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The Impact of the Digital Economy on Income Inequality

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Abstract

This paper employs a univariate linear regression model to examine the impact of the digital economy on income inequality, using provincial panel data from 2010 to 2023 obtained from the National Bureau of Statistics of China. Robustness checks are conducted using the number of internet broadband access ports, and heterogeneity analyses are carried out from the perspectives of different time periods, regions, and the urban–rural dual structure. The main findings are as follows. First, the digital economy plays a mitigating role in income inequality. Second, following China's proposal of the urban–rural integrated development strategy in 2017, the inequality-reducing effect of the digital economy has become more pronounced. Third, the mitigating effect of the digital economy is stronger in Northeast and Western China, while it is relatively weaker in Eastern and Central China. Fourth, the digital economy in urban areas has a stronger alleviating effect on income inequality. Based on these findings, this study further emphasizes that the government should strengthen digital economy infrastructure development, establish mechanisms for two-way data flows between urban and rural areas, leverage digital technologies to empower the transformation and upgrading of old industrial bases in Northeast China and the development of the green economy in Western China, and enhance digital awareness campaigns in rural areas as well as regulatory oversight of digital industries in urban areas.

Keywords

digital economy, income inequality, regression analysis, heterogeneity analysis, robustness test

1. Introduction

The digital economy is a new form of economic activity that relies on data as a key factor of production, digital technologies, and modern information networks. Through the deep integration of digital technologies with the real economy, it drives the digitalization, networking, and intelligent transformation of economic and social systems, while reshaping patterns of economic development and governance. Since China achieved full functional access to the international internet in 1994, the digital economy has experienced rapid growth. By 2023, the overall scale of China's digital economy had reached 55.4 trillion yuan, ranking second globally for several consecutive years and accounting for 47.1 percent of GDP.

However, in the era of the digital economy, China still faces a relatively serious problem of income inequality. As of 2024, China's overall Gini coefficient had reached 0.47, exceeding the internationally recognized warning threshold of 0.4. Official data from 2023 indicate that the average monthly income of high-income groups is approximately 10.5 times that of low-income groups, further demonstrating the persistence of a substantial income distribution gap in China.

Accordingly, this study seeks to address the following questions: Does the development of the digital economy generate income effects? Does digital economy development exacerbate income inequality in China? How can the digital economy be leveraged to advance China's goal of common prosperity?

In light of these considerations, this paper conducts an empirical analysis of the impact of the digital economy on income inequality. Based on an accurate assessment of China's current conditions, it employs macro-level data from 2010 to 2023 and applies a univariate linear regression model. Robustness tests and heterogeneity analyses are further conducted to derive more comprehensive and reliable conclusions.

2. Literature Review

The body of literature most closely related to this study examines the impact of the digital economy on income inequality from a macro-level perspective. Yibing Ding et al. [1] argue that the digital economy represents a new wave of technological revolution and industrial transformation, exerting profound effects on the income distribution structure. Xiumei Wang et al. [2] find that the digital economy mitigates income inequality among farmers. Kai Yang et al. [3] suggest that the impact of the digital economy on urban–rural income inequality exhibits significant regional heterogeneity. Han Bu et al. [4] show that the development of the digital economy in Eastern China has a stronger effect on labor income inequality. Xingjian Yi et al. [5] contend that the digital economy improves residents' income inequality through channels such as the expansion of social networks. Ting Chen [6] argues that the exacerbation of income inequality inhibits the expansion of the digital economy.

From a micro-level perspective, studies examining the effects of firms' digital transformation on income inequality are also closely related to this paper. Rongji Wang and Jue Wang [7] find that digital transformation significantly reduces income inequality within firms. Fangzhuo Li et al. [8] argue that narrowing the digital capability gap can alleviate the inequality-widening effect of digital transformation on labor income. Shaoxuan Zhai and Xinran Wang [9] demonstrate a U-shaped nonlinear relationship between digital transformation in manufacturing and intra-firm wage disparities.

In addition, some studies explore income inequality from multiple dimensions, including digital literacy, digital rural development, and the development of digital services. Zizhen Zhang [10] finds that improvements in digital literacy help reduce urban–rural income inequality, with a stronger equalizing effect in rural areas. Bochi Sun and Han Yin [11] argue that digital rural development has widened income inequality among rural households, with the income-increasing and gap-widening effects of rural economic digitalization being the most pronounced. Xinze Li et al. [12] find that digital rural development mainly narrows income disparities within rural areas by increasing entrepreneurial opportunities and expanding non-agricultural employment. Dongming Zhang and Huaying Li [13] suggest that the development of digital services trade helps reduce the income share of high-income groups while increasing the income share of middle-income groups.

Based on the above literature, this paper may offer the following contributions. First, the research topic is highly time-sensitive, focusing on the socially salient issue of the digital economy and its impact on income inequality. Second, the research methodology has practical relevance. Against the backdrop of the rapid development of the digital economy in China from 2010 to 2023, this study analyzes income inequality in China with particular attention to the urban–rural dual structure and the effects of urban–rural integration. It thus carries important practical significance and provides China's experience for other countries actively developing their digital economies. Third, the study employs comprehensive and up-to-date data, covering the period from 2010 to 2023 and encompassing 31 provinces, municipalities, or autonomous regions in China.

3. Stylized Facts of China's Digital Economy and Income Distribution

Figure 1 illustrates the urban–rural gap in the development of China's digital economy, measured by the ratio of broadband access users in urban areas to those in rural areas. From a trend perspective, between 2010 and 2023 this ratio shows a clear downward trajectory, indicating a continuous narrowing of the urban–rural digital economy gap in China. From a growth-rate perspective, during 2010–2012, alongside the rapid expansion of mobile communications and broadband networks, the urban–rural digital gap declined at a relatively fast pace. Between 2013 and 2018, as network hardware penetration approached saturation and the marginal effects of network installation diminished, the pace of gap reduction slowed. During 2019–2023,

owing to the impact of the COVID-19 pandemic and the persistence of disparities in network usage capabilities, the rate of decline in the urban–rural digital economy gap approached zero.

Figure 2 depicts the evolution of the number of internet users in China, thereby reflecting the overall development trajectory of the national digital economy. From a trend perspective, the number of internet users in China increased steadily from 1997 to 2024, indicating continuous expansion of internet development. From a growth-rate perspective, between 1997 and 2006 the number of internet users grew at a relatively slow pace. From 2007 to 2024, however, the pace of growth accelerated markedly with the advent and diffusion of new-generation information technologies.

Figure 1: Urban–Rural Gap in the Development of China's Digital Economy

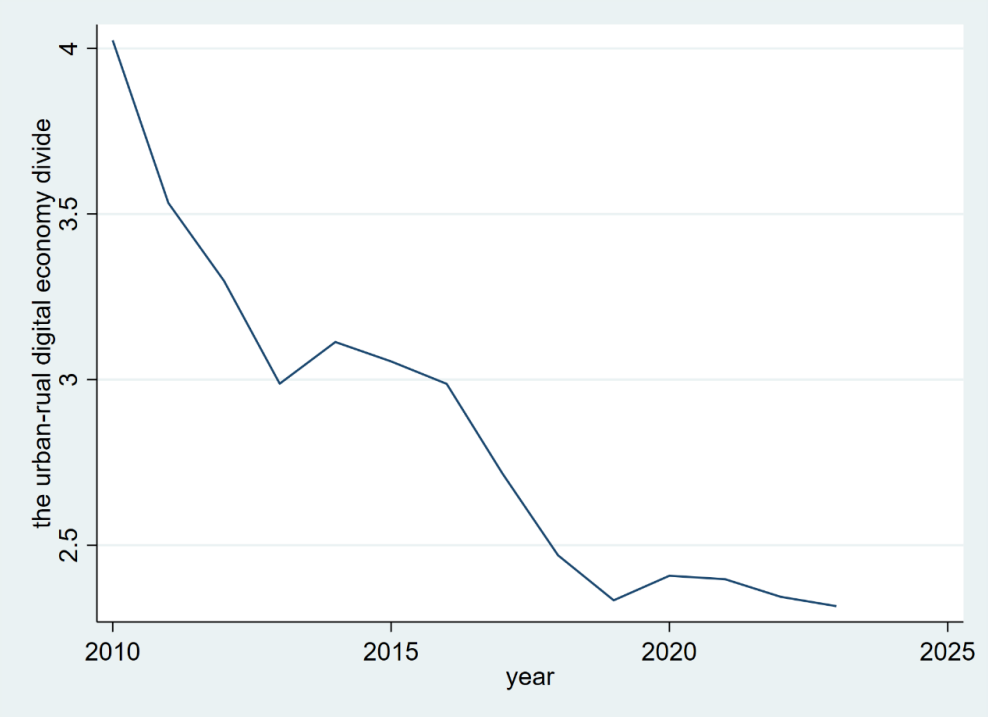


Figure 2: Number of Internet Users in China

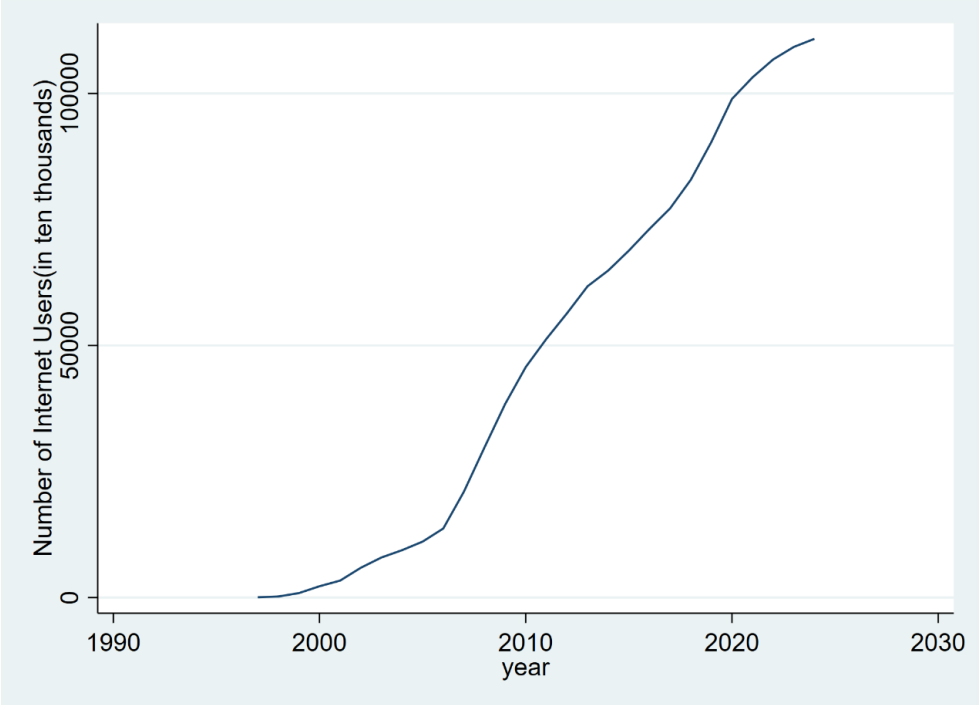


Figure 3: Urban–Rural Income Ratio in China

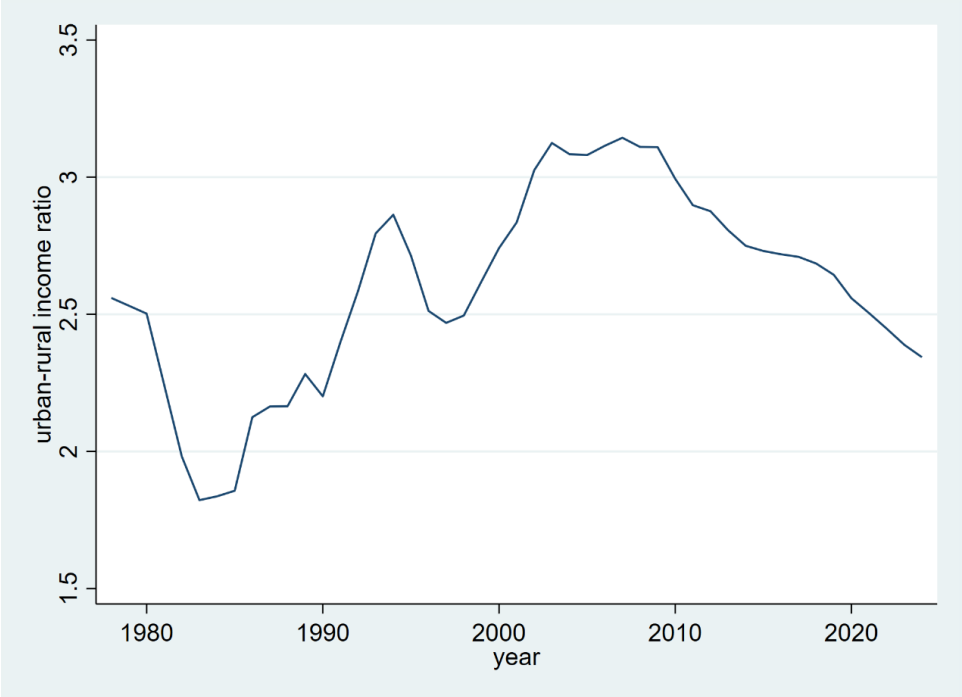
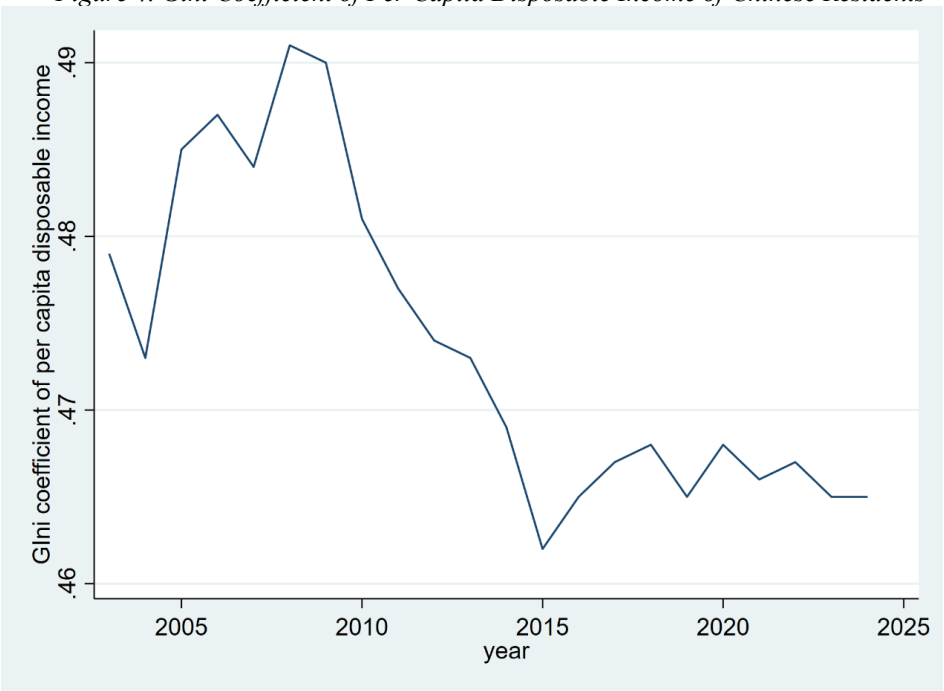


Figure 3 presents the urban–rural income gap in China, measured by the ratio of per capita disposable income of urban residents to that of rural residents. From a trend perspective, during 1978–1984 the urban–rural income ratio declined, indicating an easing of income inequality. From 1984 to 2004, the ratio fluctuated upward, while from 2004 to 2024 it declined again, suggesting a renewed narrowing of the urban–rural income gap. From a growth-rate perspective, the urban–rural income ratio changed relatively rapidly during 1978–2004, but declined more slowly during 2004–2024. Notably, after 2004 the pace of change in the urban–rural income ratio slowed substantially while exhibiting a downward trend. This suggests that following the Lewis turning point, the urban–rural income gap further narrowed.

Figure 4 illustrates the evolution of the Gini coefficient of residents' per capita disposable income, thereby providing additional insight into the trajectory of income inequality in China. From a trend perspective, during 2003–2008 the Gini coefficient fluctuated upward, indicating a worsening of income inequality. Between 2009 and 2014, the Gini coefficient declined sharply, reflecting a significant alleviation of income inequality. From 2015 to 2024, it rose again slowly with fluctuations and gradually stabilized, indicating that relative income disparities did not change markedly during this period. From a growth-rate perspective, during 2003–2014, alongside rapid industrialization and urbanization in China, changes in the Gini coefficient were swift and income inequality exhibited considerable volatility. From 2015 to 2024, as China's economic growth shifted from high-speed to medium-high-speed growth, the rate of change in the Gini coefficient of residents' per capita disposable income also slowed.

Figure 4. Gini Coefficient of Per Capita Disposable Income of Chinese Residents



4. Research Design

4.1 Variable Selection

The dependent variable in this study is income inequality, proxied by the ratio of per capita disposable income of urban residents to that of rural residents. The key independent variable is the digital economy, measured by the number of internet broadband access users. In addition, the number of internet broadband access ports is used for robustness checks, while per capita disposable income of urban residents and per capita disposable income of rural residents are employed to conduct social heterogeneity analyses.

4.2 Data Sources

The empirical analysis is based on a panel of 31 provinces, municipalities, or autonomous regions in China, with an observation period spanning from 2011 to 2023. All data are obtained from the National Bureau of Statistics of China. Descriptive statistics are reported in Table 1. All variables are standardized using logarithmic transformation and inverse hyperbolic sine (IHS) transformation. A small number of missing observations are supplemented using linear interpolation.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Per capita disposable income of urban residents (yuan)	403	35152	13194	15707	89477
Per capita disposable income of rural residents (yuan)	403	14508	6753	4278	42988
Internet broadband access users (10,000 households)	403	1172	1026	12.80	4824
Income inequality	403	2.538	0.384	1.794	3.672
Internet broadband access ports (10,000 ports)	403	2317	1957	26.70	10395
Urban broadband access users (10,000 households)	403	843.5	693.8	12.80	3704
Rural broadband access users (10,000 households)	393	336.5	360.7	0	1577

4.3 Model Specification

This study adopts a univariate linear regression model, specified as follows:

$$Y=\alpha X+\beta+\varepsilon \quad (1)$$

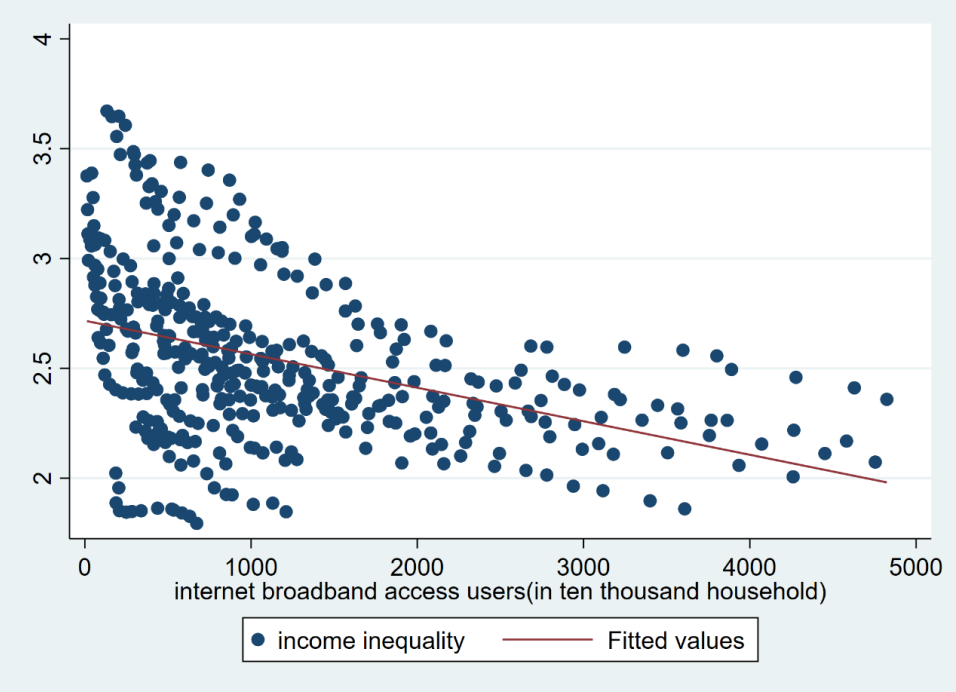
where Y denotes the dependent variable, income inequality; X represents the core explanatory variable, digital economy development; and ε is the random error term.

5. Empirical Analysis

5.1 Correlation Analysis

Figure 5 illustrates the relationship between income inequality and the digital economy. A preliminary inspection of the trend suggests that the ratio of per capita disposable income between urban and rural residents declines as the number of internet broadband access users (per 10,000 households) increases. In other words, income inequality appears to ease alongside the development of the digital economy. Nevertheless, the relationship between income inequality and the digital economy requires further verification through regression analysis, which is undertaken in this study.

Figure 5. Correlation Analysis



5.2 Baseline Regression

Model (1) in Table 2 reports the main regression results on the effect of internet broadband access users on the urban–rural per capita disposable income ratio. Specifically, the estimated coefficient of the core explanatory variable is −0.2624, which is statistically significant at the 1 percent level. These results provide preliminary evidence that, with respect to income inequality, the digital economy currently exerts an overall negative effect-that is, the development of the digital economy can effectively mitigate income inequality.

Table 2: Baseline Regression, Robustness Check, and Time Heterogeneity Analysis

	(1)	(2)	(3)	(4)
	Baseline	Robustness check	Before 2017	After 2017
x	-0.2624***	-0.2386***	-0.2380***	-0.4671***
	(-37.5804)	(-29.7654)	(-17.1974)	(-28.7721)
cons	4.2778***	4.2891***	4.1198***	5.7297***
	(56.1167)	(51.2555)	(38.5771)	(44.2033)
N	403	403	186	217
R2	0.7928	0.7040	0.6538	0.8400

Note: ****, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Values in parentheses are z-statistics. The same notation applies hereafter.*

5.3 Robustness Check

To assess the stability and reliability of the baseline regression results, this study conducts a robustness analysis by replacing the measure of the digital economy. Specifically, the number of internet broadband access ports is used to substitute for the core explanatory variable-the number of internet broadband access users. The empirical results reported in Model (2) of Table 2 show that after replacing the digital economy indicator, its effect on income inequality remains significantly negative, confirming the robustness of the baseline model.

5.4 Heterogeneity Analysis

5.4.1 Time Heterogeneity Analysis

Using the introduction of the urban–rural integrated development strategy in 2017 as a temporal breakpoint, this study divides the sample period into two subperiods to conduct a time heterogeneity analysis. Models (3) and (4) in Table 2 report the regression results of internet broadband access users on the urban–rural per capita disposable income ratio for 2011–2017 and 2017–2023, respectively. The estimated coefficients of the explanatory variable are −0.2380 and −0.4671, both of which are significantly negative at the 1 percent level. These results indicate that throughout 2011–2023, the digital economy exerted an inhibiting effect on income inequality in China, and that this effect became stronger after the proposal of the urban–rural integrated development strategy in 2017. This suggests that the 2017 strategy effectively amplified the inequality-reducing effect of the digital economy.

5.4.2 Regional Heterogeneity Analysis

Following the classification method of the National Bureau of Statistics in 2011, this study divides China's provinces into four major regions-Eastern, Central, Western, and Northeastern China[1]-to examine regional differences in the impact of the digital economy on income inequality. Models (1)–(4) in Table 3 report the regression results of the number of internet broadband access users on the urban–rural per capita disposable income ratio in Eastern, Central, Western, and Northeastern China, respectively. The estimated coefficients are −0.2185, −0.2068, −0.2900, and −0.3789, all of which are significantly negative at the 1 percent level. These findings indicate that, in China, the inequality-reducing effect of digital economy development is strongest in Northeastern China, followed by Western China, and relatively weaker in Central and Eastern China.

5.4.3 Social Heterogeneity Analysis

Taking China's inherent urban–rural dual structure into account, this study distinguishes between urban and rural digital economy development to examine social heterogeneity in the impact of the digital economy on income inequality. Models (5) and (6) in Table 3 report the regression results of the number of internet broadband access users on per capita disposable income in urban and rural areas, respectively. The estimated coefficients are −0.2883 for urban areas and −0.1456 for rural areas, both statistically significant at the 1 percent level. These results suggest that, compared with rural areas, the development of the digital economy in urban areas has a stronger mitigating effect on income inequality in China.

Table 3: Regional and Social Heterogeneity Analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	Eastern	Central	Western	Northeastern	Urban	Rural
x	-0.2185***	-0.2068***	-0.2900***	-0.3789***	-0.2883***	-0.1456***
	(-20.1047)	(-17.5572)	(-25.4860)	(-10.5350)	(-36.5916)	(-24.1223)
_cons	3.8296***	3.8986***	4.6369***	4.7211***	4.5715***	3.3583***
	(36.3395)	(37.5400)	(41.8556)	(18.6380)	(55.8782)	(45.9852)
N	130	78	156	39	403	403
R2	0.7904	0.8103	0.8264	0.8070	0.7839	0.6159

[1] The Eastern region includes Beijing, Hebei, Tianjin, Shandong, Shanghai, Jiangsu, Zhejiang, Guangdong, Hainan, and Fujian (10 provinces or municipalities). The Central region comprises Inner Mongolia Autonomous Region, Shanxi, Henan, Anhui, Jiangxi, Hubei, and Hunan (7 provinces). The Western region includes Xinjiang Uygur Autonomous Region, Tibet Autonomous Region, Gansu, Qinghai, Sichuan, Yunnan, Guangxi Zhuang Autonomous Region, Ningxia Hui Autonomous Region, Guizhou, Chongqing, and Shaanxi (11 provinces or municipalities). The Northeastern region consists of Heilongjiang, Jilin, and Liaoning (3 provinces).

6. Conclusion

Based on the empirical results presented above, this study finds a negative relationship between the development of China's digital economy and income inequality. When the sample period is divided into different time intervals, the inequality-reducing effect of the digital economy becomes significantly stronger after the introduction of the urban–rural integrated development strategy in 2017. From a regional perspective, digital economy development exerts the strongest mitigating effect on income inequality in Northeastern China, followed by Western China, while the effects are relatively weaker in Central and Eastern China. From the perspective of China's urban–rural dual structure, the development of the digital economy in urban areas has a greater alleviating effect on income inequality than that in rural areas. Overall, these findings indicate that the digital economy helps to reduce income inequality in China, with its effects being particularly pronounced in Northeastern and Western regions, after 2017, and in urban areas.

The policy implications of these conclusions can be summarized as follows. First, given the inequality-reducing role of the digital economy, the government should strengthen the construction of digital economy infrastructure and improve mechanisms for the allocation of data as a factor of production and the functioning of data markets. Second, it is necessary to establish a "two-way circulation mechanism for urban–rural data factors" to promote coordinated digital transformation of urban and rural industries and accelerate urban–rural integrated development. Third, policies should be tailored to local conditions. In Northeastern China, the digital economy should be leveraged to empower the revitalization of old industrial bases and promote innovation and upgrading in the secondary sector, while in Western China efforts should be intensified to upgrade western nodes of the "East Data, West Computing" project and foster green, digitally enabled industries. Fourth, greater emphasis should be placed on enhancing digital economy awareness in rural areas to bridge the digital knowledge gap, while strengthening regulatory oversight of digital economy–related industrial flows in urban areas and improving regulatory frameworks.

Although this paper focuses on the impact of the digital economy on income inequality in China, it does not account for the potential effects of the digital economy on occupational income inequality. Future research may therefore explore whether the digital economy also shapes occupational income inequality and regional income disparities. In addition to univariate linear regression, alternative econometric approaches such as spatial econometric models and difference-in-differences methods may be employed, and more granular analyses using city-level or county-level data could be conducted to provide deeper insights.

References

[1] Ding, Y. B., Sun, Y. N. and Zhang, X. G. The Impact of Digital Economy Development on Income Inequality in Europe. Chinese Journal of European Studies. 2024, 42(5), pp. 1-28+157.

[2] Wang, X. M., Yi, F. M. and Jiang, Y. "To Exacerbate" or "Mitigate" income inequality among migrant workers:the impact of digital economy. Journal of Huazhong Agricultural University(Social Sciences Edition). 2024(6), pp. 100-111. https://doi.org/10.13300/j.cnki.hnwkxb.2024.06.009.

[3] Yang, K., Liu, D. R. and Sun, S. Research on the impact of the digital economy on urban-rural income inequality: Digital empowerment or digital negative effect. Journal of Lanzhou University of Finance and Economics. 2024, 40(3), pp. 79-91. https://doi.org/10.3969/j.issn.1004-5465.2024.03.007.

[4] Bu, H., Gao, Y. D. and Xun, Z. Digital economy and labor income inequality: Evidences from smart city pilot policy. Journal of Jiangxi University of Finance and Economics. 2024(2), pp. 27-40. https://doi.org/10.13676/j.cnki.cn36-1224/f.20240305.002.

[5] Yi, X. J., Wei, X. T., Yang, B. Y. and Zhang, L. S. Does the digital economy significantly promote "Common Prosperity": Microeconomic evidence from an income inequality perspective. China Journal of Econometrics. 2023, 3(3), pp. 660-682. https://doi.org/10.12012/CJoE2022-0130.

[6] Chen, T. The impact of digital economy on income inequality. Market Weekly. 2023, 36(12), pp. 9-12+45.

[7] Wang, R. J. and Wang, J. Crossing the “Digital Divide”: Digital transformation and corporate income inequality. Modern Economic Research. 2024(11), pp. 88-101. https://doi.org/10.13891/j.cnki.mer.2024.11.012.

[8] Li, F. Z., Tang, Y. Y. and Xie, Y. G. Research on the impact of enterprise digital transformation on labor income inequality. Finance and Economy. 2024(5), pp. 12-23. https://doi.org/10.19622/j.cnki.cn36-1005/f.2024.05.002.

[9] Zhai, S. X. and Wang, X. R. Manufacturing digital transformation and pay gap: Intra-firm and inter-firm income inequality. Soft Science. 2023, 37(12), pp. 7-14. https://doi.org/10.13956/j.ss.1001-8409.2023.12.02.

[10] Zhang, Z. Z. Does the urban-rural digital literacy gap exacerbate income inequality among residents?: Micro-evidence from CFPS data. Journal of Shandong University(Philosophy and Social Sciences). 2025(6), pp. 152-162. https://doi.org/10.19836/j.cnki.37-1100/c.2025.06.014.

[11] Sun, B. C. and Yin, H. Can the development of digital villages promote common prosperity among farmers: From the dual perspectives of income growth and income inequality. East China Economic Management. 2025, 39(6), pp. 35-45. https://doi.org/10.19629/j.cnki.34-1014/f.250107004.

[12] Li, X. Z., Gao, Y., Liu, F. and Li, J. Y. Can digital village development shrink income inequality of farmers?: Empirical evidence from China. Journal of Guizhou University of Finance and Economics. 2024(5), pp. 90-99.

[13] Zhang, D. M. and Li, H. Y. The impact and action mechanism of digital service trade development on global income inequality. Asia-pacific Economic Review. 2025(1), pp. 136-151. https://doi.org/10.16407/j.cnki.1000-6052.2025.01.012.

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The authors declare no conflict of interest.

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