An Empirical Analysis of the Impact of Digital Economy Development on Employment Quality:

An Empirical Study Based on a Spatial Econometric Model

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Abstract. The rapid development of the digital economy has not only brought new challenges to the labor market in the new economic era, but also provided an opportunity to achieve higher-quality employment for our workers. The data are from 31 Chinese provinces between 2013 and 2020, systematically explores in the context of digital economy development and employment dynamics quality in China and its mechanism of action using a spatial econometric models. We find that the negative spatial spillover effect of digital economy development on neighboring urban areas is significant. Accordingly, the study proposes that differentiated initiatives should be developed in different regions in the future to suppress digital economy monopoly in order to achieve employment quality improvement.

Keywords: Digital Economy, Employment Quality, Spatial Econometric Models.

1 Introduction

According to data disclosed in China Internet Development Report 2021, the scale of China's digital economy continues to expand. The disappearance of the demographic dividend and the rise in labor costs in the future have become a definite trend, and digital and high-tech dividends such as digital technology are replacing the demographic dividend, becoming an important engine and booster for the next stage of economic development. On the positive side, the development of the digital economy has gradually penetrated into all aspects of the national economy and production activities, greatly improving the production and service efficiency of enterprises, expanding the scale of employment, raising labor productivity. On the other hand, the monopolistic nature of the digital economy, as well as the "digital divide" between urban and rural areas and regions, and the impact of the new generation of digital technologies on the middle- and low-skilled labor force have all posed great challenges to narrowing the gap in the quality of employment. This paper focuses on the following question: What

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is the spatial impact of digital economy development on the quality of employment after considering spatial correlation?

2 Theoretical Analysis

Since AI-type technology-intensive industries are mainly concentrated in the more economically developed first-tier cities, it will lead to labor force transfer, and traditional agriculture, light industry and manufacturing industries, which are less related to digital technology, will lag behind, forming a regional balance and industrial structural imbalance at the same time (2020)[1]. Specifically, affected by the economic foundation and digital infrastructure, the quality of employment in the east is most affected, which can mainly promote the coordinated development of the employment structure of the primary and tertiary industries, followed by the central region, which can mainly promote the upgrading of the employment structure of the secondary industry, and has strong spatial autocorrelation and spillover effects (2022)[2], while the northeast region and the west are weaker (2022)[3]; in general In general, the development of digital economy has a positive effect on the quality, structure and scale of employment in the province, but only the employment and scale of the spatial spillover effect, so we should pay attention to the "digital divide" while developing the digital economy, in order to improve the quality of employment in each region (2022)[4]. At the same time, many scholars start from the concept of research on employment quality around the construction of employment quality evaluation index system (2011,2020,2022) [5,6,7], which is also the focus of the research in this paper.

3 Selection of Indicators

3.1 Core Explanatory Variables

Taking full account of objective requirements such as the start-up years[8,9]. See Table 1 for details.

Table 1. Digital economy development level system.

Target Layer	Primary Indicators	Secondary Indicators
Evaluation of Digital Economy Development at Provincial Level in China System	Digital Environment Development	R&D personnel
		R&D internal expenditure
		Number of patent applications at the State Intellectual Property Office
		Number of students per 100,000 enrolled in higher education
		Cell phone penetration rate

Digital Infrastructure Development	Percentage of Information Technology Practitioners
	Fiber optic cable line length
	Internet broadband access port
	Number of corporate owned websites
Digital Trading Development	The proportion of e-commerce enterprises
	E-commerce sales
	Software business revenue

3.2 Explained Variables

The quality of employment is calculated as follows[10]:

Employment quality (EMP) = (per capita wage income of farmers*0.4 + average wage of urban workers*0.6)*0.6 + social security and employment expenditure in fiscal expenditure*0.4

3.3 Control Variables

(1) economic development (PGDP) is expressed using GDP per capita; (2) financial development (FIR) is expressed using institutional year-end deposit and loan balance/GDP; (3) urbanization rate (POP) is expressed using urban population/total population; the higher the urbanization rate, the more employment opportunities of all types; (4) government intervention (GOV) is expressed using government expenditure/GDP; and (5) education level (EDU) is expressed using education expenditure.

4 Empirical Results and Analysis

Global Moran's I calculations is performed prior to the establishment of the spatial econometric model, and here the spatial autocorrelation test between the explanatory variable employment quality and the core explanatory variable digital economy development level is performed using the adjacency matrix.

Table 2. Global Moran's I.

	EMP			DIG		
year	Moran's I	Z	p	Moran's I	Z	p
2013	0.171	2.622	0.004	0.203	3.129	0.001
2014	0.168	2.587	0.005	0.204	3.126	0.001

2015	0.154	2.399	0.008	0.206	3.143	0.001
2016	0.123	2.001	0.023	0.200	3.055	0.001
2017	0.154	2.406	0.008	0.201	3.071	0.001
2018	0.163	2.516	0.006	0.191	2.941	0.002
2019	0.163	2.514	0.006	0.196	2.998	0.001
2020	0.160	2.473	0.007	0.213	3.208	0.001

Table 2 illustrates that the Moran indexes are positive at 1% significant level, which shows that both the explanatory variable and the core explanatory variable are spatially autocorrelated, with H-H aggregation and L-L aggregation among regions. In 2013, Zhejiang, Jiangsu, Beijing and Guangdong and their neighbors have high digital economy development level, Tibet, Gansu, Heilongjiang and Ningxia and their neighbors have low development level, Shanghai, Anhui and their neighbors have high employment quality, Xinjiang, Qinghai and their neighbors have low employment quality, in 2020, high - high aggregation area of digital economy development level newly added Shaanxi, Hunan and other places, low - low aggregation area decreases Guizhou and other areas, high-high aggregation area of employment quality decreases Shanghai and other areas, low-low aggregation area is basically unchanged, indicating that most Chinese provinces and cities have the characteristics of spatial aggregation in both digital economy development level and employment quality, which may lead to systematic errors in research conclusions if spatial factors are ignored.

The Hausman test identified the choice of a fixed effects SDM model to analyze the impact of the digital economy on the quality of employment, in the following form:

$$EMP_{it} = \rho W_{ij} EMP_{it} + \alpha_1 DIG_{it} + \alpha_2 X_{it} + \alpha_3 W_{ij} DIG_{it} + \alpha_4 W_{ij} X_{it} \quad (1)$$

Due to space limitations, control variable results are not reported. Since the individual fixed effect has the highest fit in Table 3, the analysis focuses on the individual fixed effect model. From the estimation results of the individual fixed SDM model, you can see that the core explanatory variable is significantly positive, which shows that digital economy development can promote employment quality improvement. The spatial lag term of the core explanatory variable is significantly negative, which means that digital economy development in the region has a siphoning effect, and with the development of digital economy, the quality of employment in the region gradually improves, forming a monopoly trend and inhibiting the employment in neighboring regions.

Table 3. Regression results of a spatial model

	Time Fixed	Individual Fixed	Dual Fixed
DIG	-0.344***	0.300***	0.362***
	（-4.06）	(3.82)	(4.67)

W×DIG	-2.192***	-0.903***	-0.5
	(-5.32)	(-3.89)	(-1.61)
ρ	0.268**	0.421***	-0.644
	(2.03)	(4.42)	(-0.42)
Sigma2	0.130***	0.021***	0.019***
	(11.05)	(11.04)	(11.12)

It is further decomposed into direct effect, indirect effect and total effect in table 4. The coefficient of direct effect of digital economy development is positive at 1% significance level, representing that the development of digital economy can lead to the improvement of the quality of employment of the region, specifically, for every 1% increase in the level of digital economy development, the employment quality of the region increases by 0.252% accordingly. The indirect effect represents the impact of the core explanatory variable on the explained variable of its neighboring regions, indicating that the digital economy plays a significant inhibitory role on the employment quality of its neighboring regions, which may be explained by the fact that regions with more developed digital economy development have lower marginal costs and higher degree of data integration and aggregation, forming a monopoly effect contrary to the general positive spillover effect. The total effect of digital economy development is significantly negative, indicating that digital economy development has a significant inhibitory effect on the quality of employment in each region, which may be mainly due to the siphon effect of digital economy development, which attracts neighboring regions to increase the employment compensation and benefits to their own regions, and then reduces the capital that should be invested in neighboring regions. The end result may be a decline in the quality of employment in neighboring regions.

Table 4. Direct effect、Indirect effects and Total effect

	Direct effect	Indirect effects	Total effect
DIG	0.252***	-1.336***	-1.084**
	(3.28)	(-2.86)	(-2.27)

5 Conclusions

Based on the spatial autocorrelation test based on the adjacency matrix, the study found that there is a spatial autocorrelation between the level of development of digital economy and the quality of employment, and the factor aggregation should be fully considered when making digital economy policies. The spatial autocorrelation was found to exist between digital economy development and employment quality. A spatial Durbin model was constructed to find that digital economy development has a positive

contribution to the improvement of local employment quality, but the spatial lag term of digital economy development has a negative impact on employment quality, indicating that it has a suppressive effect on its neighborhood. Therefore, there is a need to curb the monopoly of the digital economy, reduce the binding situation caused by excessive aggregation, and reverse the negative spatial spillover effect into a positive one.

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