

# The Paradox of Early Retirement and Re-employment: Research on Motivation, Mechanism and Optimization of Retirement Policy

## -- Based on the 2018 CHARLS Data

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### Abstract

With the second baby boom generation entering retirement age and the trend of low birth rates, China's aging process is accelerating. Coupled with early retirement, the full development of the elderly human resources in China has not been achieved, which restricts economic development and increases the pressure on pension insurance expenditures. Relatively speaking, re-employment among younger elderly people is also a common phenomenon. CHARLS data shows that the proportion of early retirement is approximately 20.29%, and among the early retired elderly, 37.48% choose to re-employ. Why does the paradox of early retired elderly re-employment exist? Under the dynamic adaptation theory and human capital theory, this project uses the cross-sectional data logit model to study the motivation and influence mechanism of early retirement on the re-employment of the elderly based on the data from the 2018 China Health and Retirement Longitudinal Study (CHARLS). It further uses the number of years of early retirement as an instrumental variable to address the endogeneity problem, and investigates whether there is a transitional employment mechanism. Finally, in light of the implementation of the delayed retirement policy in China and the current situation of elderly re-employment, relevant policy suggestions are proposed for further developing the human resources of the elderly.

### Keywords

Early Retirement; Re-employment; Old People; CHARLS.

## 1. Introduction

Aging and fewer children have become the basic trend of population development in China. According to the seventh national census data, the proportion of people aged 60 and above has risen to 18.7%, and the proportion of people aged 65 and above has reached 13.5%, which is about to enter the stage of a deeply aging society. At the same time, from 2017 to 2023, the new population has declined for seven consecutive years, and the phenomenon of negative population growth occurred for the first time in 2022, and the natural population growth rate in 2023 is -1.48‰. Under this trend, the reduction of the size of the labor force will be inevitable, and the working-age population of China aged 16-59 will be 864 million in 2023, which has been declining for many years since 2012. Under the goal of high-quality economic development, the decline in the total labor force has raised the requirement for the efficiency of labor resource utilization.

Since the 1980s, however, our labor force participation rate has declined, and early retirement is widespread. In 2017, the Ministry of Human Resources and Social Security said that the problem of "retiring before old age" is particularly prominent in China, with early retirees in some areas accounting for 30% of the number of retirees that year. According to the analysis of data from the China Health and Retirement Tracking Survey (CHARLS) from 2011 to 2018,

about 20.29 percent of the respondents who have retired have chosen to retire early. Many literatures (Giles et al., 2021; Wang Jun, Wang Guangzhou, 2016; Zhang Yi, 2015)<sup>[1-3]</sup> shows that the actual retirement age of Chinese workers is significantly lower than the legal retirement age and far lower than the average retirement age of developed countries in the world, and early retirement is a common phenomenon in China. Early retirement means that the working life of workers is shortened and the retirement life is extended, which brings severe challenges to economic construction and old-age security (Li Xiangmei, Wang Hui, 2016)<sup>[4]</sup>. Early retirement of workers will lead to an increase in the support rate of the pension system, bring pressure on the payment of the pension insurance fund, and waste certain labor resources, which will increase the difficulty of the government to implement the reform of delayed retirement (Wang Runquan, Wang Yongnian, 2022)<sup>[5]</sup>.

At present, re-employment of the elderly after retirement is also a common phenomenon, "2022 Survey Report on the retirement and re-employment of the elderly Group" shows that 68% of the elderly again obtain employment after retirement. According to CHARLS data from 2011 to 2018, 37.48% of older people who retired early chose to re-employment. Why does the early retirement re-employment Paradox exist? Research on the behavioral motivation of the elderly and the influence mechanism of early retirement on the re-employment of the elderly can further promote the development of human resources for the elderly, because the early retirees have a longer retirement period and contain more abundant labor resources. From the perspective of micro individual life cycle and macro long-term national human resources reserve, to some extent, compared with the short-term human resources development plan of delayed retirement, reemployment after retirement is a long-term supplementary plan with a wider development range. The Outline of the 14th Five-Year Plan will actively respond to the rise of population aging as a national strategy, and the development of human resources for the elderly will play an important role in alleviating the pressure of pension insurance, ensuring adequate labor supply, and extending the demographic dividend period. Research on the motivation and mechanism of early retirement and re-employment of the elderly is conducive to fully understanding the motive nature of the paradox of early retirement and re-employment, and discover the realistic needs and wishes of early retirees to re-employment, so as to formulate targeted early retirement countermeasures and re-employment incentive programs, which is conducive to the smooth implementation of delayed retirement reform and the alleviation of pension insurance pressure.

Based on the above analysis, this paper uses the data of CHARLS China Health and Pension Tracking Survey in 2018, adopts Logit model and takes retirees as research samples to conduct an empirical analysis of the impact of early retirement on re-employment of the elderly, and discusses whether the type of early retirement and the number of years of early retirement have an impact, and further discusses the mechanism of the impact. In addition, the heterogeneity analysis is carried out from two aspects: gender and pre-retirement position. The contribution of this paper is mainly in the following two aspects: On the one hand, this paper studies the influence of factors related to early retirement on the re-employment of the elderly, adding a new Angle to the relevant research on the re-employment of the elderly population, and complements the existing research on the outcome variables of early retirement behavior. On the other hand, the internal mechanism of early retirement re-employment paradox is expounded, which provides new Chinese insights for dynamic adaptation theory and human capital theory.

The rest of this paper is as follows: The second part is literature review, theoretical model and research hypothesis; The third part is empirical research design; The fourth part is the analysis of empirical results; The fifth part is further analysis; Finally, the main conclusions of this paper and policy recommendations.

## 2. Literature Review, Theoretical Model and Research Hypothesis

### 2.1. Literature Review

#### 2.1.1. Foreign Research Status

In the study of early retirement, because many developed countries in the world earlier than our country, the problem of early retirement, so the study of this problem and factors is more comprehensive. According to Zhang Yi (2015), economists mainly try to explain the phenomenon of early retirement from the perspectives of imperfect annuity market, income effect, family production and social security system. Among them, the imperfect annuity market theory holds that if there is no annuity market, high mortality rate will lead individuals to reduce savings and choose to work until death. When the mortality rate drops, individuals' motivation to save will recover and leave time for retirement at the later stage of life, that is, early retirement (Kalemli-Ozcan, 2010)<sup>[6]</sup>. According to the income effect theory, the extension of life expectancy increases an individual's time endowment and lifetime income, thereby increasing the consumption of "retirement (leisure)" (Chang, 1991)<sup>[7]</sup>. The family production theory holds that with the growth of age, the value of individuals engaged in family production is greater than the value of engaging in social production, so the early retirement of individuals actually shifts from social production to family production (Rogerson and Wallenius, 2009)<sup>[8]</sup>. In addition, foreign scholars also pay attention to the study of the influential factors of early retirement, including health, pension insurance, family care and other factors.

As for the research on re-employment, since the developed countries in foreign countries entered the aging society earlier and the development of human resources for the elderly started earlier, the research on re-employment after retirement has progressed from the analysis of relatively scattered influencing factors to the exploration of the realization mechanism of re-employment. As for the re-employment motivation of the elderly after retirement, foreign scholars mainly explain it from economic needs (Sullivan, 2019)<sup>[9]</sup>, Marx's theory of human essentiality (Santos, 2016)<sup>[10]</sup> and career shaping theory (Lichtenthaler, 2016)<sup>[11]</sup>. In addition to the explanation of the re-employment motivation of the elderly after retirement, there are further studies on the re-employment decision-making of individual elderly people in foreign countries, such as through role theory (Hochman, 2013)<sup>[12]</sup>, life cycle theory (Chai, 2011)<sup>[13]</sup>, life course theory (Dingemans, 2019)<sup>[14]</sup> and Social cognitive occupational theory (Deller, 2013)<sup>[15]</sup> to construct the decision-making mechanism of re-employment after retirement for the elderly. In general, the relevant research abroad has entered a deeper stage of mechanism exploration around reemployment motivation and reemployment decision-making.

#### 2.1.2. Domestic Research Status

With the increasing prominence of the issue of early retirement, domestic scholars have gradually shown their emphasis on this issue. At present, in addition to a small number of quantitative studies on the model and behavior of early retirement and its influencing factors, more researches are focused on institutional factors, mainly qualitative and descriptive studies (Liu Bohong et al., 2011)<sup>[16]</sup>. Zhang Chuanchuan et al. (2014)<sup>[17]</sup> compared the employment situation of the population aged 55 to 65 in Chinese cities in 2010 and 1990, and found that the employment ratio of the population aged 55 to 65 in 2010 was 29%, which was 2% lower than that in 1990, indicating that the proportion of early retirement of Chinese workers has gradually increased in the past 20 years. Zhang Binbin et al. (2014)<sup>[18]</sup> used the double-difference model to estimate the incidence of early retirement in different provinces with different pension pooling modes. They found that different pooling modes had different effects on early retirement in different provinces, and the unified revenue and expenditure mode was more likely to cause early retirement than the budget management mode. Lu Yuanping et al.

(2014)<sup>[19]</sup> analyzed the happiness of early retirement and found that workers who retire early are often accompanied by negative factors such as poor health or high economic pressure, so their happiness is lower than that of normal retirees. He Yuan et al. (2015)<sup>[20]</sup>, based on the data of CHARLS 2011 and using the survival analysis method, found that subjects who need to take care of their grandchildren tend to retire earlier than other subjects. Feng Jin et al. (2008)<sup>[21]</sup> adopted the data of China Health and Nutrition Survey and found that there was a significant positive relationship between the unemployment rate and early retirement of employees, that is, the higher the unemployment rate of employees, the higher the probability of early retirement. Liao Shaohong (2012)<sup>[22]</sup>, based on the data of China General Social Survey in 2008, found that men and women in urban population have significantly different early retirement behavior patterns. Education level only affects women's early retirement behavior, while social security system only has a significant impact on men's early retirement behavior.

The research on the re-employment of the elderly in our country is more of a single influence factor study, lack of practical theoretical analysis framework. Studies on factors affecting the re-employment of the elderly, such as the sociological characteristics of the population, such as age, gender, hukou type, etc. (Qian Xin, Jiang Xiangqun, 2006)<sup>[23]</sup>, the characteristics of human capital include health status, education level, professional skills, etc. (Tong Yufen, Liao Yuhang, 2017; Zhao Liqing, 2015)<sup>[24-25]</sup>, pre-retirement occupational factors include the nature of pre-retirement unit, pre-retirement salary, pre-retirement position, etc. (Tian Llegislating et al., 2014; Niu Jianlin, 2015)<sup>[26-27]</sup>, social security factors include categories of pension insurance, pension income, medical insurance participation, etc. (Cong Jinzhou et al., 2022; Zhao Yifan et al., 2022; Zou Huakang, Zhai Zhenwu, 2019)<sup>[28-30]</sup>, family factors include spouse's health, spouse's retirement or not, children's economic support, children's attitude, family care, etc. (Feng Jin, Han Xu, 2017; Song Jian et al., 2018; Zhong Bo, 2022)<sup>[31-33]</sup>.

From the comparison of domestic and foreign studies, it can be seen that the theoretical research of foreign scholars on early retirement and the re-employment of the elderly is more mature, and the empirical research is more abundant. The breadth and depth of Chinese scholars' research on early retirement is relatively insufficient, and the research on the re-employment of the retired elderly lacks a practical theoretical analysis framework, and the re-employment motivation and re-employment behavior are not strictly distinguished and discussed.

## 2.2. Theoretical Model and Research Hypothesis

### 2.2.1. Dynamic Adaptation Theory

Dynamic adaptation theory is a psychological theory that aims to explain how individuals adapt to environmental changes and cope with stress and challenges. According to the theory, adaptation is a continuous process, including not only the response to environmental changes, but also the adjustment and change of one's own psychology and behavior. According to the dynamic adaptation theory, re-employment after retirement can be regarded as the process of middle-aged and elderly workers adapting to the new life stage and role change after retirement. Through the study of early retirement and re-employment, we can deeply explore how middle-aged and elderly people adapt to the life after retirement, and study the psychological, social and economic factors in the adaptation process.

### 2.2.2. Income Effect Theory

When middle-aged and elderly workers choose early retirement, they can no longer pay social security and get more flexible working hours. When the retirement leisure, social security expenditure and income of re-employment are greater than the income of continuing to work without retirement, middle-aged and elderly workers will choose to actively re-employment after retirement. The income effect theory explains the influence of income change on the labor supply behavior of consumers.

### 2.2.3. Social Role Theory

Social role theory refers to the theory in social psychology that each person plays a specific role in society and that these roles have an impact on individual behavior and cognition. These social roles can be defined by social expectations, social labels, social norms and other factors. Individuals play different roles in different social roles and carry out corresponding behaviors according to the requirements of the roles. After retirement, middle-aged and elderly workers have changed from their original work roles to the roles of retirees. However, some middle-aged and older adults may feel a lack of sense of purpose or social identity and so choose to re-enter employment to fill this void, regain some sense of self-identity, regain a social role, and remain active. Social role theory can help us understand the behavior of the elderly after retirement and recognize the changes and needs of individuals in different social roles.

### 2.2.4. Research Hypothesis

Hypothesis 1: Early retirement has a significant impact on re-employment;

Hypothesis 2: Early retirement affects re-employment by affecting pension income.

## 3. Empirical Research Design

### 3.1. Data Sources and Descriptive Statistics

#### 3.1.1. Data Source and Variable Selection

This paper uses cross-sectional data from the China Health and Retirement Tracking Survey (CHARLS) for 2018 and partial data from Harmonized CHARLS for 2018. The national baseline survey of CHARLS was conducted by Peking University in 2011, followed by follow-up surveys in 2013, 2015, 2018 and 2020, covering 28 provincial-level units, 150 county-level units and 450 village-level units nationwide. The CHARLS data collects micro data of households and individuals aged 45 and above in China, mainly including information on family structure, health status, medical services and medical insurance, work and retirement, and pension security. Harmonized CHARLS data was integrated by the Center for Social and Economic Research of the University of California with variables from the United States Health and Retirement Survey (RAND HRS) data for ease of use and international comparison. The combined use of the two databases provides high-quality data support for key variables such as the re-employment behavior and pension income of the early retired elderly people concerned in this paper, and facilitates the acquisition of some variable data that needs to be tracked.

This paper takes retired people as the research object. According to the CHARLS questionnaire design, retirement refers to retirement from government departments, public institutions and enterprise units, as well as flexible employment personnel who have participated in the basic pension insurance. Excluding those who retired before the age of 45 and after the age of 60, a total of 1,488 samples were screened.

The dependent variable: The dependent variable of this paper is whether the old people are re-employed after retirement. In the CHARLS questionnaire, work is defined as paid work, including agricultural self-employment, non-agricultural self-employment or employment, but does not include domestic work or voluntary work.

The independent variable: The core independent variable of this paper is whether the elderly retire early. According to the CHARLS questionnaire, "Do you have normal retirement, early retirement or formal retirement after internal retirement or formal retirement in the future?" Classification is carried out, "early retirement, internal retirement before formal retirement, internal return before formal retirement" is defined as early retirement, "formal retirement" is defined as no early retirement, and the data of 2018 are retroactively processed using the

CHARLS data of 2011, 2013 and 2015. That is, those who have taken early retirement before 2018 are also defined as early retirement in 2018.

Tool variable: The number of early retirement years is calculated as the statutory retirement age minus the actual retirement age. The statutory retirement age is 60 for male workers, 55 for female cadres and 50 for female workers.

Control variables: The control variables in this paper are mainly divided into three categories: First, personal characteristics, including gender, age, health status, education level, pension income, and pre-retirement position; Second, family factors include the number of children, whether the spouse is retired, and the health status of the spouse; The third is the social level, including the region, province life expectancy, province aging rate.

**Table 1.** Variable declaration

Variable type	Variable name	Variable meaning
The dependent variable	Post-retirement re-employment status	Employment =1; Unemployment =0
The independent variable	Early retirement or not	Yes =1; No =0
Tool variable	Number of early retirement years	Mandatory retirement age - Actual retirement age
Control variables	Gender	Female =1; Male =0
	Age	2018- Year of birth registered in household register, unit (year)
	Health status	Very good =1; Good =2;General =3;Poor = 4; Very poor =5
	Educational level	College degree or above =4; High school =3; Junior high =2; Primary school and below =1
	Pension income	The logarithm of the pension income
	Pre-retirement position	Cadre =1; Worker =0
	Number of children	Total number of children
	Whether spouse is retired	Yes =1; No =0
	Spouse's health status	Very good =1; Good =2;General =3;Poor = 4; Very poor =5
	Area	East =1; West =2; Middle =3; Northeast =4
	Provincial life expectancy	Average life expectancy in the province
	Provincial aging rate	The proportion of the population aged over 65 in the province

### 3.1.2. Descriptive Statistics

The mean value of post-retirement re-employment status was 0.823, indicating that 82.3% of the individuals in the sample were re-employed after retirement. The mean value of early retirement or not was 0.193, indicating that 19.3% of the seniors in the sample chose early retirement.

**Table 2.** Descriptive statistics

Variable name	Sample size	Mean value	Standard deviation	Min	Max
Post-retirement re-employment status	1,488	0.823	0.382	0	1
Early retirement or not	1,488	0.193	0.395	0	1
Number of early retirement years	1,006	2.000	3.197	0	15
Gender	1,488	0.427	0.495	0	1
Age	1,488	63.369	8.579	44	94
Health status	1,488	2.786	0.957	1	5
Educational level	1,488	1.999	0.939	1	4
Pension income	1,484	1500.010	5606.301	0	54000
Pre-retirement position	1,488	0.185	0.388	0	1
Number of children	1,488	2.041	1.183	0	8
Whether spouse is retired	1,262	0.463	0.499	0	1
Spouse's health status	1,197	2.825	0.973	1	5
Area	1,488	2.194	1.037	1	4
Provincial life expectancy				73.12	82.09
Provincial aging rate	1,488	77.676	1.390	4	2
	1,488	0.120	0.021	0.072	0.152

### 3.2. Estimation Model Setting

This paper studies the impact of early retirement on the re-employment of the elderly after retirement. The dependent variable is a binary categorical variable, and the logit model is adopted for regression analysis. The model is set as follows:

$$\text{Logit}(\text{working}_i) = \alpha + \beta_1 \text{earet}_i + \sum_j \beta_j \text{controls}_{ji} + \varepsilon_i$$

Among them,  $\text{working}_i$  is the re-employment status of the elderly after retirement,  $\text{earet}_i$  is whether the elderly retire early,  $\text{controls}_i$  is the control variable, including personal characteristics, family factors, social level,  $\varepsilon_i$  is the random disturbance term.

The endogeneity of the model may be derived from the following two aspects: First, there is a reverse causality between whether the elderly retire early and whether they re-work after retirement. For example, when the average pension level of the employees in enterprises is generally low, they make the decision of early retirement and re-employment to increase their income (Zheng Yao, 2016); Secondly, due to the influence of some unmeasured factors, the model may have the problem of missing variables. To solve these possible endogenous problems, the number of early retirement years is used as an instrumental variable.

## 4. Analysis of Empirical Results

### 4.1. Baseline Regression Analysis

According to the logit model, this paper adopts the method of gradual regression, adding the control variables of personal characteristics, family factors and social level successively, and the regression results are shown in the table. It can be found that whether the core explanatory variable is early retirement significantly affects the re-employment decision of middle-aged and elderly workers at the significance level of 0.01, and the coefficient is positive, indicating that middle-aged and elderly workers who retire early are more likely to choose re-employment.

The possible explanations are as follows: To meet economic needs, some middle-aged and elderly people may find that their pension or savings cannot meet their living expenses or other economic needs after early retirement, so they choose to re-employment to increase their income; Meeting social needs: Work can provide social interaction and relationships, and for some middle-aged and elderly people, re-employment can help them maintain social contacts and avoid loneliness; Self-actualization: Some middle-aged and elderly people may find their time is boring after retirement, and re-employment can provide them with a way to re-realize their self-worth; Work can help people maintain physical and mental health. For some middle-aged and elderly people, re-employment can help them maintain vitality and good mental state. Some middle-aged and elderly people may be interested in a particular field or job, and re-employment allows them to continue doing what they love.

The regression results of some control variables in the above table are also satisfactory. First of all, among the personal characteristic variables, age is positively correlated with re-employment. The possible explanation is that with the growth of age, middle-aged and elderly people in the process of adapting to retirement change from enjoying leisure at the beginning to thinking that life is boring. In order to achieve self-worth or maintain a positive social role and maintain social interaction and vitality, they are gradually willing to choose re-employment. The regression result coefficient of pre-retirement positions is negative, indicating that middle-aged and elderly workers with pre-retirement positions as workers are more likely to choose re-employment after retirement, possibly because middle-aged and elderly workers with pre-retirement positions as cadres can receive more pensions and have less demand for re-employment to obtain economic income. Secondly, in terms of family factors, the formal retirement of spouse is negatively correlated with the re-employment of middle-aged and elderly workers, indicating that the formal retirement of spouse will lead to a decrease in the probability of re-employment of middle-aged and elderly people. This may be because accompanied by spouse, middle-aged and elderly people can better adapt to retirement life and enjoy leisure time with spouse, and the possibility of needing re-employment to maintain social and vitality is reduced. Finally, among the variables at the social level, the region where middle-aged and elderly people live significantly affects their probability of re-employment. Possible explanations include different economic conditions and industrial structure in different regions, and different policy and social supports for middle-aged and elderly people. Some regions may provide more re-employment opportunities and related education and training that are more suitable for middle-aged and elderly people, while others may have limited employment opportunities, which will affect their re-employment choices. And the cultural background of different regions will also affect, some regions may pay more attention to family responsibilities, middle-aged and elderly people may be more inclined to take care of family rather than re-employment. The aging rate of the province where the middle-aged and elderly people live also has a significant impact on re-employment. The higher the aging rate of the province, the higher the possibility of re-employment. Provinces with a heavy aging population may face increased pension spending and increased pressure on social welfare, which may lead to relatively low pension levels. Middle-aged and elderly people may choose to rework in order to make up for the shortage of retirement funds or cope with the rising cost of living. In provinces with serious aging, there may also be insufficient social support, such as imperfect elderly care services and imperfect social welfare systems. For the sake of their own quality of life and well-being, middle-aged and elderly people may choose to re-employment to improve their living standards.

According to the above analysis, early retirement plays a positive role in the re-employment decision of middle-aged and elderly workers after retirement, but there may be the problem of missing variables in the model, and there may be reverse causality in choosing early retirement for re-employment. Therefore, there may be endogeneity problems in the model, and the

instrumental variable method is considered to correct the resulting bias in the parameter estimates. The number of years of early retirement is selected as an instrumental variable to fit the impact of early retirement on re-employment, and the two-stage regression is used to explore.

**Table 3.** Baseline regression analysis results

	(1)	(2)	(3)	(4)
Variable	re-employment	re-employment	re-employment	re-employment
Early retirement	0.811***	0.715***	0.823***	0.824***
	(0.212)	(0.216)	(0.255)	(0.256)
Age		0.040***	0.060***	0.058***
		(0.010)	(0.014)	(0.014)
Gender		-0.334**	-0.231	-0.230
		(0.152)	(0.180)	(0.181)
Health status		-0.041	-0.035	-0.002
		(0.074)	(0.086)	(0.088)
Educational level(Reference group:Junior high)				
Primary school and below		-0.377**	-0.238	-0.242
		(0.177)	(0.201)	(0.204)
High school		-0.126	-0.029	0.005
		(0.194)	(0.220)	(0.223)
College degree or above		-0.407	-0.255	-0.236
		(0.307)	(0.358)	(0.364)
Pre-retirement position		-0.345*	-0.502**	-0.496**
		(0.203)	(0.230)	(0.233)
Pension income		-0.022	-0.003	-0.006
		(0.023)	(0.027)	(0.027)
Number of children			-0.076	-0.040
			(0.088)	(0.091)
Whether spouse is retired			-0.405**	-0.437**
			(0.172)	(0.176)
Spouse's health status			-0.061	-0.030
			(0.086)	(0.088)
Area(Reference group:West)				
East				0.662**
				(0.286)
Middle				0.440**
				(0.216)
Northeast				0.887***
				(0.326)
Provincial life expectancy				-0.109
				(0.085)
Provincial aging rate				9.269**
				(4.338)
_cons	1.414***	-0.486	-1.333	5.459
	(0.073)	(0.636)	(0.822)	(6.435)
N	1488	1484	1180	1180
adj. R2				

Standard errors in parentheses.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

As can be seen from the table, the coefficient of early retirement years of instrumental variables is 0.043, which is significant at the level of 1%. The result of the second stage regression is the estimated result obtained after the improvement of endogenous problems by the method of instrumental variables. It can be seen from the table that the coefficient of early retirement is 0.554, which is significant at the 1% level.

If there is a weak instrumental variable problem, 2OLS estimation is difficult to correct the bias of maximum likelihood estimation, so it is necessary to test the validity of instrumental variables by checking the correlation of instrumental variables. The results of the firststage are analyzed using the estate firststage command to determine if there is a weak tool variable problem. The results show that the number of early retirement years of the instrumental variable has a strong explanatory power on whether the endogenous variable has early retirement. Combined with the F statistic =84.87>10, it can be concluded that the instrumental variable used in this paper is not a weak instrumental variable. According to the regression results, early retirement still has a significant positive impact on the re-employment of middle-aged and elderly workers, which is basically consistent with the estimated results of the baseline regression.

**Table 4.** Results of endogeneity test

Variable	The first stage	The second stage
Early retirement		0.554*** (0.000)
Number of early retirement years	0.043*** (0.000)	
Control variable	Control	Control
observations	791	791
The F-value of the first stage	84.87	

## 4.2. Robustness Test

In order to further verify the reliability of the baseline regression results, this paper reestimates the baseline regression results by replacing the core explanatory variables and changing the research samples respectively.

### 4.2.1. Change the Core Explanatory Variables

Earlier retirement or not was used as the explanatory variable above. Now, the impact of the specific number of years of early retirement on re-employment is further considered, and the number of years of early retirement is used as the independent variable for regression. According to the regression results reported in the following table, the impact of the number of years of early retirement on the re-employment of middle-aged and elderly workers presents a significant positive impact, and it is significant at the 1% confidence level, which is consistent with the baseline regression estimate. This indicates that middle-aged and elderly workers with more years of early retirement are more likely to be reemployed. The reason may be that the longer the period of early retirement, the lower the pension income of middle-aged and elderly workers, and the greater the possibility of reemployment due to economic pressure. In addition, the longer the period of retirement, the stronger their desire to obtain social opportunities and realize their self-worth, the more likely they are to be reemployed.

**Table 5.** Regression results of changing the core explanatory variables

	(1)	(2)	(3)	(4)
Variable	re-employment	re-employment	re-employment	re-employment
Number of early retirement years	0.295***	0.309***	0.362***	0.372***
	(0.051)	(0.053)	(0.063)	(0.065)
_cons	1.185***	-6.161***	-8.836***	-18.466**
	(0.092)	(1.134)	(1.518)	(8.455)
N	1006	1004	791	791

#### 4.2.2. Change Research Sample

The cross-section data of CHARLS2018 is used above. In different years, the differences of investigators and external environment may affect the respondents' different understanding of some questions, which may cause measurement errors and affect the robustness of regression estimation results. Therefore, this paper uses mixed cross-section data from 2011-20184 to re-estimate the impact of early retirement on re-employment. Results As shown in the following table, the impact of early retirement on the re-employment of middle-aged and elderly workers is significant at the confidence level of 1%, which is consistent with the benchmark regression results, indicating that the results of this paper are robust.

**Table 6.** Regression results of changing research sample

	(1)	(2)	(3)	(4)
Variable	re-employment	re-employment	re-employment	re-employment
Early retirement	0.375***	0.287***	0.207***	0.204***
	(0.062)	(0.066)	(0.076)	(0.076)
Year(Reference group: 2011)				
2013	0.728***	0.701***	0.664***	0.662***
	(0.066)	(0.070)	(0.080)	(0.083)
2015	1.134***	1.163***	1.154***	1.111***
	(0.068)	(0.072)	(0.084)	(0.092)
2018	2.204***	2.257***	2.217***	2.143***
	(0.081)	(0.087)	(0.100)	(0.122)
_cons	-0.785***	2.655***	3.002***	6.557***
	(0.051)	(0.243)	(0.313)	(1.974)
N	7487	6977	5464	5464

## 5. Further Analysis

### 5.1. Mechanism Analysis

**Table 7.** Results of mediation effect test

	Post-retirement re-employment status	Pension income
Early retirement	0.827*** (0.256)	-0.373** (0.146)
Control variable	Control	Control
Constant term	5.459 (6.435)	-12.607*** (4.595)
Sample size	1180	1990

This paper discusses the internal mechanism of early retirement affecting re-employment from the perspective of pension income. With pension income as the intermediary variable, the regression results are shown in the following table. As shown in the results in the second column, the estimated coefficient of early retirement is significantly negative at the 5% test level, indicating that early retirement significantly reduces the level of pension income. It is confirmed that early retirement increases the re-employment probability of middle-aged and elderly workers by reducing pension income.

## 5.2. Heterogeneity Analysis

This paper will prove that the impact of early retirement on the re-employment of middle-aged and elderly workers is different at different levels from gender, pre-retirement position, age and other dimensions.

### 5.2.1. Gender

The following table shows the difference in the impact of early retirement on the re-employment of middle-aged and elderly workers of different genders. The results showed that women's early retirement had no significant impact on reemployment, while men's early retirement had a significant impact on reemployment at the 1% confidence level. It shows that early retirement has no significant effect on women's re-employment, but has a significant effect on men's re-employment. The main reason may be due to the social perception of gender roles, men generally assume more responsibility for financial support of the family, so early retirement of men may have a greater impact on the family's financial situation and force men to seek re-employment opportunities to maintain the family's living standard. Women, on the other hand, may have less pressure on the family economy, so they can choose whether to work again after retirement.

**Table 8.** Heterogeneity test results on gender

	(1)	(2)
Variable	re-employment	re-employment
	(female)	(male)
Early retirement	0.552	0.923***
	(0.401)	(0.343)
Control variable	Control	Control
Constant term	-15.498	22.998**
	(9.915)	(9.709)
Sample size	456	724

### 5.2.2. Pre-retirement Positions

As shown in the table below, the impact of early retirement on the re-employment of middle-aged and elderly workers with different positions before retirement is also different. The comparative results show that the early retirement of middle-aged and elderly workers who were workers before retirement will significantly affect their re-employment, but this coefficient is not significant for middle-aged and elderly workers who were cadres before retirement. It may be because workers are generally in grass-roots positions and may face more economic pressure after retirement, and their career development path is relatively simple, and they may lack other sources of income after retirement. However, workers' vocational skills may be more easily converted into jobs in other industries, so it is relatively easier to find re-employment opportunities after retirement, and they have more motivation to find re-employment opportunities. While cadres usually enjoy higher social status and income in their posts, they may have more economic security after retirement, usually have more professional experience and network resources, and it may be easier to find other forms of economic

activities after retirement, so there is less urgent need to look for re-employment opportunities. Moreover, cadres enjoy higher social status and authority in their posts, and may pay more attention to self-identification and maintenance of social roles after retirement, rather than filling economic vacancies through re-employment.

**Table 9.** Heterogeneity test results on Pre-retirement positions

	(1)	(2)
Variable	re-employment	re-employment
	(worker)	(cadre)
Early retirement	1.018***	0.535
	(0.320)	(0.558)
Control variable	Control	Control
Constant term	14.667*	-34.585**
	(7.701)	(16.180)
Sample size	959	221

### 5.2.3. Age

The following table shows the difference in the impact of early retirement on the re-employment of middle-aged and elderly workers in different age groups. The age group is divided into 44-59 years old and 59 years old and above, respectively, representing the initial aging and the elderly two groups, and different ages represent the decision-making changes in different life stages. The regression results show that the two stages of early retirement have a significant impact on re-employment, and the re-employment probability in the early old age stage is greater than the re-employment probability of the elderly. It may be influenced by physical factors and individuals' pursuit of social recognition.

**Table 10.** Heterogeneity test results on age

	(1)	(2)
Variable	re-employment	re-employment
	(44-59)	(>59)
Early retirement	1.413**	0.643**
	(0.571)	(0.292)
Control variable	Control	Control
Constant term	-3.891	13.624*
	(10.627)	(8.120)
Sample size	369	811

## 6. Conclusion and Policy Implications

In this paper, the Logit model is used to study the impact of early retirement on the re-employment of the elderly, and the sample in the 2018 CHARLS is verified to analyze the intermediary effect of pension income, and the robustness test and endogeneity test are carried out. The main findings of this paper include: early retirement has a significant impact on the re-employment of the elderly, and it affects the re-employment of the elderly through affecting the pension income of the elderly. Based on the above analysis and the current situation of early retirement and re-employment of the elderly in China, this paper puts forward the following policy suggestions.

Establish an information service platform and develop human capital in multiple dimensions

The government can establish a human resource bank for the elderly and an employment information service platform specifically for the elderly. Provide them with job opportunities information, career guidance and job search tips to help them better understand market needs and job opportunities. For middle-aged and old workers of different ages, different measures should be taken to cultivate human capital. For workers aged 44 to 59, we can provide relevant career transition training based on the latest trends and skill needs of their industries, help them adapt to changes in career development, provide technical update training, help them master the latest technologies and tools, and maintain competitiveness in the workplace. For middle-aged and elderly workers over the age of 59, retirement planning counseling services can be provided to help them rationally plan their retirement life, prepare for financial planning and career transition, and volunteer opportunities can be provided to let them participate in social welfare activities to maintain social connections and vitality. For middle-aged and elderly workers of different genders, women can be provided with relevant vocational skills training suitable for their work, providing more career opportunities and more flexible work arrangements, and for men, professional re-employment training programs can be provided to help them update their vocational skills and adapt to the new working environment and needs. For middle-aged and elderly workers who are workers before retirement, attention should also be paid to training support for their re-employment.

Introduce preferential tax policies to encourage enterprises to hire middle-aged and elderly workers, relax the entry threshold of middle-aged and elderly workers, reduce the cost of hiring middle-aged and elderly workers, and increase the enthusiasm of employers. Enterprises are encouraged to set up some suitable jobs or positions for middle-aged and elderly workers, which can be more suitable for the characteristics of middle-aged and elderly workers in terms of work content, intensity and time, and support flexible work arrangements, such as part-time work, remote work, project contracts, etc., to meet the needs of middle-aged and elderly people and help them better balance work and life.

Strengthen social security and welfare support for middle-aged and elderly re-employed people to ensure that they can obtain appropriate security and welfare benefits in the process of re-employment. In order to reduce the burden of family care for middle-aged and elderly workers in early retirement, it is necessary to improve community care services, including old-age security services and infant care services for 0-3 years old. And strengthen social advocacy and cognitive education, eliminate discrimination and prejudice against middle-aged and elderly re-employment, and enhance social acceptance and support for middle-aged and elderly re-employment.

## References

- [1] Giles, J.T., X.Lei, G.Wang, Y.Wang, and Y.Zhao, One Country, Two Systems: Evidence on Retirement Patterns in China, World Bank Policy Research Working Paper, 2021, No.9650.
- [2] Wang Jun, Wang Guangzhou: Study on the willingness of urban labor force to delay retirement and its influencing factors, China Population Science, (2016) No.3, p.81-92+128.
- [3] Zhang Y: Frontiers of endogenous retirement age research, Economic Trends, (2015) No.3, p.90-103.
- [4] Li Xiangmei, Wang Hui: Research on human resource development strategies of elderly employees from the perspective of person-job matching, China Human Resource Development, (2016) No.8, p.13-17.
- [5] Wang Runquan, Wang Yongnian: Employee pension insurance, implicit tax and early retirement incentive, Financial Development Research, (2022) No.1, p.3-12.
- [6] Kalemli-Ozcan, S.&D.Weil: Mortality change, the uncertainty effect, and retirement, Journal of Economic Growth, Vol. 15 (2010) No.1, p.65-91.

- [7] Chang,F.: Uncertain lifetimes,retirement and economic welfare, *Economica*, Vol. 58 (1991) No.230, p.215-232.
- [8] Rogerson, R.&J.Wallenius: Retirement in a life cycle model of labor supply with home production (Ph.D., Arizona State University,America 2009), p.205.
- [9] Sullivan S E, Ariss A: Employment after Retirement:A Review and Framework for Future Research: *Journal of Management*, (2019) No.1, p.262-284.
- [10] Santos A C S, Ribeiro B, Martins J T,et al: Motivations of Retired Professors to Return to Work Activities at A Public University, *Rev Rene*, (2016) No.4, p.561-569.
- [11] Lichtenthaler P W, Fischbach A: Job Crafting and Motivation to Continue Working beyond Retirement Age, *Career Development International*, (2016) No.5,p.477-497.
- [12] Hochman O, Lewin-Epstein N: Determinants of Early Retirement Preferences in Europe:The Role of Grandparenthood, *International Journal of Comparative Sociology*(2013) No.1, p.29-47.
- [13] Chai J, Horneff W J, Maurer R and Mitchell O S: Optimal Portfolio Choice over the Life-cycle with Flexible Work,Endogenous Retirement,and Lifetime Payouts, *Review of Finance*, (2011) No.4, p.875-907.
- [14] Dingemans E, Möhring K: A Life Course Perspective on Working after Retirement, What Role does the Work History Play?, *Advances in Life Course Research*, (2019) No.2, p.23-33.
- [15] Wöhrmann A M, Deller J and Wang M: Outcome Expectations and Work Design Characteristics in Post-retirement Work Planning, *Journal of Vocational Behavior*, (2013) No.3, p.219-228.
- [16] Liu Bohong, Guo Shi, et al.: Research Report on Retirement Age (Part 1), *China Women's Sports*, (2011) No.5, p.31-34.
- [17] Zhang Chuanchuan, Zhao Yaohui: The relationship between employment of the elderly and employment of the young: Empirical evidence from China, *World Economy*, Vol. 37 (2014) No.5, p.74-90.
- [18] Zhang Binbin, Wu Yaowu: Effect of early retirement on the improvement of basic endowment Insurance pooling level, *Journal of Shanxi University of Finance and Economics*, Vol. 36 (2014) No.6, p.1-13.
- [19] Lu Yuanping, Zhang Kezhong: Are you enjoying your old age? Empirical analysis based on retirement and happiness, *Economic Management*, Vol. 36 (2014) No.8, p.168-178.
- [20] He Yuan, Wang Yipan: Will intergenerational parenting and child support advance the retirement age of parents? Empirical analysis based on CHARLS data, *Population Research*, Vol. 39 (2015) No.2, p.78-90.
- [21] Feng Jin, Hu Yan: Study on early retirement behavior of urban labor in China, *China Population Science*, (2008) No.4, p.88-94+96.
- [22] Liao Shaohong: Early retirement patterns and behaviors and their influencing factors: An analysis based on the data of China General Social Survey, *Chinese Population Science*, (2012) No.3, p.96-105+112.
- [23] Qian Xin, Jiang Xiangqun: Analysis on the influencing factors of employment willingness of the urban elderly in China, *Population Journal*, (2006) No.5, p.24-29.
- [24] Tong Yufen, Liao Yuhang: The influence of health status on labor participation decision making of elderly people in China, *China Population Science*, (2017) No.6, p.105-116+128.
- [25] Zhao Liqing: An empirical study on the influencing factors of urban elderly human resource development in China -- taking national statistical Data as an example, *Social Scientist*, (2015) No.11, p.53-57.
- [26] Tian Lifa, Shen Hongli, Zhao Meihan, et al.: Investigation on the influencing factors of the re-employment willingness of the urban elderly: A case study of Tianjin, *China Economic Issues*, (2014) No.5, p.30-38.
- [27] Niu Jianlin: Study on the influence of education level on retirement decision, *China Population Science*, (2015) No.5, p.58-66+127.

- [28] Cong Jinzhou, Wu Ruijun: The realization mechanism of reemployment of retired elderly people: An empirical analysis based on Maslow's Hierarchy of Needs theory, *Population of Northwest China*, Vol. 43 (2022) No.6, p.52-64.
- [29] Zhao Yifan, Yi Dinghong, Zhao Yilan: The impact of pension security on the employment of the elderly: An empirical study based on the data of China's Elderly Social tracking survey, *China Human Resources Development*, Vol. 40 (2002) No.3, p.115-128.
- [30] Zou Huakang, Zhai Zhenwu: Study on the influence of pension Security on the employment of the elderly and the difference between urban and rural areas, *Scientific Research on Aging*, Vol. 40 (2019) No.9, p.3-18.
- [31] Feng Jin, Han Xu: The impact of retirement age on family care and labor participation, *World Economy*, Vol. 40 (2017) No.6, p.145-166.
- [32] Song Jian, Wang Jiwen, Qin Tingting: Research on the relationship between grandchild care and employment of the elderly, *Population and Economy*, (2018) No.3, p.92-103.
- [33] Zhong Bo: Intergenerational interaction and labor supply of the younger elderly, *Population and Economy*, (2022) No.3, p.34-55.