The Impact of China's Digital Economy Development on High-Quality Employment - Based on Full Employment Theory

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Abstracts: The rapid development of China's industrial digitization and digital economy is driven by the development of artificial intelligence, another growth wind following the booming development of the Internet and technology fields. Economic development is often related to the level of employment, so this paper aims to explore the impact of China's digital economy development on high-quality employment, collect relevant data from 11 provinces in China during 2010-2019, and conduct in-depth analysis based on the full employment theory. Based on data samples, this paper uses econometric methods to analyze the impact of digital economy development on employment structure, employment quality and employment opportunities in China. Through model construction, regression analysis and robustness test, the results show that the rapid development of the digital economy has a significant impact on the improvement of China's employment quality, and provides strong support for China to achieve the goal of full employment by optimizing the industrial structure, improving the skill level of the labor force, and creating more job opportunities. In addition, on the basis of this conclusion, this study discusses the extensibility of the empirical analysis results, and also concludes that the development of digital economy has a positive effect on the stability of the job market, which helps to alleviate the employment pressure and improve the matching efficiency of the labor market. This study has important theoretical and practical significance for understanding the relationship between digital economy development and high-quality employment, and formulating targeted employment policies.

Keywords: digital economy; employment quality; employment structure; industrial structure; labor market; empirical analysis

1. Introduction

With the rapid development of information technology, the digital economy has become an important engine for global economic growth. As the world's second-largest economy, China's digital economy has been developing particularly rapidly, with far-reaching impacts on various economic and social fields. Among them, the impact of the digital economy on the job market has attracted much attention. In order to make the conclusions more generalizable, we selected the relevant data of a total of 11 provinces in various regions of China for the 2020-2019 years

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for data modeling and data analysis. Therefore, this paper explores the impact of digital economic development on high-quality employment based on the theory of full employment, aiming to reveal the intrinsic connection between digital economic development and the employment market, and to provide theoretical support and empirical evidence for the formulation of more precise employment policies.

2. Literature Review

With the progress of science and technology and the development of society, the study of digital economic development on various industrial fields in China has gradually deepened and attracted the attention of more and more scholars. The purpose of this paper is to explore the impact of digital economic development on the quality of employment level, and to provide theoretical support and practical reference for subsequent research by combing and analyzing the existing literature.

Past research has mainly focused on the construction of basic theories in the field of employment driven by the development of the digital economy and changes in employment structure and employment patterns. For example, [1] Meng Q (2021) elaborated the impact of "Internet Plus" on employment level in their works, while [3] GUO Xiaoye,LI Yan,LI Changan (2023) focused on the correlation and impact of the digital economy, employment structure and employment quality, which provided an important theoretical framework for subsequent researchers. [2] Yue Changjun (2024), on the other hand, further expands the application of the theory by combining it with practical problems and proposing a series of innovative ideas.

As China's digital economy grows, research methods diversify and refine. Scholars increasingly use quantitative methods to reveal links between digital economy development and employment quality, structure, and level. [7] Zhang Z (2023) studied the impact of new factors on employment structure. The study by [8] Soboliev and I.O. (2020) explore the changing employment landscape in the digital economy, highlighting the need for adaptation to emerging job trends and patterns.

Interdisciplinary research links digital economy with other fields, broadening horizons and uncovering new problems/solutions. [5] Zhu R and [4] Wang W analyze policy-employment links, highlighting digital economy's dual impact on high-quality employment, and propose four paths for future high-quality employment, informing further research.And [6] Tyutyunnikova and Romanika (2019) examine the impact of the digital economy on youth employment and unemployment, highlighting both challenges and opportunities for young people.

In summary, digital economy's impact on high-quality employment research is fruitful but lacks depth on post-pandemic impacts and solutions for improving quality or structure. This paper aims to contribute to China's employment quality and new economy development through detailed studies.

3. Data description

The panel data of 11 provinces from 2010 to 2019 were selected, in which the explanatory variables consisted of "the number of employed people in the past 10 years", "the number of unemployed people in the past 10 years", "the per capita income in the past 10 years", "the added value of the primary industry (billions of yuan)", "the added value of the secondary industry (billions of yuan)", "the added value of the tertiary industry (billions of yuan)", etc., and the data was standardised using the Principal Component Analysis (PCA) method. Interpreted variables selected indicator system for "the number of employed people", "the number of unemployed people" (the value of the reverse processing), "per capita income", "value added in the primary industry", "value added in the secondary industry", "value added in the tertiary industry", the use of principal component analysis to jointly abstract the explanatory variable "quality of employment", the control variables were "birth rate (‰)" and "the local financial expenditures on science and technology (billions of yuan)".

4. Econometric model and estimation

Empirical model construction

In order to test the impact of the development of digital economy on the quality of labor employment, this paper establishes the following benchmark model:

$$\text{Yir} = \beta 0 + \beta 1\text{Diger} + \beta 2\text{Xcontrol} + \beta 3\text{X}'\text{control} + \Sigma \text{ir} \quad (1)$$

In model (1), Yir is the quality of employment for the ith worker in city r, Dige r is the digital infrastructure development in city r (cell phone penetration rate in the last ten years)/industry digitization (the number of mobile Internet users in the last ten years in sub-provinces)/digital industrialization (the number of firms with e-commerce transaction activities in the last ten years in sub-provinces), Xcontrol is the control variable reflecting the characteristics of the individual, X' control is the control variable reflecting city characteristics, βi is the regression coefficient of each variable, and εir is the random error term.

Selection of indicators

(1) Explained variable: quality of employment In order to more comprehensively reflect the quality of employment of workers, this paper measures the employment rate (number of employed and unemployed) and the level of employment income (per capita income in the past 10 years). Drawing on the research method of Ding Shulei et al. (2022), the sub-indicators are first standardized, and then the integrated employment quality index is obtained using principal component analysis. Since the "number of unemployed" is a reverse indicator, in order to ensure that its direction is consistent with the quality of employment, it needs to be assigned a reverse value.

(2) Main explanatory variables: digital economy

Regarding the measurement of the level of the digital economy, "the number of employed people in the past 10 years", "the number of unemployed people in the past 10 years", "the per capita income in the past 10 years" were selected, The index system is built by selecting several data indicators, including "value added of primary industry (billion yuan)", "value added of secondary industry (billion yuan)" and "value added of tertiary industry (billion yuan)".

(3) Control variables

Considering that the quality of labor employment is affected by a variety of factors, drawing on the relevant literature, this paper also controls, as much as possible, for other variables that may affect the quality of labor employment, such as "birth rate (‰)" and " local fiscal expenditure on science and technology (billion yuan)." Table 1 reports the descriptive statistics of the main variables.

5. Regression results

Table 1 Regression Results Table

VARIABLES	Score	P>|t|	Observations	R-squared
broadband access port	0.000994***	0.000145		
cable line	2.73E-07	2.66E-07		
e-commerce	0.000180***	6.47E-05	110	0.833
birth	0.00864	0.0287		
expenditure	-0.00260**	0.00101		
Constant	-2.340***	0.336		

Table 2 Multiple regression analysis table

Variable	Obs	Mean	Std. dev.	Min	Max.
broadband access port	110	1841.928	1610.542	111.3	8538
cable line	110	893941.7	686161.7	66991.3	3328646
e-commerce	110	2995.584	2626.809	131	15175
birth	110	11.11264	2.779119	5.36	16.44
expenditure	110	141.7309	198.369	7.47	1168.79
Employment figure	110	361.8527	321.9829	38.6	1566.9
Employment (Negative)	110	25.32182	14.35373	2.9	56.3
Income	110	64360.41	28190.88	29003	166803
Primary industry	110	1801.687	1234.547	104.8	4807.5
secondary industry	110	9523.833	8696.946	528.6	43368.2
tertiary industry	110	12865.58	11109.32	970.1	60268.1

The model is a 10-year random effects GLS regression with 110 observations. It explains 88.04% of within-group, 92.89% of between-group, and 83.31% of overall variation. The Wald test rejects the null hypothesis of all coefficients being zero, indicating significance. The coefficient of x1 is 0.000994, indicating a 0.000994 increase in pc1's mean for every 1-unit increase in x1.

At 99% confidence, x3's coefficient of 0.000180 significantly increases pc1's mean by 0.000180 per unit. controlx2's coefficient of -0.00260 decreases pc1's mean by 0.00260 per unit, both significant at 95%. Model error is mainly due to time series change (sigma_e=0.6598). Variance is mainly time-driven (rho=0).

In summary, refer to Table 1 Regression Results Table and Table 2 Multiple regression analysis table, the model accounted for a high degree of variation in the dependent variable, achieving R-squared values of 0.8804 within clusters, 0.9289 between clusters, and 0.8331 overall. Both x1 and x3 positively influenced pc1 with significant effects, while controlx2 negatively impacted pc1 with a significant effect.

6. Robustness checks

Table 3 Robustness Inspection Form

		Robust				
pc1	Coefficient	std.err.	z	P>|z|	(95% conf. interval)	
broadband access port	0.000994	0.0001469	6.77	0	0.0007061	0.0012819
cable line	0.73e-07	2.49e-07	1.09	0.274	-2.15e-07	7.61e-07
e-commerce	0.0001798	0.0000362	4.97	0	0.0001089	0.0002506
birth	0.0086438	0.0176244	0.49	0.624	-0.0258995	0.043187
expenditure	-0.0026032	0.0008099	-3.21	0.001	-0.0041905	-0.0010158
Employment figure	-2.340159	0.2351155	-9.95	0	-2.800977	-1.879341
sigma u	0					
sigma e	0.65979553		(fraction of variance due to ui)			
rho	0					

Data underwent descriptive and statistical analysis, uncovering missing values among 13 variables. Data cleaning focused on handling these missing values with mean padding to maintain mean value, simplicity, and sample size.

To handle the negative explanatory variable y2 (unemployment), we subtracted its max value to ensure positive observations. The egen and gen commands enable simple data manipulation and new variable generation. Given six explanatory variables, we applied PCA to reduce dimensionality, generate principal component scores (pc1), and separate noise from signal for more focused analysis.

Regression analysis was conducted using a random effects model with robust standard errors in Stata, and heterogeneity tested via Breusch-Pagan/Cook-Weisberg. Refer to Table 3 Robustness Inspection Form, this approach leverages cross-sectional and time-series data, enhances estimation accuracy, addresses omitted variables, handles heteroscedasticity, and confirms model validity. Heteroscedasticity test results showed no significant issues, confirming model accuracy.

7. Conclusion

This paper shows that e-commerce enterprises, digital infrastructure, and employment quality positively correlate in China's 11 provinces from 2010-2019. To enhance employment quality, we propose workforce skill enhancement, digital economy trend analysis, job requirements analysis, and personalized skill plans. Workers should engage in training and practical projects to acquire digital expertise.

Regions should emulate digital industry development, optimize industrial structure, balance regional digital economy, and increase digital enterprises. The digital economy fosters industrial upgrades, emerging industries, job opportunities, and innovation-driven strategies. IT, AI, big data create jobs. Digital infrastructure metrics reveal broadband, mobile internet, domain names, IPv4, and 5G base stations. Regional integration trends are clearer, with digital intelligence enriching scenarios, breaking barriers, and reducing inter-regional costs.

Promote integration of traditional and digital industries to balance job transfers. Leverage industry sharing, learn from talent attraction strategies, and incorporate digital flexibility. The digital economy widens market access and connects long-tail markets. Governments and enterprises must develop strategies to guide integration, including objectives, timetables, and evaluation. Invest in R&D to digitalize traditional industries via university-industry partnerships. Encourage collaboration to share resources, complement strengths, and enhance industrial chain competitiveness.

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