Front Manage Bus, 2023, 4(2): 330-339
DOI: 10.25082/FMB.2023.02.003

RESEARCH ARTICLE

Research on the impact of artificial intelligence on the employment environment of labors in China

Nannan Shan

Management and Science University, Selangor, Malaysia

Correspondence to: Nannan Shan, Management and Science University, Selangor, Malaysia;
E-mail: NAN19933137191@163.com

Received: September 20, 2023;
Accepted: November 23, 2023;
Published: November 29, 2023.

Citation: Shan N. Research on the impact of artificial intelligence on the employment environment of labors in China. *Front Manage Bus*, 2023, **4**(2): 330-339. https://doi.org/10.25082/FMB.2023.02.003

Abstract: Purpose: The development of artificial intelligence technology can undoubtedly trigger profound changes in the labor market. Empirical analysis of the impact of artificial intelligence on the employment environment and its mechanism can propose effective paths to optimize the employment environment, which can effectively promote the improvement of the employment environment for Chinese labors and the stability of the employment situation. Based on the limitations of the development of artificial intelligence technology in China, this study focuses on studying its impact on the employment environment in the short term, and the long-term effects on the employment environment in China will become the author's future focus and research direction. Methodology: This study uses quantitative research methods, based on Panel data of 30 provinces in China from 2009 to 2019, and uses program computer software Stata 17.0 for data processing and empirical analysis. Conclusion: AI technology has a significant positive role in promoting the employment environment, and the new Information infrastructure represented by the Internet is conducive to promoting the positive moderating of AI on the employment environment. Through further research, it was found that the employment environment improvement effect of AI technology has regional differences, with a greater impact on the employment environment in the eastern region than in the western region, while the impact on the central region is not significant.

Keywords: AI technology, employment environment, information infrastructure, empirically analysis

1 Introduction

As one of the typical representatives of scientific and technological innovation achievements, AI is highly valued by the Chinese government. In a certain sense, this has formed a guiding role for the development of AI. Just as industrial automation upgrades in the past have changed the entire labor market, AI will have the same effect. WordSmith, an AI editor at The Associated Press, a New York news agency, and ROSS, an artificial intelligence lawyer in San Francisco are just real cases where AI technology improves work efficiency and then triggers changes in the labor market . In terms of research on the impact of AI on jobs, domestic and foreign scholars have made more in-depth research on employment impact, which is mainly reflected in the employment Substitution effect and creation effect of AI [1, 2]. The impact of AI on total employment depends on the relative strength of the two effects, that is, the result of the net effect. This is where scholars currently have great disagreements. Although the impact of AI technology on total employment is uncertain, relevant scholars have reached a consensus on the conclusion that it has a heterogeneous impact on the employment structure. For labor groups of different genders, skills, regions, and industries, the effect and degree of AI 's impact on them are not the same [3–5]. The study of the impact of AI on the labor force is, in the final analysis, the study of the impact of changes in human demand, while the employment environment reflects the relationship between people and labor materials. Therefore, while AI affects the labor market, it will inevitably cause changes in the employment environment. The notice of the State Council on printing and distributing the "14th Five-Year Plan" employment promotion plan mentioned: "The application of intelligent technologies such as AI is accelerating, and the employment substitution effect continues to appear; the international environment is becoming increasingly complex, and the instability and uncertainty have increased significantly. Potential shocks need to be vigilant and guarded against. By optimizing the employment environment of laborers, the level of income and protection of rights and interests of laborers should be improved. The working conditions of laborers should be improved, the protection of rights and interests of laborers should be strengthened, and the sense of gain and satisfaction of laborers should be enhanced, so that the majority of laborers can achieve decent Labor and all-round

development" [6]. Therefore, it is urgent and realistic to take the effect of AI on the employment environment of laborers as the subject of research.

This article is based on the entire macroeconomic level of China and focuses on research issues. Panel data from 30 provinces in China from 2009 to 2019 are selected to empirically analyze and test the impact of artificial intelligence technology on the employment environment. This research will not only enrich the understanding of the relationship between intelligence and employment, make up for the insufficient research on external constraints (employment environment) of labor employment in existing literature, but also conduct further empirical tests on the impact of artificial intelligence technology on the overall employment environment in China, and identify the moderating factors of the relationship between the two variables. Finally, based on its mechanism process, it is hoped to provide reference for the relevant policy formulation of the Chinese government, To achieve a perfect match between artificial intelligence and Chinese labor, and promote the positive development of China's labor force.

2 Literrature review and reseach hypothesis

The task model introduces factors such as industrial robots, automation, and artificial intelligence into the production function, so that macroeconomists can analyze the far-reaching impact of these revolutionary production methods. Zeira (1998) [7] was one of the pioneers of the task model, which introduced the use of machines into theoretical models for analyzing economic growth. Acemoglu & Restrepo (2017, 2018a, 2019) [8–10] further developed the task model on this basis.

Research on the employment impact of AI on jods is divided into pessimists and optimists. Schumpeter's theory of "destructive creation" believes that technological innovation is the source of economic growth, while low-end tasks will continue to be eliminated. Faced with the computerization of work tasks, future jobs, especially occupations involving low-skilled and repetitive tasks, face the risk of automation [11]. The effect and probability of technological substitution are greater, thus showing the polarization of the labor market [12]. Optimists believe that AI can replace some mechanically repetitive tasks, but the essence of human work is a combination of creativity and complexity, and this kind of work cannot be replaced. The skill compensation theory and the Means-Ends Theory (Means-Ends Theory) also believe that the development of AI is a means, although it will bring about the reduction or transfer of some employment, but by creating new demand for skills, it will make some Laborers' skills are enhanced and better job opportunities are provided, with the ultimate goal of improving productivity and quality of life. George et al. (2018), Autor (2019) believe that the demand for new skills stimulated by AI may promote the transfer of labor with traditional vocational skills replaced by AI to emerging fields; John Markov in "with In the article *'Robots Dancing Together – The Future of the Era of AI'*", it is mentioned that when robots become sufficiently complex, they will be neither servants nor masters of humans, but partners of humans, and coexistence will be achieved through human- machine collaboration.

There is a virtuous circle relationship between employment environment and employment quality . Regarding the research on the impact of AI on the employment environment of laborers, there is little research in the frontier literature, and no systematic answer has been given. From the perspective of practitioners, some scholars have studied the impact of AI applications on their employment quality, using objective indicators of income level, working hours, and subjective indicators of career development and working status as the definition and measurement standards [13], studies have shown that the use of AI technology in human resource management by enterprises can improve the employment quality of HR practitioners. The dependent variable in the study can also be seen as a reflection of the individual worker's micro-employment environment in a particular workplace or organization. At the research level from a macro perspective, Chen et al. (2022) [14] regard the employment environment as an important positive evaluation indicator of the comprehensive level of employment quality , so the impact on employment quality can reflect the effect on employment environment to a certain extent. Empirical research shows that AI has a significant effect on promoting employment quality. Another empirical study found that the development and application of AI technology can significantly improve the employment environment of laborers; and play a mediating effect through the level of urbanization and labor factor income [15].

Based on the macro level, this study studies the impact of AI on the employment environment of laborers. The macro employment environment of laborers refers to the impact of the macroeconomic environment on employment, including national policies, economic environment, industrial structure, social security and other factors. Countries around the world have promoted AI to the national macro-strategy level, which is enough to see the impact of AI on the formulation of relevant national policies. It is generally believed that AI can promote the

improvement of management efficiency, resource allocation efficiency and social transaction efficiency, promote innovation and improve total factor productivity, and promote economic growth by increasing productivity [16]. Most business research institutions believe that thanks to the development and penetration of AI technology, the economic growth rate of countries around the world has increased significantly. By 2030, the global GDP is expected to grow by about 12% [17]. As an important driving force leading a new round of scientific and technological revolution, AI has mature technologies in learning and information processing. It integrates with traditional industries, generates new industrial models and promotes the transformation of traditional industries, and accelerates the upgrading of industrial structures, thereby affecting The market environment for labor employment. The penetration of information network technology and AI technology has made its application in social security more and more. The 24*7 automatic front-end support ensures that customers can query information at any time. The introduction of intelligent chat robots satisfies customers. The demand for personalized online services has improved the quality of intelligent social security services to a certain extent. In summary, this paper proposes the following hypotheses:

H1: Artificial intelligence technology can promote the improvement and enhancement of the employment environment for Chinese laborers.

Information infrastructure refers to the general term for the physical and software components used to support the flow, storage and processing of information. The goal of information infrastructure is to provide a reliable, secure, efficient and scalable information technology environment. In terms of intelligence, information infrastructure plays a key role, providing support for intelligent applications and providing the basis for intelligent decision-making and forecasting. Information infrastructure drives developments in areas such as AI, the Internet of Things, and big data. The application of information infrastructure has greatly liberated human labor, and at the same time led to the transformation of the job market, ultimately affecting the entire macro employment environment. Therefore, this paper puts forward the following hypothesis:

H2: The relationship between artificial intelligence technology and the employment environment of labors is often influenced by the construction of new information infrastructure, and this moderating variable has a positive moderating effect. (see Figure 1)

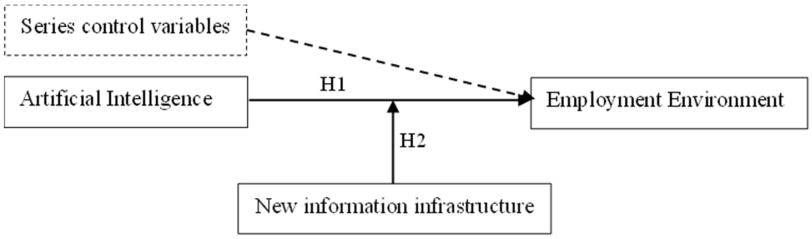

Figure 1 Research model

3 Research materials

3.1 Model setting

In order to test the impact of AI technology on China's employment environment, that is, the rationality of hypothesis H1, Drawing on the practice of Yang and Hou (2020), the measurement benchmark model is set as follows:

$$\mathrm{EV_{it}} = \alpha_0 + \alpha_1 \ln \mathrm{robot\_dens_{it}} + \sum \beta \mathrm{kControl_{it}} + \mu_i + \mathrm{v_t} + \epsilon_{it} \quad (1)$$

In the above model, i and t represent region and time respectively, EV is the explained variable employment environment, robot_dens is the explanatory variable AI technology level, Control is a set of control variables, μ and v represent region and year fixed effects respectively, ϵ represents the residual error estimated by the model. Through this model, it can be seen that it is a linear function of the employment environment (EV)and artificial intelligence technology (robot_dens). To ensure a clear study of the causal relationship between research variables, other series of variables that affect the employment environment of workers are added to the research model as control variables. The impact of the level of artificial intelligence technology on the employment environment depends on the positive and negative values of α_1, which is also one of the research purposes of this article. Based on the H1 in the chapter2, assuming α_1 is positive, artificial intelligence technology can effectively promote the improvement of the employment environment for labors. That is, the higher the level of artificial intelligence technology, the more perfect the employment environment.

3.2 Variables setting

3.2.1 Explained variable: employment environment

The employment environment can be defined as an overall assessment of the job market and various factors in the labor market in a country or region. These factors include government policy, economic development, industry structure, human capital, labor market and so on. A good employment environment can increase the employment rate, reduce the unemployment rate, increase salary levels and career development opportunities, thereby improving the quality of life of individuals and social and economic welfare.

There is no uniform measurement standard for the employment environment in the frontier literature. Some scholars describe the employment environment from the aspects of wage income differences, education expenditures, regional economic development level, labor employment structure, and transportation facilities [18, 19]. Therefore, this study combines the definition of the employment environment and the achievements of previous scholars to measure the macro-employment environment of a certain region from the aspects of employment (unemployment) rate, income level, and economic growth. Among them, economic development is expressed by per capita GDP and the proportion of tertiary industry GDP; labor market conditions are expressed by the gap between per capita income and national per capita income, and urban registered unemployment rate; social security is expressed by the level of social welfare (using urban basic medical care Insurance participation rate), transportation convenience (measured by the ratio of traffic passenger volume to the country's total population in that year). This paper calculates the weights of various indicators based on the entropy method, and uses the linear weighting method to calculate the comprehensive effect of the panel data corresponding to the employment environment to obtain the final comprehensive value of the employment environment.

3.2.2 Explanatory variable: AI

Looking back at previous literature research, there is no unified standard in China for the measurement of the level of AI technology in the entire macro economy . Some scholars have drawn on the practice of Jeff & Mi-chael, using "information transmission, computer services, and software industry-wide fixed asset investment" to measure the development level of AI. These investments can reflect the role and impact of AI in the economy. Of course, this indicator does not fully reflect the development level of AI technology, because investment does not necessarily equal the level of technology. Some scholars use the density or penetration of industrial robots as proxy variables for AI. For example, Lv et al. (2017) [20] used the density of industrial robots to measure the degree of automation of industrial manufacturing in a country or region. Han et al. (2020) [21] used the robot penetration index to measure the distribution density and use degree of industrial robots in a certain area. The penetration of industrial robots reflects the distribution density and use degree of industrial robots, and can more directly reflect the current level of AI development in my country. Therefore, this paper uses the installation density of industrial robots to measure the development level of AI. Referring to the method of Kang (2021) [22] and Lu (2021) [23], firstly, according to the installation volume of industrial robots in various industries in China announced by the IRF Alliance, and then collect the employment numbers of each province in the subdivided industries from the "China Labor Statistical Yearbook". As a percentage of total employment, use this percentage x the number of robot installations in various industries across the country.

3.2.3 Control variables

In order to identify the effect of AI technology as much as possible, this paper introduces a series of control variables based on cutting-edge research. Specifically include: socio-economic growth rate (GDP (%)), represented by the growth rate of the annual regional GDP, R&D investment level (R&D), represented by the ratio of regional R&D expenditure to GDP, social welfare level (sec) , land use The proportion of social security and employment expenditure in the fiscal expenditure of the district government indicates that the social urbanization level (urb), Expressed by the proportion of the urban population in the total population at the end of the year, the education input level (edu) is expressed by the ratio of the regional financial education expenditure to the total fiscal expenditure, and the consumption level of residents (cons) is expressed by the per capita consumption of the regional resident households as a percentage of the disposable income The proportion of the foreign investment level (fdi), expressed by the ratio of the region's foreign direct investment to GDP

3.3 Data source and description

Since 2020, the global outbreak of the new crown pneumonia epidemic has caused a huge impact on the world economy. The Chinese economy has not been spared. All major economies

have experienced a sharp drop in economic growth, which has also had a huge negative impact on the employment environment. Therefore, in order to exclude the interference of the new crown pneumonia epidemic on China's employment environment, the research sample data selected in this paper is the data of 30 provinces (autonomous regions and municipalities) in China from 2009 to 2019. Among them, the data needed to measure the employment environment come from the "China Statistical Yearbook" and "China Labor Statistical Yearbook". Through the official website of the National Bureau of Statistics of China, enter the keywords "Statistical Yearbook" and "Labor Statistical Yearbook" to obtain statistical data for each year and column, and extract the measurement data involved in the variables in the model. At present, industrial robots are the key field of AI technology application, so the industrial robot data required to measure the level of AI technology comes from the International Federation of Robotics (IFR). The data needed to measure moderator variables come from the China Internet Development Statistical Report issued by China Internet Network Information Center every year, The data was collected from the official website of the China Internet Information Center. Table 1 shows the descriptive statistics of each variable. It can be seen from the table that the technical level of AI has a minimum value of 3.874 and a maximum value of 11.87, implying that there are obvious differences in the level of AI in various regions; in addition , the minimum value of the employment environment is -0.211 and the maximum value is 0.526 , the average value is 0.0357, which can reflect the large gap in employment environment among regions.

Table 1 Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
EV	330	0.0357	0.1810	-0.2110	0.5260
lnrobot dens	330	7.8850	1.5610	3.8740	11.8700
GDP	330	0.1060	0.0731	-0.2500	0.2990
R &D	330	0.0159	0.0110	0.0034	0.0631
sec	330	0.1290	0.0322	0.0577	0.2750
urb	330	0.5640	0.1280	0.2990	0.8960
edu	330	0.1640	0.0253	0.0989	0.2220
cons	330	0.7150	0.0528	0.5620	0.8940
fdi	330	0.0157	0.0230	0.00033	0.1460

4 Research methods

4.1 Correlation analysis

By conducting correlation analysis between independent and dependent variable elements, the degree of correlation between the two variable factors can be measured. Because there needs to be a certain connection or probability between the elements of correlation in order to conduct correlation analysis. However, it should be noted that correlation does not equal causality, and further analysis is needed to determine the specific relationship between variable elements. Correlation analysis is often the first step in conducting empirical research.

4.2 Multicollinearity test

Multicollinearity refers to the distortion or difficulty in accurately estimating the explanatory variables in a linear regression model due to the existence of precise or highly correlated relationships between them. In this study, multicollinearity tests were conducted to determine whether the independent variable is highly correlated with each control variable, and whether the explanatory variable has an independent impact on the dependent variable.

4.3 Benchmark regression analysis

Benchmark regression analysis is a non-linear regression that can be used to evaluate the accuracy of models or data, as well as to calculate the parameters of variables in benchmark regression models, in order to conduct empirical analysis of regression results. By performing benchmark regression on the research model, the coefficients of the explanatory variable (artificial intelligence technology level) are obtained, and the impact of the Explained variable (employment environment) on the dependent variable is judged based on the sign, size, and significance of the coefficients.

4.4 Heterogeneity analysis

Heterogeneity refers to heterogeneity and complexity, including temporal and spatial heterogeneity. Heterogeneity analysis focuses on the temporal and spatial distribution patterns of elements. This research focuses on 30 provinces in China as research samples. Due to China's

vast territory, uneven economic development, and different market environments in different regions, there are differences in the response and acceptance of artificial intelligence technology in different regions, leading to differences in the employment environment for workers. To ensure the accuracy of the research results, it is necessary to conduct spatial heterogeneity analysis on the development level and employment environment of artificial intelligence in various regions of China.

5 Empirical nanlysis

5.1 Correlation analysis and multicollinearity analysis

Correlation analysis was carried out on the main variables in the study, and the correlation coefficients among the variables are shown in Table 2. Among them, the correlation coefficient between the level of AI and the employment environment is 0.522, which can preliminarily show that the application of AI is related to changes in the employment environment. Except for the main explanatory variable, the level of AI, the correlation between the relevant control variables and the employment environment is relatively high , such as socioeconomic growth rate, R&D investment, social security, urbanization, resident consumption and foreign investment. According to Table 3, the average VIF value of the explanatory variables is $2.31 < 5$, and the 1/VIF of each variable is less than 1, indicating that there is no multicollinearity problem in the strict sense between the explanatory variables and the control variables. The contribution of the variable to the employment environment of the explained variable is independent and significant, and the prediction effect of the model will be more reliable and accurate.

Table 2 Correlation analysis of main variables

	EV	lnrobot_dens	GDP	R&D	sec	urb	edu	cons	fdi
EV	1								
Lnrobot_dens	0.522***	1							
GDP	-0.159***	-0.294***	1						
R&D	0.751***	0.478***	-0.0680	1					
sec	-0.286***	-0.0390	-0.284***	-0.157***	1				
urb	0.799***	0.475***	-0.232***	0.786***	-0.104*	1			
edu	0.0750	0.259***	0.129**	-0.0160	-0.495***	-0.242***	1		
cons	-0.216***	-0.184***	-0.129**	-0.194***	0.118**	-0.0700	-0.351***	1	
fdi	0.705***	0.525***	-0.0400	0.538***	-0.334***	0.580***	0.103*	-0.219***	1

Note: *, ** and *** are at the significance level of 10%, 5% and 1% respectively. The following tables are the same.

Table 3 Multicollinearity analysis

Variables	VIF	1/VIF
urb	4.19	0.238505
R&D	3.05	0.328142
edu	2.46	0.406522
lnrobot_dens	2.15	0.46436
fdi	2.06	0.48602
sec	1.97	0.508475
GDP	1.34	0.747313
cons	1.27	0.785805
Mean VIF	2.31	

5.2 Benchmark regression results

In the choice of measurement method, after the Hausman test, prob $>$ chi2 = 0.0622 < 0.1, that is, at the 10% significance level, the null hypothesis that the coefficients of the random effect model and the fixed effect model are similar is rejected, that is, the fixed effect model is adopted, combined with The subject of this research is to use year fixed effects for analysis. Based on the setting of model (1), this paper conducts an empirical test on the basis of panel data from various provinces (autonomous regions and direct-controlled regions) in China. Table 4 reports the benchmark regression results. Only artificial In the case of the single influence of intelligent technology, the regression coefficient (0.007) of the main explanatory variable AI technology level is significant at the 1% level and the direction is positive. In addition, the regression coefficient (0.024) of the AI technology level is still It is significant at the 1% level and the direction is positive, which indicates that the level of AI does show a significant positive correlation with the employment environment, and that a 1% increase in the level of AI technology will improve the employment environment of laborers by 0.024%. Therefore,

Table 4 Fixed-effect benchmark regression

Variables	(1) EV	(2) EV
lnrobot_dens	0.007***	0.024***
	(17.35)	(6.68)
GDP		-0.169
		(-1.19)
R&D		4.075***
		(7.30)
sec		0.242
		(1.33)
urb		0.693***
		(11.65)
edu		1.554***
		(8.01)
cons		-0.191
		(-1.61)
fdi		2.579***
		(6.93)
Constant	-0.536***	-0.342**
	(-16.26)	(-2.45)
N	330	330
R-squared	0.245	
		0.784
province FE	YES	YES
Year FE	YES	YES

the hypothesis H1 is supported by empirical evidence. Further considering regional economic factors, the results show that regional economic factors and resident consumption levels have no significant impact on the employment environment; however, the regression coefficient of R&D input factors shows significant at the 1% level and the direction is positive , indicating that in the case of sufficient government R&D investment, the level of AI technology has a greater positive impact on the employment environment. Similarly, regional governments increase investment in social welfare, the improvement of urbanization levels, investment in education, and foreign investment The increase will help to improve the employment environment.

5.3 Moderation effect test

Information infrastructure (inter), including the carrier of data interaction and storage, computing power and network communication, provides the basic conditions required for the realization of AI. The level of information infrastructure construction reflects the quality of the macro-intelligent environment to a certain extent. The Internet is an important symbol of the information age. Scholar Tan (2022) [24] selected the Internet penetration rate to measure the construction level of new infrastructure, in order to test the effect of AI on the quality of employment. Among them, the Internet penetration rate is represented by the ratio of the number of Internet broadband households to the total population. Combined with the realization of the functions of the information infrastructure, this study will refer to Tan Yusong's measurement standards, choose the Internet penetration rate to represent the level of new infrastructure, and express it by the ratio of the number of Internet users to the total population of the year.

In the baseline regression, it has been found that the development of AI level can promote the improvement of employment environment. On the basis of this conclusion and the previous theoretical analysis, we explore in-depth research on the external dependence conditions of AI affecting the employment environment. This study introduces information infrastructure to examine how it affects the effect of AI technology on the employment environment, that is, to verify the hypothesis that H2 can is not supported by empirical evidence. Using the method of interaction items to investigate the path of AI technology affecting the employment environment, the specific econometric model is set as follows:

$$\begin{aligned} \mathrm{EV}_{\mathrm{it}} =& \alpha_0 + \alpha_1 \ln robotdens_{\mathrm{it}} + \theta inter_{\mathrm{it}} + \rho inter_{\mathrm{it}} * lnrobotdensit + \sum \beta k Control_{\mathrm{it}} \\ &+ \mu_{\mathrm{i}} + \mathrm{v_t} + \varepsilon_{\mathrm{it}} \end{aligned} \tag{2}$$

Among them, inter it is the adjustment variable, which is represented by the regional Internet penetration rate. At the same time, the cross term of inter and lnrobot_dens it is used as the explanatory variable, and the other variables are completely consistent with the model (1).

Based on the test of model (2) and sample data, in the mechanism test, the interactive relationship between the independent variable and the moderator variable is encoded as the

variable M. According to the test results (Table 5), the coefficient of the interaction term between information infrastructure and AI technology is significantly positive at the statistical level of 1% and 5% respectively under the condition of a single main explanatory variable and the introduction of control variables, which means that information infrastructure is positive Adjusting the effect of AI technology on the employment environment of laborers, that is, confirming the establishment of hypothesis H2.

Table 5 Mechanism test

Variable	(1) EV	(2) EV
M	0.028***	0.001**
	(1.07)	(2.77)
lnrobot_dens	0.050**	-0.037
	(2.43)	(-1.43)
GDP		-0.041
		(-0.58)
R&D		4.701
		(1.40)
sec		-0.438*
		(-1.75)
urb		0.897***
		(3.54)
edu		-0.109
		(-0.29)
cons		-0.130
		(-0.90)
fdi		-0.814***
		(-3.33)
Constant		-0.137
		(-0.71)
N	330	330
R-squared	0.320	0.488

Table 6 Heterogeneity Analysis

Variables	(1) EV	(2) EV	(3) EV
lnrobot_dens	0.003***	0.000	0.041**
	(0.34)	(0.03)	(5.17)
GDP	0.044	-0.242**	-0.04
	(0.28)	(-2.00)	(-0.50)
R&D	5.044***	-3.717	-2.990**
	(3.70)	(-1.26)	(-2.12)
sec	0.259	-0.732	0.384*
	(0.64)	(-1.41)	(1.72)
urb	0.530***	0.825***	0.341***
	(2.68)	(3.96)	(3.07)
edu	1.370*	-0.004	0.02
	(1.87)	(-0.01)	(0.06)
cons	-0.168	-0.627***	0.249**
	(-0.70)	(-3.03)	(2.33)
fdi	1.716***	17.713***	-8.594***
	(3.87)	(3.75)	(-2.96)
Constant	-0.505**	0.028	-0.698***
	(-2.02)	(0.12)	(-5.50)
Observations	121	99	110
R-squared	0.700	0.384	0.577
F test	0	3.76E-07	0
r2_a	0.678	0.329	0.543
f	32.61	7.006	17.22

6 Heterogeneity analysis

The Benchmark regression conclusion confirms the positive promotion effect of AI technology on the employment environment of Chinese laborers. In order to further explore the impact of AI technology on the employment environment, whether there are individual characteristics due to regional differences. Further in accordance with the regional division standards in the field of economics research, China's 30 provinces (autonomous regions and municipalities directly under the central government, excluding Tibet) are divided into three regions: eastern,

central, and western. Table 6 reports the test results of regional heterogeneity in each province, where columns (1), (2) and (3) are the regression results of the eastern, central and western regions, respectively. Column (3) The regression coefficient of the effect of AI technology on the employment environment is significantly positive at the 5% level, indicating that AI technology has a positive effect on the improvement of the employment environment in the western region. Column (1) The effect of AI technology on employment The regression coefficient of the environment is significantly positive at the 1% level, indicating that AI technology has significantly promoted the improvement of the employment environment in the eastern region; the significance is higher than that in the western region. Column (2) is an empirical test in the central region. It can be seen that the coefficient of the level of AI technology is not significant, indicating that AI technology will not help improve the employment environment in the central region.

7 Conclusion and recommendations

Based on the data of 30 provinces in China from 2009 to 2019, this paper empirically analyzes the impact of AI technology on the employment environment of Chinese laborers . A three-dimensional employment environment system including regional economy, labor market, and social security is constructed, and the entropy weight method and linear weighting method are used to measure the comprehensive effect value of the employment environment in various provinces in China; the AI technology level uses the installation density of industrial robots in each region as the index. measurement standard. According to the empirical analysis results, AI technology has a significant positive effect on the employment environment of Chinese laborers. Specifically, a 1% increase inthe level of AI technology will improve the employment environment of laborers by 0.024%. Among them, the new information infrastructure represented by the Internet in various regions will help promote the role of AI technology in promoting the employment environment. A further empirical analysis of the employment environment found that: there are significant differences in the impact of AI technology on the employment environment in the eastern, central, western and northeastern regions . The effect of region is not significant.

Combined with the above research conclusions, in order to promote the high-quality growth of China's economy and at the same time ensure the stability of the employment environment for laborers, the following policy suggestions are put forward: Firstly, the government should formulate relevant legal and regulatory frameworks that adapt to the development of AI to ensure that the rights and interests of laborers are protected . Protection, from aspects such as employment contracts, working hours management, data privacy and security. The government should plan ahead, predict the evolution trend of intelligent technology and its impact on the employment environment, and grasp the opportunities to respond. Secondly, enterprises should strengthen cooperation with government departments, educational institutions, trade unions and industry organizations from the perspective of macroeconomics to jointly cope with the challenges brought about by technological development. For laborers, enterprises should also pay attention to the reserve of human capital and invest in technical training, digital literacy and innovation capabilities, so that laborers can better adapt to changes in their work. Thirdly, to strengthen the construction of the social security system to ensure that laborers can still enjoy basic or more advantageous social security and benefits in the era of AI, including the establishment and improvement of adaptive unemployment relief, medical insurance, pension and other welfare mechanisms. More attention should be paid to job transfer and retraining support for skilled laborers , including support such as career counseling, skill conversion training, loans and subsidies, to provide opportunities for laborers affected by AI to transform, and to avoid the rich and poor caused by AI technology widening gap. The fourth is to accelerate the new information infrastructure, promote the process of digital, networked, and intelligent development of Chinese society, deepen the application in the fields of transportation, manufacturing, medical care, and life services, and promote the economic reform and development of the industry while steadily improving labor. The improvement of objective employment environment and subjective employment environment perception.

In addition, compared to developed Western countries, artificial intelligence technology in China has made breakthroughs and developed slightly later. Although the current momentum is strong, it is still in its early stages. Considering that this study is based on relevant data from various provinces in China from 2009 to 2019, and the data collection is limited, this study only analyzes the short-term effects of artificial intelligence technology on China's labor employment environment, and the long-term effects have not yet been studied.

Given the increasing aging population in China, the quantity advantage of Chinese labor force will become history, and the application of artificial intelligence technology in the labor

market will become more widespread. According to the author's prediction, in the long run, the economic benefits brought by artificial intelligence technology may compensate for short-term costs. The new round of technological revolution led by artificial intelligence technology may improve the employment environment of Chinese labor to a greater extent, this issue will also become a future research direction.

References

[1] Autor DH. Why Are There Still So Many Jobs? The History and Future of Workplace Automation. Journal of Economic Perspectives. 2015, 29(3): 3-30. https://doi.org/10.1257/jep.29.3.3

[2] Yan XL, Li WX, Gao R. The impact and impact of AI technology on my country's labor market. Industrial Economics Review. 2021, 2: 65-77.

[3] Autor DH, Dorn D. The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market. American Economic Review. 2013, 103(5): 1553-1597. https://doi.org/10.1257/aer.103.5.1553

[4] Lu Y, Gu W, Bao Q. AI and Chinese enterprises' participation in the global value chain division of labor. China Industrial Economics, 2020, 5: 80-98.

[5] Han J, Yan XF, Wei NN. Regional Differences in the Impact of AI on China's Employment Skills Structure. Northwest Population. 2022, 3(49): 45-57.

[6] Notice of the State Council on Printing and Distributing the "14th Five-Year" Employment Promotion Plan. x National publication, No. 14, 2021. https://www.gov.cn/zhengce/content/2021-08/27

[7] Zeira J. Workers, Machines, and Economic Growth. The Quarterly Journal of Economics. 1998, 113(4): 1091-1117. https://doi.org/10.1162/003355398555847

[8] Acemoglu D, Restrepo P. Secular Stagnation? The Effect of Aging on Economic Growth in the Age of Automation. American Economic Review. 2017, 107(5): 174-179. https://doi.org/10.1257/aer.p20171101

[9] Acemoglu D, Restrepo P. Modeling Automation. AEA Papers and Proceedings. 2018, 108: 48-53. https://doi.org/10.1257/pandp.20181020

[10] Acemoglu D, Restrepo P. Automation and New Tasks: How Technology Displaces and Reinstates Labor. Journal of Economic Perspectives. 2019, 33(2): 3-30. https://doi.org/10.1257/jep.33.2.3

[11] Frey CB, Osborne MA. The future of employment: How susceptible are jobs to computerisation? Technological Forecasting and Social Change. 2017, 114: 254-280. https://doi.org/10.1016/j.techfore.2016.08.019

[12] Acemoglu D, Autor D. Skills, Tasks and Technologies: Implications for Employment and Earnings. Handbook of Labor Economics. Published online 2011: 1043-1171. https://doi.org/10.1016/s0169-7218(11)02410-5

[13] Mao YF, Hu WX. The impact of AI application on the employment quality of human resources practitioners. Economic Management. 2020, 7(11): 92-108 .

[14] Chen Z, Cheng CP, Chen A. AI promotes high-quality employment research in China. Economic Issues. 2022, 9: 41-51.

[15] Sui X. AI technology and improvement of labor employment environment. Economic issues. 2022, 10: 73-82.

[16] Guo CX, Fang AO. AI promotes high-quality economic development: mechanism, problems and countermeasures. Guangxi Social Sciences, 2021, 8.

[17] Zhang X. How to understand the impact of AI on the future economy and society (People's Daily Online), 2020. https://it.people.com.cn/n1/2020/0903/c1009-31847145.html

[18] Qi YD, Liu CH, Ding SL. Digital Economy Development, Employment Structure Optimization and Employment Quality Improvement. Economic Momentum. 2020, 11: 11-35.

[19] Zhang S, Guo JJ. The impact of employment quality on the unemployment rate of urban residents. Chinese Population Science, 2020, 1: 73-84.

[20] Lu J, Du CW, Li YX. Will the application of industrial robots force the transformation of a country's manufacturing labor force structure? –Based on the empirical analysis of 22 countries from 1990 to 2015. Technology Management Research, 2017, 22: 32-41.

[21] Han MC, Qiao G. The structural impact and regional differences of industrial robots on labor employment in manufacturing. Sankei Review. 2020, 5(3): 49-63.

[22] Kang X, Lin GH. Industrial Robots and Employment of Migrant Laborers: Substitution or Promotion. Journal of Shanxi University of Finance and Economics. 2021, 43(2): 43-56.

[23] Lu TT, Zhu ZY. Will AI Reduce Labor Income Share–A Test Based on Fixed Effect Model and Panel Quantile Model. Journal of Shanxi University of Finance and Economics. 2021, 43(11): 29-41.

[24] Tan YS, Wang LH, Hu SM. Can AI technology promote the improvement of employment quality? Journal of Harbin University of Commerce (Social Science Edition). 2022, 3(3): 65-89.