

Impact of Delay of Retirement Age on Middle Age Employment Rate

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Abstract: This paper examines the implications of delaying retirement on the labor market in China, focusing on its impact on the employment rates across different age groups. Over the past several decades, demographic shifts, such as the aging population and extended education durations, have necessitated adjustments to retirement policies. These adjustments pose significant questions about the optimal retirement age and the consequent effects on the labor market. Utilizing a combination of theoretical frameworks and empirical data, this study explores the correlation between delayed retirement and employment rates among middle-aged and older workers. The findings suggest a significant and positive correlation between these groups, indicating that a delayed retirement age could enhance employment opportunities for middle-aged individuals without adversely affecting the younger workforce. The study engages with data from the 2020 census in China and employs Ordinary Least Squares (OLS) regression models to analyze the relationship between age groups and employment rates. The results show a nuanced impact of delayed retirement on the labor market, with implications for policy-making. Specifically, the paper addresses the potential benefits of a flexible retirement age policy, considering economic, demographic, and social factors.

Keywords: Delayed retirement, labor market, aging population, China

1. Introduction

Since the implementation of retirement regulations 46 years ago, which stipulated that male workers retire at the age of 60, female managers at the age of 55, and female workers at the age of 50; the Chinese economy and labor market have undergone significant transformations, including the extension of average duration of education and aging population. These transformations aroused the demand for adjustment. Such demand left us -- the economics researcher with two questions to be solved, how to adjust the retirement age and what positive and negative effect it would bring after implementation.

This article will mainly focus on the second question. With the help of theoretical and empirical methods, this paper acknowledged that there is minor correlation between the employment rate of young and old labor force (for both gender). At the same time the correlation between middle age and old labor force is significant and positive. Which indicates that with model, while the retirement age was delayed, the employment rate of the middle age population is expected to increase.

Until 2020, there are 421 core research papers uploaded in China around the topic of retirement age and aging population. [1] Based on existing literatures, the debate upon the retirement age mainly focused on 2 areas, that is, the evidence and consequence of aging population, and the possible solution—prolong of retirement age.

The economic ramifications of China's aging population have been a subject of extensive research, highlighting a complex relationship between demographic shifts and economic dynamics. Jingbo Li and Quanbao Zhang's investigation into this demographic phenomenon uncovers a U-shaped relationship between economic growth and an aging population [2], suggesting that while initial stages of aging may hinder economic performance due to a shrinking workforce, it eventually leads to enhanced technological innovation as a response to the need for greater efficiency. Meng Wang further explores the consequences of this demographic shift, noting a transition towards the tertiary sector, reduced consumption demand—attributed to the elderly's lower spending habits—and proposes extending the retirement age as a potential countermeasure [3]. Meanwhile, Shien Gong and Xingtong Mao's focus on Jiangsu Province's rural areas reveals that an aging population can directly impact local economies by lowering average incomes, illustrating a negative correlation between aging demographics and economic growth [4].

The discourse surrounding the impacts of an aging population in China has gradually shifted towards examining the economic and social outcomes of delaying the retirement age. Kaifen Guo posits that the aging demographic has precipitated a severe financial crisis in China, advocating for measures such as postponing retirement as essential solutions [5]. Reinforcing this perspective, Chuanchuan Zhang and Yaohui Zhao, utilizing data from 1990 and 2000, argue that employing older individuals does not detrimentally affect the job prospects of younger people and may even positively influence average incomes, suggesting that the crowding-out effect is minimal [6]. This view is echoed by Yinan Yang and Yuzhao Xie, whose model spanning over 27 countries concludes that delaying retirement age does not significantly crowd out younger workers [7]. Additionally, scholarly work by Zhang Shibin, Zhang Anqi, and Song Jincheng, as well as Su Chunhong and Li Qiyun [8-9], explores the intricacies of implementing a flexible retirement age policy. They propose a system that allows for either delayed or early retirement centered on a balance between contributions and benefits and taking into account the heterogeneity of the workforce. This body of research collectively underscores the potential economic benefits of a flexible retirement age policy in mitigating the challenges posed by an aging population, suggesting a nuanced approach that considers both the financial sustainability of pension systems and the diverse needs and capabilities of the labor force.

However, the past research has several drawbacks. Firstly, most of research around these topics in China is mainly wrote in Chinese and lacked translation. An English version of research paper upon this topic can help the scholar who want to international comparative research. Secondly, most of the famous work around this topic used the outdated data base. Thus, it is crucial to recheck their conclusion by using the most up to date data base. Thirdly, some of the research focused on the impact of introduction of delaying retirement age in affecting the young labor force employment rate. In other words, they only investigate how the new retirement age will block the new employer from entering the market, however, they did not investigate how it crowd out the existing middle-aged employer. In this paper, this paper are going to use the most accurate and up to date data to see the impact of delaying retirement age on middle-aged employer.

2. Theoretical Research -- Relationship between Delay of Retirement Age and Employment

According to definition, employment elasticity is the capacity of an economy to create job opportunities in relation to its growth and development. Employment elasticity can be expressed by the equation:

$$\lambda(\text{Employment Elasticity}) = \frac{\text{rate of change of Employment}}{\text{rate of change of GDP}} \quad (1)$$

This equation suggests that the economic growth has positive impact on encouraging employment. The rate of change of GDP can be expand as:

$$\text{rate of change of GDP} = \frac{\Delta \text{GDP}}{\text{GDP}(\text{base year})} \quad (2)$$

Thus, if substitute equation 2 into equation 1 and rearrange the equation, this paper will be able to get the equation that express the relationship of economic growth and rate of change of employment

$$\text{rate of change of employment} = \lambda \frac{\Delta \text{GDP}}{\text{GDP}(\text{base year})} \quad (3)$$

Since different industries have different capacity of absorbing labor force, thus different λ , thus the equation above should be rewrite as:

$$\text{rate of change of employment} = \sum_{x=1}^n \lambda_x \frac{\Delta \text{GDP}_x}{\text{GDP}(\text{base year})_x} \quad (4)$$

In this case, λ_x represents the specific employment elasticity for industry x, and $\frac{\Delta \text{GDP}_x}{\text{base year GDP}_x}$ express the extent of industry x contribute to the economic growth.

The rate of change of employment can be expand as:

$$\text{rate of change of employment} = \frac{\Delta L (\text{change of employment})}{L (\text{base year})} \quad (5)$$

By substituting equation 5 into equation 2, it gets the relationship between economic development and employed labor force:

$$\frac{\Delta L}{L (\text{base year})} = \sum_{x=1}^n \lambda_x \frac{\Delta \text{GDP}_x}{\text{GDP}(\text{base year})_x} \quad (6)$$

In this case, since the delay of retirement age is a way of increase in the labor force, which after such delay, more people were brought into the labor market. This paper defined such increase in labor force as $\Delta L'$. Thus, this paper rewrites the equation for this specific case:

$$\frac{\Delta L'}{L (\text{base year})'} = \sum_{x=1}^n \lambda_x \frac{\Delta \text{GDP}_x}{\text{GDP}(\text{base year})_x} \quad (7)$$

To expand $\Delta L'$, this paper assumed the sum of labor force of age of i equals to L_i , thus the participant rate of such age group is γ_i , thus $L_i \gamma_i$ is the sum of employed with the age of i. Thus, the sum of employed labor force of all ages can be represented as $\sum L_i \gamma_i$. Then, this paper defined for people with age of i, they will originally exit the labor market at age of b, and the delay of retirement is m, thus the new exit age is (b+m). Thus, $\Delta L'$ can be expand as:

$$\Delta L' = \sum_{i=a}^{b+m} L_i \gamma_i - \sum_{i=a}^b L_i \gamma_i \quad (8)$$

By substituting equation 8 to 7, this paper gets the model that can explain the relationship between delaying retirement age and employment:

$$\frac{\sum_{i=a}^{b+m} L_i Y_i - \sum_{i=a}^b L_i Y_i}{\sum_{i=a}^b L_i Y_i} = \sum_{x=1}^n \lambda_x \frac{\Delta GDP_x}{GDP(\text{base year})_x} \quad (9)$$

From this equation, it can get two intuitions. Firstly, there is a direct relationship between retirement delay and labor supply. The more delay of retirement age, the more labor supply on the market. However, only knowing the labor supply will increase is not enough to convince the policy maker to make the decision. That's because this paper does not know such increase in labor supply of old labor force will have a substitution effect or complementary effect for young and middle age employment rate. If there's a substitution effect, the increase in retirement age will actually damaging the short-term labor market by decreasing the employment rate of other age group. Thus, to find out that the empirical method.

3. Empirical Method – Substitution or Complementary Effect between Middle and High Age Employment Rate.

3.1. Descriptive Data

This essay is going to use the data based on the seventh census in China on 2020. The data this paper used is based on the general survey, this make the data more accurate, because they are not undergoing any estimation. At the same time, this paper also notices the difference in Chinese retirement age, thus, it is not adequate to introduce a dummy variable into the model, instead this paper going to do regression on men and women respectively due to this specific feature.

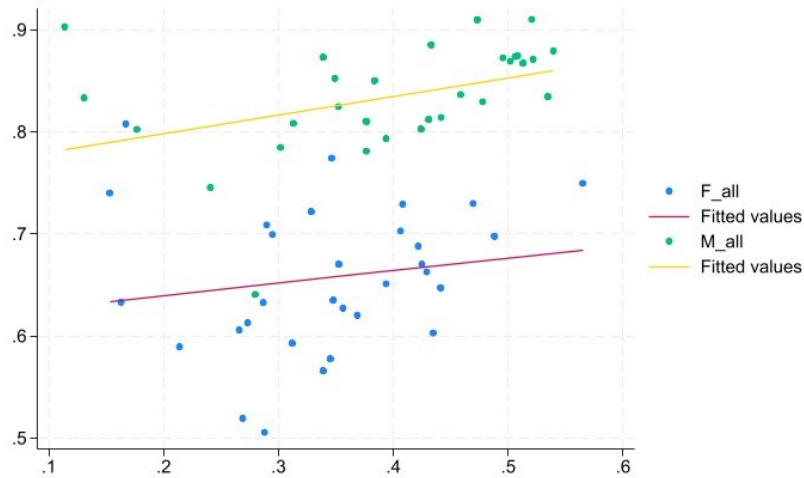


Figure 1: The scatter diagram between the working age employment rate and the employment rate of the elderly

From figure 1, it can seen a clear up-ward sloping curves for all female and male. At the same time this graph also confirmed attempt to discuss the case for male and female respectively. Clearly, gender function as a dummy variable, however, since definition for old-employee is different for male and female workers, thus, this paper need to model them separately.

3.2. Introduction to the Model

By using OLS, this paper formulates the function below:

$$\text{Employment}_{\text{midj}} = \alpha + \beta \text{Employment}_{\text{oldj}} + \gamma X_j + \varepsilon_j \quad (10)$$

Employment_{midj}: middle age employment rate (To specify, the employment rate this paper used here is the fraction between employment and labor force. The reason for such simplification is due to the limited data this paper are able to get as an individual researcher.)

Employment_{oldj}: old age employment.

X_j: a series of variables that would influence the demand and supply in the labor market. J: all the variables are investigated upon province level.

ε_j: error term in the model. (This may be aroused due to the regional difference that may not be able to include. Such error is unavoidable, but this paper did tried best in modeling)

j: all the data is in province level

Some data is changed before it can be used. For example, the age span is more detailed in the original data (one unit every five years), and because the model studies the relationship between the employment rates of the two age groups, this paper combined some data to formulate this employment rate. At the same time, the raw data only included the specific number of employed people and the labor force, so this paper did division to calculate the employment rate

The data of X_j includes contribution of each province to the GDP in 2020, GDP growth rate and contribution of tertiary industry to the overall GDP. This paper used GDP and GDP growth rate because the economic growth contributes a lot to the employment rate. At the same time, this paper also include the contribution of tertiary industry to the model. This idea was inspired from (Zhang & Zhao, 2014), while they put the contribution of secondary industry to their OLS model. However after the test of statistical significance, it found this variable insignificant, while the contribution of tertiary industry significant. This could be due to the fact that their work is based on the data of 1990 and 2000, when the secondary industry is the main of Chinese economy. So this paper use the contribution of tertiary industry to regional GDP as this variable.

3.3. Result

The model has a moderately strong explanatory power, as indicated by an adjusted R-squared value of 0.5109, meaning approximately 51.09% of the variability in Employment_{mid} is explained by the predictors used in the model, as shown in table 1.

The coefficients of the variables indicate significant relationships. The employment rate of the old male labor force (Employment_{old}) shows a positive and significant effect on Employment_{mid}, with a coefficient of 0.2901 (p = 0.005), suggesting that regions with higher employment rates among older males also see higher employment among middle-aged males. The intercept, significant at p = 0.000, indicates the baseline employment rate when all predictors are at zero. At the same time, the control variables X is statistically significant at a p value less than 0.05, which means they are correct in making this model more accurate in explaining the relationship between middle and old age employment rate.

Table 1: Middle age with old age employment rate (MALE)

Middle Age with Old age employment rate (MALE)				
Number of obs		=	31	
F(4, 26)		=	8.84	
Prob > F		=	0.0001	
Adj R-squared		=	0.5109	
Employment _{mid}	Coefficient	P> t	[95% conf. interval]	
Employment _{old}	0.2901507	0.005	0.096427	0.483874
X1(GDP at 2020)	7.41E-07	0.02	1.25E-07	1.36E-06

Table 1: (continued).

X3(GDP growth)	-0.5434388	0.039	-1.05595	-0.03093
X2(Tertiary Sector Contribution)	0.3100175	0.038	0.018866	0.601169
Constant	1.12019	0	0.546249	1.69413

The model explains 47.24% of the variance in Employment_mid, as indicated by the adjusted R-squared value, as shown in table 2.

The coefficients of the variables also indicate significant relationships. The employment rate of the old male labor force (Employment_old) shows a positive and significant effect on Employment_mid, with a coefficient of 0.36 ($p = 0.007$), suggesting that for female the positive relationship also stands. At the same time, the constant, although is not statistically significant at 5% level but at 10% level ($p=0.083$), states that holding all the variables 0, the employment rate for middle age employment rate is 0.20. Differentiated with the model for male, the control variable gdp growth here is no longer statistically significant, so it was dropped out for fuction.

Table 2: Middle age with old age employment rate (FEMALE)

Middle Age with Old age employment rate (FEMALE)				
Number of obs		=	31	
F(3,27)		=	9.95	
Prob > F		=	0.0001	
Adj R-squared		=	0.4724	
Employment mid	Coefficient	P> t	[95% conf. interval]	
Employment_old	0.3571714	0.007	0.108384	0.605959
X1(GDP at 2020)	1.05E-06	0.009	2.87E-07	1.81E-06
X2(Tertiary Sector Contribution)	0.6125404	0.001	0.294055	0.931026
Constant	0.1997359	0.083	-0.02825	0.427721

4. Conclusion

This study has explored the complex dynamics of postponing the retirement age in China, analyzing its diverse effects on the labor market among various age cohorts. Through the combination of theoretical and empirical methods, this paper clarified the intricate relationship between the extension of working life and the employment rates of middle-aged and elderly individuals.

Theoretical analysis revealed a clear correlation between postponed retirement and a rise in the availability of labor, indicating that as individuals extend their working years, a larger number of people continue to participate in the workforce. This discovery is vital for policymakers who are contemplating modifications to the retirement age as a tactic to address demographic changes and labor market requirements.

This regression analysis provided empirical evidence that the employment rate of older individuals has a positive impact on the employment rate of middle-aged workers, suggesting a complementary relationship rather than a substitution effect. This implies that retaining older individuals in the workforce does not necessarily replace younger workers but may actually enhance the employment environment.

Nevertheless, it is crucial to acknowledge the constraints of this research. Given the primary data constraints and regional disparities in China, it is necessary to conduct more localized studies in order to fully comprehend the implications of these policies. Furthermore, this analysis necessitates continuous updates and assessments to ensure that policy recommendations stay pertinent as economic conditions change.

Ultimately, the strategy of postponing the retirement age seems to be a feasible choice for addressing certain economic difficulties caused by a growing elderly population. It promotes a more sustainable labor market by increasing the employment rates among older age groups without negatively impacting the younger workforce. Future policies should prioritize the development of adaptable retirement choices and the inclusion of older employees in the workforce, with the aim of maximizing economic advantages while upholding social and personal welfare. This study not only enhances the scholarly discourse on demographic economics but also establishes a data-driven basis for policymakers in China and other economies facing similar challenges globally.

References

- [1] Lin, H. (2022) *Literature Review Research on Delay of Retirement Age*. *Economic Research Guide*, 524(30), 65–67.
- [2] Li, J., Zhang, Q. (2023). *Population Size, Population Aging and Economic Growth*. *Population Journal*, 45(2), 55–66.
- [3] Wang, M. (2021) *Research on Population Aging in China*. *China Economic & Trade Herald*, 2021(8), 158–160.
- [4] Gong, S., Mao, X. (2022) *Population aging and income of rural residents in Jiangsu province*. *Hubei Agricultural Sciences*, 61(1), 182–187.
- [5] Guo, K. (2023) *The Impact of Delayed Retirement on the Sustainability of Basic Pension in China*. *Economic Research Guide*, (3), 99–102.
- [6] Zhang, C., Zhao, Y. (2014) *The Relationship Between Employment of the Elderly and Employment of the Young: Empirical Evidence From China*. *The Journal of World Economy*, 37(5), 74–90.
- [7] Yang, Y., Xie, Y. (2014) *The Impact of Increasing Retirement Age on Youth Unemployment: Empirical Evidence From Oecd Countries*. *Chinese Journal of Population Science*, (4).
- [8] Su, C., Li, Q. (2014) *An Analysis of the Effect of Delaying Retirement Age and a Study of China's Progressive Promotion Strategy*. *Theory Journal*, 2014(5), 69–76.
- [9] Lin, H. (2022) *Literature Review Research on Delay of Retirement Age*. *Economic Research Guide*, 524(30), 65–67.