CURRENT SITUATION AND DEVELOPMENT TREND OF POPULATION AGING IN CHINA

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ABSTRACT

At present ,with the deepening of the aging degree of China's population, the quantitative demographic dividend effect is weakening. Especially after the turn of the century, a series of impacts brought by the increasingly distorted population structure are inevitable and cannot be ignored. Based on the data of 31 provinces and cities in China from 2000 to 2016, this paper selects variables such as per capita REAL GDP, old-age dependency ratio, labor force share, birth rate, technological innovation ability, average years of education, and savings rate.rom the static and dynamic two directions to make empirical research, sensitivity test, the final regression conclusion.Through the analysis found that:In the short term, Ageing has certain positive economic effect, but in the face of entering an aging society rapidly, and depth stage, the society, the dependency ratio will rapidly rising in the long run, China's economy is by the negative impact is far more than its positive effect, namely the empirical conclusions are almost consistent with the initial theoretical derivation. At present, countries are actively formulate relevant solutions, take measures to slow down the population structure imbalance continues to impact, therefore, at the end of the paper, based on the theoretical and empirical results, from the pattern of economic development, birth policy, older industries, labor quality quantity, old-age security service system four aspects gives the policy Suggestions, in order to provide valuable reference.

Keywords: Current situation; Development trend; Population aging

Introduction

Since western European countries first reached the standard of aging society in the 19th century, the pace of population aging has never stopped. By the late 20th century, more than 70 countries and regions in the world met the international standard of aging

society. Undoubtedly, the young population age structure has been a powerful boost to China's economy jumping forward. However, as time goes by, the base of middle-aged and elderly population in China is increasing rapidly, and the aging process is advancing as a whole. The inversion between urban and rural areas and between regions is serious, and the burden of social population is becoming heavier and heavier. As a result, the quantitative demographic dividend effect is weakening, which is bound to lay major hidden dangers for the sound operation of social economy in the future. At present, in order to achieve balanced social and population development, China has taken a proper view of the situation, changed the previous strict birth control measures, and let the "universal two-child policy" into the public view. Its appearance not only symbolized another strategic adjustment of the national population policy in the historical process, but also caused high attention and discussion in the academic circle and the public. Based on this, how population aging affects China's economic development and what kind of economic effect it will have become the research thrust of this paper.

Research Objectives

1. Literature research and reading method. With the help of school resources, network platforms and other channels, the author comprehensively searched and read some successful works and materials in the field of population economy, systematically combed them, compared them, thought and summarized them, actively absorbed the academic views and research experience of predecessors, and finally formed his own inference cognition combined with the conclusions of his own research.

2. First take theoretical demonstration, and then use empirical evidence to give quantitative test. When exploring this topic, the author considers starting with a series of concepts of aging, focusing on the construction of theoretical analysis framework from the three aspects of population transformation, economic growth and transmission mechanism; Then, with the help of a series of indicators and according to the characteristics of sample data, the panel data measurement model is selected to quantitatively investigate this problem.

Conceptual Framework

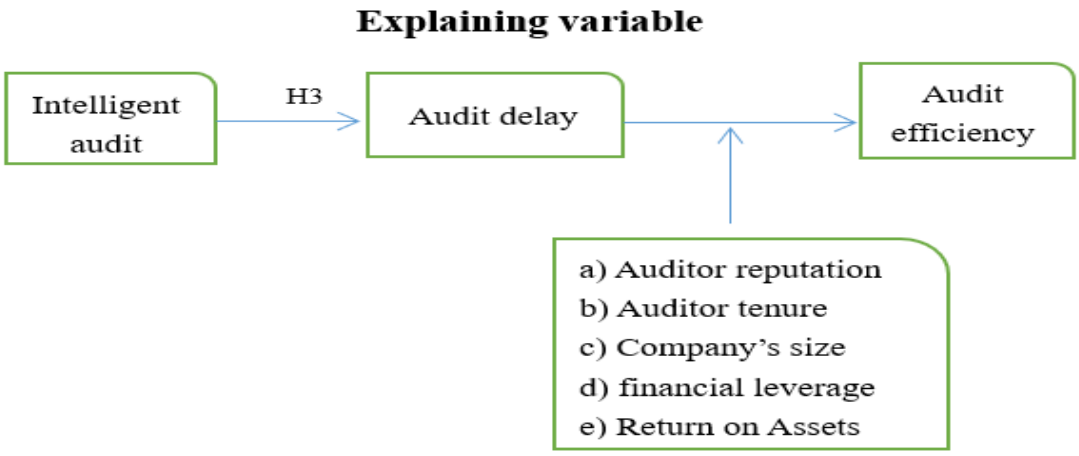

Figure 1.1

For accounting firms, the explaining variable is audit delay. The control variables mainly include auditor reputation, auditor tenure, company's size, financial leverage, Return on Assets and industry involved.

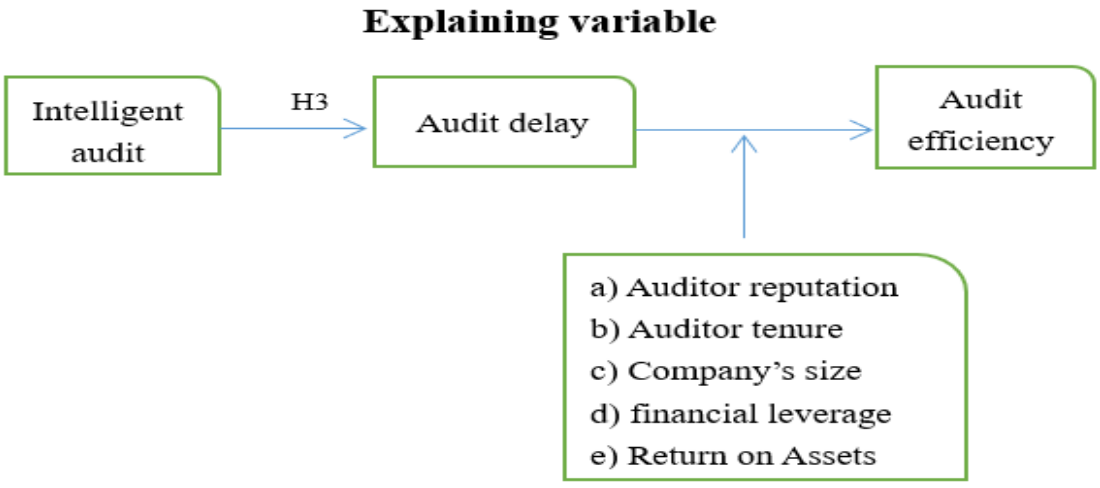

Figure 1 Conceptual Framework

Theoretical analysis

Theoretical basis

It is convenient for the development of social personnel work, and can have a reasonable quantitative measurement of the population age structure. The international community usually divides the social population level according to the specific value of age. Among them, 0-14 years old belongs to the young population, 15-64 years old is considered as the productive and working population, and starting from 65 years old (or 60 years old), the group above this age is referred to as the elderly population. And because the two groups of age groups in theory, have not entered the field of social production division of labor and cooperation, they will be collectively called non-productive labor population.

The so-called population age structure refers to the share of population of different age levels in the total population of different countries or regions in different periods. When the development of this country or social area reaches a certain extent, the proportion of children in the society declines, the scale of young and middle-aged labor force gradually shrinks, and the number of elderly groups tends to expand accordingly, which is called population aging. When the proportion of the resulting elderly population reaches the internationally accepted criteria (i.e., the proportion of the population aged 60 and above in the current total population is more than 10%, or the proportion of the population aged 65 and above is more than 7%), it can be judged that the population has entered the aging process.

Based on this, the academic field mostly measures the degree of aging around the following indicators, which will be explained successively below.

The specific calculation of the child population coefficient and the elderly population coefficient is as follows:

Children population coefficient (children population ratio) = children population/total social population *100%

Elderly population coefficient (elderly population ratio) = number of elderly population/total social population *100%

The calculation of the median age is the same as the method of solving the median, but the ages of all people are regarded as numerical values to rank, and then divided into two parts according to the number of people, and the corresponding ages of the people in the middle can be taken. The increase of the index value means that the aging degree of population structure is aggravated.

The dependency ratio, which is another name for the population burden factor, is the percentage of a society's non-productive and productive population over a given period of time, According to this, two dependency ratios were divided, and the sum of the two was the total social dependency burden.

Child dependency ratio = population aged 0-14 / population aged 15-65 *100%

Elderly dependency ratio = number of people aged 65 and above/number of people

aged 15-65 *100%

Among them, population dependency ratio can well describe the burden degree of young and middle-aged groups in the society, that is, to distinguish the difference of social pressure caused by the two parts of the population, and reflect whether they enjoy or have enjoyed the "demographic dividend". In real life, the stable growth of social economy is driven by the resource element of productive population. They use their diligence and wisdom to continuously deliver value to society, so this index can effectively observe and quantify the interaction between aging and the economy.

Demographic transition theory

The theory mainly focuses on exploring the major transformation of population reproduction model when the social and economic level has gone through the process of development from low to high. The completion of the stage of western industrial revolution means that the public's cultural perception and even different areas of society have undergone a huge transformation baptism, and the transformation of economic growth has also obtained sufficient power source. Therefore, in terms of demographic structure transformation, many European scholars have put forward their own theoretical studies, and their views on this dynamic transformation mode can be roughly divided into three categories, namely 3-stage theory, 4-stage theory and 5-stage theory.

Theory of economic growth

To the national economy growth dynamics research to explore the major issues, has been the core of the economics profession work, and it took nearly 250 years of history, a rich layers, a mature system of theories of economic growth have basically formed, and as an indispensable in the field of contemporary economics branch is continue to deepen. According to the time sequence of the development of this theory, the relevant representative theories of classical and modern stages are expounded here, which are regarded as the theoretical foundation of the whole paper.

The transmission mechanism of population aging on economic development

At present, China's production of labor population base is still huge, can be a long-term health of social economy.But we cannot relax our vigilance in the face of a new demographic transition.In the future, the trend of rapid aging of society is likely to affect social and economic development through the following three transmission pathways exhibition, the effect may be an opportunity, may also be a challenge, based on this we should treat rationally, scientific response.

Population aging development status, characteristics and trend analysis

Population aging development status

With the development of economy, China's social population shows different characteristics in different periods, both in terms of absolute number and structure. Before

the founding of The People's Republic of China, the level of productive forces and medical technology in China lagged far behind the developed countries, and people did not establish the scientific conception of fertility, which showed the characteristics of the traditional population transition mode with low natural growth rate. After the founding, our level of productivity development, improved the national economy, science and technology strength, the social security mechanism construction started on the right track, unnatural death phenomenon is effectively reduced, but the birth consciousness change relatively has a certain lag, thus a significant reduction in the birth rate has not occurred, the population growth is a stage increased, Specifically, at the beginning of the People's Republic of China, the total population increased by 340 million people, or 2%, compared with 1972. Since then, the deepening of reform and opening up has injected fresh vitality into the sustained and steady development of the national economy, and the health and medical security has been gradually implemented. In addition, the impact of birth restrictions has significantly increased the average age of the society, and birth and mortality rates have been effectively controlled. It can be seen from Figure 2 that in the early 1990s, the trend of birth rate changed from a small fluctuation at the initial stage to a continuous large downward trend, even to a low of less than 12%. The death rate remained stable between 6.4% and 7.16%, which led to the formation of a modern demographic transition pattern characterized by "three lows". At present, the aging rate of society has obviously exceeded the expansion rate of population scale, which makes China's "three low" type of population structure society is about to face an unprecedented challenge.

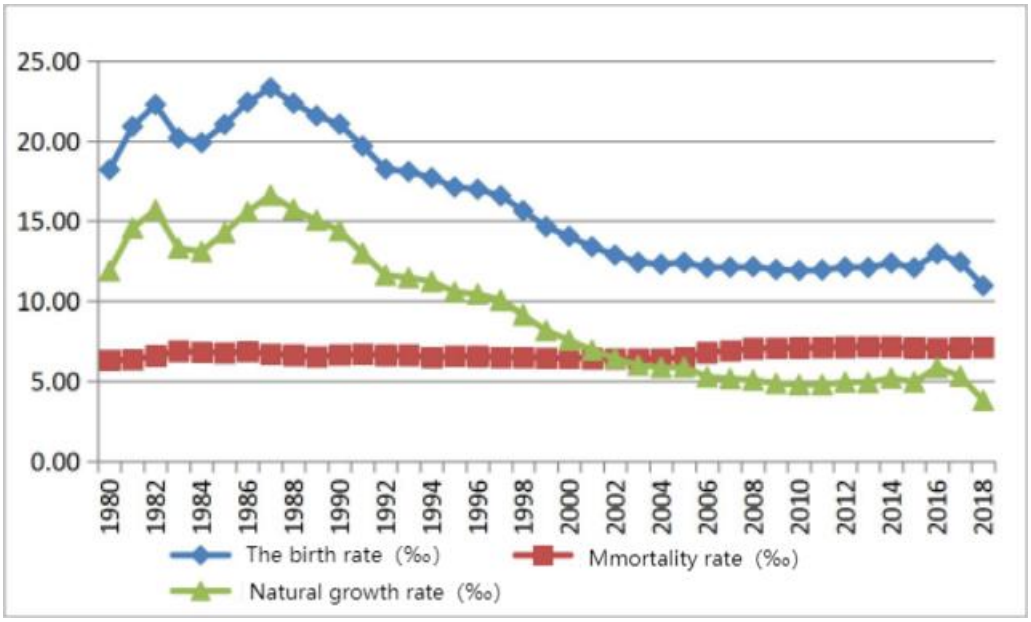

Figure 2 National birth rate, death rate and natural growth rate from 1980 to 2018

As can be seen from Table 1 and 2, as early as the middle of the last century, China was in a standard young-oriented society, where the elderly accounted for only 4.41% of the population and the ratio of the old to the young was 12.13% (less than the cut-off of 15%). Such demographic structure provided abundant and strong impetus for the rapid economic and social progress. After more than ten years, the demographic dividend effect began to weaken, and the size of children's population declined for the first time and continuously in the fourth census. In 2006, the coefficient of children's population fell below 20%, and now it is far below the demarcation line of 30%. Since 1964, the coefficient of elderly population, the median age and the old-age dependency ratio have continued to rise. The size of the productive workforce has also expanded steadily, and the ratio of young to old has increased dramatically, from 30.4 percent at the beginning of the century to 54.43 percent at the time of the next census in just a decade. Therefore, through the comprehensive measurement of these indicators, it can be fully proved that China has begun to deepen the aging process since 2000.

indicators	proportion (%) 0 to 14 people	60 year old upward	65 year old upward	Young and old than (%)	Median age year old
light	≥40	≤5	≤4	≤15	≤20
adult	30-40	5-10	4-7	15-30	20-30
The elderly	≤30	≥10	≥7	≥30	≥30

Table 1 Classification criteria of population structure

year	Total population	Age group 0 – 14 years population	(%)	15 – 64 years population	(%)	65 years population	(%)	Median age years old	Young old (%)	Total dependency ratio (%)	Child rearing ratio (%)	Old-age ratio (%)
1953	58260	21148	36.3	34548	59.3	2569	4.41	22.7	12.12	68.6	61.2	7.4
1964	69458	28262	40.69	38773	55.75	2473	3.56	20.2	8.85	79.4	72.9	6.5
1982	101654	34146	33.59	62517	61.5	4991	4.91	22.9	14.62	62.6	54.6	8.0
1990	114333	31659	27.69	76306	66.74	6368	5.57	25.3	20.11	49.8	41.5	8.3
2000	126743	29012	22.89	88910	70.15	8821	7.0	30.8	30.40	42.6	32.6	9.9
2010	134091	22259	16.6	99938	74.53	11894	8.87	35.2	53.43	34.2	22.3	11.9
2018	139538	24860	17.80	98020	70.25	16658	11.9	-	67.01	42.36	25.36	16.99

Table 2 The general changes of China's population age structure

Combined with Figure 3 and Figure 4, it can be intuitively found that China's overall population base is still growing at a low speed, and the non-productive population size of

children and elderly groups has been on the rise since 2011. In 2018, the figures increased to 248.6 million and 166.58 million, respectively. In particular, as the proportion of the elderly continues to rise sharply, the share of the labor force has been gradually compressed, falling to 70.25% in 2018, about 2.55 percentage points lower than in 2008. From this, we can clearly understand that the dividend era with quantitative labor force as economic booster is getting farther and farther away. At the present stage, it is urgent to think about how to make the dynamic factors relied on for national economic development smoothly change to the qualitative population factors.

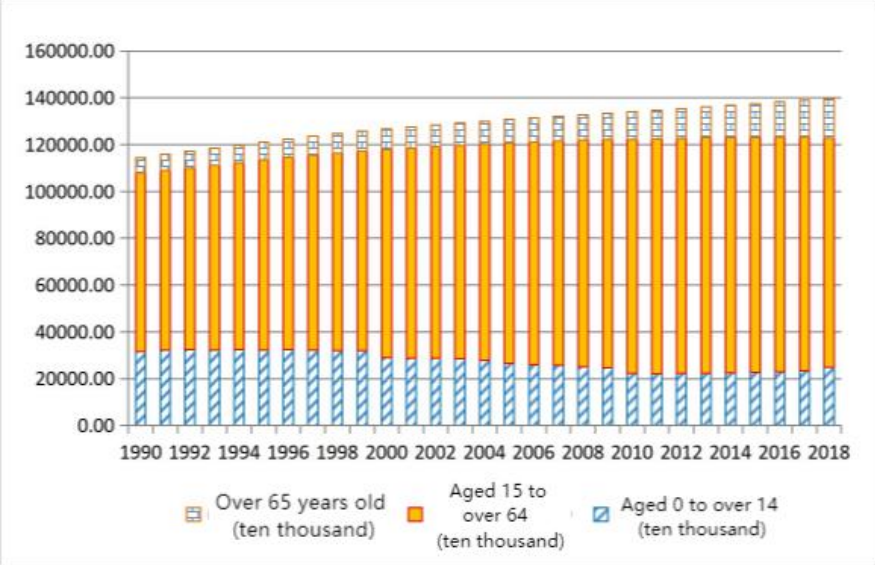

Figure 3 National population size by age group, 1990-2018

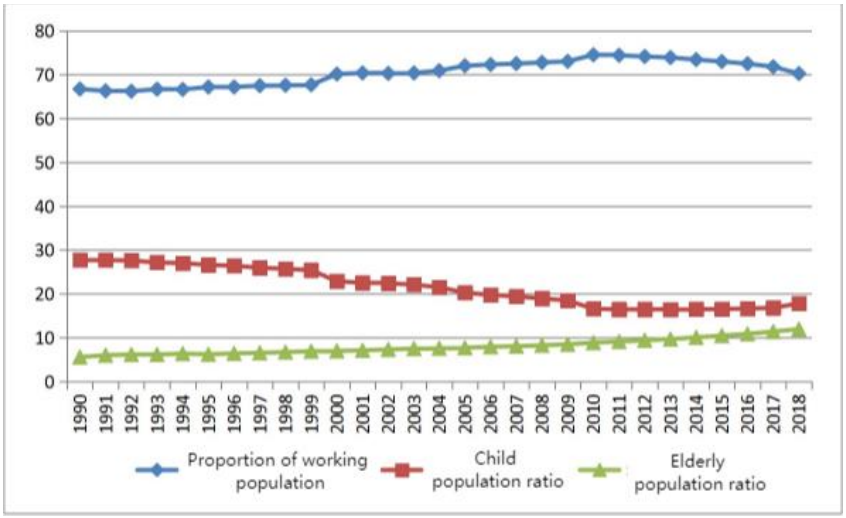

Figure 4 Proportion of Working population, children population and elderly population in China from 1990 to 2018

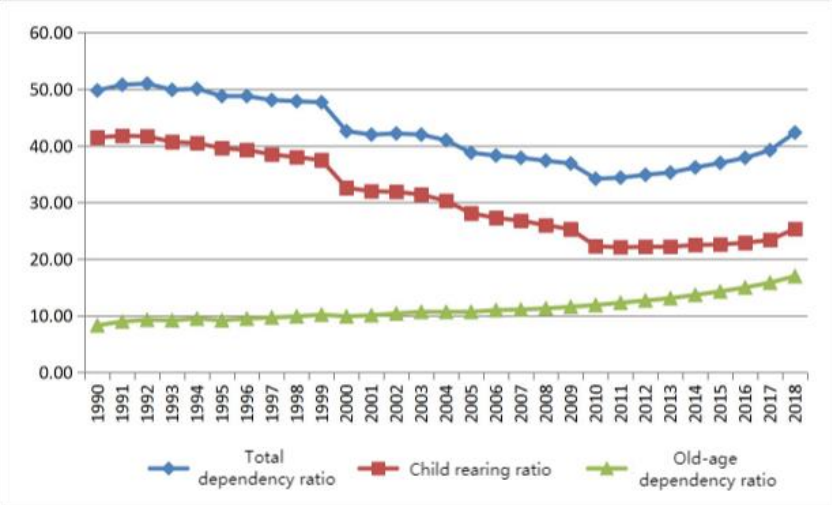

Figure 5 Total dependency ratio, child dependency ratio and elderly dependency ratio in China from 1990 to 2017

As can be clearly seen in Figure 5, since 1982, along with the overall decline of the total dependency ratio and the child dependency ratio, the old-age dependency ratio has rapidly climbed from 8% at the beginning to 16.99% in 2018, indicating that the aging speed of society has obviously been far ahead of the speed of economic development. In fact, from the perspective of the social burden imposed by the population aged 0-14 on the working group, children generally have inherent growth, which means that they have the possibility of creating value in the future, which is actually a disguised investment of the working population in the future. On the other hand, the burden imposed by the elderly is an investment, not an investment. In the long run, the rapid rise of the old-age dependency ratio will make the pressure on the productive population more and more heavy, and eventually reverse effect on economic development through many ways.

The characteristics of aging population in China

Large base and fast growth, According to the official statistics of the State, the size of the elderly group aged 65 and above in China has increased by 108.46 million in absolute value in the 30 years from 1982 to 2017, and the coefficient of the elderly population has increased to 11.4%. Seven years ago, the size of the elderly group was 200 million, and now it is about to break the number of 250 million. This is in fact inseparable from the identity of China's large population.

From the relevant population forecast data released by the United Nations in 2015, we can more intuitively understand that the absolute scale of people over 80 years old in China will climb to 120,687 million in the middle of this century with an average annual growth rate of 5.05% from 2017, which is more than 8 times that of the early 20th century. Their share of the elderly population will double from the current 18.2%, and average life

expectancy will rise to 85 years.

Not rich first old, from the perspective of amount, they have accumulated sufficient capital wealth and there is no significant difference between them. With the improvement of various security systems and facilities for the elderly, they can more calmly face the negative impact brought by the imbalance of population structure in the future. But now, there is a huge gap between the aging degree of China's population and the actual economic level, which means that there may be a bigger social crisis hidden in the new demographic situation in the future.

Imbalance of regional aging, China has a vast territory, and each region under its jurisdiction has its own geomorphological characteristics, natural conditions, cultural environment and even economic development level. Therefore, a careful observation of the population age structure of each region will find the existence of imbalance characteristics.

Development trend of Aging population in China

Some people may believe that the implementation of the universal two-child policy and the gradual relaxation of the family planning policy in the future can reverse the imbalance of population structure and resolve various social conflicts accordingly. However, as long as we think scientifically, it is not difficult to find that such population regulation at the level of policy measures cannot fundamentally change the current situation of population aging, and can only play a limited slowing down and inhibiting effect. Therefore, it is necessary to explore the general trend of China's population structure in the future based on the background that the current population policy is undergoing tremendous changes.

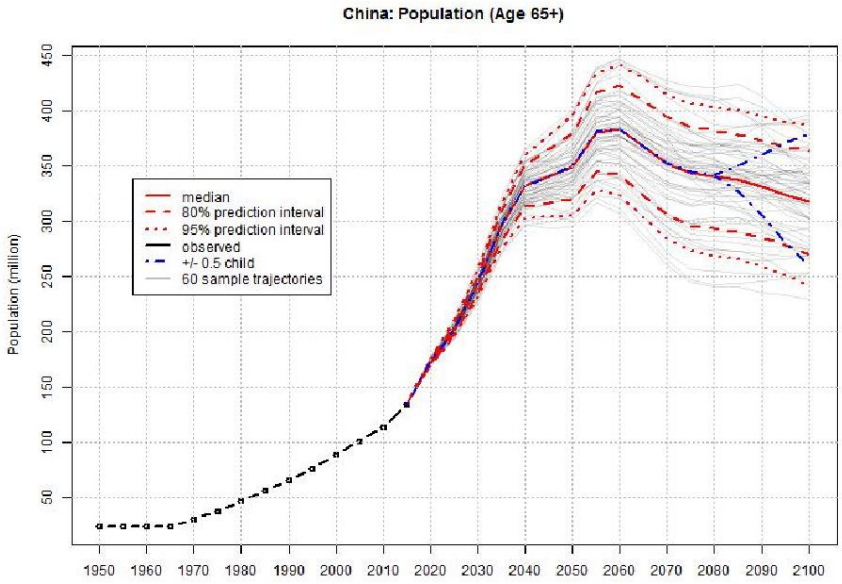

Figure 6 UN forecast of Population over 65 years old in China from 1950 to 2100

An empirical analysis of the impact of population aging on economic development

theoretical model and measurement model setting

The solo growth model regards the labor force and the total population as the same variables and does not distinguish them. Therefore, we distinguish them here, take the aging factors in the population into account, and build a new production function including human capital h on this growth model to explore the economic effects brought by the aging development of population structure.

Variable selection and data statistical description

variable selection, this paper explores this topic from the perspective of population age structure, so the variables are as follows: the actual per capita GDP of each province (taking 2000 as the base period) is the explained variable; The key explanatory variable for measuring aging is pop, which can be divided into the following two parts: the dependency ratio of the elderly U / (1-u-c), expressed by dependent; The proportion of productive population in the total population (1-u-c), expressed in Wfr. The human capital stock h adopts the method of years of education, which is calculated according to the algorithm of Chen Zhao et al; The savings rate is measured by the GDP of each province minus the total final consumption under the expenditure method, and then compared with the GDP under the expenditure method to measure the savings rate s; In order to obtain better data, after summing up the employed population of the three major industries in each province, the labor participation rate LP is defined by the ratio of the obtained value to the scale of productive population; Popr is the sum of natural growth rate and capital depreciation rate (n)+ δ), By reading the existing literature, δ It is usually taken as 5% - 7%, so it is assumed to be 10% here; The amount of invention patent authorization in each province is used to measure the CPAT of technological innovation ability.

Data sources and descriptive statistics, the panel data of 31 provinces and cities in China from 2000 to 2016 used here are obtained through the search and calculation of China Statistical Yearbook, China Demographic Yearbook and statistical yearbooks of provinces and cities over the years. In addition, in order to ensure the integrity of the data used and the feasibility of the research method, the interpolation method is used to supplement a few missing data. A detailed description of the data used is shown in table 3.

variable	number	mean value	standard deviation	Maximum	minimum value
pcgdp	527	21217.28	15904.89	2759	91894.72
depend	527	0.1209497	0.0265049	0.0614525	0.2188
wfr	527	0.7277246	0.0379508	0.6346009	0.8384523
lp	527	0.7487693	0.1279902	0.4927765	1.306294
s	527	0.4753265	0.0920104	0.0891057	0.6605381
popr	527	0.1055668	0.003032	0.0981	0.1131
h	527	8.262025	1.230147	2.514623	13.57763
cpat	527	2608.499	5569.941	1	40952

Table 3 descriptive statistics of panel data

Empirical results and analysis based on static panel and dynamic panel

Because the sample data belongs to short panel data, the regression estimation analysis is carried out through two different panel models: static and dynamic. Firstly, based on the stability of the data, we establish a static panel model, and use OLS mixed method, fixed effect method and random effect method for regression. Then use Ftest to test whether a mixed model or a fixed effect model should be established, that is, Ho: establish a mixed model; Then Hausman test is used to identify whether there is a constraint relationship between regression coefficients, that is, Ho: individual effect α I is independent of the explanatory variable xit (random effect).

Sensitivity test

Because the current capital depreciation rate δ There is no consistent provision on the value of, and the value of 10% used above is not rigorous enough, which may make the overall estimation of the model inaccurate. Therefore, in case of this situation, two relatively extreme values are taken: 5% and 15%, and the analysis and test are carried out again in combination with the static and dynamic panel models.

Policy suggestion

Accelerate the pace of economic development and change the mode of economic development

From the historical experience of the whole international community, the economic level of a country is the key to alleviate the problem of aging. Low economic and social conditions always coexist with high unemployment. A large number of unemployed groups will occupy a large number of social welfare and resources, which will squeeze pension resources accordingly. Although China's current economic aggregate is considerable, the per capita level is still among the developing countries. At this time, the imbalance of

population structure accelerates, so it is urgent to deal with it in combination with the current economic development.

Further adjust the fertility policy

In order to cope with the unreasonable population pattern and enrich the labor market, although the family two-child fertility policy has been fully implemented, the birth rate in many areas has not achieved the expected effect of policy formulation. In fact, there are many other support measures that can be tried, such as social security, housing and the construction of medical and health care system for women and infants; Or in the long run, we can directly subsidize or deduct part of the expenditure on family childbirth and support according to different facts, and implement measures to benefit the people such as women's flexible maternity leave; Or by observing the dynamic changes of the birth rate in real time, we can scientifically evaluate the implementation effect of the two-child policy and make adjustments in time. In the future, our fertility policy needs to transition to the direction of comprehensively relaxing fertility restrictions, in order to realize the internal optimization and balanced development of population structure.

Boost the high-quality development of emerging aging industries

The accelerated development of population aging brings us not only pure negative effects, but also dialectical thinking. Under this normal phenomenon, the demand and consumption of the elderly group are also growing rapidly. It is the emergence of such a growing consumer group that is more likely to give birth to the prosperity of some emerging industries.

Increase investment in human capital and develop elderly talent resources

The most obvious disadvantage of the aging problem is that the aging labor force needs to support more and more social needs. In order to solve this problem, on the one hand, starting from the quality of the existing labor force, that is, under the current situation that the total amount is difficult to improve, improve its unit efficiency; On the other hand, it is to reuse the productivity of the elderly population in order to increase the total supply of labor in a disguised form.

Improve the old-age security service system

On the one hand, capital guarantee can be regarded as the endogenous driving force to effectively improve the elderly care service supply system. In fact, in recent years, it has been found that the expenditure gap of pension funds in many regions has expanded, indicating that the operation sustainability of the current pension security mechanism is facing challenges. From the perspective of improving the source of financing, it is urgent to change the current situation of the distribution of pension payment proportion dominated

by the government, and study and establish a scientific and reasonable payment and contribution mechanism, such as dividing the level according to the individual payment amount, and the pension at the high level should be distributed to the high payers; At the same time, in order to further expand the source of the social security fund, we can consider determining the state-owned share capital allocated to the security fund as preferred shares, and study and estimate the corresponding plan for the realization of equity value according to the capital gap in different regions; Moreover, the actual coverage of the existing basic old-age insurance system is still missing. Many vulnerable people who are unable to bear the payment pressure or feel the payment pressure is too high have not been guaranteed. Therefore, it is necessary to improve the defects in the top-level system planning, strengthen the construction of supporting management service projects, continue to do a good job in fund transfer and succession, and further strengthen the publicity of old-age insurance, In particular, it is necessary to pay attention to the changes in the insurance participation rate of difficult areas and poor people, reduce the proportion of individual contributions of these vulnerable groups, implement differentiated financial assistance policies compared with rich areas, and consider how to innovate and improve the pension financing mode and transfer payment mechanism, so as to strive to achieve real guarantee fairness; From the perspective of fund operation and management, in view of the limitations of the current fund investment and operation channels, we urgently need to break the traditional inherent mode of investment management, expand the investment scope and market-oriented model of pension funds on the premise of standardized market operation and controllable capital risk, and make the capital operation more efficient and ensure the maintenance and appreciation of the fund through a prudent and compliant operation mechanism. In addition, we should continue to improve the two support pillar systems of domestic enterprise annuity and commercial savings insurance, especially improve citizens' attention to the latter, actively encourage commercial insurance institutions to enter in an orderly manner and provide policy support, and design travel alienated pension insurance products according to the different risk-taking abilities of the elderly, so as to make the three pillar systems closely cooperate with each other and allow the government to leave more space, Optimize and adjust the first pillar system and promote the formation of a multi-level old-age security system that covers different subjects such as employers, individuals and families in addition to the government.

Conclusion

"An aging China", some foreign media called it. Since the founding of the people's Republic of China, China's population aging has become the norm of modern society, with significant characteristics of bottom aging. In the near future, it will experience three consecutive peaks of elderly population growth, and the social support level will also rise to the highest value of this century, which will undoubtedly have a serious impact on the long-

term balanced development of China's population and the coordinated and sustainable development of economy and society. At present, the cancellation of the one-child policy, the liberalization of the two-child policy and other changes in population control policies have not brought China a fertility climax, but continue to wander in the fertility trough. If China's economy is not prepared for the general trend of aging, it will not have a profound impact on the people's livelihood in every field of economic development, although it will not have a profound impact on the overall situation, Hinder the long-term stability and prosperity of economy and society.

References

Bao Yuxiang. (2012).Analysis of regional economic effects of population aging: Based on neocl assical economic growth Model [J]. *Population and Economy*, (01):1-7.

Bond A S. (1991).Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations[J]. *The Review of Economic Studies*, 58(2):277-297.

Cao Yu, Chen Xiaohong, Ma Yueru. (2010).Urbanization, Urbanrural income gap and Economic Growth: *Based on provincial level in China Statistical research*, 27(03):29-36.

Chang Z Z. (2018). The Economic Impact of Population aging - Research and Reflection on Literature [J]. *Finance researchLin*, 29 (02): 11-22.

Chao X J, SHEN K R. (2014).Urbanrural income gap, labor quality and China's economic growth. *Economic research Investigate*, 49 (6): 30-43.

Chen Zhao, Lu Ming, Jin Yu. (2004).Regional disparities in human capital and education devel opment in China: An estimation of panel data[J]. *Journal of World Economy*, (12):25-31.

Chiswick B R. (1971). Earnings Inequality and Economic Development[J]. The *Quarterly Journal of Economics*, 85(1):21-39.

Feyer J. (2007). Demographics and Productivity[J]. *The Review of Economics and Statistics*, 89(1):100-109.

Fougere M, Harvey S, Mercenier J, et al. (2009).Population Ageing, Time Allocationand human capital: A general equilibrium analysis for Canada[J]. *Economic Modelling*, 26(1):30-39.

Fougere M. (2002).Population ageing and Economic Growth in SevenOECD countries[J]. *Economic Modelling*, 16(3):411-427.

Guo Jianhua. (2011). Analysis on the impact of population aging on labor Market [J]. *Theory Monthly*, (04):81-83.

Guo Xibao, Li Tongping, Yuan Bei. (2013).The impact of population aging on Chinese econom y and its Countermeasures [J]. *Economic Theory and Economic Management*, (02): 43-50.

Mason A, Lee R. (2006).Reform and support systems for the elderly in developingcountries: capturing the second demographic dividend[J]. *Genus*, 62(2):11-35.

Ladd H F, Murray S E. (2001).Intergenerational conflict reconsidered: countydemographic stru cture and the demand for public education[J]. *Economics ofEducation Review*, 20(4):34 3-357.

Li Wenxing, XU Changsheng, AI Chunrong. (2008).Population age structure and houseold cons umption in China :1989 -- 2004[J]. *Economy Research*, (7): 118-129.

Li Zhihong. (2013).Analysis of positive effects of population aging on China's economic and so cial development [J]. *Scientific Research on AgingLin*, 1 (07): 3-12.

Li Zhihong. (2014).Analysis of the Negative "Metaeffect" of population aging on China's Econo mic and Social Development [J]. *aging Science research*, 2(11):3-13.

Li Zhihong. (2014).Analysis of the Negative "Metaeffect" of population aging on China's Econo mic and social Development [J]. *aging Science research*, 2(10):3-10.

Li Zhihong. (2015).General Report of National Strategy for Coping with population aging [J]. *Scientific Research on AgingLin*, 2015, 3 (3): 4-38.

Liu Q Z, He Q. (2013).Population aging, economic growth and fiscal policy [J]. *Economics seas on Journal*, 12 (01): 119-134.

Liu Shenglong, GUO Weilong. (2013).Population aging and Economic Growth: Based on OECD and BRICS transnational. *perspectives Research on aging*, 1(07):13-23.

Liu Xiaoyong. (2013).An inverted Ushaped relationship between aging and provincial economi c growth [J]. *China population, Resources and Environment*, 23 (5): 98-105.

Martin GonzeglezEiras, Dirk Niepelt. (2012).Classification with Support of Council of Remote S ensing and growth[J]. *European Economic Review*, 56(1):0-115.

Meng Lingguo, WANG Qing. (2013).Lewis Turning Point, second Demographic Dividend and sus tainable Economic Growth [J]. *Economic Theory on Economic Management*, (06):44-53.

Miller R A. (1996).The aging immune system: primer and prospectus[J]. *Science*, 273 (5271): 70-74.

Mr. CAI. (2010).Demographic transition, demographic dividend and lewis turning point [J]. *Economic research journal*, 45(04):4-13.

Peng X J, Dietrich Fausten. (2006).Low fertility rate, aging population and labor supply. *China's labor Economics*, 3 (4): 43-63.

Poterba J M. (1997).Demographic structure and the political economy of publiceducation[J]. *Journal of Policy Analysis & Management*, 16(1):48-66.

Qian Xiaoye, Chi Wei, Li Bo. (2010).The Impact of Human Capital on Regional innovation and Economic Growth in China: Based on spaceJournal of quantitative and technical. *economics*, 27(04):107-121.

Rubinfeld D L. (1977).Voting in a Local School Election: A Micro Analysis[J]. *The Review of Economics and Statistics*, 59(1):30-42.

Senesi R. (2003).Population dynamics and lifecycle consumption[J]. *Journal of Population*, 12(72):685-696.

Tang J, Macleod C. (2006).Labour Force Aging and Productivity Performance inCananda[J]. Canadian. *Journal of Economics*, 39(2):582-603.

Tang X, Ren Z J. (2018)."Shortage of migrant workers" and China's "Lewis inflection Point" problem.] *Journal of Northwest A&F University (social science edition)*, 18(02):101-107.

Tong Yufen. (2014).The characteristics and Challenges of China's labor supply in the process of population aging [J]. *Population Research*, 38 (02): 52-60.

Wang Shaoping, Ouyang Zhigang. (2007).The Measurement of Urbanrural income gap in China and its Effect on Economic Growth [J]. *Economy Research, and* (10): 44-55.

Wang Yupeng. (2011).Research on the Impact of Population aging on The Consumption Behavior of Urban Residents in China [J]. *Chinese Population Science*, (01): 64-73.

Winegarden C R. (1979).Schooling and Income Distribution: Evidence fromInternational Data[J]. *Economica*, 46(181):83-87.

Wu Cangping, XIE Nan. (2011).Theoretical Thinking on Population aging in China [J]. *Beijing Social Science Science*, (01): 4 to 8.

Wu Cangping. Social Gerontology. (2011).Beijing: China Renmin University Press,1999,77-180.[52] Li, J., Li, J., Et al. The study of population aging strategy in China [J]. *Economic Research Reference*, (34):2-23.

Yan Kun. (2000).*Research on China's Oldage Security System [M].* Beijing: China Social Sciences Press, :47-53.

Yang Xue, Hou Li. (2011).Study on the Macro and micro Impacts of Population aging on Economy and Society in China [J]. *Demography Publication*, (04): 46-53.

Yu Xuejun. (1995).The Impact of Aging population on Economic Development in China: Is it positive? Or negative? [J]. *Journal of population researchInvestigate*, (04) : 1-6.

Zhang Tongbin. (2016).From quantitative "demographic dividend" to qualitative "human capital dividend" -- *Also on China's economic growth Economic Science*, (05):5-7.

Zheng Wei, Lin Shanjun, Chen Kai. (2014).A study on the relationship between population aging and economic growth in China [J].*Journal of Quantitative and Technical Economics*, (08):20-38.

Zhong S Y, Zhao Y, REN J R. (2016).Research on the substitution effect of "education dividend" on "demographic dividend". *The population of China Science*, (02): 26-34.

Zou Zhizhuang. (1995).Capital Formation and economic growth in China [J]. *Journal of Quantitative and Technical Economics*, (03): 35-43.