for elderly parents, is becoming less viable as the number of children per family decreases. The shift in family structure has not only weakened the effectiveness of family caregiving but has also increased the pressure on societal pension systems. The unique "4-2-1" family structure, characterized by four grandparents, two parents, and one child, has placed an immense burden on the younger generation. This only child is expected to support not only their parents but also their grandparents, creating a scenario where the strain on the pension system is further exacerbated. As the demographic trend continues, the pressure on the pension system will likely intensify, necessitating innovative solutions and policy interventions to ensure the financial security and well-being of the elderly in the future.

4. Sustainability issues: current challenges in pension systems

Currently, most countries' public pension systems operate under the pay-as-you-go model, which heavily relies on intergenerational fund transfers. However, with the intensification of population aging, the dependency ratio between contributors and beneficiaries is deteriorating. In China's urban employee basic pension insurance system, the dependency ratio dropped from 3.65:1 in 2000 to 2.65:1 in 2022, and is projected to further decline to 1.5:1 by 2050 [2].

Declining Pension Replacement Rate: The pension replacement rate (the ratio of pensions to pre-retirement wages) serves as a key indicator of pension security levels. OECD countries average 58% replacement rates, while China currently stands at approximately 45%. With mounting pension payment pressures, this ratio may continue to decline in the future [3].

Personal Account Deficit Issues China's pension system operates under a "social pooling + individual accounts" model. However, historical practices have led to funds being used to cover current pension payments, resulting in account deficit issues. As of 2022, the accumulated surplus of pension insurance funds reached 5.8 trillion yuan, while the deficit exceeded 7 trillion yuan [4].

5. Response strategies and policy recommendations

5.1. Delayed retirement age

Gradually raising the retirement age is a crucial measure that can significantly increase the supply of the labor force and alleviate the pressure on pension payments. Many developed countries, such as Japan and Germany, have already raised their retirement age to 67, and China should also consider gradually implementing flexible retirement policies. This approach not only helps to maintain the vitality of the workforce but also contributes to the sustainability of the pension system.

5.2. Optimize the investment structure of pension funds

To improve the investment returns of pension funds, it is essential to explore and expand investment channels, such as stocks, bonds, and infrastructure projects. For instance, the National Social Security Fund (NSSF) of China has achieved an average annual return rate of 8.3% (as of 2022) [5], demonstrating the potential for higher returns through diversified investments. However, the investment proportion of basic pension funds remains relatively low, indicating a need for further optimization of the investment structure to ensure the long-term stability and growth of pension assets.

5.3. Fertility policy

To increase the fertility rate, it is necessary to implement comprehensive measures that include child support, extended maternity leave, and tax incentives. Countries like France and Sweden have successfully raised their Total Fertility Rate (TFR) above 1.8 by adopting family-friendly policies, which serves as a valuable example for China to follow [5]. These policies can help create a more supportive environment for families, thereby encouraging larger family sizes and addressing the issue of population aging.

5.4. Promoting a multi-pillar pension system

Establishing a multi-pillar pension system that involves the government, enterprises, and individuals is essential for ensuring the sustainability of pensions. The system should include:

- Pillar 1: Basic pension insurance (pay-as-you-go)
- Pillar 2: Enterprise annuity (occupational annuity)
- Pillar 3: Personal pension (tax benefits)

China introduced a personal pension system in 2022, but the participation rate remains low, indicating that policy incentives need to be strengthened to encourage more people to participate in the system and build a more comprehensive retirement security network.

5.5. Strengthening financial subsidies and cross-regional adjustment

The central government should increase transfer payments for pensions and promote national pooling to balance regional differences in pension revenues and expenditures. This approach will help ensure that all regions, regardless of their economic development levels, can provide adequate pensions to their residents, thereby promoting social equity and stability.

6. Conclusion

The aging population and declining birth rates present significant challenges to the sustainability of pension systems. The current pay-as-you-go system is facing a dilemma due to the decreasing number of contributors and the increasing number of beneficiaries. To address these challenges, comprehensive measures such as delaying retirement, optimizing investments, encouraging childbirth, and developing multi-pillar pension systems are necessary. Future policies should prioritize intergenerational equity to ensure the long-term stability and fairness of pension systems, providing a secure and dignified life for the elderly.

References

- [1] United Nations. (2023). World Population Prospects. <https://population.un.org/wpp/>
- [2] National Bureau of Statistics. (2023). China Demographic Yearbook. <http://www.stats.gov.cn/>
- [3] OECD. (2022). Pensions Market Outlook. https://www.oecd-ilibrary.org/finance-and-investment/oecd-pensions-outlook-2022_7d1d29f4-fr
- [4] Chinese Academy of Social Sciences. (2023). China Pension Development Report. <https://www.cs.com.cn/hyzt/ylyj2023/>
- [5] World Bank. (2022). Global Pension System Assessment. <https://data.worldbank.org.cn/>