



Enabling Agricultural Development in the Silver Economy: Mechanisms, Challenges and Paths to Financial Support

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Abstract. With the acceleration of China's population aging and the deepening of rural revitalization strategy, the integration of silver hair economy and agricultural development has become a key path to achieve resource reallocation and stimulate rural vitality. From a financial perspective, this paper explores the internal mechanism, practical bottlenecks and policy optimization of the silver economy through theoretical analysis and case studies. The study concludes that the silver economy can help agricultural transformation through the three major paths of labor re-development, industrial integration and innovation and financial resource allocation, but it needs to solve the obstacles of insufficient market incentives and the lack of risk diversification mechanism. In this regard, it is necessary to build a sustainable ago-ecosystem for the elderly through the design of differentiated financial instruments, policy synergy and social capital guidance.

Keywords: silver economy, agriculture, integrated development

1 Introduction

China is facing the dual challenges of "ageing before getting rich" and "unbalanced development between urban and rural areas". According to Cathay Pacific's database, by analyzing the sample population, China's population aging rate from 2000 to 2023 (Figure 1), provinces and cities in China with more than 10% of their population aged 65 and over in 2023 reached 97%, and the current population aging rate is still rising. At the same time, rural revitalization urgently needs to expand industrial space and human capital. The synergy between the silver economy and agriculture is not only an innovative solution to cope with aging, but also a strategic choice to promote high-quality agricultural development. This study aims to answer the question of how the silver economy can empower agricultural development through financial and non-financial channels, and how the current model can make financial instruments play a role in benefit linkage and risk prevention and control.

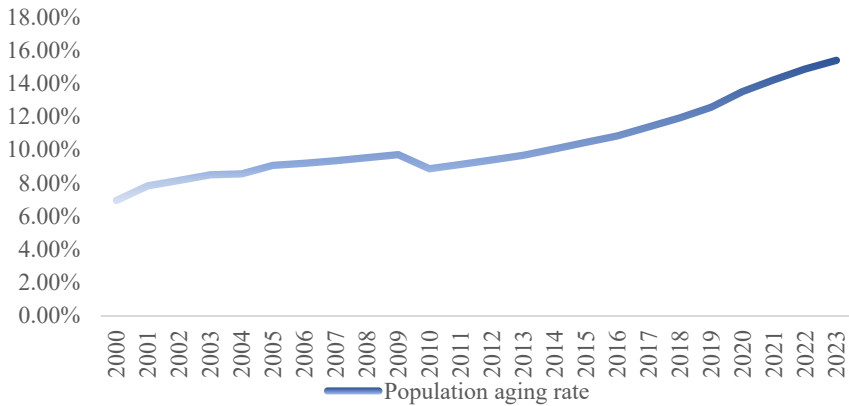


Fig. 1. Population ageing rate in China, 2000-2023

2 Theoretical framework and literature review

2.1 Connotation of Silver-Haired Agricultural Economy

Silver-Haired Agricultural Economy is a new development model that promotes the transformation and upgrading of the agricultural economy against the background of the aging population through the integration of resources of elderly people's strength, technological innovation and the synergistic empowerment of policy and finance. The core of the model lies in restructuring the factors of agricultural production (land, capital, technology and labor), activating the dual value of the elderly in agricultural production, technology promotion and recreational consumption, and optimizing the allocation of resources by relying on policy financial support and digital inclusive services to promote the integration of urban and rural industries and the transformation of green agriculture. This model not only meets the needs of the elderly through ageing-appropriate agricultural products and services, but also cracks the supply bottleneck with the help of institutional innovation, and ultimately achieves the synergistic development of agricultural efficiency, income generation for the elderly, and rural revitalization, and has become an important and innovative path for the in-depth integration of the active ageing strategy and agricultural modernization.

2.2 Progress in related research

The enthusiasm for research on the silver hair economy is increasing year by year, and the number of papers on the topic of the silver hair economy on the China Knowledge Network as of March 25 has also increased (Table 1), and the number of related papers issued in the past five years has also been increasing year by year (Figure 2).

Table 1. Number of papers published in CNKI in the past 5 years related to silver hair economy

Year	Volume of Silver Economy Issues	Total number of relevant papers
2021	45	74
2022	70	111
2023	61	92
2024	499	665
2025	161	206

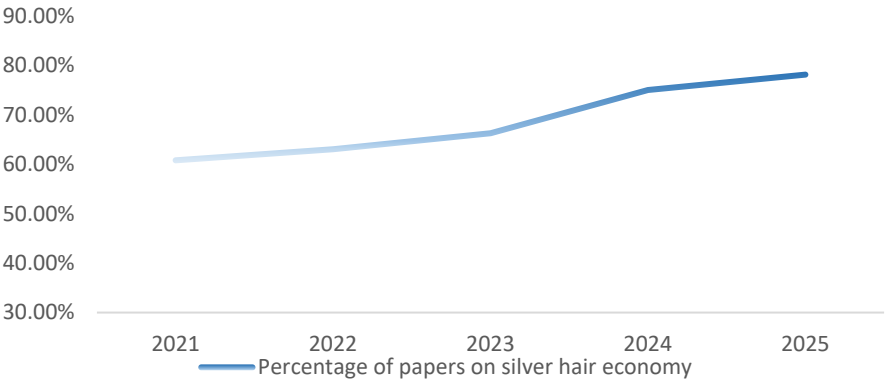


Fig. 2. Percentage of silver-hair economy publications in CNKI in the past 5 years

Ping Zhang et al. (2025) [1] find, based on empirical studies of Chinese firms, that the aging of the population significantly drives the digital transformation of firms, a phenomenon that is particularly prominent in the agricultural sector. The study points out that the aging of the rural workforce has led to a shortage of traditional agricultural labor supply, forcing agricultural enterprises to accelerate the introduction of digital technologies such as smart agricultural machines and Internet of Things (IoT) monitoring systems in order to improve production efficiency. Rumei Liu et al. (2025) [2] take the perspective of energy consumption and reveal the path of aging population through changing the structure of the workforce to promote the low-carbon transformation of agriculture. The study shows that the older workforce prefers low-energy and sustainable farming modes, while the loss of the younger workforce indirectly promotes the upgrading of agricultural mechanization to new energy equipment. Zongzhi Yang et al. (2025) [3] innovatively introduce FinTech into the analytical framework of aging and the resilience of the agricultural economy. Their study finds that FinTech enhances agriculture's ability to cope with aging shocks by alleviating the financing constraints of the rural elderly population. Yong Huang et al. (2024) [4] use a panel data model to reveal the nonlinear impact of rural population aging on agricultural carbon emissions. It was found that the rise in the proportion of older laborers initially increased carbon emissions due to sloppy management, but with policy guidance, older farmers gradually shifted to low-carbon cultivation patterns.

This duality is echoed in Takeuchi et al.'s (2025) [5] longitudinal study in Japan, which found that older adults engaged in agricultural work exhibited slower physical and cognitive decline compared to non-agricultural counterparts, suggesting farm labor may act as a health-preserving mechanism for aging populations. Pension systems in rural contexts also draw attention: Hlochova et al. (2025) [6] analyzed European farming sectors, highlighting fragmented pension schemes that fail to accommodate seasonal income volatility, while Czyżewski et al. (2025) [7] demonstrated Poland's post-EU accession agricultural budget allocations disproportionately burdened smallholder retirees. Technological interventions show divergent potentials—van de Vlasakker and Veen (2020) [8] documented how high-tech urban agriculture in Dutch nursing homes improved elderly nutritional autonomy but inadvertently reduced intergenerational cooking socialization. Labor productivity concerns persist, as Bossman et al. (2024) [9] identified in U.S. manufacturing sectors a nonlinear relationship between older workforce participation and productivity growth, implying sector-specific dynamics that may extend to agriculture. Cho and Lee (2025) [10] investigate the interplay between pension system viability and governmental institutional capacity under accelerating demographic aging, this indicates the necessity at the policy level. Collectively, these studies underscore the need for multidimensional policy frameworks that integrate health, labor, and pension systems while leveraging context-appropriate technologies.

3 Practical mechanisms and case studies

3.1 Labor redevelopment: low-cost human capital activation

As an important vegetable production base in China, Shouguang City in Shandong Province faces the dual challenges of aging rural areas and a shortage of agricultural labor. By compiling data from the Cathay Pacific database, it is understood that a decreasing percentage of the labor force over the age of 65 chose agriculture from 2006-2023 (Figure 3). 2023, with the support of the Ministry of Agriculture and Rural Development (MARD), Shouguang City innovatively launched a model called "Senior Agricultural Cooperative", which aims to activate the agricultural human capital of senior farmers over 60 years of age through a low-cost pathway. This model verifies the human capital reconstruction logic of "de-ageing", and through organizational innovation and process dismantling, it transforms the elderly labor force, which is traditionally regarded as a "burden", into a low-cost, highly adaptable factor of production, and provides a replicable path to the sustainable development of agriculture in the aging region. The logic of reconstructing old-age labor force is to transform old-age labor force traditionally regarded as "burden" into low-cost and highly adaptable production factors through organizational innovation and process dismantling.

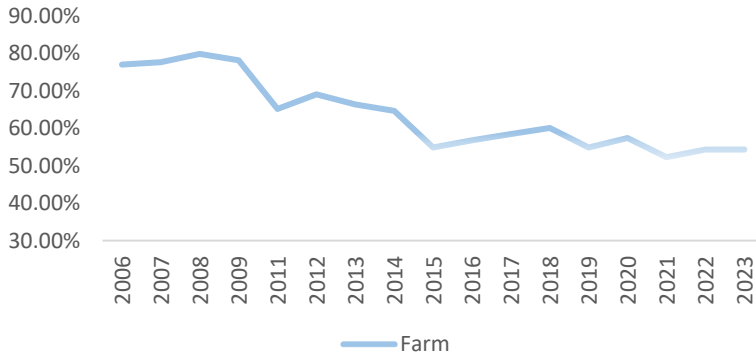


Fig. 3. Percentage of working population aged 65+ choosing agriculture, 2006-2023

3.2 Industry integration and innovation: demand-side driven supply-side reforms

As one of the first rural community governance experimental areas in the country, Anji County in Zhejiang Province has taken the "idyllic retirement community" as a practical carrier, relying on demand-side structural change to promote supply-side reforms in the field of elderly care services. Demand-side drive is reflected in two aspects: first, the aging of the population has forced the innovation of service supply, and in 2023, Zhejiang will have 13.4 million elderly people aged 60 or above, and it will be difficult to meet the diversified needs of the traditional institutional elderly care model; second, the desire of the rural residents for "home-based elderly care" has given rise to the embedded small and micro-embedded elderly care service model in the community, which will help to promote the reuse of stock resources and the development of public services. The Anji model's demand-driven supply system innovation provides replicable experience for cracking the problem of mismatch between urban and rural resources for the elderly, with the dual significance of optimizing the efficiency of economics and transforming social governance.

4 Realistic bottlenecks and financial constraints

Real-world bottlenecks focus on market failures and insufficient policy incentives, broken down into three points: information asymmetry, risk pooling, and lack of collateral (Figure 4).

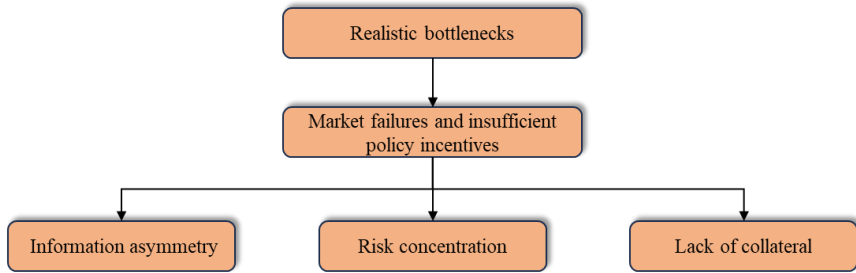


Fig. 4. Refinement of the problem

4.1 Information asymmetry

On the one hand, the digital information collection system in rural areas, especially for the elderly farming population, has not yet been improved, and the fragmented distribution of credit data and dynamic tracking mechanism for agricultural subjects are missing, leading to insufficient coverage of key dimensions of data such as production and operation data, information on the confirmation of assets, and the state of health, which are required for credit assessment. On the other hand, there is a significant gap between the application of financial technology and the technological adaptability of the aging rural population, with the low adoption rate of digital technology and weak information decoding ability of elderly farmers, exacerbating the cognitive bias between supply and demand in the financing segment.

4.2 Risk concentration

On the one hand, silver economy-driven agricultural projects (e.g., smart agriculture) mostly rely on asset-light operation modes or non-standardized assets, while the credit assessment system of traditional financial institutions is still centered on physical collateral, such as land and real estate, which has led to silver economy projects facing financing difficulties due to insufficient collateral. For example, Gansu Provincial Agricultural Development Bank relies on real estate for 90% of its mortgages, but mortgages on rural land contract management rights are difficult to promote due to vague legal definitions and imperfect transfer markets, exacerbating the singularity of financing channels and risk concentration. On the other hand, innovative projects integrating the silver economy and agriculture involve cross-industry asset integration, and the lack of uniform standards for their value assessment further magnifies the risk of adverse selection by financial institutions.

4.3 Lack of collateral

On the one hand, silver-hair economy-related agricultural projects mostly involve non-standardized assets or light-asset operation modes, making it difficult to satisfy the rigid requirements of traditional financial institutions for physical collaterals, such as land and property. On the other hand, the existing rural collateral mechanism is insufficiently

innovative, and the application of new types of collateral such as mortgages of land contract management rights and pledges of accounts receivable is still limited by vague legal definitions and imperfections in the transfer market, making it difficult to effectively revitalize agricultural assets.

5 Conclusions

The synergistic development of the silver economy and agriculture needs to break the traditional cognitive paradigm of "ageing = burden", activate the stock of resources through the innovation of financial tools, and build a sustainable silver agriculture ecosystem. This model can not only meet the challenges of population ageing, but also promote the high-quality development of agriculture and achieve the goal of providing for the elderly, making them productive and enjoying themselves. Future research can further quantify the marginal effects of policy interventions, explore new modes of capital market participation in rural revitalization, and promote research on sustainability assessment and regional differentiation paths for the integrated development of silver-hair economy and agriculture.

5.1 Product innovation: developing adaptable financial instruments

First, drawing on the experience of financial instrument innovation in the insurance market, we can design products with both soundness and profitability for age-related agricultural projects, such as "agriculture + pension" composite insurance products combined with the transfer of rural land or the construction of pension communities, so as to safeguard the rights and interests of elderly investors through the risk-diversification mechanism. At the same time, it is necessary to strengthen the adaptability of policy tools, set up a special credit line for the silver-haired economy, and guide the flow of funds to emerging areas such as smart agriculture and recreational agriculture through a combination of policies such as subsidized loans and tax incentives.

5.2 Risk Diversification: Building a Multi-Level Protection System

Under the framework of the silver-hair economy empowering agricultural development, the construction of a multi-level security system needs to be based on the core logic of "hierarchical classification, multi-dimensional synergies, and sustainability", and the integration of old-age pension, medical care, policies and market mechanisms: The first is to establish an old-age protection system, through universal pensions to support low-income groups, combined with basic pension insurance, enterprise annuities and low-threshold commercial insurance to raise the level of farmers' old-age pension; the second is to improve the medical network of "basic medical insurance + major disease insurance + social assistance", introduce commercial insurance to optimize the efficiency of major disease protection, and supplement the needs of disadvantaged groups by relying on community mutual aid funds and the collective economy.

5.3 Infrastructure: improving the rural financial ecology

Against the backdrop of a silver-haired economy empowering agricultural development, improving the rural financial ecology requires the construction of a multi-level, gradient-based financial system. Firstly, it should promote supply-side structural reform, optimize the allocation of financial resources, cultivate diversified main bodies by relaxing market access policies, and guide the synergistic development of traditional agricultural credit societies, new rural financial institutions and private finance. Secondly, it is necessary to strengthen financial technology empowerment, use information technology to broaden service channels, reduce operating costs, and enhance the depth and breadth of coverage of rural commercial banks in inclusive finance, especially to solve the problem of financial exclusion in remote areas.

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