An Empirical Study on the Impact of Digital Economy on the Income Gap between Urban and Rural Areas

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Abstract. This paper selects panel data of 31 provinces and cities from 2012 to 2021 to explore the impact of digital economy on urban-rural income gap through empirical research. The results indicate that the improvement of the development level of the digital economy has a significant narrowing effect on the urban-rural income gap. The economic development level, government intervention level, and urbanization level of each province also have a significant improvement effect on the urban-rural income gap. In the future, we can gradually narrow the urban-rural income gap by promoting the Digital transformation of traditional agriculture, focusing on the training and introduction of talents in the digital economy, and integrating smart cities and digital villages.

Keywords: Digital economy; urban-rural income; gap Theil index

1 Introduction and Literature Review

The priority development strategy of heavy industry centered around cities has led to a large influx of capital and labor into cities.[1] Although China's economy has developed well and the imbalance between urban and rural development has improved, this imbalance still exists. The income of urban residents is much higher than that of rural residents.[3] here is still relative poverty among low-income groups, and the proportion of poverty in rural areas is still higher than that in urban areas. At the same time, the continuous development and widespread application of the digital economy and digital technology have had a huge impact on various industries in China.

Domestic and foreign researchers have conducted extensive research on the relationship between the digital economy and the urban-rural income gap. [5] The study by Han Qing (2018) and others shows that farmers using digital technologies such as the internet can increase agricultural income, wage income, and entrepreneurial income. [2] The digital economy can reduce the adaptation cost of migrant populations, support urban production systems, and integrate urban functions. This can improve the urbanization system through economies of scale, technology transfer, and optimized labor distribution, thereby stimulating the development of agricultural economy. This is a question that is often worth studying.[4] With the rapid development of digital science and the

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cautious influence of digital technology in many fields of the social economy, the digital economy has become an important new engine for promoting high-quality development of China's economy, which will inevitably have a profound impact on the urban-rural income distribution pattern. With the continuous expansion of the breadth and depth of digital technology, work requires more knowledge and human capital skills, and the differences in digital skills between urban and rural areas are becoming apparent. Due to factors such as cultural level and resource acquisition, digital dividends are more beneficial for urban residents. The development of the Internet can greatly increase the income of urban residents, but it will not have a significant impact on the income of rural residents.

2 Empirical Research

2.1 Establishing a Model

To study the impact of digital economy on urban-rural income gap, establish an econometric model:

$$Gap_{it} = \alpha_0 + \alpha_1 de_{it} + \alpha_2 control_{it} + \varepsilon_{it} \quad (1)$$

In the above formula, is the dependent variable representing the urban-rural income gap, is the independent variable representing the level of the digital economy, and is the control variable of the impact of the digital economy on the construction of the urban-rural income gap, including the level of economic development, urbanization, and government intervention. It is a random interference term.[6]

2.2 Variable Description and Data Source

Dependent variable: urban-rural income gap (gap). Through literature review, domestic researchers often use indicators such as urban-rural income ratio and consumer expenditure ratio to measure urban-rural income gap;[8] This article follows the approach of Ji Fu jun (2023) and uses the ratio of per capita disposable income of urban residents to per capital consumption of rural residents, known as the Theil index, to measure the urban-rural income gap.

$$Theil_{it} = \sum_{i=1}^{2} \left(\frac{I_{it}}{I_t}\right) ln \left(\frac{\frac{I_{it}}{P_{it}}}{\frac{I_t}{P_t}}\right) \quad (2)$$

Independent variable: The level of development of the digital economy (de). After comprehensive consideration, this article refers to the research results of Ji Fu jun(2023) and selects digital economy development indicators to characterize the level of digital economy development. [7] This article uses data such as per capital total telecommunications business, per capital postal business, per 100 mobile phone users, and digital inclusive finance index, and uses entropy method to measure.

Control variables: Economic development level (lnGDP), government intervention

level (cz), and urbanization level (ur) are selected as control variables. The level of economic development is represented by the ratio of GDP to population in each province, the degree of government intervention is the ratio of fiscal expenditure to GDP in the general budget, and the level of urbanization is the proportion of urban population to the total population.

2.3 Descriptive Statistics

This paper selects the panel data of 31 provinces and cities (excluding Hong Kong, Macao and Taiwan) from 2012 to 2021. In order to study and verify the impact of the digital economy on the urban-rural income gap, the data is extracted from the China Statistical Yearbook and the statistical yearbooks of provinces, and the missing values are supplemented by interpolation. As shown in Table 1 the minimum value of the urban-rural income gap (GAP) is 0.0180 and the maximum value is 0.197, indicating significant differences in urban-rural income gap among provinces. The same applies to other variables.

Table 1. Decriptive statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
year	310	2,017	2.877	2,012	2,021
gap	310	0.0865	0.0383	0.0180	0.197
de	310	0.322	0.0840	0.153	0.575
cz	310	0.280	0.192	0.107	1.334
ur	310	59.28	12.77	22.87	89.60
lngdp	310	10.90	0.432	9.887	12.12

Data sources: China Statistical Yearbook

2.4 Linear Regression

As shown in Table 2, the regression coefficient of the variable on the development level of the digital economy is less than 0, passing a significance test of 5%, indicating that the development of the digital economy has a positive impact on narrowing the urban-rural income gap. For every unit increase in the development level of the digital economy, the urban-rural income gap will shrink by 0.034 units. The three control variables are all significant at the 1% level, among which the level of economic development and urbanization have a positive impact on narrowing the urban-rural income gap, while the degree of government intervention is the opposite.

Table 2. Linear regression

gap	Coef.	St.Err.	t-value	p-value	[95% Conf Inter-val	Sig	
de	-0.034	0.017	-2.02	0.044	-0.067	-0.001	**
cz	0.022	0.007	3.21	0.001	0.008	0.035	***
ur	-0.002	0	-8.84	0	-0.002	-0.001	***
lngdp	-0.019	0.006	-3.27	0.001	-0.031	-0.008	***
Constant	0.403	0.052	7.78	0	0.301	0.504	***
Mean dependent var		0.086	SD dependent var			0.038	
R-squared		0.770	Number of obs			310	
F-test		255.598	Prob > F			0.000	
Akaike crit. (AIC)		-1590.164	Bayesian crit. (BIC)			-1571.481	
*** *p*<.01, ** *p*<.05, * *p*<.1							
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3 Conclusions and Suggestions

Through the above research, it can be concluded that the development of the digital economy helps to narrow the income gap between urban and rural areas. The higher the level of economic development and urbanization rate in each province, the more conducive it is to narrowing the urban-rural income gap. [9] Therefore, this paper puts for-

ward the following suggestions: Digital transformation of traditional agriculture. Develop smart agriculture, develop and promote agricultural production communication equipment, and encourage and support farmers to develop production through subsidies, tax exemptions, and other means. Promote the development of the digital economy, while addressing the resulting digital divide in the later stages and expanding the urban-rural income gap. One is to strengthen the promotion and education of the digital economy, improve rural internet thinking, participation, enthusiasm, and well-being, and increase awareness of digital technology. Secondly, strengthen the effective utilization of the digital economy in agricultural production and life, with a focus on improving farmers' ability to pay. Thirdly, governments of various countries need to strengthen the construction of rural digital economy infrastructure, such as expanding the coverage of rural networks, building information stations and internet cafes in rural areas, and addressing the problem of information asymmetry between rural and rural areas.

Focusing on talent cultivation and introduction in the digital economy. Firstly, to enhance farmers' understanding of the digital economy, such as through "online+offline" training and other forms, improving farmers' ability to use relevant software and hardware equipment for digital technology, actively promoting typical cases, promoting wealth through e-commerce and other internet channels, and mobilizing and encouraging farmers to actively learn digital knowledge and technology.

Secondly, integrate the construction of smart cities and digital villages to promote the integration process between urban and rural areas.[10] Strengthen the construction of rural digital infrastructure, continue to strive to improve digital services such as rural big data, Internet of Things, and digital finance, and lay the foundation for urban-rural cooperation and division of labor. At the same time, promote modular network construction, promote coordinated urban-rural development, accelerate industrial transformation, and deepen professional division of labor by improving productivity and transaction efficiency; promoting the expansion of rural digital economy, reducing the siphon effect of big cities, and ultimately narrowing the urban-rural gap. Accelerate the modernization of agriculture and rural areas Exploring the digital island economy to promote the building of land distributors, promoting the development of e-commerce in land distributors, creating intelligent industrial clusters in agriculture, promoting the development of advanced industries in land distributors, increasing the competitiveness of land distributors, Providing incentives for the modern of agriculture and land distributors, Provide Agricultural Products and Increase Farmers' Income with Farmers modern technology.

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