Proceedings of the 3rd International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/89/20231469

The Acceleration or Suppression: Aging in China

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Abstract: The article aims to verify whether the aging population suppresses the economic consumption level of Chinese residents, depending on the economic situation in China. To diversify the sample, the work searched the situation of expenditure of countries in China. Using daily data over the period 2014-2021, the work estimates the correlation between the elderly dependency ratio and economic consumption through the expenditure approach of GDP and the Hodrick and Prescott Filter model. The work adds cyclical components to the correlation equation, indicating the manner of detrending to test the objective outcome of the GDP index. The work concludes that the GDP index is closely connected with medical insurance fund expenditure, leading to the working population paying more attention to healthcare problems. The level of the elderly dependency ratio depends on the medical insurance fund expenditure、social pension insurance funds, and government health expenditure.

Keywords: Elderly people, Elderly dependency ratio, GDP, Hodrick and Prescott Filter model

1. Introduction

The WHO believes that "health is not only the absence of physical defects and diseases, but also the ability to have good physical, psychological, and social adaptation." Therefore, the health of the elderly should cover the three aspects of their physical, psychological, and social health. The elderly health support system refers to the sum of resources, systems, services, care, and other factors provided by the government, enterprises, non-governmental organizations, families, and other entities to promote the realization of the physiological, psychological, and social health goals of the elderly. Specifically, the elderly health support system mainly includes the medical security system for the elderly population, medical and health resources, community health services, volunteer service activities for caring for the elderly, scientific research in geriatric medicine, the elderly health service industry, and family care and care for the elderly. The average annual increase in the elderly population aged 60 and above in China is about 6.4 million, and it will reach 2. 5% by 2020, About 5.5 billion, accounting for 1.7% of the total population, About 8% [1]. Health economics has always regarded population aging, the popularization of medical security systems, national income growth, physician-induced demand, and medical technology progress as the five major factors affecting the rise of medical expenses. Among them, medical technology progress is the main factor affecting the rise of medical expenses, and factors such as population aging have limited effects on the growth of medical expenses. The Global Report on Aging and Health released by the World Health

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Organization also believes that the healthcare expenses caused by population aging are far more work than the high costs caused by factors such as high-tech medical technology. Home workers, some domestic studies speculate that the aging population is still the main factor for the future increase in medical expenses. In 2018, the average life expectancy in China has increased to 77 years old, and people naturally believe that as the average life expectancy increases, the survival time with diseases is also increasing. Generally speaking, extending per capita life expectancy may result in unhealthy or healthy lifespans. If the main extension is a healthy lifespan, it may not necessarily lead to a significant increase in medical expenses, especially if elderly medical expenses are concentrated at a certain period, and the increase in per capita lifespan only delays the arrival of the peak medical expenses. Based on the above ideas, this article will analyze the relationship between working population aging and medical expenses.

2. Literature review

With the development of society, the life span of the public gradually prolonged at the age above 65. Commonly, working people should raise both parents until they retire from the workplace. The idea is that the expansion of the family income should consist of several parts, including the consumption of the medical care and the insurance of the medical care. An interesting thing is that those experiences may influence the well-being awareness of the public.

According to existing literature in the academic community, the population of elderly people is increasing year by year. At the same time, the dependency ratio of elderly people in families is also increasing yearly [2]. Some scholars have mentioned that the issue of aging is influenced by many factors, such as the physical and psychological problems of the elderly and even the upbringing of children at home [3]. For workers, China's aging phenomenon is not an exception, and most countries worldwide are also facing the problem of aging [4]. Some scholars have mentioned that in addition to the cost of raising children, there is a certain amount of expenditure for medical and health care for the elderly in household expenses. This will increase the parenting burden on the working group at home [5]. Based on this, the dependency ratio of the elderly has been increasing yearly compared to the cost of raising children [6]. In addition to considering the issue of medical insurance expenses for the elderly, the community environment in which the elderly reside is also a factor worth considering [7]. At the same time, the physical health issues of the elderly need to be highly valued, such as their susceptibility to dependency personality disorder (DPD). When elderly people experience loneliness for a long time, they may develop restless emotions, reduce their sense of happiness in life, gradually neglect the cultivation of intimate relationships, and even face the problem of refusing social assistance [8].

Some scholars have even studied the relationship between the lifespan of the elderly and their intake of fruits and vegetables to further analyze the economic principles behind the dependency ratio of the elderly [9]. In addition to basic living needs, the happiness of elderly people is also influenced by other factors, such as personal entertainment activities, satisfaction of personal achievement, and social needs. The long-term care of the elderly in the community can also affect their happiness [10]. Apart from the complete supporting facilities of basic fitness facilities, communities should vigorously advocate for the elderly to develop healthy lifestyle habits and promote knowledge of health preservation. Considering the fragile physical conditions of the elderly, their health conditions are influenced by many factors, and healthy lifestyle habits can cultivate a healthy body [11].

To sum up, Overall, various sectors of society have formulated many preferential and convenient policies to ensure the physical health of the elderly and attach great importance to the issue of aging. The facts on the role of reducing the economic pressure from the young could lead to the government, which regulates some supporting policies to subsidy the expenditure of medical healthcare. Elevating the awareness of dependency on aging is becoming a serious problem.

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3. Methodological Framework

For many macroeconomic research, the decomposition of time series in trends and cyclical is widely analyzed by the level of the social economic situation such as gross domestic product, interest rate, unemployment, and so on. Owing to the component's theoretical definition, they are non-observable. To mathematically analyze the index of expenditure in China during the year 2014-2021, the work utilizes the expenditure analysis manner to test the statistical outcome, certificating what factors could influence the GDP. With the worsening aging problem in China, the burden of elderly care for working children in families is increasing, and the dependency ratio of elderly people is increasing. In response to the issue of elderly care, to ensure their physical health, young people with jobs in their families invest a portion of their money in medical insurance. At the same time, they also pay attention to pension investment to ensure that the elderly have a certain level of financial security in their later years. The government also attaches great importance to medical insurance expenditure and the construction of corresponding medical infrastructure. Young people who can support themselves will allocate a portion of their salary to medical care.

3.1. Hodrick and Prescott Filter

To use time panel data to analyze the trend and correlation of various indicators, this article cites the Hodrick–Prescott (HP) filter model to analyze the trend factors of various indicators and objectively explore the correlation of each factor. By calculating the periodic values of various indicators, the article objectively reflects the changes and trends in the work data. Therefore, the model used in the article is as follows: The estimation of the decomposition of a trend component is taken through the minimization of the following function:

$$\min_{T_t} \sum_{t=1}^{T}(y_t - T_t)^2 + \lambda \sum_{t=2}^{T-1}[(T_{t+1} - T_t) - (T_t - T_{t-1})]^2 \quad (1)$$

Considering that the article uses time panel data based on the Hodrick–Prescott (HP) filter formula principle, the work generally uses the smoothing parameter λ. The trend becomes more volatile, for it contains a larger part of the spectral of high frequencies or annual data. Many researchers use the value λ=100, assuming that the cyclical component is 10 times more volatile from the change of the time series. Thus, many researchers choose high values for λ when filtering annual data because they claim that low values provoke unstable growth rates.

3.2. Test for the trends and cyclical

This article also uses detrending to analyze the trend and periodicity of data. Using detrending methods to analyze macroeconomic data is more accurate and objective. Trending mainly reflects the direction and degree of changes in GDP and other indicators related to medical insurance. Periodicity mainly reflects the objectively changing situation of data over time. Based on the data graph, the fluctuation situation and direction of data can be clearly understood.

As shown in the data, the process of de-trending data in this article is mainly divided into the following steps: (1) collecting actual data of relevant indicators over the years; (2) using de-trending methods to analyze the trend and periodicity of the data; (3) applying the analyzed data to formulas, using HP models and correlation calculations to determine the internal correlation various indicators based on the data. De-trending methods to process data can effectively ensure that the data is not easily affected by non-objective factors in the external environment. Using de-trending methods to process data

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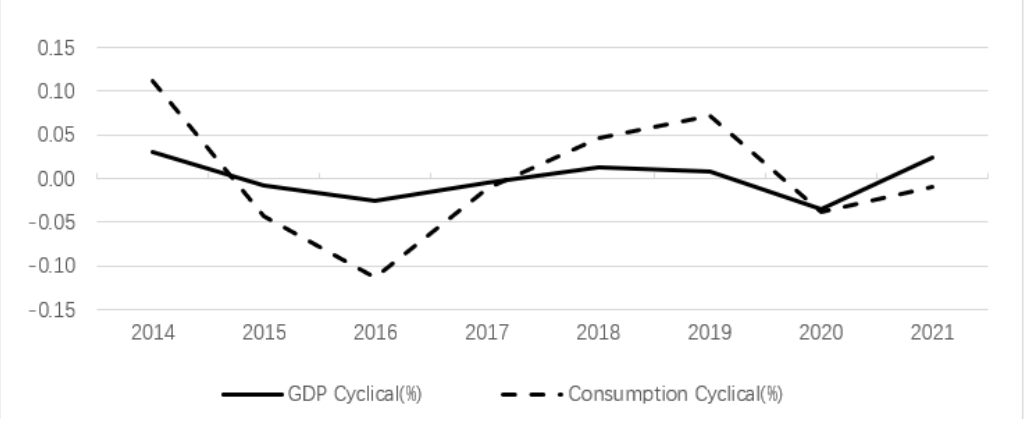
4. Data

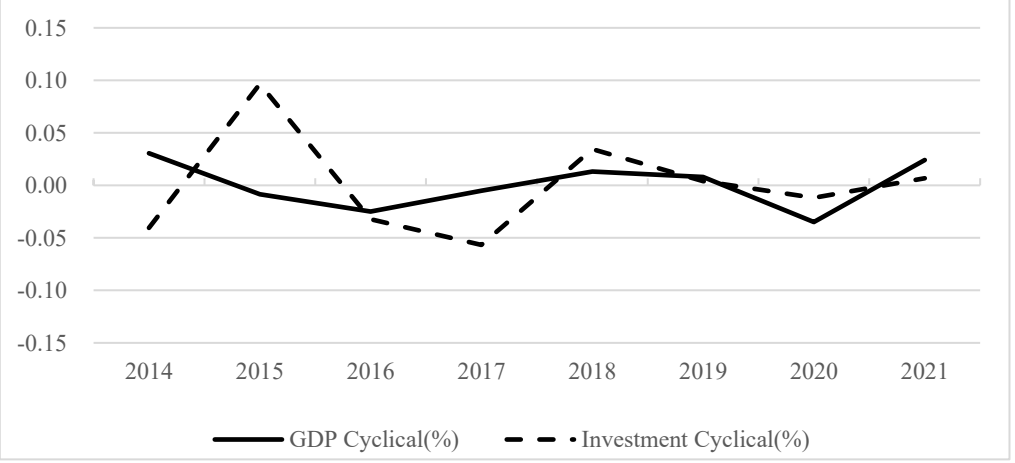
To collect data on China's macroeconomic indicators from the perspective of data authority, this article selects data from the National Bureau of Statistics from 2014 until 2021. Considering the scientific and objective nature of data validation, this article cites the HP model to analyze the degree of detrending of data. Through model analysis, the best economic development indicators are fitted. By exploring the cyclical factors and trending data, the relationship between China's macroeconomic elderly care ratio and medical insurance expenditure is objectively analyzed.

The first step in data analysis is using graphs. The graph below presents time series data for correlation in China. Looking at Figure 1,2,3, the work can conclude that the GDP cyclical component has a strong relative relationship with the medical insurance fund expenditure cyclical component, with a correlation figure of almost 0.77. Moreover, the factor of government health expenditure cyclical component also correlates with 0.57 level, almost has the same trend with the fluctuation with the GDP index. According to the analysis of the statistics, the work could find that the trend of GDP and I Expenditure of social pension insurance funds for urban and rural residents has a work connection, which is 0.01 at the relation in the standard of correlation.



Note: Source: NBS

Figure 1: Gomovement of China's GDP and Consumption Cyclical Components (2014-2021).



Note: Source: NBS

Figure 2: Comovement of China's GDP and Investment Cyclical Components (2014-2021).

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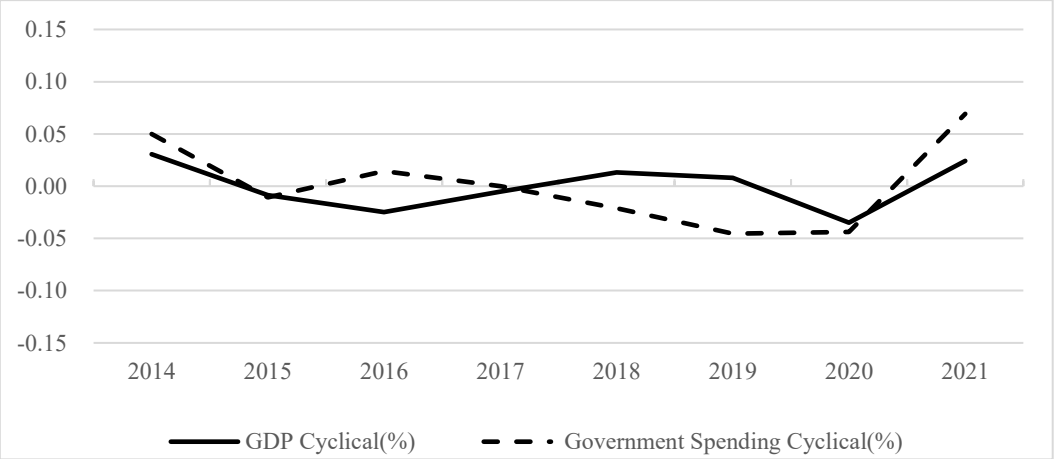

Note: Source: NBS

Figure 3: Comovement of China's GDP and Government Spending Cyclical Components (2014-2021).

According to Table 1 and 2 statistics, the worker can virtually notice the correlation better with the elderly dependency ratio with different components. The correlation of the elderly dependency ratio is strongly connected with medical insurance fund expenditure、expenditure of social pension insurance funds, and government health expenditure, respectively 0.98,0.97 and 0.99.

Table 1: Trend.

Year	Medical Insurance Fund Expenditure Trend (HP)	Expenditure of social pension insurance funds Trend (HP)	Government health expenditure trend (HP)
2014	8133.60	1571.20	9545.81
2015	9312.10	2116.70	10579.23
2016	10767.10	2150.50	12475.28
2017	14421.80	2372.20	13910.31
2018	17823.00	2905.50	15205.87
2019	20854.20	3114.30	16399.13
2020	21032.10	3355.10	18016.95
2021	24048.20	3715.00	21941.9

Table 2: Elderly Dependency Ratio Correlation.

Elderly dependency ratio & Medical insurance fund expenditure Trend(HP) Correlation	0.98
Elderly dependency ratio & Expenditure of social pension insurance funds Trend(HP) Correlation	0.98
Elderly dependency ratio &government health expenditure trend(HP)	0.99

5. Results

Through the analysis of the HP model and correlation testing, this article finds that the processed data is more objective in the display of results based on data discovery. By analyzing the correlation

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between the support ratio of the elderly and the expenditure on medical insurance, the following conclusions can be drawn comprehensively.

Table 3: Descriptive statistics.

Medical insurance fund expenditure SD / GDP SD	3.14
Expenditure of social pension insurance funds SD / GDP SD	2.12
Government health expenditure SD / GDP SD	1.80
GDP &Medical Insurance Fund Expenditure Cyclical Component Correlation	0.77
GDP & Expenditure of Social Pension Insurance Funds Cyclical Component Correlation	0.01
GDP & Government Health Expenditure Cyclical Component Correlation	0.57

According to Table 3, the work could find that the fluctuation level of Medical insurance fund expenditure SD is three times that of GDP SD, which is closely connected with GDP. The statistics of the Expenditure of social pension insurance funds SD is nearly one time than GDP SD, which has a weaker connection compared to the medical insurance fund expenditure. The Expenditure of social pension insurance funds SD is nearly twice that of GDP SD, which does not have a strong connection with GDP.

Above the analysis of the correlation between the elderly dependency ratio and other components of GDP, the work could find that those factors have another wonderful connection with the elderly dependency ratio, which figures almost at 0.9, indicating a close relationship.

6. Conclusion

Based on the above analysis, the work could easily find that in a short period, the government should enforce support the medical insurance fund expenditure because the figure of the medical expense is relative to the public health problem of aging. The sensitivity of medical insurance fund expenditure is higher than other expenditures, based on the correlation of the GDP. Moreover, from a long-term perspective, the government should allocate more money to health expenditure aspects, which could permanently influence the health care of the elderly. Emphasizing the health care of the elderly is a beneficial way to take care of the body condition of the old, releasing the financial pressure from the working populations. The elderly dependency ratio is related to the aspects of the medical insurance fund expenditure, owing to the population of the elderly growing faster than before, and it shows that China has already entered into the times of aging. More and more family should raise their parents not only for medical insurance but also for social pension insurance. The government should emphasize aging problems and regulate the policy to support health care expenditure.

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