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A Literature Review on China's Fiscal Sustainability in the Context of Population Aging

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ABSTRACT

This paper reviews 30 core papers from major Chinese journals in recent years, focusing on the topic of "China's fiscal sustainability in the context of population aging." It first clarifies how the concept of "fiscal sustainability" has evolved from "whether debt can be repaid" to "whether the government can withstand pressure in the long run." Then, it summarizes scholars' main views from five perspectives: declining revenue, rising expenditure, non-linear relationships, pressure on specific institutions, and policy responses. Finally, the paper points out four gaps in current research—regional differences, long-term predictions, quantification of the silver economy, and intergenerational equity—and suggests directions for future research.

KEYWORDS

Population aging; Fiscal sustainability; Silver economy; Local government finance

1. INTRODUCTION

According to the 2026 statistical communiqué issued by the National Bureau of Statistics, by the end of 2025, China's population aged 65 and above had reached 224 million, accounting for 15.9% of the total population, officially entering the stage of "aged society [1, 2]." From an "aging society" (65+ population ≥ 7%) to a "aged society" (≥ 14%), China took only 21 years. Cheng Ren et al. predict that by around 2030, this proportion will exceed 20%, entering a "super-aged society," and will peak at about 30% around 2055 [3].

At the same time, China is also facing two other features: "getting old before getting rich" and a " simultaneous decline in fertility" The total fertility rate has fallen to below 1.1, even lower than Japan's; the natural population growth rate has turned from positive to negative; and the proportion of the working-age population has dropped from 73.1% in 2009 to about 68.9% [4]. Fewer people and more elderly people directly mean fewer taxpayers and more pensioners, putting increasing pressure on local government finances. The Fourth Plenary Session of the 20th Central Committee of the Communist Party of China included "strengthening fiscal sustainability" in its official documents, showing that this issue has risen to the national strategic level [5, 6].

It is against this background that Chinese scholars have published a large number of relevant studies in the past decade or so. The task of this paper is not simply to list these works, but to "sort them into categories and compare them," identifying where scholars agree, where they disagree, and what questions remain unanswered. The structure of the paper is as follows: Part 2 explains what "fiscal sustainability" really means and how it is measured; Part 3, the core of the paper, summarizes the literature from five perspectives; Part 4 discusses regional differences and the role of transfer payments; Part 5 points out gaps and future directions; and the final part concludes.

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2. WHAT IS “FISCAL SUSTAINABILITY”?

2.1. The Evolution of the Concept

The term "fiscal sustainability" was first proposed by Buite in 1985. His definition was simple: if the government can roll over its debt and the currency does not collapse, and if long-term debt and fiscal surpluses can be matched, then the fiscal situation is sustainable [7]. Later, scholars developed two sets of testing methods. One is retrospective: using unit root tests and cointegration tests to check whether past fiscal data were stable (Hamilton and Flavin in 1986, Bohn in 2005). The other is forward-looking: using indicators such as the "fiscal gap" and the "tax gap" to estimate the theoretical upper limit of debt (Buiter 1985, Blanchard 1990).20 In a 2007 review, Wang Xiaoxia clearly summarized these approaches, but also pointed out that these old methods are essentially "hindsight wisdom" and are of limited use in guiding future policy [8].

In China, Deng Ziji argued as early as 2001 that the essence of fiscal sustainability is not simply a balance between revenue and expenditure, but a matter of fiscal risk control [9]. Liu Shangxi took a broader view: he believed that the deep reason for fiscal unsustainability is the government's insufficient ability to "hedge" public risks—for example, when risks such as economic downturn, pandemics, or aging come, can the fiscal system still hold the bottom line [10]?

In recent years, the concept has been further upgraded. In 2023, Yang Yuangen and Zhang Qi defined it as "the government's comprehensive ability to support long-term public development goals while withstanding various shocks." They divided it into four dimensions: stability of revenue, efficiency of expenditure, risk prevention, and institutional adaptability [6]. Xie E et al. followed this line of thinking and directly incorporated demographic changes into their analytical framework, proposing a four-dimensional view of "revenue resilience, expenditure efficiency, risk prevention, and institutional adaptability." This turned "fiscal sustainability" from a "calculation problem" into a "capacity problem [4]." Lv Bingyang summarized three common measurement methods: looking at debt indicators, checking the cointegration of fiscal revenue and expenditure, and estimating the fiscal reaction function. This provides a methodological foundation for later empirical studies [11].

2.2. Measuring Aging and Fiscal Sustainability

In the literature, three main indicators are used to measure population aging: the proportion of the population aged 65 and above, the old-age dependency ratio (how many elderly people every 100 working-age people must support), and the ratio of elderly to young. Among these, the 65+ proportion is the most commonly used international standard: 7% indicates an aging society, 14% an aged society, and 21% a super-aged society [12, 13]. On the fiscal sustainability side, scholars use a variety of "proxy variables." Sun Zheng uses the "discounted difference of cumulative fiscal surpluses" to measure provincial fiscal sustainability [14]. Yu Hongyan uses "fiscal space," defined as the theoretical upper limit of the debt ratio minus the actual debt ratio—the larger the difference, the safer the situation. Liu Jianmin et al. directly use the "fiscal deficit ratio" as a reverse indicator of fiscal risk [15]. Because different scholars use different indicators, their conclusions often conflict. This point will be discussed repeatedly when comparing studies later in this paper.

3. MAIN FINDINGS FROM THE LITERATURE

3.1. The Revenue Side: Fewer Workers, Less Tax Revenue

This is the most frequently discussed causal chain in the literature, and it is easy to understand: fewer working people → fewer people earning wages → the tax base for income tax, VAT, etc., shrinks → local government revenue declines.

Qiu Guoqing and Yang Zhi'an, using provincial panel data from 2000 to 2019, empirically confirmed that aging significantly weakens local fiscal sustainability through two channels: "reducing the labor participation rate" and "suppressing household consumption." They also found that if the central government gives local governments a larger share of tax revenue, it can alleviate this negative impact [16].

Liu Jianguo and Sun Qinying, using an "overlapping generations model" (dividing people into a young phase and an old phase) combined with data from 40 prefecture-level cities, found that the labor participation rate, per capita consumption, and per capita GDP growth are "positive factors," while a rapid increase in the number of pension insurance participants is a "negative factor [17]." Yu Hongyan's study reminds us that aging has a two-sided effect on consumption. On the one hand, elderly people's consumption (especially medical and nursing care) expands the consumption tax base. On the other hand, young people, because they have to support the elderly and save for their own old age, are reluctant to spend as much. These two forces pull in opposite directions, and the net effect depends on which force is stronger.

Sun Zheng, looking at the overall population structure, found that the higher the old-age dependency ratio, the worse the fiscal sustainability. In contrast, the youth dependency ratio is positively correlated with fiscal sustainability in the short run—because fewer children mean a lighter family burden and more savings. But in the long run, fewer children mean fewer future workers, so the long-term effect is negative. Wei Jinrui et al., using an overlapping generations (OLG) model, showed that the effect of aging on fiscal sustainability depends on "how much income tax the elderly pay." When the tax rate is very low, more elderly people are indeed a drag. But when the tax rate is high enough, elderly people who continue to work and pay taxes can actually make a positive contribution [18].

Studies by Li Yonghai et al. and Cao Congling et al. also support the judgment that "aging compresses the tax base," and they add that the urbanization rate and the level of the digital economy can play a buffering role [19]. In summary, the findings on the revenue side are relatively consistent: aging, through the reduction of the labor force and changes in consumption, puts continuous pressure on local government revenue.

3.2. The Expenditure Side: More Elderly, More Spending

The logic on the expenditure side is even more direct: a larger elderly population mechanically raises spending on pensions, medical insurance, and long-term care, thereby increasing the rigidity of fiscal expenditure.

Zheng Wei's research shows that the "worker-to-pensioner ratio" (active contributors ÷ retirees) for urban workers' basic pension insurance has been declining continuously. In some provinces, the number of months that the fund can sustain has already fallen below the safety line. Over the past decade, total fiscal subsidies have even exceeded the cumulative surplus of the fund. Fiscal subsidies have become the "ballast stone." Xi Xiaogang points out that in 2022, the expenditure of the urban workers' basic pension insurance fund had already reached 5.6 trillion yuan, and fiscal subsidies accounted for 18.7% of the fund's total income, and this share is still rising. The intergenerational burden has become "inverted"—young people pay more and receive less, while the elderly pay less and receive more [20]. Li Qing, using a three-dimensional evaluation model, estimated that the surplus rate of the urban workers' pension insurance fund has dropped to 12.3%, below the international warning line of 15%, while the dependency ratio has risen to 38.7%, exceeding the warning line of 30% [21].

On the medical insurance side, Cui Jun and She Xinyi, using "health resources" as a threshold variable, found a counterintuitive result: in regions with richer health resources, the negative impact of aging on fiscal sustainability is actually stronger. Their explanation is that when resources are abundant, there is a tendency toward "over-treatment," where more money is spent but the effect does not keep pace [22]. Chen Youhua and Ai Bo, from a more fundamental institutional perspective, issued a

warning: our current social insurance system (pay-as-you-go) is built on a demographic pyramid where there are many young people and few elderly people. But persistently low fertility rates are turning the population structure into an "inverted pyramid." If this trend continues, the system will become increasingly difficult to sustain and will have to rely on continuous fiscal injections [23].

3.3. Non-linear Relationships: It's Not a Straight Line

Not all studies agree with the simple linear view that "more aging means worse fiscal health." This is one of the most interesting parts of this review.

Gong Feng and Yu Jinliang, based on a two-period overlapping generations model and a threshold model, found that the relationship between the proportion of elderly people and fiscal sustainability is "U-shaped." On the left side of a turning point, where the elderly commodity tax burden is about 1.3% of GDP, aging is harmful. After the turning point, aging becomes beneficial. Their explanation is that when the tax system taxes elderly people's consumption heavily enough, having more elderly people can actually broaden the tax base [24]. Wei Jinrui et al. reached a similar conclusion, but used the "relative wage level of the elderly" as the threshold variable, and found that the critical values differ greatly across the eastern, central, and western regions.

Ma Zhiyue and Li Guanhua introduced a new variable—"industrial agglomeration of the silver economy"—and found an "inverted U-shaped" relationship between aging and fiscal sustainability. At low levels of aging, moderate consumption by the elderly can drive related industries and increase tax revenue. But when aging exceeds a certain critical point, problems such as labor shortages and lack of innovation begin to dominate, and fiscal sustainability deteriorates. The more developed the silver economy, the later this turning point occurs [25]. Liu Jianmin et al. proposed a "U-shaped" relationship, which is more pronounced in regions where the industrial structure is not advanced enough or where attention to the digital economy is at a medium level. Effective labor supply and elderly consumption can "flatten" this U-shape [7]. Sun Kejing and Hu Zhengxuan, using the provincial pension gap as a threshold, found that the shock follows an "L-shaped broken line" pattern—once fiscal sustainability is breached, it is very difficult to repair itself [26].

Why do these disagreements exist? This paper argues that there are three reasons. First, scholars use different indicators to measure fiscal sustainability (debt ratio, deficit ratio, fiscal space, regression residuals, etc.). Second, whether or not they include "reverse-regulating variables" such as the silver economy, delayed retirement, and artificial intelligence makes a big difference. Third, whether the data sample covers the aged society stage also matters. These three points will be discussed again in Part 5, "Gaps in Current Research."

3.4. Specific Institutions Under Pressure

Zooming in, the impact of aging on several specific "fund pools" differs.

In the pension pool, Zheng Wei distinguished between "macro-actuarial balance of the pooling account" and "micro-actuarial balance of the individual account." He pointed out that the biggest hidden dangers are "the disconnect between the notional interest rate and the market interest rate" and "the low participation rate of flexible employment workers." Xi Xiaogang and Li Qing both emphasized the "three-pillar imbalance": the first pillar (basic pension insurance) dominates and relies heavily on fiscal subsidies, while the second pillar (enterprise/occupational annuities) and the third pillar (personal pensions) are underdeveloped. They argued that the solution is to move toward "national pooling plus multi-pillar coordination."

Transfer payments show a significant moderating effect, discussed in detail in Section 4. In the medical insurance pool, Fu Yinghong et al., using a micro-level survey, found that 74% of elderly people are willing to pay more for better benefits, but they most prefer the government to increase its investment. This shows that the financing of medical insurance is politically sensitive [27].

3.5. Policy Responses: Institutional Reform and Technology-Industry Offsetting

Studies on policy responses can be divided into two types: "institutional reform" and "technology-industry offsetting."

On the institutional reform side, Xie E et al. proposed four frameworks: "resilient fiscal, efficient fiscal, safe fiscal, and agile fiscal," corresponding to the four dimensions of revenue, expenditure, risk, and institutions [4]. Zhang Lingxuan suggested carrying out labor supply-side reform, improving the multi-level pension system, exploring flexible delayed retirement, and learning from Germany's "Skilled Immigration Act" to attract high-skilled immigrants to supplement the labor force [28]. In its 2025 review of pension reforms, the OECD systematically compared international experiences such as "linking retirement age to life expectancy," "Latin American-style redistribution," and "including informal workers in the social security system [29]."

Technology-industry offsetting is the hottest new topic in recent years. Gong Lingzhi, from a theoretical perspective, systematically argued that artificial intelligence can offset the negative effects of aging on the revenue side through four mechanisms: "replacing labor, increasing capital accumulation, raising total factor productivity, and stimulating consumption." On the expenditure side, AI can optimize spending on social security, public services, and technological innovation [3]. Ma Zhiyue and Li Guanhua operationalized "silver economy industrial agglomeration" into six indicators (industrial scale, enterprise density, innovation momentum, medical resources, specialized human capital, and elderly consumption), and empirically found that it can significantly mitigate the negative impact of aging [6]. Cheng Ren et al.'s prediction study also emphasized that actively developing the silver economy is a key way to turn "population burden" into "industrial opportunity."

4. REGIONAL DIFFERENCES AND THE ROLE OF TRANSFER PAYMENTS

"Regional differences" have been an important new focus in the literature in recent years. Sun Kejing and Hu Zhengxuan found that the negative impact of aging on local fiscal sustainability varies greatly across provinces, and there is a clear jump at the threshold of "the gap in basic pension insurance between provinces." In provinces where the pension imbalance is upward (i.e., more severe), the central government's vertical transfer payments play a positive role. In provinces where the imbalance is downward, both vertical and horizontal transfer payments can play a positive role. Tang Qiang further distinguished between vertical (central to local) and horizontal (between regions) pension transfer payments, pointing out that their moderating effects are not symmetric depending on the direction of the pension imbalance [30].

Li Yonghai et al. and Cao Congling et al. focused on inter-provincial heterogeneity. They found that the level of the digital economy, the urbanization rate, and the industrial structure all have significant moderating effects on the relationship between aging and fiscal sustainability. Moreover, the positive impact of aging on high-quality development is greater in the eastern region than in the central and western regions. Together, these studies point to an important policy implication: coping with aging cannot rely on a "one-size-fits-all" national plan. Instead, differentiated fiscal arrangements should be made for different regions and stages of development.

5. GAPS IN CURRENT RESEARCH AND FUTURE DIRECTIONS

Based on the literature reviewed above, this paper identifies four gaps in current research, which also serve as directions for future investigation.

First, regional differences are still stuck at the "running regressions" stage. Many studies have found that the impact of aging differs between the eastern, central, and western regions, but most simply

split the sample and run regressions. There is a lack of a theoretical framework that puts "population mobility—tax base transfer—fiscal horizontal imbalance" into a single model. Future research could combine spatial econometric methods with population migration data to quantify the spillover the siphon effect on the fiscal sustainability of neighboring regions.

Second, there are too few long-term dynamic predictions. Most empirical data only go up to around 2020, but China is precisely entering the period of accelerated aging from 2030 to 2055. More long-term simulations based on dynamic general equilibrium (DSGE) models or overlapping generations models, with time horizons extending to 2060, are needed. These simulations should also endogenize scenarios such as "recovery of fertility rates," "AI replacement rates," and "the scale of the silver economy."

Third, quantitative research on the silver economy and AI has just started. Gong Lingzhi provided a theoretical framework, and Ma Zhiyue et al. did some preliminary empirical work. But how exactly should the "silver economy" be measured? How much labor can AI actually replace? The measurement errors are still large. Future research could combine enterprise registration data, patent data, and big tax data to construct more refined indicators of industrial agglomeration.

Fourth, research on intergenerational equity and social acceptance is very weak. Chen Youhua and Ai Bo raised the warning of "Ponzi-scheme-like" dynamics, but few studies have incorporated "intergenerational burden," "young people's willingness to have children," or "social acceptance of pension reform" into the assessment of fiscal sustainability. Future research could introduce experimental economics and survey methods to measure the public's acceptance of different reform plans.

6. CONCLUSION

Writing this review, I have come to a general judgment: population aging is not a question of "whether it will cause problems" for China's fiscal sustainability, but rather "when and where the problems will first appear." The literature reviewed above has already made it clear: the tax base is shrinking on the revenue side, and social security spending is expanding on the expenditure side. This two-way squeeze is certain. In my personal view, the next 10 to 15 years (approximately 2030–2040) will be a critical window. If the system is not adjusted well during this period, by the time the aging peak arrives around 2055, it will be very difficult to make changes.

First, fiscal pressure is structural, not cyclical. I particularly agree with Zheng Wei and Chen Youhua: the problem is not that the economy is temporarily in a downturn, but that the demographic "foundation" has changed. Cyclical problems can be solved by stimulating the economy and giving it time to recover. But structural problems are different: more and more elderly people, fewer and fewer young people—this is an irreversible trend. It is like a math problem: the variables are already fixed, and you can only adjust the parameters; you cannot rewrite the problem. This means that hoping "the economy will get better and the fiscal situation will naturally improve" is unrealistic. Proactive reforms are necessary.

Second, regional differences are more worrying than the national average. Many studies use national data or provincial panel data, and their conclusions sound like "we can still hold on." But when I read the works of Li Yonghai, Sun Kejing, and others, I noticed a detail: in eastern provinces (such as Guangdong and Zhejiang), because of the large influx of young migrant workers, the impact of aging is "diluted." In contrast, in the northeast and some central and western provinces (such as Liaoning and Heilongjiang), pension funds are already seriously unable to cover expenditures and rely entirely on central transfer payments to survive. So I believe that the real risk is not in the "national average," but in the "weakest province." It is like the barrel theory—how much water a barrel can hold depends on the shortest plank.

Third, the silver economy isa promising approach, but not a "cure-all." The papers by Ma Zhiyue and Li Guanhua inspired me: aging itself can also give rise to new industries (elderly care, senior products, health management), and these industries can create tax revenue and provide jobs, thereby alleviatin g fiscal pressure. But I think we cannot be too optimistic. First, the silver economy will mainly develop in large cities and developed regions first; remote areas will find it hard to benefit. Second, there are still many steps from "elderly people spending money" to "the government collecting taxes." Opening a nursing home today does not mean the fiscal situation will be better tomorrow. So the silver economy is a "good card," but it must be played in the right place and at the right time.

As a literature review with a limited scope, this study does not elaborate on some econometric methods in detail, and the classification of the literature may inevitably involve some overlap. I have not been able to go into detail on some of the econometric methods, and my classification of the literature may inevitably have some overlap. These limitations are not only the shortcomings of this study but also the direction for my continued learning after entering university.

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