

Research on the relationship between population ageing and economic development based on national policy perspective

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Abstract. This article discusses the relationship between the ageing population and economic as well as policy contexts. A more specific issue is the various impacts of aged population on the economy. By using the AD-AS model for a theoretical study and a regression model for empirical analysis, the paper evaluate the impact of population ageing from a unique perspective. The results demonstrate that in theory population ageing will decrease China's real GDP, whereas there is a clear trend that ageing population will benefit the tertiary sector by increasing demand, and thus improving the employment there. Thus, the next five years will see a significant transformation of China's industrial structure. Our findings provide ideas for future research on this issue.

Keywords: Population Ageing, Economic Development, National Policy.

1. Introduction

1.1 Research background and motivation

The focus of this paper is population ageing, which is defined as within a certain population system, the process of increase in proportion accounted by those middle-aged and aged over 60 [1]. China has the world largest population size, around 1.41 billion [2]. According to historical context, owing to the economic policy--Reform and Opening up published in 1978, with the aim of switching the type of economy from planned into market-based one, the economic development in China is greatly improved. During the past 44 years since the first introduction of this policy, China has now become one of the most influential and fastest growing emerging countries in the world. To be more specific, it has the world second largest real GDP(PPP) of 23.02 trillion dollars in 2020 [3]. Thus, nowadays on average each individual in China has higher earning of income, and the government budget is able to support better infrastructure, such as those for tertiary sector services and healthcare, subsidies and also better education. These factors have all contribute to an improvement in people's living standard, so it is clear to see why the lifespan of Chinese residents reaches the mean value of 77 years by 2018 [4]. With the increase in life expectancy and better physical strength due to improved daily diets and systematical medicine care, the elder population can work longer time as well.

As for some benefits brought by the increasing population ageing, there will be more experienced employers in China that are more familiar with the job and tasks they have been working on, which could, to some extent, rise the productivity, and thus increase the aggregate supply. As a result, it will be able to enhance the economic growth while reducing the inflation rate. Furthermore, those elder workers can impart the knowledge from their working experience to younger workers and fresh graduates, like inheritance. This shortens the time needed for new employers to get used to the job and time spent on amassing experiences and tips.

Nevertheless, the growing aged population have several drawbacks that cannot be ignored as well. First of all, more government spending is required in the tertiary sectors like the construction of nursing houses, grants on medical examinations, some discount on medicine purchase etc. At the same time, if this section of population gets retired, the tax revenue gained will be greatly reduced. If

spending outweighs the earning, budget deficit will occur as a consequence. In addition, with increasing spending on services that care for the aged population, the remaining funds for others—more important infrastructure, cutting-edge technology research and macro uses of manipulating the entire economy—are likely to be constrained [5]. Furthermore, if the ageing population stay in their working position longer because of the rise in their life expectancy, the job opportunities for fresh graduates will be limited. Young people are often an important factor driving innovation in an enterprise, so few fresh bloods injected into the economy may cause the lack of insightful ideas. These disadvantages will to some extent influence China's potential economic growth.

Based on the above background information and the discussion of both advantages and disadvantages of China's population ageing problem, this article is motivated to evaluate the economic impact of the increase in the number of elderly people. In order to simplify, but also maintain the reliability of the research outcome, we divide the change of population into two major parts: On the one hand, the population is in the process of ageing (7% to 14 %) from 2000 to 2021. On the other hand, the society is mainly consisted of the aged population (over 14%) from 2022 to the future.

1.2 Literature Review

Two main past literature that will be explained in the following content are "2020-2025 China Pension Industry Market Prospects and Investment Opportunities Research Report" from China Commercial Industry Research Institute [6] and "Physical activity and health in the presence of China's economic growth: Meeting the public health challenges of the aging population" from Science-Direct [7]. Both of these two essays have focused on discussing the likely result of increasing number of ageing population on the economic environment. "2020-2025 China Pension Industry Market Prospects and Investment Opportunities Research Report" makes an in-depth analysis of the characteristics of China's ageing of population, expounds the current situation and challenges of the pension system, compares different pension modes, and finally presents its own position and some enlightenment for the future. It helps me gain very thorough understanding of these aspects, but the author does not straightforward address the influence of population ageing on the domestic economy and employment, whereas it is the precondition of considering all specific solutions. Therefore, this paper aims to find out how China's ageing population affects the economy and employment both in the short term and long term. "Physical activity and health in the presence of China's economic growth: Meeting the public health challenges of the aging population" examines the effects of "rapid economic development, industrialization, and urbanization on health-related behaviors, putting an emphasis on physical activity (PA) among older people". The journal article goes over the demographic context, major public health challenges, evidence on PA and exercise interventions, as well as knowledge gaps and future research directions. At the same time as economic growth, society has not paid adequate attention to important public health problems, such as the rising incidence of chronic diseases and the decline in PA that comes with an ageing population. The rapid growth of China's elderly population will have an immediate effect on the country's economy, population health, and health behaviors, while also putting additional pressure on China's healthcare system.

1.3 Research Contents and Framework

Based on the background information and pivotal studies in this field, this paper uses a theoretical and an empirical analysis to evaluate the impact of population ageing on China's economic development, involving relevant national policies. Then the paper summarizes the result, predicts the future development trend, and proposes recommended solutions to the issue. The basic framework of this paper is as follows: The first part is introduction, the second part is theoretical and empirical analysis and results, the third part is the discussion of the results, and the fourth part is conclusion.

2. Methodology

2.1 A theoretical study on the existing impact of population ageing on China's economy

As shown in the figure 1 below, over the past 6 decades, the number of people aged 65 and over in China has increased by 2.8 times from 4.97% in 1960 to 14% in 2022. Since 1965, China's ageing rate (the proportion of the population aged 65 and up to the total population) has increased, and this trend has accelerated since 2010. However, the total fertility rate has been decreasing since 1965 and has remained stable since 1995, at around 1.60, which conveys that the major factors driving population ageing in China are low fertility and increasing longevity from Figure 1. According to the United Nations Population Division, China will become a super-aged society in 2035 when the proportion of people aged 65 and up exceeds 20% of the total population, which is a huge amount of population and a dreaded signal [8].

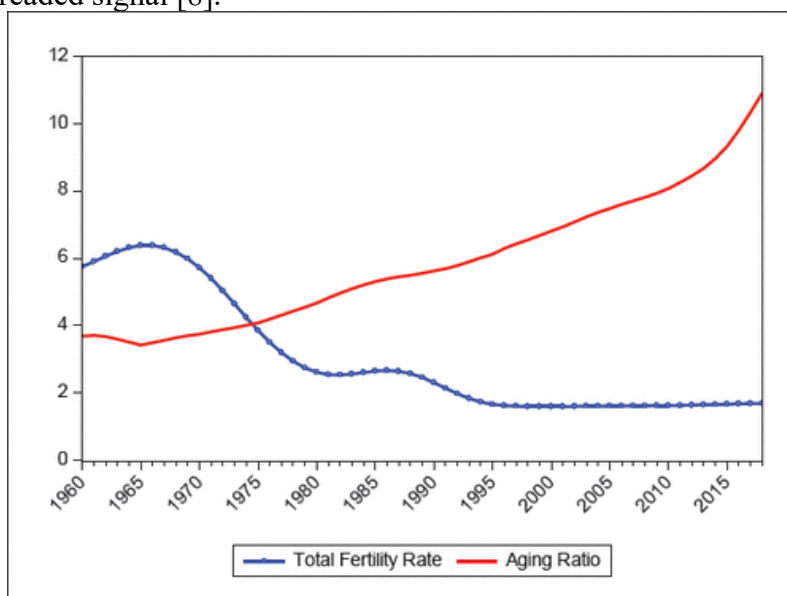


Figure 1. Total Fertility Rate and Ageing Rate

Source: World Development Indicators, World Bank (<https://data.worldbank.org/country/china>).

Figure 2 demonstrates the AD/AS model. As aforementioned, the changing trajectories in life expectancy, fertility, and mortality in China may have contributed to the country's ageing population. The decrease in domestic production power is a result of the shrinking working-age population. Over time it will be represented by a gradual shift to the left of aggregate supply curve. This leads to a reduction in real GDP from Y to Y_1 and a rise in the price level from P to P_1 , while aggregate demand experiences a contraction from B to A causing real GDP and output to fall and thereby leading to constrained economic development. As a result, China may face a domestic goods and services shortage, which may also cause China's exports overseas decrease. As a result, the changes wrought by China's ageing population may have an impact not only on the domestic economy but also on foreign markets that import Chinese goods [9].

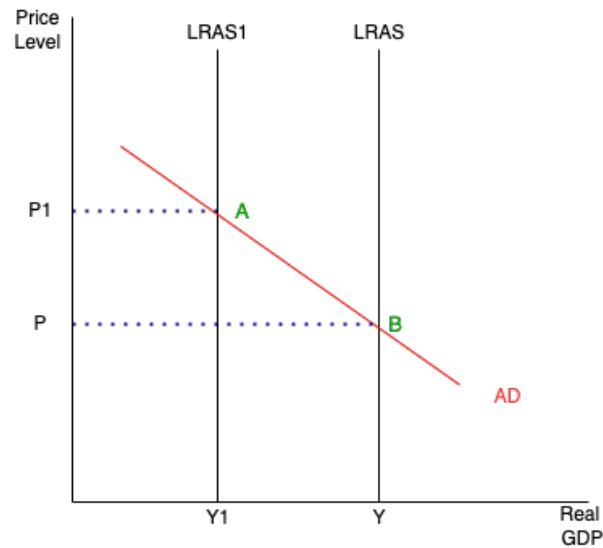


Figure 2. AD/AS model

2.2 Empirical Study

2.2.1 Source of data

The data in this paper come from the Statistical Bulletin of China's National Economic and Social Development in 2021 and other data of the National Bureau of Statistics compiled by Zhiyan Consulting. The sample data are selected from 2017 to 2021. The formula is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + u_i \quad (1)$$

2.2.2 Data analysis

While the ageing of population has a negative impact on economic growth, it also brings more development and opportunities to the service sector, which is also defined as the tertiary industry according to the regulations on the Division of Tertiary Industries revised by the National Bureau of Statistics in 2018. Table 1 collected data about the ageing degree of population and the development of tertiary industry in the past five years [10]. By observation, there is an increasing trend of both the percentage of old people and value-added of service industry during the period of time.

Table 1. Data collected from National Bureau of Statistics

Year	2017	2018	2019	2020	2021
Percentage of old people (%)	11.4	11.9	12.6	13.5	14.2
Value-added of service industry (hundred million RMB)	438356	489701	535371	551974	609680

Table 1 allows us to do a linear regression analysis to demonstrate whether the correlation between X_i (Percentage of old people) and Y_i (Value – added of service industry) is significant.

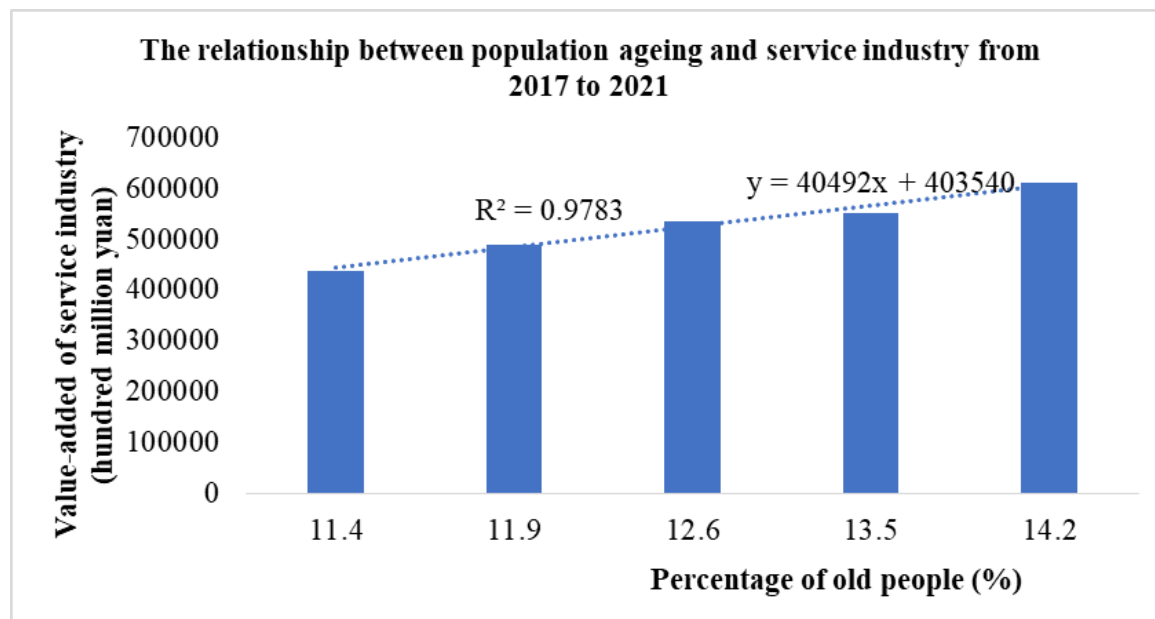


Figure 3. Linear regression of percentage of old people and value-added of service industry from 2017 to 2021

2.2.3 Results

Figure 3 conveys that there is a very strong positive correlation between the percentage of old people in society and the value-added of service industry, as $r^2=0.9783$, which means that approximately 97.8% variation in value-added of service industry can be explained by the increase in the degree of population ageing. The correlation between percentage of old people (x) and value-added of service industry (y) is as following:

$$y = 40492x + 403540 \quad (2)$$

in which $\beta_0(\text{intercept}) = 403540$ while $\beta_1(\text{gradient}) = 40492$. It indicates that as the percentage of elderly in the society increases by 1 percent, the value-added of service industry increases by 40492 hundred million yuan, which is a great sum of money flowed into the service industry in China and the gradual accumulation can bring significant growth. β_0 means that when there are no old people in China, the value-added of service industry is 403540 hundred million yuan. However, since it is in the extrapolation of the collected data, the y-intercept is not accurate. The result provides a positive signal for the later development of the tertiary industry, and it shows that the impact of population ageing on China is not only negative. This also gives the domestic economic development an industrial structure transformation vane. Specifically, it is crucial to have a look at the changes in the scale of China's elderly care industry from 2014 to 2020.

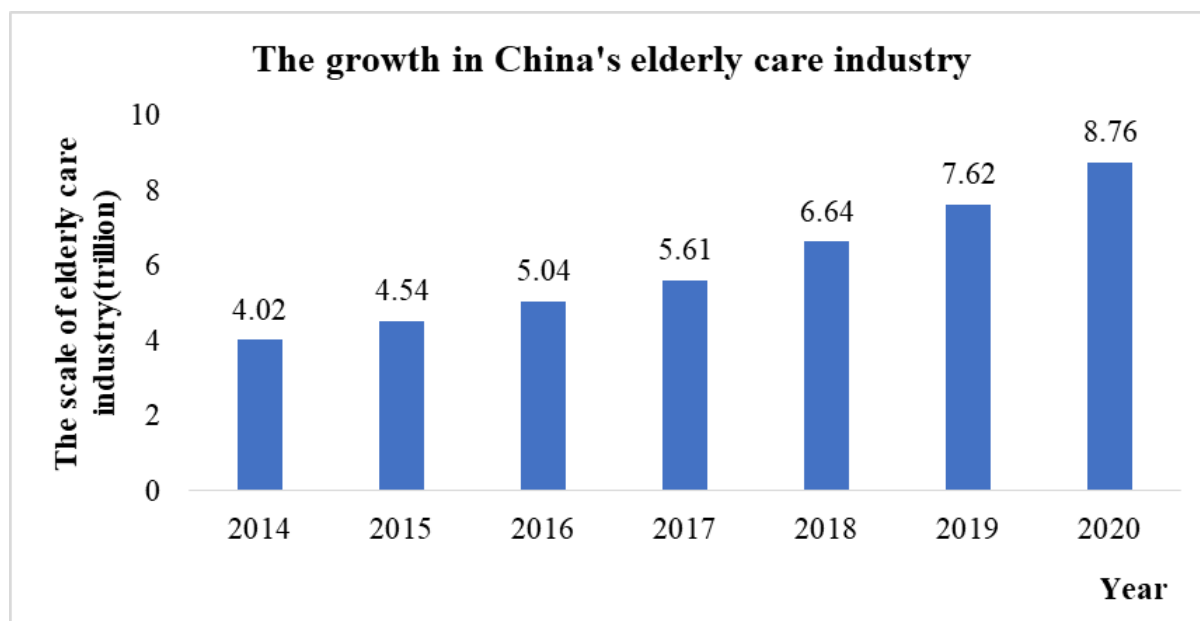


Figure 4. The increase in the scale of elderly care industry

Figure 4 shows a steady increase in the scale of elderly care industry over the period of 2014-2020. Additionally, the increase rate also accelerates at an average of 12.7%, which is much larger than the average increase rate of real GDP, about 6.6%. Nevertheless, according to the “In-depth investigation and forecast report of future development status and trend of old-age health industry from 2022 to 2027”, currently the pension industry only accounts for less than 7% of China's GDP, while the proportion in developed countries is generally 25%. If the proportion of the elderly care industry can reach 25%, the scale of the industry is expected to reach 100 trillion yuan by 2050. Therefore, it is highly expected that in the next five years, the elderly care industry will become a new important part of China's development.

3. Discussion

This paper applies both qualitative research and quantitative study to investigate the impacts of population ageing on China's economy. The effect of population ageing on the economy in the short run would not be as significant as that in the long term. Whereas due to the characteristics of “fast speed” and “large volume” of China's population ageing problem, it will contribute to an apparent decrease in labor supply, economic output, and gross national income (GNI). Over the past 30 years, China's ageing population has been increasing, putting pressure on the domestic economic growth and making its significant growth potentially unsustainable. According to the definition, population ageing refers to a permanent demographic transition caused by declining fertility and increasing longevity [11]. As the population ages, the proportion of elderly people who are dependent on others grows, while the proportion of working-age people decreases. Despite of the fact that it reduces the productivity in the economy, demographic ageing also has implications for structural transformation from labor-intensive industries, often indicating primary industry and part of secondary industry, to service industry and new investment opportunities [12]. The research demonstrates that the ageing of the population has an impact on China's future economic growth as well as the fiscal, social welfare, and health-care systems' long-term viability, among which the pension burden is a growing problem. China has become the second largest economic entity in the world, after thirty years of uninterrupted growth. Despite its strong economic performance, China is woefully unprepared to face the challenges of population ageing. Faced with the world's largest elderly population, China has a pension system that lacks a solid fund foundation and can only provide a basic retirement income to its beneficiaries [6]. However, from another point of view, if the Chinese government can properly adjust the domestic industrial structure and establish a pension system and pension model suitable for

the national conditions, the negative impact of population ageing can be constantly reduced or even offset.

Based on the “*Statistical Classification of Elderly Care Industry (2020)*”, the elderly care industry involves “the old-age care service, the elderly health service, the elderly health promotion and social participation, social security, pension education and human resources services, pension financial services, old-age technology and smart old-age services, public administration of old-age care, other pension services, elderly supplies and related products manufacturing, elderly supplies and related products sales and leasing, elderly care facilities construction etc.” In total, there are 12 large categories that covers all the aspects the society must pay attention to for the sake of ensuring the life quality, safety and health of the increasing amount of old population.

At present, it is undeniable that the market is still in its infancy. Since China's population base is about 1.4 billion, the ageing process is not only fast, but also large-scale, which is a serious problem and challenge that the Chinese government needs to encounter. And that means huge opportunities for both public and private investors. Looking at some other government endeavors to promote the elderly care industry, one of the 6 general directions of China's "14th Five-year Plan" is "well-being of people's livelihood", pointing out that China's pension industry has entered a period of deep transition, officially entering the beginning of the whole pension industry chain. The 2021-2022 White Paper on China's Pension Industry focuses on the systematic in-depth analysis of the pension industry, focusing on the strategic trends and changes of the pension industry. The government has also enacted a number of proactive measures to deal with the ageing population. One of them is "Formulate a clear long-term population development strategy and optimize the fertility policy." enacted in "The fourteenth Five-Year Plan and the Vision 2035 Outline.

4. Conclusion

This study develops a practical solution and theoretical research to investigate the effects of population ageing on China's economy. The research focuses on the inner relationship between the ageing population and the domestic economic situation, based on national policy perspective. Population ageing is an irreversible demographic transition that occurs as a result of lower fertility and longer life expectancy. Under the ageing demographic transition, the proportion of people in their retirement years is increasing while the proportion of people in their working years in China is decreasing. Future economic growth, as well as the fiscal, social welfare, and health-care systems' long-term viability, are all affected by this demographic ageing. Owing to a shrinking working-age population and rising old-age dependency, China's population ageing will inevitably result in a drop in national output. Technological advancements can help to mitigate the negative effects of an ageing economy on economic growth, but they cannot offset the effects of shrinking labor force. According to the data provided, it is clear to see that the increasing ageing population literally has a positive influence on the tertiary sector. China, as one of the typical examples, has experienced a visible rise in the average GDP per capita due to some proper reactions and responses towards the ageing population. Among the policies taken, the emphasis of "well-being of people's livelihood" in the "14th Five-year Plan" has already pointed out the way to solve the problem of aging and will play a greater role after being fully implemented in the future. At the same time, the rapid development of the elderly care industry in the tertiary sector has created many new opportunities for the state and private investors. However, it is also worth noticing that population ageing could lead to some drawbacks. For example, overspending on the healthcare sector while experiencing a reduction in the tax revenue gained could cause public budget deficit, which is harmful to the future development of a nation, as it generates huge opportunity cost which can otherwise be spent on other products and services.

Despite of strong economic performance, China's preparations for facing an aging society are still in the beginning stage. Having the world's largest elderly population, China has a pension system that lacks a solid fund foundation and can only provide a basic retirement income to its beneficiaries. As Napoleon said, “Lead the ideas of your time and they will accompany and support you; fall behind

them and they drag you along with them.” If China views population ageing as an opportunity to grow its economy, it will set an example for the rest of the world to follow.

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