

Research on the Impact of Population Structure Changes on China's Economic Development

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Abstract: With the improvement of the level of social development and the transformation of the population growth model, China's population structure has become increasingly prominent. Correctly assessing the potential risks brought by changes in population structure and making corresponding policy adjustments in a timely manner can promote long-term coordination between population and the economy and society development. Based on this, this article studies the impact of demographic changes on China's economic development. First, it outlines the demographic structure, introduces its definition and classification, and then describes the demographic changes in China. It mainly analyzes the age change of the working population in China, and then explains the impact of population structure changes on economic growth from three aspects: labor supply, national savings, and technological innovation. Finally, based on this, some countermeasures and suggestions are proposed, which are of some significance to economic development.

1. Introduction

For a long time, China's population problem has been receiving attention. With its rapid growth and huge base, it has brought many problems to social and economic development. In the new era, we are facing important goals of achieving a well-off society and building a harmonious society. On the other hand, after many years of efforts, China's population situation has also ended the stage marked by rapid population growth, showing many new features, of which the prominent problem of the population structure has received our attention. Therefore, only find the relationship between population structure and economic development can we better understand the national conditions and develop the economy.

2. Population Structure

2.1 Definition and Classification of Population Structure

The population structure, also known as the population composition, refers to a result obtained by dividing the population by different standards [1]. It reflects a variety of prescriptive quantitative ratio relationships within the population as a whole in a certain region and at a certain point in time. There are mainly gender structure and age structure. The factors that constitute these standards include age, gender, race, nation, religion, education, occupation, income, family size, etc.

However, its nature can be summarized into three categories: the natural structure of the population, the social structure of the population, and the regional structure of the population.

Natural structure: The natural structure (composition) of the population is a population structure formed by dividing the population into various components according to the natural indicators of the population, including the age structure and gender structure of the population. The natural structure of the population is closely related to population reproduction. The existing natural structure of the population is the result of long-term natural changes in the past and the basis of future natural changes in the population. The age structure of the population refers to the age distribution of the population at a certain point in time, and the age of the population. The

proportion of the group population in the total population can indicate the type and speed of population development, and reflect the proportion of the working-age population and the dependent population.

Social structure: divided according to the social characteristics of the population, mainly including class structure, ethnic structure, cultural structure, language structure, religious structure, marriage structure, family structure, occupation structure, department structure, etc. Socioeconomic development and social production mode determine the population and society structure and its changes; the social structure of the population has adversely affected socioeconomic development.

Regional structure: divided according to the living area of the population, there are mainly natural geographical structure and administrative area structure [2]. The geographical structure of the population is related to the geographical environment, natural resources and economic development. A reasonable regional structure of the population is conducive to the development and use of nature resources and promote the development of urban and rural economy. The regional structure of the population is also an important reason for the regional differences in birth rate, mortality rate and life expectancy of the population.

2.2 Demographic Transition and Population Age Structure Change

According to Caldwell's brief description of the theory of demographic transition, the type of population reproduction roughly goes through three main stages corresponding to the pre- and post-industrial periods. They are in turn the "high birth rate, mortality, and low natural growth rate" stage, "high birth rate, low mortality and high natural growth rate" stage, and "low birth rate, low mortality and low natural growth rate" stage. Williamson later found that the type of population reproduction was in the process of transitioning from the second stage to the third stage described above. As the decline in birth rate and mortality has a sequential characteristic in time, usually there will be three stages of change in the age structure, and these three stages in turn have a high child rearing ratio and a high working age [3]. Cai Yan made a more detailed analysis of this process, pointing out that there is a time lag between the decline in mortality and the decline in birth rate, and the natural population growth rate will rise during this period, resulting in a corresponding increase in the child dependency ratio; after a certain time difference, people born during the "baby boom" period gradually grow up into adults, leading to the ratio of working-age people gradually increases; at the same time, economic and social development will reduce the fertility rate, and then the population growth rate tends to decrease, and then gradually begin to age the population. When the natural growth rate of the population shows an "inverted U-shape" curve (first rise, then descent), with a time difference of about one generation, the working-age population will also show a similar trajectory.

Changes in the distribution of the age structure of the population will cause changes in the population's economic burden to show a periodical characteristic [4]. At the beginning stage, the distribution of the population's age structure showed a typical pyramid shape, and the population dependency ratio was mainly composed of the child dependency ratio and the burden is heavier; in the second stage, the age structure of the population has a typical olive shape. The number of economically active people in the total population has increased significantly. Although the proportion of the elderly population in the total population is gradually increasing, the working-age population is growing faster than the total. As the population grows, the economic burden of the population continues to decrease; in the third stage, the distribution of the population's age structure shows a typical inverted pyramid shape, and a large number of people born at the peak of childbearing age enter the retirement age; resulting in a significant increase in the old-age dependency ratio and the age structure of the population. The economic burden of the population has begun to increase. People of different ages often have significant differences in economic behavior. Therefore, the degree of population's impact on economic growth at different age structure stages will be different [5]. The second phase of China's economic development provides a period of strategic opportunities for economic development.

3. Changes In China's Population Structure

From 1950 to 1965, the number of elderly people in China basically remained stable, between 24 million and 25 million. However, due to the rising number of working-age population, the dependency ratio of the elderly population gradually declined at this time: from 7.20% in 1950 fell to 6.18% in 1965. After 1965, the dependency ratio of the elderly population began to increase slowly and reached a level of 10.19% in 1999. From 1966 to 1999, the dependency ratio of the elderly population in China increased by 3.86 percentage points. After China entered the population aging society in 2000, the elderly population dependency ratio began to increase rapidly and reached a level of 15.86% in 2017. From 2000 to 2017, China's elderly dependency ratio increased by 5.94 percentage points in total. 1950-2013, the number of working-age population showed a gradual upward trend: from 34.113 million in 1950 to 10.582 million in 2013. After 2013, the number of working-age population in China began to decline slowly: labor in China in 2017 reached 99.829 million, 7.53 million less than in 2013. At the same time, the proportion of China's working-age population has undergone a process of "declining, rising, and then falling" [6]. China's proportion of working-age population gradually declined from 61.53% in 1950 to 55.74% in 1973. After 1973, the proportion of China's working age population began to increase continuously. In 2010, the proportion of China's working age population reached a historical high of 74.53%. After 2010, the proportion of China's working-age population began to decline slowly and reached 71.82% in 2017. Since the founding of New China, the proportion of China's elderly population has experienced three periods of slow decline, slow rise and rapid rise. The proportion of China's elderly population showed a slow decline, from 4.43% in 1950 to 3.43% in 1965. From 1966 to 2000, the proportion of China's elderly population reached a level of 6.96% in 2000, a total increase of 3.46 percentage points in 34 years. After 2000, China officially entered an aging society, and the proportion of the elderly population was on the rise, reaching 11.39% in 2017. From 2001 to 2017, the proportion of China's elderly population increased by 4.29 percentage points.

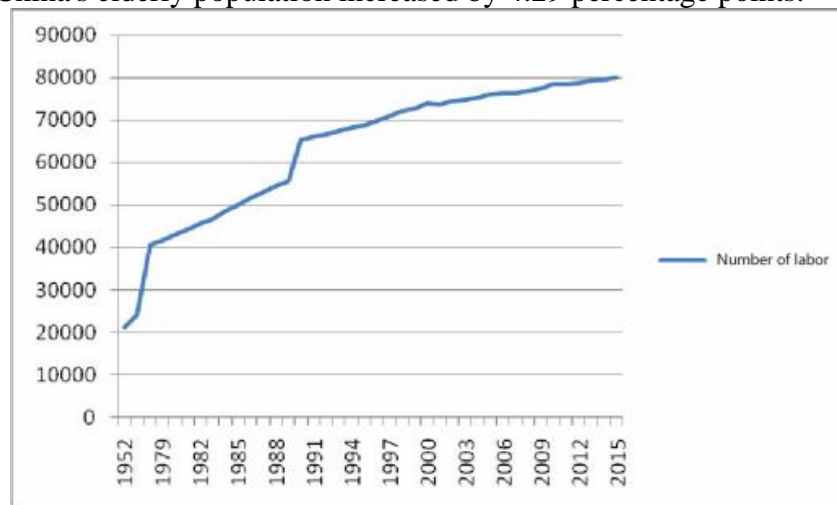


Figure 1 China's labor force, 1952-2015

For men, in 2000, the labor participation rate of the male population aged 15-19 was 49.10%. From 2000 to 2010, the average rate of labor participation of the male population aged 15-19 was 3.38%. In 2010, the labor participation rate of the 15-19-year-old male population is 34.80%. In 2000, the labor participation rate of the 20-24-year-old male population was 90.23%. From 2000 to 2010, the average labor-rate participation rate of the 20-24-year-old male population was 1.67 %.

In 2010, the labor force participation rate of the male population aged 20-24 was 76.22%. From 2000 to 2010, the labor force participation rate of the male population aged 25-29, 30-34, ..., and 60-64 years changed little. It can be approximated that the labor force participation rate remains unchanged. In 2000, the labor force participation rate of male population aged 65 and over was 33.76%. From 2000 to 2010, the average labor force participation rate of male population aged 65 and over declined by 1.99 %. In 2010, the labor participation rate of the male population aged 65

and over was 27.61%.

For women, in 2000, the labor participation rate of the female population aged 15-19 was 51.74%. From 2000 to 2010, the average rate of labor participation of the female population aged 15-19 was 4.68%. In 2010, the labor participation rate of the 15-19-year-old female population was 32.04%. In 2000, the labor participation rate of the 20-24-year-old female population was 85.39%. From 2000 to 2010, the average labor participation rate of the 20-24-year-old female population declined by 2.06%.

In 2010, the labor force participation rate of the female population aged 20-24 was 69.34%. From 2000 to 2010, the labor force participation rate of the female population aged 25-29, 30-34, ..., and 60-64 years changed little. It can be approximated that the labor force participation rate remains unchanged. In 2000, the labor force participation rate of female population aged 65 and over was 17.27%. From 2000 to 2010, the average labor force participation rate of female population aged 65 and over was 1.33 %. In 2015, the labor participation rate of female population aged 65 and over was 15.11% [7].

4. The Impact of Demographic Changes on China's Economic Development

In an economic growth that relies on labor quantity input, insufficient working age population or excessive proportion of the elderly population will become factors hindering economic growth. When the population age structure is in the most productive period, the labor supply is sufficient and the savings rate is high. It will become an additional source of economic growth, the so-called demographic dividend; and when the population transition exceeds this period, the age structure of the population tends to age and is no longer productive in general, then this kind of additional source of economic growth, the demographic dividend, will be lost. Changes in the age structure of the population will mainly affect economic growth directly or indirectly through three channels, namely labor supply, savings and technological progress.

4.1 Impact of Labor Supply on Economic Development

From the perspective of labor supply, demographic transition will lead to a relative change in the number of labor in the total population. Assuming that sufficient labor demand appears with economic growth, the proportion of the working age population will be higher, which will increase labor supply and labor participation rate; in addition, the reduction in family size will greatly increase the possibility of women entering the labor market, which will further increase the supply of labor [8]. Of course, due to the scale effect of the sub-tools, as the amount of labor supply decreases, the effect of the division of labor scale will also weaken, which will lead to a decline in the level of total output and per capita income; at this time, even if it is assumed that labor productivity is unchanged, the relative reduction in the amount of labor supply still means that the total output will decline in the same proportion. .

4.2 Impact of National Savings on Economic Development

Changes in the demographic structure will lead to changes in the distribution of consumption and savings in national income, which will have an impact on economic growth. The process of population change is long-term, which includes changes in personal life cycles and reflects changes between generations relationships. In society, there are systematic differences in the output, saving, and consumption behaviors of people of different ages. If a certain group of people accounts for the main proportion of the total population, the behavior of that age group will obviously affect economic development. As a person's age increases, especially after reaching the working age, the change in their savings will first rise and then decline. If the proportion of the working-age population in the total population is relatively large, the sum of the personal savings of that part of the population will be beneficial to increase the savings rate; coupled with the relatively low dependency ratio of working-age people, it means that they bear less financial burdens such as upbringing and maintenance, which will help reduce household expenditures and further increase household savings.

Physical capital is an important factor of production, and changes in the level of investment in physical capital have an important impact on economic growth. Classical economists represented by Smith, Ricardo, and Mueller have long noticed the impact of physical capital investment on economic growth. For example, Smith pointed out that with the increase in physical capital investment, entrepreneurs can hire more labor for productive activities, and the increase in the number of labor can promote the further refinement of labor division, which is conducive to increasing labor productivity and increasing national wealth. Therefore, the increase in physical capital investment can promote economic growth. Early development economists represented by Rosenstein-Rodan and Nelson Rostow emphasized that physical capital investment is the (only) important factor in promoting a country's economic growth. For example, Rosenstein-Rodan put forward the "big push" theory when studying the economic development of eastern and southeastern European countries [9]. The theory holds that it is difficult to invest in one sector or a few sectors because of the inseparability of the production function. Only through large-scale physical capital investment to build a large amount of infrastructure is only possible for developing countries to achieve economic development. Rostow pointed out in the book "Phase of Economic Growth" that for developing countries to achieve economic growth, three prerequisites must be met at the same time. Among them, the growth rate of physical capital investment must exceed ten percent is the most important of these three prerequisites. From the supply side, national income is equal to consumption plus savings, and from the demand side, national income is equal to consumption plus investment. Therefore, in the case of consistent supply and demand, savings and investment are equal. Therefore, savings are an important source of investment. As savings increase, the more investment is converted, which promotes economic growth; as savings decrease, conversions into investment will also decrease correspondingly, which may adversely affect economic growth.

4.3 Impact of Technological Innovation on Economic Development

Demographic changes will also affect economic growth by affecting the speed of technological progress. In a society, the aging of the population will lead to a decrease in the speed of absorbing new knowledge, new ideas, and a decline in scientific and technological innovation capabilities, which is easier. Inducing a government to use protectionist measures to protect its own labor market, thereby weakening the degree of labor market flexibility, technological progress and other contributions to long-term economic growth. For example, according to a study by the European Union, it is expected that the labor supply and public fiscal "double shock" will affect the future economic growth rate of the European Union and Japan and other countries by about 0.5 percentage points, and the impact on the United States will reach about 0.25 percentage points. In addition, changes in the age structure of the population will also lead to changes in the pattern of human capital accumulation. When the mortality rate declines, households will be more inclined to invest in human capital, which will significantly increase the labor market returns and also help promote long-term economic growth.

Keynes, a British economist, puts forward the famous national income determinism in the General Theory of Employment, Interest, and Currency, but Keynes' economic theory is only applicable to short-term analysis, not long-term analysis and dynamic analysis. Harrod published an article entitled "A Thesis on Dynamic Theory " in the Journal of Economics, which extended the national income determinism proposed by Keynes to make it dynamic and long-term. In Harrod's paper, the capital-output ratio is assumed to be constant, so the long-term economic growth rate and the savings rate are directly proportional. This seminal paper is regarded as the beginning of modern economic growth theoretical research, and the model he proposed in this paper is also called Harrod's growth model. However, the Harrod model itself also has fatal flaws. The first is that the Harrod model assumes that the capital-output ratio is unchanged, and this assumption is not realistic. The second is that the Harrod model does not consider the role of technological innovation. American economics Solow based on the criticism of the Harrod model proposed a Solow model, an economic growth model with neoclassical characteristics. In the most primitive In the Solow

model, the steady-state growth rate of total output is equal to the exogenous population growth rate. According to the theory of population transition, when a country completes the traditional population transition, the population growth rate will tend to zero [10]. At that time, the steady-state growth rate of the country's total output will also tend to zero because the population growth rate is going to zero. Obviously, this reasoning is seriously inconsistent with the historical fact that western developed countries have experienced continuous growth in total output. To overcome this shortcoming, Solow introduced exogenous technological changes in the aggregate production function. In this case, the steady-state growth rate of total output is equal to the sum of the exogenous technological change rate and the exogenous population growth rate. If a country population growth rate approach zero, at which time the country's long-term economic growth rate will no longer approach zero, but equal to the rate of exogenous technological change. Although the Solow model is a critical succession and development of the Harrod model, the Solow model also has some shortcomings. For example, although the Solow model emphasizes technological innovation as the source of long-term economic growth, Solow advocates that technological innovation is a by-product of production experience in product production. Therefore, the Solow model cannot be very obviously unsatisfactory to explain exactly where technological innovation comes from. The development of economic growth theory has even stalled because of this. Unlike neoclassical economic growth theory, the endogenous economic growth theory that emerged in the late 1980s emphasizes that technological innovation is the product of conscious innovation by economic entities pursuing maximization of profits due to market stimulus. Under this framework, three types of representative endogenous economic growth models have gradually formed. The first type is the endogenous economic growth model of endogenous technological change proposed by Romer, the second type is the creative destruction endogenous economic growth model proposed by Aghion and Howitt, and the third is the product quality ladder endogenous economic growth model proposed by Grossman and Helpman. When the growth rate approaches zero, the steady-state growth rate of total output in the Romer model will not approach zero, but will be equal to a positive number. It is precisely because of the increasing number of new intermediate products (technological innovation achievements), the growth rate of total output can be sustained, and technological innovation is the engine that promotes the long-term economic growth of a country. As an important variable affecting long-term economic growth, the level of technology innovation itself is affected by many factors.

5. Suggestions

In view of China's current status of population and economic development, in order to promote the coordinated development of population structure and economy, this article proposes the following.

5.1 Improving Population Policies and Promoting the Healthy Development of the Population

5.1.1 Moderate liberalization of population fertility policies

Studies have shown that China's natural population growth rate has been at a very low level. In recent years, the age structure of the population has undergone very significant changes. The coexistence of oligomerization and aging of the population and the increase of the dependency ratio are likely to lead to insufficient labor resources in the future. Based on this, China has adjusted its population fertility policy in a timely manner, and local governments at all levels should also actively cooperate to improve related policies and safeguards in accordance with the actual conditions of the province or region. In recent years, the liberalization of the two-child policy has not appeared as predicted by people. The peak fertility of the population may be related to changes in people's thinking, increased fertility costs, and greater emphasis on the realization of their own value. Therefore, while the government has liberalized its policies, it should also introduce a series of safeguards, such as extending maternity leave, paid vacations, support and compensation for enterprises, improvement of medical insurance, active promotion of women's employment,

protection of women's legal rights, etc.

5.1.2 Eliminate gender discrimination and promote balanced development of the population

In the process of researching the national gender structure of the population, we found that although the gender ratio of the total population did not show much imbalance, the gender ratio of the birth population was very serious. In recent years, the number of older single males has gradually become more popular. In the final analysis, the imbalance in the gender ratio of the population is inseparable from the level of economic development and the traditional concepts of backwardness. This not only affects economic development, but also brings hidden dangers to social stability. To this end, we must attach great importance to the problem of gender discrimination in the population. Start from various aspects to promote the balanced development of the gender structure of the population. First, we must strengthen publicity and education, especially in backward rural areas, and strive to improve the disadvantages of feudal traditional culture. Second, we must severely combat gender discrimination through legal channels, including illegal fetal gender identification, women discrimination in employment, discrimination in women's status, etc.; third, vigorously develop a diversified economy and promote women's employment.

5.2 Increase Investment in Education and Strengthen Talent Team Building

China's per capita education period and the proportion of highly educated talents are relatively low, the level of development between regions is significantly different, and the level of population and cultural structure development is low, and it is difficult to make better use of its economic benefits. Therefore, we must promote the development of education and improve the population cultural structure as a major task.

5.2.1 Adjust education development strategy and improve education system construction

First, develop basic education. At present, China's basic education system is relatively complete. The enrollment rate of people of the right age has continued to increase, and the number of years of education per capita has continued to increase. Second, to promote educational equity and focus on improving education in backward areas. Third, to improve the quality of running colleges and universities and vigorously develop vocational and technical education. From the conclusion of the correlation between population structure and economy, the proportion of higher education population has a positive role in promoting economic development. At the same time, China's economic development is diversifying and the speed of industrial upgrading is accelerating. This requires us to adapt to the needs of economic and social development and timely reform the school running system and training goals. Some universities and majors can adjust the training plan in a timely manner to reduce or expand the number of students enrolled based on the market needs. At the same time, learn from advanced foreign experience and run vocational and technical education.

5.3 Optimizing Industrial Structure and Layout

At present, China is in the development type of industrial structure of the population, and it is continuously changing to the type of modern industrial structure. However, the development of the industrial structure of the population is not balanced among regions. To this end, we should actively optimize the industrial structure and layout, and use the industrial development to drive the employment structure of the population change.

5.3.1 Cultivate agricultural production technology

In 2017, the proportion of employees in the primary industry in China was 27.0%, which is still high. Therefore, we should continue to promote the transformation of agricultural production methods and accelerate the transformation of agricultural development to modernization. Rely on science and technology to promote agriculture, vigorously develop modern biotechnology, cultivate excellent varieties, improve planting technology; actively promote the mechanization, scale and specialization of agricultural production; use modern networks, science and technology, etc. to promote the modernization of agricultural activities from production to consumption.

5.3.2 Actively follow the path of new industrialization and promote the upgrading of industrial structure

China has taken many detours in the process of developing industrialization. To this end, we should learn from domestic and foreign experiences and lessons, and adhere to the new type of industrialization. First, we must accelerate the transformation of traditional industries and abandon some of the high energy consumption and high pollution in a timely manner. And industries with low added value, the second is to actively cultivate emerging industries, increase investment in science and technology, strive to create a group of high-end technical talents, upgrade traditional processing and manufacturing industries, promote cleaner production, make China's trump card, and focus on building high-tech Industry-led modern industrial system.

6. Conclusion

With the prosperity and development of society and the continuous improvement of people's living standards, the relationship between population structure issues and the socioeconomic and natural resource allocation has become increasingly apparent. China as a large country with one-fifth of the world's population, population has always been a constraint factor on China for economic development. Although China has entered the ranks of low-fertility countries in recent years, the huge population base and unhealthy population structure are silently affecting China's economic growth.

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