

The Impact of China's Ageing Population on Consumption Structure

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Abstract

Population ageing is one of the most significant issues in recent human history. According to Modigliani's life cycle hypothesis, consumers strive to optimise their expected income at various stages of life to maximise their utility. Consequently, population ageing will have a substantial impact on consumption levels and economic growth, as supported by a significant body of research. Recent studies suggest that different age groups exhibit distinct consumption behaviours and preferences. While there is considerable literature analysing the impact of population ageing on overall consumption, there is a notable lack of research focused on how population ageing affects consumption structure. Thus, investigating the impact of population ageing on consumption structure may offer a more effective approach for future studies in demographic economics. Governments could adjust industry structures based on the preferences of the older population, thereby promoting economic development. This study examines the impact of population ageing on consumption structure across 31 provinces in China using grey relational analysis. Time series data have been collected from China's Statistical Yearbook covering the years 2010 to 2020. The estimation results indicate that older individuals have the strongest consumption preference for healthcare and the weakest preference for home purchases.

Keywords

Ageing population, consumption structure, grey relational analysis, China.

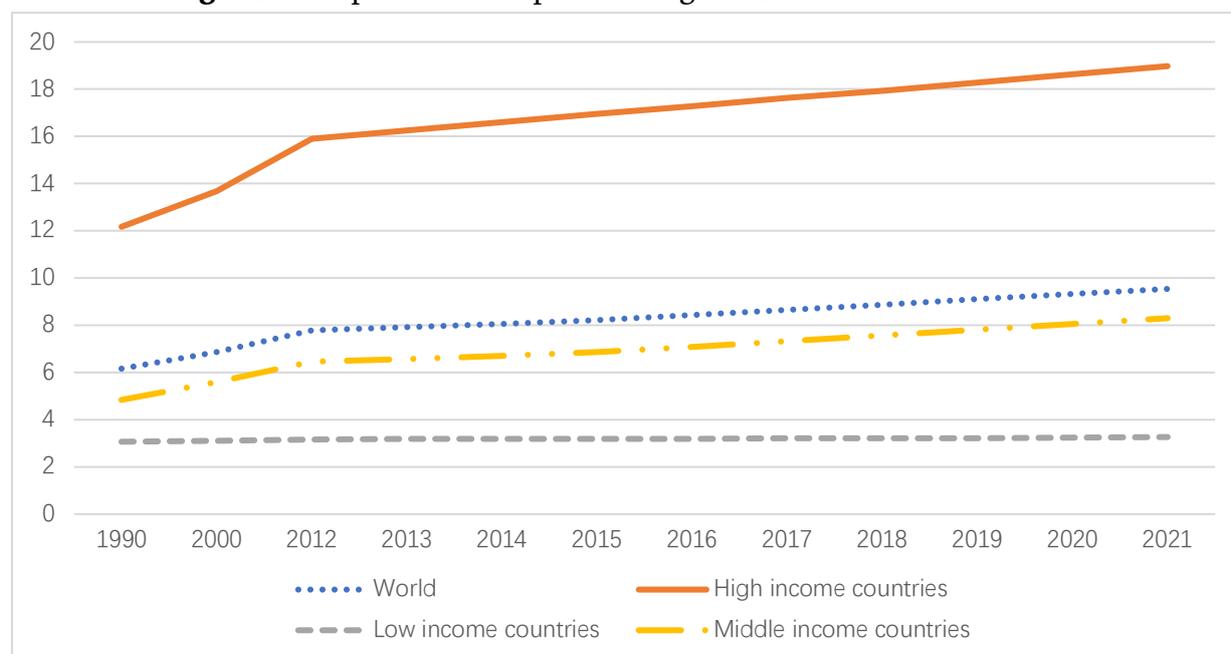
Introduction

According to the United Nation's World Population Prospects 2019, the three demographic trends for the 21st century are global population increase, population ageing, and worldwide migration. Population ageing is expected to become a global trend as fertility rates continue to decline and life expectancy continues to increase. In this article, the authors refer to older persons as those who are 65 years of age or older, according to the World Health Organisation's criteria. A society or country with more than 7% of its population being older people is defined as an ageing society or country, over 14 per cent is defined as an aged society or country, and more than 20 per cent is defined as a hyper-aged society or country.

Data from the World Bank also shows that population ageing has become a global issue. According to Figure 1, we can see that the proportion of older adults rises steadily

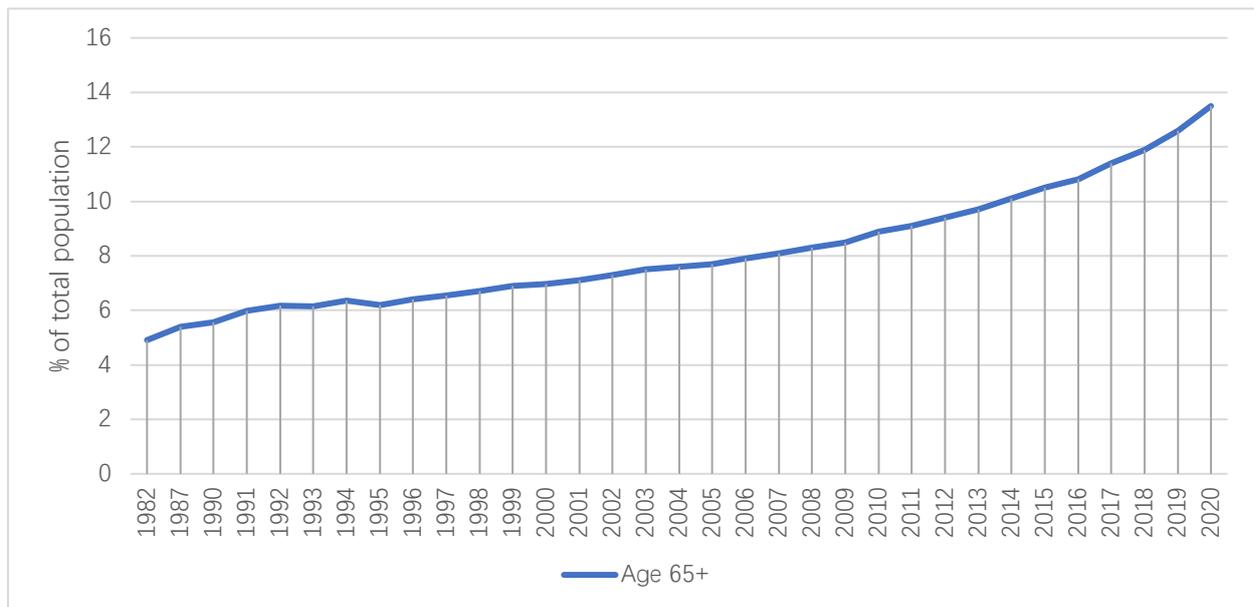
in a more moderate trend from 1990 to 2021. In terms of the global average, the proportion of the old population in 2021 has already surpassed the benchmark of 7%, indicating an ageing society on a global scale. Figure 1 also indicates a correlation between population ageing and income; in high-income countries, the proportion of older people is relatively high. For middle-income countries, population ageing is relatively low. For low-income countries, population ageing is not a serious problem.

Figure 1 Proportion of Population Aged 65+ Around the World



Source: World Bank, 2022.

China is the world's most populous country. Although it is still a developing country, the proportion of the elderly population in China is already far above the level of other developing countries. Figure 2 illustrates the sharp increase in China's elderly population between 1982 and 2020. It only took 38 years to transition from an unaged society of around 5 per cent to an aged society of around 14 per cent, which is an unprecedented speed compared to anywhere else in the world. There is a close relationship between demographic and economic development components, especially for China. The source of China's rapid economic development after the reform and opening up in 1978 was the demographic dividend. A large labour force has enabled China's rapid economic development. Such rapid demographic changes today are likely to have a significant impact on various economic variables, including labour productivity, healthcare costs, and pension systems. This paper focuses on the impact of population ageing on China's consumption structure.

Figure 2 Proportion of Population Aged 65+ in China

Source: China Statistic Yearbook (2010-2020)

Studying the changes in the population's consumption structure is of immense practical importance. It can provide insights into consumer preferences and needs, enabling the government to make macro-adjustments in the market and guide the development direction of each industry in the economy. This, in turn, can ensure China's long-term economic growth. Moreover, it is of great theoretical importance. Several economic theories examine demographics and consumption, with most theories linking and explaining the relationship between demographics and consumption by income. This paper delves into the relationship between demographics and consumption, emphasising that different age populations have distinct consumption preferences for various products, which in turn influence their consumption patterns. Building on this, the paper investigates the impact of China's ageing population on consumption structure. The authors have selected time series data from 2010 to 2020, collected from the China Statistical Yearbook, for analysis. The Grey correlation model is used to calculate the correlation between China's old population and the consumption of each product in China.

Literature Review

Countless studies have delved into the impact of population ageing on consumption. Most of these studies utilise macro data and apply the Life Cycle Theory to conduct empirical and theoretical analyses. However, due to the diverse range of research methods and the inclusion of different countries, a consistent result has not been reached. Some argue that population ageing would enhance consumption (Aslam, 2018; Eremina, 2018; Loser, 2017), as the Life Cycle Theory suggests that the elderly

population is a pure consumer without any income, and with the increasing number of elderly, total consumption is bound to rise. On the other hand, some empirical analyses find that an increase in population ageing would decrease total consumption (Dantas Guimarães, 2020; Tiné, 2020; K. Zhang, 2017). This could be explained by the Precautionary Saving Theory, which suggests that the elderly population prefers to save money to mitigate future uncertainties, such as health problems or for their children.

Research increasingly recognises the impact of an ageing population on consumption patterns. This is due to the fact that individuals of different ages exhibit diverse consumption habits. Understanding how population ageing affects consumption structures is therefore a complex and important area of study. This analysis helps clarify why there is no consistent conclusion regarding the overall impact of ageing on total consumption. Most studies have concentrated on the effects of population ageing on specific categories of consumption, such as energy expenses, private spending, and services, among others. This text does not comprehensively address the implications of population ageing on various consumer products.

The principal question of this research is: How will the structure of consumption change as the elderly population in China continues to expand? Furthermore, the purpose of this research is to evaluate the impact of population ageing on consumption patterns. This study aims to address an existing gap by taking a unique approach, utilising disaggregated data from the China Statistics Bureau to examine how population ageing influences the consumption of eight distinct product categories. The insights derived from this analysis, made possible by our innovative approach, will provide valuable information for businesses and policymakers.

Data and Method

This study examines time series data on China's ageing population and consumption structure from 2010 to 2020. The variable Y1 represents the proportion of the elderly population (aged 65 and above) to the total population, reflecting the level of population ageing. The consumption structure is categorised into eight groups based on the China Statistical Yearbook: X1 (Food consumption); X2 (Clothing consumption); X3 (Housing consumption); X4 (Household equipment consumption); X5 (Transportation and communication consumption); X6 (Cultural, educational, and entertainment consumption); X7 (Healthcare consumption), and X8 (Other types of consumption).

Since the Chinese government began collecting relevant data in 2010, the authors have access to data spanning 10 years, from 2010 to 2020. This limited timeframe results in a small sample size, and there is no guarantee that the data follows a normal distribution. In this context, the thoroughness of grey correlation analysis provides more reliable results than some traditional analysis methods, such as ordinary least squares (OLS). Therefore, the authors employ grey relational analysis for this research. This method helps investigate the relationships, influences, and interactions among all the elements involved. A stronger correlation indicates that the space curves of the two

parameters are more closely aligned.

Calculation

- 1) Determine the standard classification sequence of consumption structure.

$$x_i(k) = \{x_i(1), x_i(2), \dots, x_i(n)\} (i = 1, 2, \dots, m) \quad (3.1)$$

- 2) Normalise the quaternion

$$x_i(k) = \frac{x_i(k)}{\frac{1}{m} \sum_{i=1}^m x_i(k)} \quad (3.2)$$

$$i = 1, 2, \dots, m$$

$$k = 1, 2, \dots, n$$

- 3) Use the following formulas to obtain the difference sequence ($\Delta_{li}(k)$), the maximum difference (Δ_{max}), and the minimum difference (Δ_{min}).

$$\begin{aligned} \Delta_{li}(k) &= |y_j(k) - x_i(k)| \\ \Delta_{max} &= \max_i \max_k |y_i(k) - x_i(k)| \\ \Delta_{min} &= \min_i \min_k |y_i(k) - x_i(k)| \end{aligned} \quad (3.3)$$

- 4) Find the correlation coefficient ($\xi_{li}(k)$) and correlation (γ_{li}).

$$\begin{aligned} \xi_{li}(k) &= \frac{\Delta_{min} + 0.5\Delta_{max}}{\Delta_{li}(k) + 0.5\Delta_{max}} \\ \gamma_{li} &= \frac{1}{n} \sum_{k=1}^n \xi_{li}(k) \end{aligned} \quad (3.4)$$

- 5) Relevance ranking

Result and Discussion

Following the analysis, Table 1 presents the relevance indexes between population ageing and various consumption categories. The data, obtained through a rigorous and objective analysis, reveals that the elderly have the strongest preference for healthcare-related expenditures, while their preference for purchasing homes is the weakest.

Table 1 The Relevance Index Between Y1 and X1, X2, X3, X4, X5, X6, X7 and X8

The relevance index (RI11) between x1 and Y1 is: .69361198
The relevance index (RI12) between x2 and Y1 is: .63582993
The relevance index (RI13) between x3 and Y1 is: .54057062
The relevance index (RI14) between x4 and Y1 is: .71467614
The relevance index (RI15) between x5 and Y1 is: .71543139
The relevance index (RI16) between x6 and Y1 is: .72888064
The relevance index (RI17) between x7 and Y1 is: .91055942
The relevance index (RI18) between x8 and Y1 is: .64947891

Table 2 illustrates a considerable difference in the relevance indices, highlighting the significant impact of population ageing on consumption patterns. The ranking of consumption preferences for the elderly, from lowest to highest, is as follows: House purchase, Clothing, Other, Food, Household equipment, Communication and transportation, Culture, education, and entertainment, and Healthcare. This outcome is consistent with both expectations and findings from related literature.

Table 2 Rank of the Old Population Consumption Preference

Items	Rank	Gap (Take House purchase as base)	Relevance Index
House purchase	1	0	0.54
Clothing	2	0.0953	0.635
Other	3	0.1089	0.6495
Food	4	0.153	0.6936
Household equipment	5	0.1741	0.7147
Communication and transportation	6	0.1749	0.7154
Culture, education and entertainment	7	0.1883	0.7289
Health care	8	0.37	0.9106

This study examines the effects of China's ageing population on the consumption patterns of its citizens. It utilises grey correlation analysis on time series data from 2010 to 2020. Based on the empirical results obtained, several aspects can be drawn regarding these impacts.

The elderly population is the primary consumer of physical therapy and healthcare products due to a decline in physical abilities and increasing psychological concerns about their health. Caregivers play a crucial role in addressing these concerns and ensuring the well-being of the elderly. At the same time, improvements in living standards and the growing popularity of healthy diets have made people more aware of the importance of balanced nutrition for their well-being. Many health issues in older adults, such as hypertension and hyperlipidaemia, are linked to obesity and poor dietary choices. To prevent problems like overnutrition and obesity, older individuals often spend less on food and beverages.

When it comes to housing, the living environment for the elderly is notably stable.

They typically do not need to travel or change their place of residence frequently, which results in lower spending on purchasing homes. This low frequency of relocations also means that the replacement of household items—such as beds, refrigerators, televisions, and other equipment—is not a standard occurrence. As a result, the consumption of household equipment is only slightly higher than their spending on food.

Retirement in China is not just about resting. With the country's improving pension insurance system, many older adults who have retired often have sufficient pension income to meet their daily needs. This, coupled with the abundance of free time after retirement, allows for a rich and diverse range of leisure activities. From travel to hobbies like singing, dancing, and playing musical instruments, retirees in China are actively enriching their lives during retirement. The variety of these activities is a testament to the diverse interests and lifestyles of retirees in China.

Based on the analysis of the results, it is evident that with the rapid increase in the elderly population, China should develop consumer markets and products tailored to their needs. This includes not only focusing on the demands of older adults in areas such as healthcare and entertainment but also considering the preferences of younger generations in sectors like food and housing. By taking a comprehensive approach that caters to all age groups, China can build a more inclusive and forward-thinking society. Additionally, the Chinese government should strengthen the healthcare system to ensure that the elderly have access to essential medical services. This approach would help reduce the financial burden of medical expenses on older individuals and prevent family poverty resulting from healthcare costs.

Conclusion

In conclusion, the findings reveal a striking trend: older adults exhibit a robust preference for healthcare services while showing a minimal interest in purchasing homes. This insight underscores the pressing need for China to pivot its priorities. Instead of channelling resources into the booming housing market, the nation should actively nurture and expand its tertiary industries, particularly in healthcare and other vital service sectors. This strategic shift is not only a response to the immediate needs of its ageing population but also a reassurance that the nation is prepared for the future.

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