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The Impact of Aging on the Economy and Countermeasures in China and Japan

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Abstract: China is facing significant economic impacts as its population continues to age. Japan, a country with a similar aging pattern and cultural background, has developed a mature coping system that can serve as a guide for China's aging direction. This paper aims to explore the impact of aging on the economy and potential policy actions for China. Specifically, the paper analyzes the impact of aging on labor, consumption, and investment. It could be founded that, in terms of the labor force, aging will reduce labor supply, while the proportion of the workforce in middle and old age will increase, slowing down economic growth. In terms of consumption, aging will promote consumption through pension expenditure in the short term, but will slow down consumption expenditure in the long term. From an investment perspective, ageing will reduce investment by society as a whole, except for some pension-related industries. This paper responds to this phenomenon by comparing relevant policies between China and Japan, and advances three countermeasures to mitigate the negative impact of aging: policy improvement, learning of advanced models, and intelligent provision for the elderly.

Keywords: China, Japan, economic growth, population aging, countermeasures

1. Introduction

Although China is a populous country, it has been entering an aging society since 1999. China's population has become more and more affected by aging. China's neighbour Japan has entered an ageing society as early as 1970 and is currently one of the countries with the most severe ageing problem. From a slightly aging society with 7% of the elderly over the age of 65 to a highly aging society with more than 14%, it took 22 years in China and 24 years in Japan. It can be seen that China is aging faster, even faster than Japan with a serious aging problem. At the same time, because of China's large population base, in 2021, China's population aged 65 years and older stood at 200.56 million people, and Japan's population stood at 36.4 million, leading to the aging scale in China being far greater than that of Japan. Secondly, compared with Japan, China is "getting old before getting rich". As is known to all, Japan is an established developed country. Even though its economy has been wavering for more than 20 years, its per capita GDP is still among the highest in the world. The country has the money and the ability to guarantee the economic development after the aging. By contrast, as the largest developing country, China's economy has not yet taken off. If the aging results in insufficient stamina for economic development, there will be a major economic

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crisis in the future.

In terms of aging on the economy, according to Estrada and others, the proportion of the elderly population has a positive role in promoting the demand for domestic consumption [1]. In contrast, Footer and Gomes believe that population ageing will lead to disequilibrium in population structure, which is not conducive to an increase in social capital [2]. Zhong Shuizhen believes that aging will result in a low demand for investment, a double deficit in China's balance of payments, and a simultaneous contraction in supply and demand that is not conducive to economic development in the long run [3]; Zhu Jiayue comes to the conclusion through an empirical analysis that the aging population has a positive role in the promotion of the tertiary industry [4]. Zhao Hui and Liu Ming, by means of simulation and predictive analysis under the accelerated aging situation, it is important to realize that because of the impact of the decline in the rate of social capital formation, total investment in fixed assets declined throughout society and in most industries, although investment in a few pension related industries has increased slightly [5]; The empirical research of Xian Jinkun and Chen Lei shows that the aging of the population significantly reduces the investment efficiency of manufacturing firms [6].

In respect of the aging policy, Liu Jie suggested to promote the employment of the elderly by changing the cognition of reemployment and other ways to reduce the impact of lack of labor force on the economy [7]. Qin Xiao promoted the development of the smart pension by proposing an innovative representative model of smart and healthy pension and by building a more scientific concept of smart pension for the entire society [8]. Han Zhenqiu discussed the need to solve the aging problem in a multidimensional manner based on China's basic national conditions, and advanced his own multilateral countermeasures [9].

The purpose of this article is to compare and analyze how aging will affect the social economy from the point of view of China and Japan, and to compare the aging policies of China and Japan in order to explore how China can better address the aging problem.

2. The Present Population Situation and Aging Trend of China and Japan

2.1. China’s Population Status and Aging Trend

According to the National Bureau of Statistics of China, China's population grew slowly to 1,412.6 million in 2021. However, official planning and the UN both overstated the effect of the open-birth policy on the public. It took 14 years for the population of China to grow from 1 billion to 1.2 billion and 24 years for it to grow from 1.2 billion to 1.4 billion. UN World Population Outlook 2022 lists China's population as 1,426 million people. Although the China forecast has been revised downwards from previous versions of the population outlook, China's total population remains an overestimate. In addition, the outlook predicts that China's population will decrease for the first time in 2022. The total fertility rate for 2021 is only 1.15, which is much less than the replacement level of 2.1 needed to maintain the population, even less than that of Japan, a country with a recognized extremely low fertility rate of 1.4. As can be seen from Fig.1, in 2016, the number of people aged 65 years and older increased from 150.03 million, representing 10.8% of the total, to 200.56 million in 2021, representing 14.2% of the total, which is the highest figure in history, and the proportion of the population has increased by 3.4%. The rate and degree of aging are unprecedented. By international standards, it took 22 years for China to transition from a slightly aging society with 7% of the elderly over the age of 65 to a heavily aging society with more than 14% of the population. In 2035, the National Health Committee of China predicted that the aging population over 60 years of age will surpass 400 million and enter a stage of severe aging.

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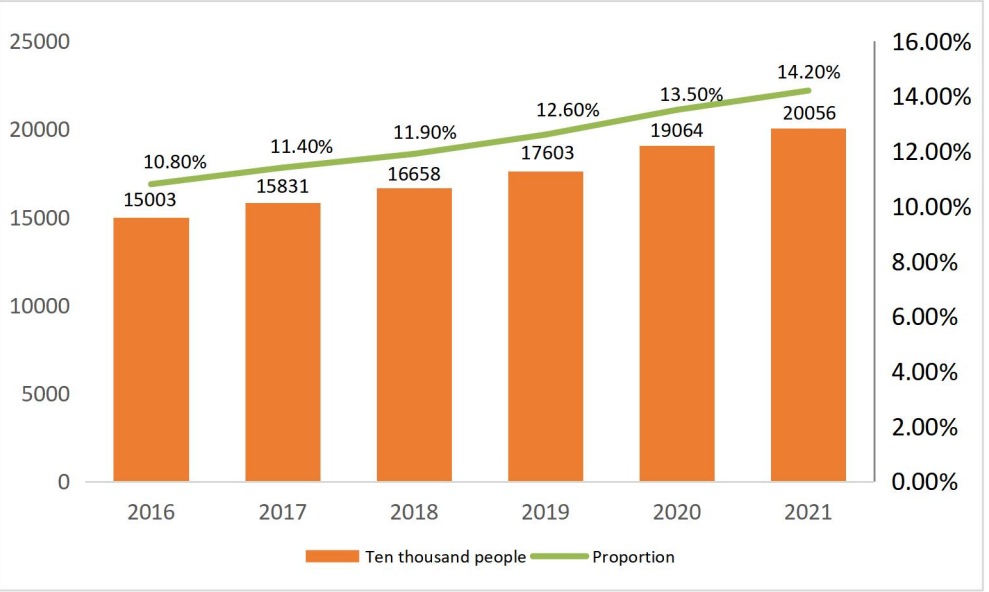

Figure 1: Number and proportion of population aged 65 and over in China from 2016 to 2021 [10].

2.2. Japan's Population Status and Aging Trend

According to data from Japan's Ministry of Health, Welfare and Labor, Japan's total population in 2021 was approximately 123 million, with 812,000 births, the lowest number since the survey. At the same time, the death toll was 1.142 million, the highest number since the survey. Since 2007, Japan's total population has been experiencing negative growth due to the number of births being less than the number of deaths. According to Japan's own estimates, there will be only about 100 million people left by 2050. Meanwhile, Japan's aging population has intensified further. From Fig.2, the population aged 65 years and older in 2021 was 36.4 million, representing 29.79% of the total population. The population continued to increase by 1.84% compared to 27.95% in 2016. It took 24 years for Japan to transition from mild to moderate aging. In 2022, for the first time, there were more than 90,000 Japanese over 100 years old. It is currently the country with the largest ageing population in the world.

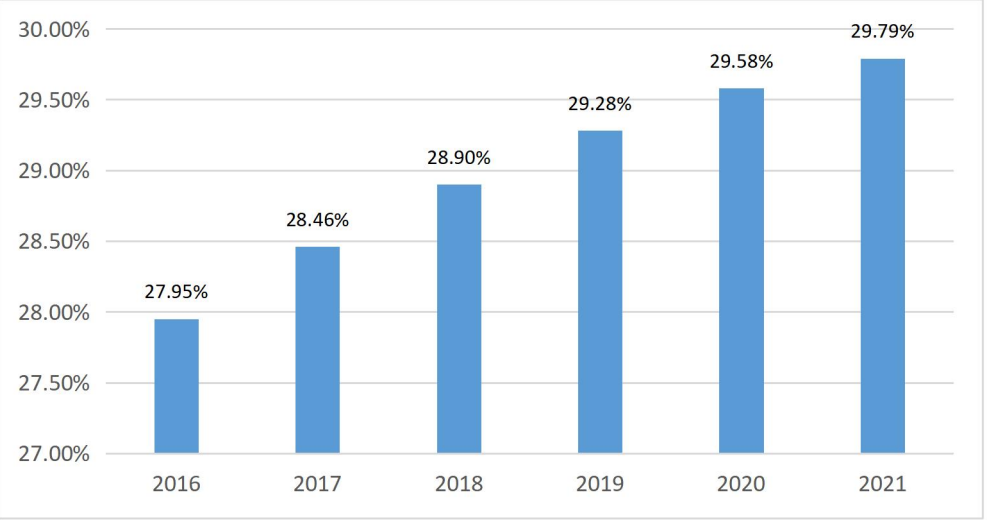

Figure 2: Japan's population aged 65 and above as a percentage of the total population in 2016-2021 [11].

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3. The Impact of Aging on Chinese and Japanese Economies

The first step is to specify how to evaluate the impact on the macro economy. Since macroeconomic conditions can be inferred from GDP, the impact of ageing can be judged from the point of view of GDP. There are two aspects to assess a country's level of GDP: on the one hand, it is the production angle of GDP. In the production approach, GDP is total output minus intermediate inputs. If the intermediate input is assumed to be constant, it can be seen from the output function Y=AF (K, L) that a country's output depends primarily on both capital and labor subject to the constraint that technology level a is constant. In contrast, the consumption spending angle of GDP. According to the expenditure method of GDP, Y=C+I+G, GDP will be affected by consumption, investment and government purchase. If government purchases are regarded as given and capital in the production method is mainly derived from investment in the expenditure method, GDP will be affected by labor, consumption and investment. This article will focus on how aging affects the economy in these three aspects.

3.1. The Impact of Aging on Labor Force

Economic development cannot be separated from labour. If there is not enough labor, it will lead to insufficient production. As the population ages, the population structure will age, leading to a shortage of labor supply, which will affect the economy.

3.1.1. Impact on Labor Force in China

Before 1970s, China experienced two waves of baby boomers, and the high birth rate made the age structure of the population young and pyramid-shaped. In the 1970s, China put forward the one-child policy, which controlled the population growth, and all age groups were relatively balanced, and they were in the adult type. By 2000, the proportion of the population aged 65 and above in China reached 7%, and it entered an aging society. With the baby boomer population growing to over 65 years old, the degree of aging in China is also increasing year by year. According to the seventh population census in 2021, according to the internationally accepted statistics that the working age is 15-64, the working population in China in 2020 is 968 million, which is 38 million less than the peak value of 1.006 billion in 2013. The age proportion of the working population has also decreased year by year, reaching 68.55% in 2020. The age of the labor force is also further aging, and the proportion of 45 to 64 years old shows a significant upward trend [12]. According to the forecast, the future will be further reduced, the demographic dividend will gradually disappear, and there will even be a shortage of labor [12].

3.1.2. Impact on Labor Force in Japan

Japan's total population has been declining for 11 consecutive years. While the number of the elderly population has been increasing, the working population has been continuously decreasing. Having reached a peak of 87.158 million in 1994, it has been declining year on year, reaching 73.447 million by 2021, a decline of 584,000, which represents 59.4% of Japan's total population. Without intervention, it is hypothesized that Japan's labor force share will fall to less than 50% by 2040 [13]. At the same time, Japan also has a serious problem of aging of the labor force. As of 2018, the proportion of the middle-aged and elderly working population has risen to 31.3%, with a serious trend towards further ageing.

3.2. The Impact of Aging on Consumption

Consumption, as one of the "three big carriages" driving the growth of GDP, affects the economic

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situation to a great extent. With the aggravation of aging, different age structures are bound to bring different impacts to the economy. According to the theory of life cycle, as people get older, they will spend their previous savings. And focus on medical care, nursing and other aspects of pension spending. However, older people have less demand for consumption than younger people, and falling incomes will reduce consumption demand even further. Thus, the impact of aging on the economy is double-linked.

3.2.1. Impact on Consumption in China

Under the influence of traditional culture, China people usually have higher storage rate and lower consumption rate. However, as can be seen in Fig.3, from 2003 to 2010, it continued to decline again, with fluctuations increasing after 2010. According to the life cycle theory, the labor force will save more to cope with the old life. One possible explanation for the change in China's consumption rate is that the labor force peaked in 2013, as noted above. That is, from 2010 to 2013, the labor force has a large population, so the increase in savings is greater than the increase in consumption brought about by aging. After 2013, the consumption brought about by aging gradually exceeds the savings, which increases the consumption rate year by year.

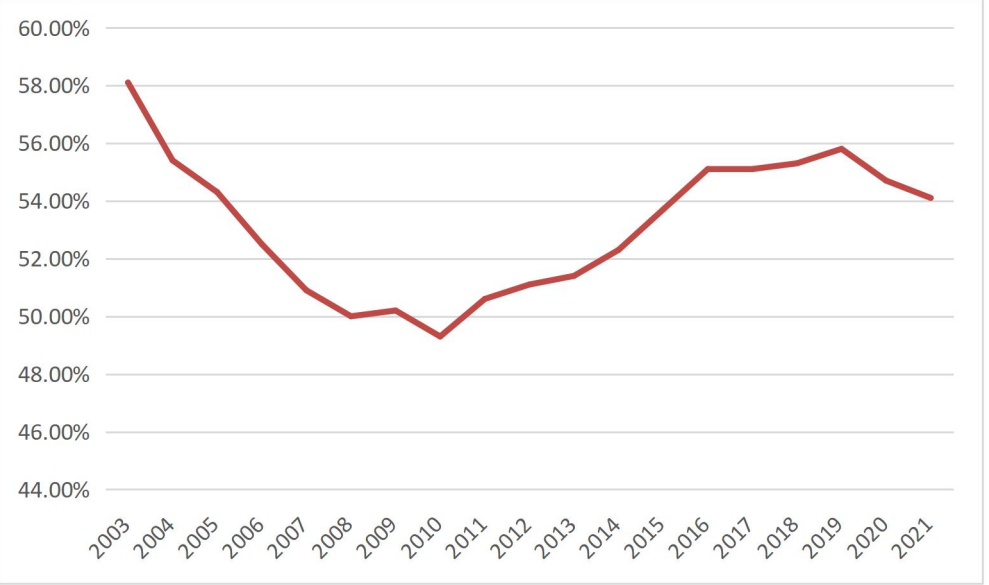

Figure 3: Final consumption rate of china residents from 2003 to 2021 [10].

3.2.2. Impact on Consumption in Japan

Japan's consumption situation is just the opposite of China's, reaching a peak in nearly 20 years in 2013 and then continuing to decline to 2017, with the consumption rate returning to the level of 20 years ago. From 2017 to now, there has been a little slow growth. Compared with China in recent 20 years, it first decreased and then increased, while Japanese increased and then decreased. Through analyzing the demographic structure, Japan's aging is more serious than China's, but it is also accompanied by a serious shortage of children, which will lead to a continuous decrease in the labor force. According to the previous theory, the labor force has a high saving rate, but the decline in the total number of Japanese labor force makes the total income decrease even if there is a high saving rate, and the resulting decrease in consumption is larger than the increase in consumption brought by aging, which eventually leads to a decrease in consumption rate [14].

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3.3. The Impact of Aging on Investment

The aging population will lead to an increase in employment costs, a decrease in marginal output and a decrease in corporate efficiency. This will lead to a decrease in the return on investment and a decrease in investment. In contrast, older people themselves prefer to save rather than invest, and a higher proportion of older people will result in insufficient investment in society as a whole.

3.3.1. Impact on Investment in China

In 2009, the growth rate of investment in fixed assets in China reached a peak of 25.7%, followed by a decline over twelve years, with a growth rate of just 4.9% in 2021. Of course, there are also demographic factors. With the continuous improvement of the aging level, on the one hand, the increase in the aging population will directly reduce the investment, leading to a decrease in the growth rate; on the other hand, the increase in consumption rate will lead to a corresponding decrease in the saving rate. According to Keynesian theory, I=S, the decrease in saving will also lead to a decrease in investment. Zhao Hui and Liu Ming simulated the investment results in the future. It can be seen from Table 1 that the whole society's fixed assets decreased, except for the small increase in agriculture, financial industry and service industry, and the large increase in investment in health, social security and social welfare, all other investment items decreased [5].

Table 1: Total cumulative investment in the context of accelerated aging 2021-2060 Unit: trillion [5].

Industry	Total cumulative investment from 2021 to 2060	Changes in baseline scenarios	Industry	Total cumulative investment from 2021 to 2060	Changes in baseline scenarios
Total investment in fixed assets	7035.4	-316.3	financial industry	14.7	0.7
Agriculture	869.0	8.5	Realty business	1753.1	-71.2
Mining industry	52.7	-1.7	Leasing and business services	515.2	-25.4
Manufacturing industry	2298.9	-203.5	Scientific research, technical services and geological exploration industries	226.8	-11.3
Electricity, heat, gas and water production and supply industries	610.4	-28.3	Water conservancy, environmental and public facilities management industry	1772.6	-84.3
Construction industry	26.3	-1.0	Resident service and other service industries	29.2	4.4
Transportation, warehousing and postal services	544.1	-24.7	Education	305.4	-14.4

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Table 1: (continued).

Information transmission, software and information technology services	163.5	-8.0	Hygiene, social security and social welfare industries	284.1	32.2
Wholesale and retail trade	127.4	-4.9	Culture, sports and entertainment industry	266.7	-12.9
Accommodation and catering	73.5	-2.9	Public management and social organization	37.7	-1.4

3.3.2. Impact on Investment in Japan

In the 1990s, after Japan's economic bubble burst, the Japanese government continuously lowered interest rates to stimulate investment. However, the investment is still in a state of fluctuation and stability. In terms of the aspect of population structure, Japan entered the aging society earlier than China, and perpetual aging placed a severe restriction on the development of investment. Big companies have opportunities, but they are seriously aging and are unwilling to make risky investments, while small companies are even less able to make large-scale investments [15]. At the same time, as the aging population increases and the labor force declines, the dependency ratio continues to rise. However, Japan's economic development has been slow for a long time and its income has not been effectively increased, which has led to more consumption and further reduction of savings, resulting in further reduction of investment. Although there is an increase in investment in pharmaceutical and other industries, it is difficult to offset the decrease in other industries. The total investment is in a fluctuating state.

4. Comparison of Chinese and Japanese Policies

4.1. China's Counterpart Policy

4.1.1. Retirement Delay

Starting from March 1, 2022, the State Council, China officially announced the implementation of "gradual postponement of the statutory retirement age". On the one hand, different programs are implemented for different groups, and different groups are treated differently. On the other hand, the delay is gradual. The retirement age of women is delayed by one year every three years, and that of men is delayed by one year every six years, until 2045, when they reach the age of 65 at the same time, bringing them into line with the world. However, delaying retirement cannot fundamentally solve the problem. When there are fewer and fewer young people, it is not possible to rely solely on the elderly workforce.

4.1.2. Birth Policy

As the fertility rate in China continued to decline in 2021, China amended the Law of Population and Family Planning on 20 August 2021, stating that the state promotes marriage and the raising of

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children of the appropriate age, giving birth to good kids and giving birth to three kids for a family. This policy has been called the "three-child policy", which means that the number of fertile children has been released from the early "one-child" policy to the "three-child policy". At the same time, there are relevant supporting systems, such as the establishment of a child-care subsidy system, and special additional deductions for children's education income tax.

4.1.3. Inclusive Care for the Elderly

Inclusive aged care is a type of policy-based service that is provided by the market for the majority of older people in addition to the basic aged care service. In addition, the old-age service in China is the basic old-age service, that is, the basic old-age service that focuses on the disadvantaged groups, and the "poverty relief" mode is used to guarantee old age service. But with the development of economy, people are not satisfied with the minimum standard to provide for the aged. Therefore, the government has launched the inclusive pension system to guide and encourage enterprises to participate in the pension market by supporting the construction of facilities such as nursing homes, so as to promote the rapid and high-quality development of the pension industry[16].

4.1.4. Insurance

With the growth of age, the care for the elderly has become more and more important. In response to the problem of caring for the elderly population, China has introduced long-term care insurance in order to avoid nobody or no capital to care for the elderly and to include it in social security coverage. The pilot system has currently been completed for 5 years, and the system has been continually improved and developed.

4.1.5. Smart Home Care

Despite the serious shortage of children, with the development of science and technology and ai, old age care can be provided as much as possible while the workforce is inadequate, which can largely solve the problems of inadequate nursing staff, high cost of aged care, and no one to care for. This approach can further improve the quality of life of older people, for example, by monitoring living conditions through smart scenes to avoid accidents, and by continually expanding application scenarios [8].

4.2. Japan's Counterpart Policy

4.2.1. Laws and Regulations

Japan and Japan have been sequentially implementing laws and regulations to address the aging population, such as the Law on the Protection of Life (1950), the Law on National Annuity (1959), the Law on the Welfare of the Elderly (1963), the Law on the Health Care of the Elderly (1982) and the Law on Nursing Insurance (2000). the Law on the Health Care of the Elderly (1982) and the Law on Nursing Insurance (2000). A series of laws and regulations not only ensure the rights and interests of the elderly, but also regulate and promote the development of relevant industries for the aged.

4.2.2. Social Security System

Japan has implemented a free medical care system for the elderly since 1973, but this system has increased the burden on the government. As a result, the Japanese government also pays a great deal of attention to the health status of the elderly, and encourages citizens to form healthy habits and

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improve health status. Besides, older people over the age of 40 can receive free preventive services, examinations and other services. At the same time, a care insurance system has been implemented since 2000, stipulating that the insurance premium will be paid from the age of 40 and the insurance can provide care and other services from 65 [17].

4.2.3. Encourage Reemployment

In 2013, Japan postponed the retirement age to 65 years, and stipulated that companies should not have a recruitment age limit, in order to alleviate the labor shortage caused by aging. Meanwhile, since 1986, silver hair development centres have been launched in different provinces, cities and districts in order to encourage retirement-aged people to find new jobs and provide them with employment and job training [17].

4.2.4. Encourage Fertility

The first is financial support for child care. The state, for example, pays more than 50% of kindergartens' expenditures, and awards a lump sum subsidy of 340, 000 yen to newborns. Each region also has its own policies to encourage childbirth. The second is the parental leave policy. According to the Parental Leave Law, women employees are entitled to six weeks' leave before giving birth and eight weeks' leave after giving birth. Employers are not allowed to refuse such leave.

4.2.5. Home-based Care for the Aged in Multi-functional Communities

In recent years, Japan has implemented small-scale multi-function community-based care. The policy supports older people to receive services such as day-to-day care and home-based services in the community, and sinks day-to-day care into the community in order to solve the problem of traditional aged care in professional institutions with too high a price tag but no one to care for at home. While large-scale superannuation facilities are specialised to provide treatment and care for older people who are unable to care for themselves or are ill [18].

5. China's Development Direction

5.1. Perfect the Policy

China's development in the next two to three decades is similar to that of Japan today, so China can learn from Japan's current pension policy. On the one hand, it can improve relevant laws and regulations at the higher level, such as to promote the sound and development of the pension industry, to guide the participation of society, companies, colleges and universities, and so on to give full play to the benefits of all sectors of society. Second, there is a need to improve the implementation of the underlying fertility policy, pension policy, and so on, with specific and visible means of solving the fertility problem at the same time, the development of the old-age economy, to protect the rights and interests of older people, the development of human resources for older people [9].

5.2. Learn Advanced Models

Taking Japan as an example, the community home-based care currently applied in Japan is worth learning from China. China needs to complete the transformation of basic old-age care into the community and the specialization of large-scale institutions under the support of policies. These deployments and changes will take time. However, the aging rate in China is faster than that in

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Japan, so China needs to lay out in advance and use the existing advanced model instead of groping slowly to face the increasingly serious aging situation.Smart pension

5.3. Further Smart Home Care

As science and technology develops, science and technology can be applied to the care of the elderly, such as twenty-four hours monitoring in homes, timely alarm in the event of an accident, smart wearable devices to detect physical conditions, and smart homes to make life more convenient for the elderly. It enables the elderly to obtain high-quality services and timely feedback even at home. Alongside a range of new smart pension models such as "time banking" and "age-friendly transformation", which will increase the accuracy, comfort and convenience of the pension through science and technology.

6. Conclusion

The purpose of this paper is to analyze how aging in China and Japan affects the economy through labor, consumption, and investment.

The first is the labor force. The labor force in China began to decline year by year after reaching its peak in 2016. China's economy began to suffer from labor shortages, and the decline in the demographic dividend impeded economic development. Japan's labor force has decreased for nearly 30 years since 1994. Japan has more mature countermeasures in place to reduce its impact compared to China's initial stage. There are two aspects of China that can learn from and address its excellent policies: slowing aging and reducing the impact of aging on the economy.

Secondly, consumption. In recent years, the consumption rate in China has increased due to the increase in pension consumption. Japan's total social income, on the other hand, has been declining due to the combined effects of aging and childlessness, leading to a decline in the rate of consumption even as far back as 20 years ago. This allows us to see that the consumption growth brought about by ageing is temporary and cannot fundamentally promote economic growth.

The third point is investment. Judging from the current investment situation and the projected results in China, apart from an increasing share of pension-related investments, aging has a negative impact on investment for society as a whole. Judging from the investment results after Japan's aging, even though the government is providing a major boost to investment, the investment situation is still fluctuating. These results also support the negative impact of ageing on overall social investment.

Finally, the paper compares China's and Japan's pension policies. China's top tier pension policy is not yet mature enough. It is still in its infancy, and it is still exploring related policies such as maternity, retirement and insurance. However, China's Internet technology is developing rapidly and it has put forward a smart pension plan. As for Japan, after several decades of layout and development, Japan has put forward a series of policies including childbirth, reemployment, the social security system, and so on, which are relatively comprehensive and mature from top-down policies to bottom-up implementation. At the same time, based on Japan's own characteristics, Japan has created a community pension model that is appropriate for its own national circumstances.

Given the shortcomings of China, this paper advances three suggestions: first, China can further improve old age policy, including top-level policy guidance and bottom-up policy implementation, to ensure old age care while developing the economic system. The second point is that China can learn from the advanced model. China can learn from Japan's excellence in providing for the elderly, as well as learn from Japan's experience and merit in how to promote the economy during the period of aging.Thirdly, China could continue developing China's characteristic smart pension system, which not only can meet the retirement needs of the ageing society, but also to develop the

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digital economy and the level of science and technology, to attract investment and consumption, to compensate for the shortage of labour supply, and to reduce the negative impact of ageing on the economy.

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