

Pre-evaluation of Delayed Retirement Policy in Shandong Province Based on Pension Accumulation Gap Model

Xiaoyun Xu, Yuetong Li, Boyang Mao, Ziyang Huang

College of Statistics and Data Science, Qufu Normal University, Jining, Shandong, 273165, China

Abstract: *With the improvement of living standards and medical care, the average life expectancy in China has increased significantly, which will lead to a serious aging of the population. In order to deal with the problem of aging population in Shandong Province, this paper formulates effective and feasible solutions from the perspective of delayed retirement policy and pension insurance. This paper evaluates the feasibility of a delayed retirement system and analyzes the positive impact if the retirement policy is implemented. Combining with the characteristics of endowment and endowment insurance, the paper puts forward corresponding countermeasures for the healthy and stable development of China's endowment system.*

Keywords: *Aging, delayed retirement, pensions, countermeasures*

1. Introduction

According to the United Nations' aging criteria, when a country's population over the age of 60 accounts for more than 10% of the total population or more than 7% of the population over the age of 65, it means that it has entered a mildly aging society. If the population over 60 years old accounts for more than 20% of the total population or the population over 65 years old accounts for more than 14% of the total population, it means that we have entered a moderately aging society. If the proportion of the population over 60 years old exceeds 30 percent of the total population, or the proportion of the population over 65 years old exceeds 21 percent, it means that the society has entered a seriously aging society. According to the seventh census data in 2021, the population over 60 years old accounted for 18.7%, and the population over 65 years old accounted for 13.5%, which has increased significantly compared with the sixth census data in 2010, which was 13.31% and 8.91%.

The intensification of population aging will directly lead to the reduction of labor supply and thus affect economic growth, while the increase of the elderly population will affect the existing consumption structure and social innovation ability. The increase of the elderly population will make the government's public financial expenditure heavily inclined to social security. At the same time, the change of family structure and scale and the increase of dependency ratio brought about by the aging population will weaken the function of family pension and lead to the intensification of intergenerational contradictions among families.

2. Analyze

2.1. Age structure of population in our country

To make the conclusions more realistic and valid, we collected data on birth and death rates, average life expectancy, population age structure and dependency ratio from the China Statistical Yearbook 2015-2019. In addition, the average life expectancy and delayed retirement policies in foreign countries provide thinking for the research direction of the model.

China's birth rate and death rate in recent 5 years [1], as shown in Table 1:

Table 1: Birth and death rates

Index (time)	2014	2015	2016	2017	2018	2019
Birth rate (‰)	12.37	12.07	12.95	12.43	10.94	10.48
Mortality rate (‰)	7.16	7.11	7.09	7.11	7.13	7.14
Natural rate of population growth (‰)	5.21	4.96	5.86	5.32	3.81	3.34

In the past five years, China's population mortality rate has stabilized at 7.10 per thousand, and the birth rate reached the highest in 2016, but the overall downward trend of natural population growth will gradually exacerbate the degree of population aging.

The age structure and dependency ratio of China's population in recent 5 years are shown in Table 2, in which,

$$\text{Old - age dependency ratio} = \frac{\text{Population aged 65 and above}}{\text{The number of people aged 15 to 64}} \quad (1)$$

$$\text{Child dependency ratio} = \frac{\text{Population under the age of 15}}{\text{The number of people aged 15 to 64}} \quad (2)$$

Table 2: Population age structure and dependency ratio

Index/time	2014	2015	2016	2017	2018	2019
Total population at year end (10,000)	136782	137462	138271	139008	139538	140005
Population 0-14 years old (10,000)	22558	22715	23008	23348	23523	23492
Population aged 15-64 (10,000)	100469	100361	100260	99829	99357	98910
Population aged 65 and above (10,000)	13755	14486	15003	15831	16658	17603
Total dependency ratio (%)	36.2	37	37.9	39.2	40.4	41.5
Child dependency ratio (%)	22.5	22.6	22.9	23.4	23.7	23.8
Old-age dependency ratio (%)	13.7	14.3	15	15.9	16.8	17.8

From Table 2, we can see that in the past 5 years, with the continuous increase of the total population in China, the children's dependency ratio increased by 1.2 percentage points, and the elderly dependency ratio increased by 3.1 percentage points, which is 2.5 times of the children's dependency ratio, which further confirms that China is accelerating into an aging society, which also makes the young generation's dependency pressure become more and more great.

China's average life expectancy of nearly 20 years [2], as shown in Table 3:

Table 3: Life expectancy

year	total	men	women
2000	71.40	69.63	72.27
2005	72.95	70.83	75.25
2010	74.83	72.38	77.37
2015	76.34	73.64	79.43
2020	77.90	73.64	79.84
2025	79.61	75.28	82.63

Using the stata software, the average life expectancy for 2000-2015 is shown in Table 3. A one-dimensional linear regression model was established, as shown in Figure 1:

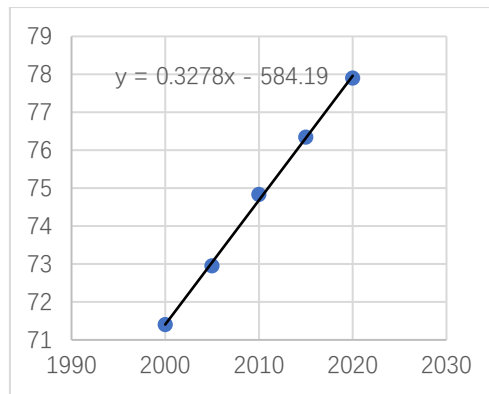


Figure 1: Regression analysis of average life expectancy

From the analysis of Figure 1, it can be seen that the average life expectancy of China in 2025 is expected to reach 79.61 years old, which is 8 years longer than that of 2000, which lays a population guarantee for the adjustment of China's population structure and the delay of retirement.

According to Table 4, the United States has the lowest life expectancy, and the retirement age for both men and women is 65 years old. The average life expectancy in China is expected to reach 79.61 years in 2025, while the retirement age for men is 60 years, for female cadres 55 years and for female workers 50 years. Considering the aging situation of our country, it is advisable to adjust the retirement age of men to 65 years old, and the retirement age of women to 60 years old.

Table 4: Life expectancy and retirement age in foreign countries

country	Average life expectancy			Retirement age	
	total	male	female	male	female
Japan	82.6	79	86.1	68	60
Australia	81.2	78.9	83.6	65	63.5
Canada	80.7	78.3	82.9	60	60
France	80.7	77.1	84.1	59.5	59.4
Britain	80.5	78.1	82.1	65	60
Germany	79.4	76.5	82.1	65	65
America	78.2	75.6	80.8	65	65

2.2. Feasibility of delaying retirement policies

Given the changes in national conditions, we cannot help thinking whether the existing statutory retirement age is still reasonable.

Under the current retirement policy, China defines the population of 0-14 years old as children, the population of 65 years old and above is defined as the elderly, and the population of 15-64 years old is defined as the working population, and the dependency ratio is calculated based on this definition. With the extension of life expectancy, the oldest age of the actual laborer in our country should also be raised. Therefore, the implementation of the retirement delay policy can achieve the purpose of optimizing the population structure.

Drawing on the experience of delayed retirement abroad, the retirement age of men is adjusted to 65 years old, the retirement age of women is adjusted to 60 years old, the population below 15 years old is defined as children, and the population above 70 years old is defined as the elderly, and the population structure and dependency ratio in the past five years are obtained, as shown in Table 5:

As can be seen from the above table, if the retirement is delayed for 5 years, the old-age dependency ratio can be greatly reduced, which can not only reduce the support pressure of the young generation, but also reduce the pressure of pension payment. Now EXCEL is used to conduct a single linear regression analysis of the changing trend of the old-age dependency ratio, and the results are shown in Figure 2.

Table 5: Adjusted age structure and dependency ratio of the population

Index/time	2014	2015	2016	2017	2018	2019
Total population at year end (10,000)	136782	137462	138271	139008	139538	140005
Population 0-14 years old (10,000)	22558	22715	23008	23348	23523	23492
Population aged 15-64 (10,000)	100469	100361	100260	99829	99357	98910
Population aged 65 and above (10,000)	13755	14486	15003	15831	16658	17603
Population aged 70 and above (10,000)	8681	8916	9214	9578	9975	10541
Total dependency ratio (%)	29.6	29.9	30.4	31.0	31.6	32
Original total dependency ratio (%)	36.2	37	37.9	39.2	40.4	41.5
Child dependency ratio (%)	21.4	21.5	21.7	22.0	22.2	22.2
Original child support ratio (%)	22.5	22.6	22.9	23.4	23.7	23.8
Old-age dependency ratio (%)	8.2	8.4	8.7	9.0	9.4	9.9
Original old-age dependency ratio (%)	13.7	14.3	15	15.9	16.8	17.8

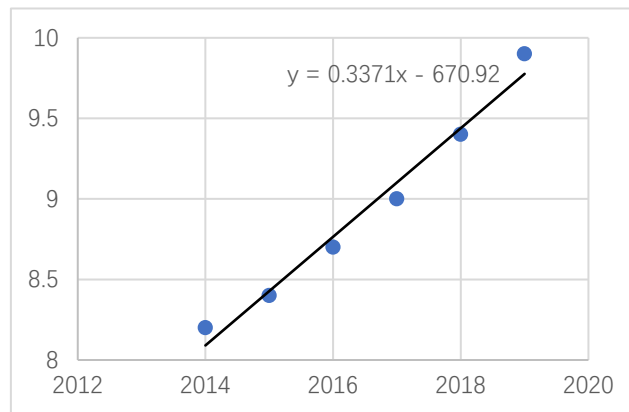


Figure 2: Regression analysis of old-age dependency ratio

With reference to the retirement policy of 60 years old for men and 55 years old for women, the old-age dependency ratio in China in 2019 is 17.8%, and there is no obvious unrest in social development, which is relatively stable, while the consequences of the old-age dependency ratio exceeding 17.8% or higher are unknown. Let's put $y = 17.8$ into the linear regression equation of one variable:

$$y = 0.3371x - 670.92 \tag{3}$$

$x = 2043.07$, If both men and women delay their retirement by five years, the old-age dependency ratio will reach 17.8 percent by 2043.

Delayed retirement is not only reflected in the decline of the old-age dependency ratio, but also in the increase of the labor force population. Under the current retirement policy, China defines 15 to 64 years old as the working population and implements delayed retirement. Age 15-70 is defined as the working population, as shown in Table 6.

With reference to the retirement policy of 60 years old for men and 55 years old for women, China's labor force population in 2019 is 98,910 people, accounting for 70.6%. When we adjust the retirement age, the labor force population in 2019 increases to 105,972 people, accounting for 75.7%. The level of labor force in our country has risen greatly.

Labor is the primary factor of the producer. A region is rich in labor resources, which provides the most basic conditions for the economic growth of the region. Lack of labor resources and lack of manpower necessary to promote regional economic growth will inevitably affect, even delay and hinder

further economic growth [3].

Table 6: Labor force population and proportion

Index/time	2014	2015	2016	2017	2018	2019
Total population at year end (10,000)	136782	137462	138271	139008	139538	140005
Original labor force population (10,000)	100469	100361	100260	99829	99357	98910
Proportion of original labor force (%)	0.734	0.730	0.725	0.718	0.712	0.706
Labor force population after 5 years of delayed retirement (10,000)	105543	105831	106049	106082	106040	105972
Percentage of labor force after 5 years of delayed retirement (%)	0.771	0.770	0.767	0.763	0.760	0.757

Forecast the number of China's labor force population under the delayed retirement policy in 2045, as shown in Figure 3:

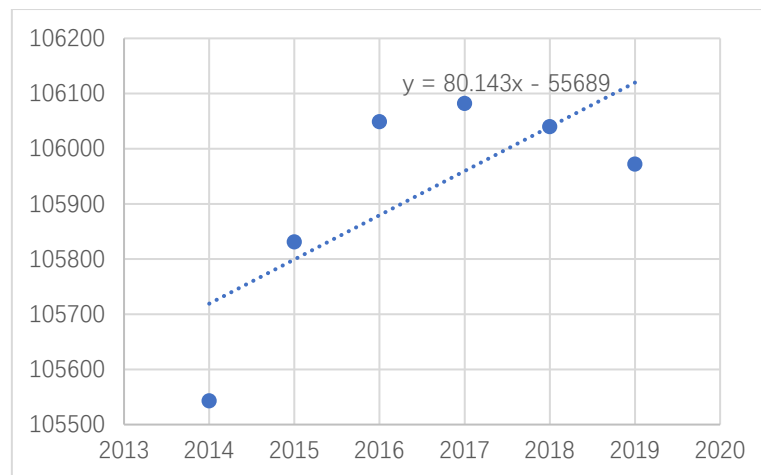


Figure 3: Regression analysis of labor force population trend after the implementation of the delayed retirement policy

$x = 2045$, Into the unary linear regression equation:

$$y = 80.143x - 55689 \tag{4}$$

We get $y = 108203.435$. If both men and women delay retirement by five years, China's labor force population will reach 108,203 by 2043, and the level of productivity will be improved.

3. Effective way

With our country's population aging continuously aggravating and labor force decreasing, the implementation of the policy of postponing retirement is extremely urgent, it is an effective way to solve our present labor force shortage. Referring to the advanced experience of foreign countries and combining with China's national conditions, the implementation of the delayed retirement policy has a positive impact on the labor market, pension contributions and other aspects.

3.1. It is conducive to increasing labor supply and making up the labor gap

With China's aging population intensifying and the implementation of the family planning policy in early years, the birth rate of newborns significantly reduces, which makes our country face the situation of the demographic dividend decreasing and even gradually disappearing, thus making it difficult to make up the gap in the labor market, which is not optimistic for our country, which still needs to maintain economic development [4]. According to the estimates of experts from the Ministry of Human Resources and Social Security, assuming that the current average age of exit from the labor market in China is 54 years old, based on the baseline scenario of maintaining the retirement system unchanged, the average

age of exit from the labor market is 54 years old. On this basis, considering the current policy intention of the state, the method of gradually delaying retirement should be introduced in a timely manner. According to the different intensity of gradually delaying retirement, the retirement age should not be delayed at all. From now on, no retirement cohort can retire only when they reach the age of 65. Every two years, a cohort will withdraw from the labor market, that is, every two years, one year later, until about 2035, the 64-year-old cohort will withdraw from the labor market, and after 2035, as long as the cohort reaches the age of 65, it can retire, and thus generate a gradually delayed retirement plan.

3.2. It is conducive to making up for the empty pension account and promoting the balance of pension payments

According to the current pension insurance system of our country [5], the longer the number of years after general retirement, the more old age insurance gets. However, although the number of the labor force aged 15-64 in our country rises somewhat, the proportion of it is declining continuously, which means that the demographic dividend of our country is gradually decreasing, and the young labor force participating in the labor market will also decrease, so the corresponding number and period of paying pension insurance will also decrease; At the same time, the proportion of the population aged 65 and above in China is increasing, which means that the population needing to receive pension insurance is increasing, and the average life expectancy of our country is constantly extending, which means that the longer the number of years per capita receiving pension insurance, it means that the national pension insurance expenditure continues to increase, and the income continues to decrease. There is bound to be a shortage of people. It can also make the working life of the elderly increase, thus making the number of people who pay pension insurance and the number of years of paying pension insurance also increase, so as to make up for the current situation of empty accounts of pension insurance, increase the income of pension insurance and reduce the expenditure of pension insurance accordingly. We will promote balance between payments for old-age insurance payments.

4. Conclusion

In general, the research on the feasible path of delayed retirement in China is still in an exploratory stage, but on the basis of many researches, many significant institutional ideas and implementation plans are still put forward. Delayed retirement has always been a complex social problem, related to all aspects of people's social life, a new system has its rationality and scientific existence, but at the same time will lead to various problems continue to emerge.

By studying the effects of birth rate and death rate, average life expectancy, population age structure and dependency ratio on delayed retirement in China, the gradual plan of delayed retirement is formulated for the purpose of controlling the old-age dependency ratio.

(1) This paper designs a progressive retirement delay plan with the goal of delaying retirement by 5 years, which is expected to be realized in 20 years. However, 20 years is too long and there are too many uncontrollable factors. Therefore, we can refer to this model and design a short-term retirement goal with a delay of 1 or 2 years to solve the short-term retirement delay plan.

(2) With reference to the regression analysis of the old-age dependency ratio in this paper, the control model of the old-age dependency ratio is established with the goal of stabilizing the old-age dependency ratio, so as to determine the appropriate delayed retirement plan at a reasonable time.

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