Artificial Intelligence and High-Quality Development of Henan Province's Economy

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Abstract: Based on the data of 18 prefecture-level cities in Henan Province from 2013 to 2021, this paper constructs a fixed effect model to empirically analyze the economic impact and mechanism of AI development. It is found that artificial intelligence has a significant role in promoting the high-quality economic development of Henan Province, which is an inverted U-shaped effect. Through the study of artificial intelligence and high-quality economic development in Henan Province, it is of great significance to the rational use of artificial intelligence.

Keywords: Artificial Intelligence, Economic Development, Job Satisfaction, Grey Correlation Degree

1. Introduction and Literature Analysis

President clearly emphasized in the report of the 20th National Congress that "high-quality development is the primary task of building a socialist modern country in an all-round way", highlighting the important position of high-quality development. An important aspect of high-quality development is high-quality economic development, which will bring about the growth of economic quality and efficiency. Since the reform and opening up, Henan Province has sent a large number of labors to the developed areas of the country, but with the industrial upgrading, the economy has turned to high-quality development, how to improve labor productivity and foster new growth momentum. So, can the development of artificial intelligence affect the local high-quality development? This paper will explore this problem based on the quasi-natural experiment of the development of artificial intelligence in Henan Province, so as to provide some reference for improving the high-quality economic development of various regions.

Through literature review, the existing literature mainly focuses on two aspects of AI's impact on high-quality economic development: First, it emphasizes that AI has an impact on industrial structure. There is no consensus on AI's impact on the development of industrial structure. Some literatures believe that AI can promote the upgrading and rationalization of industrial structure [1-3]. Some literature suggests an inhibitory effect [4-5], while others suggest a regionally heterogeneous effect [6-7]. The continuous upgrading and application of artificial intelligence technology can improve the competitiveness and efficiency of enterprises and inject new impetus into economic growth. At the same time, because the application of artificial intelligence technology requires a large number of data, algorithms and intelligent equipment and other infrastructure, it can promote the development of related industries and improve the level of technology and industry. When artificial intelligence technology gradually matures, competition will intensify, which will lead to the squeeze of profits between enterprises and inhibit industrial development. In this regard, this paper puts forward the hypothesis H1: artificial intelligence has an inverted "U" impact on high-quality economic development.

2. Research Design

2.1. Index selection

2.1.1. Explained variable

The level of high-quality economic development. According to the availability of data, the indicators of high-quality economic development in Henan Province are constructed from four aspects: economic structure, economic innovation, economic development and sharing of economic achievements. The

construction of specific indicators is shown in Table 1 below, and the data are all from the statistical yearbook of Henan Province.

Table 1: High Quality Economic Development Indicators of Henan Province.

Aim	Subsystem	Criterion layer	Specific measure
Indicators of high-quality economic development	Economic structure	Industrial structure	Output value of tertiary industry/output value of secondary industry
		Consumption structure	Food consumption expenditure/total consumption expenditure
		Open structure	(Actual utilization of foreign trade direct investment + actual utilization of total funds outside the province)/GDP
	Economic Innovation	Innovation input	R & D expenditure/GDP
		Innovation output and contribution	Turnover of technology market/GDP
	Economic Development	Development efficiency	Land productivity = total grain output/total area of cultivated land Labor productivity = GDP/total number of employees
		Development results	Income outcome = ln (per capita disposable income) Consumption outcome = ln (per capita consumption expenditure)
		Sustainable development	Continuous employment = employment rate
		Green economy	Regional greening rate = area covered by regional greening/total area
	Sharing of economic achievements	Urban-rural income ratio	Urban per capita disposable income/rural per capita disposable income
		Urban-rural consumption ratio	Urban per capita consumption expenditure/rural per capita consumption expenditure
		Urbanization rate	Urban population/total population

2.1.2. Explanatory variable: artificial intelligence

At present, the single measurement of artificial intelligence mainly includes patent application related to artificial intelligence, patent authorization related to artificial intelligence, investment in fixed assets of the whole society in information transmission, computer service and software industry, and installation density of industrial robots. Construct the AI development index. According to the characteristics of Henan Province, this paper selects information transmission, computer services and software industry as the indicators to measure the development level of artificial intelligence in Henan Province, and the data comes from the Statistical Yearbook of Henan Province.

2.1.3. Control variable

The control variables include the number of municipal enterprises, the number of colleges and universities, government education expenditure and consumer price index.

2.2. Measurement model

$$HQED_{it} = \partial_0 + \partial_1 AI_{it} + \partial_2 AI^2_{it} + \partial_3 X_{it} + \lambda_i + e_i \qquad (1)$$

$HQED_{it}$ is the economic development level of city i in year t, AI_{it} is the artificial intelligence level of artificial intelligence in city i in year t, X_{it} represents the control variable, λ_i is the city fixed effect which controls the characteristics that the city level does not change over time, e_i is the random perturbation term.

3. Analysis of Empirical Results

3.1. Empirical analysis of the impact of artificial intelligence on high-quality economic development

Table 2: Empirical analysis of the impact of artificial intelligence on high-quality economic development.

	(1)	(2)
	HQED	HQED
AI	0.0305**	0.0218**
	(0.0113)	(0.00787)
AI2	-0.00669*	-0.00660**
	(0.00346)	(0.00286)
lnenternum		-0.000126
		(0.00831)
cpi		0.000310**
		(0.000133)
schoolnum		0.0161***
		(0.00411)
lneduexpend		0.0749***
		(0.0157)
_cons	0.455***	-0.719***
	(0.00427)	(0.185)
N	162	162
R2	0.480	0.775
adj. R2	0.411	0.737

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In this paper, fixed effect analysis is carried out without control variables and with control variables in the model to test the impact of AI development on high-quality economic development. The specific results are shown in Table 2 above. The square term of artificial intelligence is significantly negative, which verifies our hypothesis . After adding control variables, it is still significant and more significant, indicating that the number of schools and enterprises has a certain impact on the high-quality development of the economy.

4. Conclusions and policy recommendations

Conclusion: Artificial intelligence has an inverted "U" effect on high-quality economic development. Suggestions: (1) Accelerate the application of artificial intelligence technology: encourage enterprises to increase the research and development, innovation and application of artificial intelligence technology, accelerate the intelligent transformation of agriculture, industry and other fields, and improve the quality and efficiency of Henan's economic development. Training professionals: The government can introduce relevant policies to support higher vocational colleges and vocational training institutions to increase education and training in artificial intelligence related fields, improve the quantity and quality of technical personnel, and provide the necessary talent guarantee for the high-quality development of Henan's economy.

In a word, the application and development of artificial intelligence technology can provide support for the high-quality economic development of Henan Province. It is necessary to continuously improve the industrial and technological level of Henan Province, strengthen personnel training, optimize the policy environment, realize the integration of artificial intelligence and all walks of life, improve residents 'job satisfaction, and closely integrate with agricultural development, so as to promote Henan Province to move towards a higher quality of economic development.

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