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Research on The Impact of Digital Inclusive Finance on County Economic Resilience in The Yangtze River Delta Region

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Abstract. This study investigates the varying impacts of digital inclusive finance's breadth, depth, and digitalization on county economic resilience using empirical analysis. The results highlight that digitalization significantly and positively influences economic resilience, underscoring the crucial role of digital technology in bolstering counties' risk resistance. Conversely, enhancements in breadth and depth do not exhibit a substantial positive effect, indicating that mere financial coverage or complexity are insufficient for directly augmenting resilience. Among the six dimensions of digital finance depth, investment and credit emerge as key drivers of economic resilience, confirming the importance of capital investment and credit management in fostering risk resistance. However, the promotion of payment and insurance may incur short-term adaptation costs. Consequently, policies should strike a balance between short-term adaptation and long-term development in advancing digital finance to ensure the steady progress of county economies.

Keywords: Digital inclusive finance; county economic resilience; investment.

1. Introduction

With the rapid advancement of urbanization and the accelerated flow of urban population, the instability and uncertainty of counties facing internal and external shocks have begun to emerge. Improving the resilience of county economies plays an important role in resisting risks and promoting high-quality regional development. The Yangtze River Delta urban agglomeration is the most dynamic region in China. With 3.7% of the country's land and 16.6% of the population, it contributes about one-fifth of the country's total economic output. The county economies in the Yangtze River Delta are developed, resilient, and have a high degree of utilization of digital finance. The relationship between digital finance and county economies in the Yangtze River Delta is closer than in other regions. The manufacturing industry in the Yangtze River Delta presents a "Z"-shaped distribution, mainly concentrated in the Shanghai-Suzhou-Ningbo-Shanghai-Hangzhou-Ningbo area, with fewer manufacturing industries distributed in northern Jiangsu, western Zhejiang, and southern Zhejiang. In 2019, the integrated development strategy of the Yangtze River Delta was elevated to a national strategy, and Anhui Province and other provinces and cities in the Yangtze River Delta developed more closely. The emergence of industrial clusters in the Yangtze River Delta region has enabled counties to have good economic resilience, resist external shocks, and maintain a steady development trend.

The development of county-level industries requires financial support. Digital inclusive finance is a combination of digital technology and inclusive finance. It can use digitalization and networking to upgrade and transform all aspects of the financial industry, lower the threshold for financial services, and provide support for the upgrading of county-level industries. According to the provincial digital inclusive finance index calculated by the Digital Finance Research Center of Peking University, the average annual compound growth rate of my country's digital finance from 2011 to 2022 is 22.7%. In 2022, Shanghai, Beijing, Zhejiang, and Jiangsu ranked in the top four, and the development of digital finance in the Yangtze River Delta region is at the national leading level.

This paper studies the impact of digital inclusive finance on county economic resilience from the perspective of the Yangtze River Delta counties. Chapter 2 summarizes the literature on digital

inclusive finance and economic resilience. Chapter 3 builds a model and interprets the data. Chapter 4 gives basic regression and robustness tests. Chapter 5 summarizes the entire paper.

2. Literature review

2.1. The role of digital inclusive finance

The Digital inclusive finance refers to the popularization of financial services to more social groups through information technology means (such as mobile payment, Internet banking, digital credit, etc.), especially low-income people, rural residents and small and medium-sized enterprises that are not well covered by traditional finance. Its core lies in using technology to lower the entry threshold of financial services and improve the availability and convenience of financial services. Xun Zhang, Guang Hua & Zongyue He (2019) [1]. pointed out that digital inclusive finance plays an extremely important role in developing countries. It not only plays a role in promoting inclusive economic growth, but also alleviates the problem of income disparity to a certain extent.

At the same time, the data accumulation and technological innovation brought about by digital inclusive finance have also promoted the precise control of financial risks. For example, Wang Zhang (2020) research shows that digital inclusive finance not only reduces the operating costs of financial institutions in remote areas, but also improves the accuracy of credit risk assessment through big data and artificial intelligence (Wang Zhang, Wei Wang, 2021) [2]. Andrianaivo and Kpodar (2011) [3] found that the development of digital inclusive finance has a significant driving effect on economic growth, especially among low-income groups, because it reduces economic inequality caused by financial exclusion.

2.2. The relationship between digital inclusive finance and county economic resilience

Do Digital inclusive finance has shown a significant role in promoting the resilience of county economy, mainly reflected in improving the availability of funds, promoting industrial upgrading and improving economic diversity. On the one hand, digital inclusive finance has increased the financial coverage of rural and remote areas by reducing the cost of financial services, thereby enhancing the risk resistance of these areas in economic fluctuations (Matin Ron et al., 2015) [4]. For example, Adger W Neil (2010) [5] pointed out that digital inclusive finance has achieved remarkable results in improving the financing capacity of rural areas and can effectively mitigate the adverse effects of economic shocks.

On the other hand, the popularization of digital inclusive finance has promoted the optimization and upgrading of the county's industrial structure, making it more resilient when encountering external economic shocks. Klapper et al. (2015) found that digital inclusive finance played a key role in promoting industrial diversification, especially in enhancing the vitality of small and micro enterprises in the county economy (Klapper et al., 2015) [6].

3. Empirical model and data

3.1. Model setting

The theory supporting the construction of this model comes from the economic resilience framework and the established connection between digital finance and economic growth and the improvement of social wealth structure. Based on the above analysis, in order to further study the potential impact of digital finance on county economic resilience, this paper constructs the following model for two-way fixed effect regression:

$$Resilience_{it}=\alpha_0+\alpha_1 DIF_{it}+\alpha_2 Controls_{it}+\eta_i+\mu_t+\varepsilon_{it} \quad (1)$$

The model is regressed with $Resilience_{it}$ representing the economic resilience of county i in year t, and DIF_{it} representing the development level of digital finance in county i. The coefficient α_1 depicts the overall impact of digital finance on county economic resilience. $Controls_{it}$ includes control variables of government behavior, information level, education level, and ε_{it} is a random disturbance term.

3.2. variable measurement and data source

3.2.1. Dependent variable

A multi-indicator system is used to measure the resilience of county economy, and the specific method is the entropy method. The determination of indicator weights is a key link in multi-factor evaluation. This paper calculates the resilience of county economy based on Martin's definition of regional economic resilience. Martin divides regional economic resilience into four dimensions: resistance, recovery, adjustment, and transformation. Compared with provincial and municipal data, county data can better reflect the economic development characteristics of counties and county-level cities, and capture the unique response of the economy to external shocks.

3.2.2. Independent variables

This paper selects the digital inclusive finance index from 2014 to 2022 to measure the level of digital financial development, and takes the logarithm of the index to obtain the final variable. The index is compiled by the Digital Finance Research Center of Peking University and can objectively reflect the level of digital financial development in a region. The digital finance total index includes three secondary indicators: coverage breadth, usage depth and degree of digitization. The usage depth indicator includes six third-level indicators: payment use, credit use, investment use, insurance use, credit use and money fund.

3.2.3. Control variables

Since the resilience of county economy will be affected by agglomeration, government behavior, education level, etc., referring to existing studies, the following indicators are selected to take logarithms to generate control variables: government behavior (Gov), information level (Int), and education level (Edu).

4. Empirical findings

In recent years, leveraging 2014-2022 county-level panel data in China, this study empirically examines the impact of digital inclusive finance (DIF) on county economic resilience using a two-way fixed effects model.DIF, disaggregated into breadth, depth, and digitization, serves as the core explanatory variable, while county economic resilience is the dependent variable. Controlling for educational attainment, government behavior, and information level, our regression analysis aims to reveal the specific effects of DIF on county economic resilience and provide policy implications. The detailed regression results are presented in Table 1 and Table 2.

Table 1. Results of the DIF and economic county resilience nexus

	(1)	(2)	(3)	(4)
	DIF	Breadth	Depth	Digitization
Index	0.025*			
	(0.014)			
Breadth		-0.007		
		(0.007)		
Depth			0.018	
			(0.015)	
Digitization				0.023***
				(0.006)
Stu	-0.007	-0.007	-0.007	-0.006
	(0.005)	(0.005)	(0.005)	(0.005)
Inf	-0.003*	-0.004**	-0.003*	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Gov	-0.006**	-0.006**	-0.006**	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	1.186***	1.322***	1.214***	1.195***
	(0.059)	(0.049)	(0.065)	(0.036)
City fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	2511	2511	2511	2511
R-squared	0.171	0.169	0.170	0.187

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The first regression results show that digital finance (DIF) positively impacts county economic resilience (CER) as follows: the degree of digitalization significantly enhances economic resilience (coefficient of 0.025, $p < 0.1$), indicating that digitalization contributes to strengthening economic resilience. The breadth and depth of digital finance have no significant effect on economic resilience, with coefficients of -0.007 and 0.018, respectively, suggesting that simple coverage or complexity in services may not directly improve economic resilience in the short term. Among the control variables, government behavior (Gov) significantly negatively affects economic resilience, indicating that excessive intervention may weaken adaptability. Additionally, the level of informatization (Inf) shows a significant negative impact in some models, suggesting potential costs during the transformation process.

Table 2. Results of the depth of DIF and economic county resilience nexus

	(1)	(2)	(3)	(4)	(5)	(6)
	Payment	Insurance	Fund	Investment	Credit	Investigation
Payment	-0.016***					
	(0.006)					
Insurance		-0.013**				
		(0.006)				
Monetary fund			-0.003			
			(0.005)			
Investment				0.045***		
				(0.015)		
Credit					0.018	
					(0.013)	
Investigation						0.012**
						(0.005)
Stu	-0.006	-0.007	-0.007	-0.006	-0.007	-0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Inf	-0.003*	-0.003*	-0.003**	-0.003	-0.003*	-0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Gov	-0.007***	-0.007**	-0.006**	-0.006**	-0.006**	-0.006**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Cons	1.346***	1.342***	1.303***	1.089***	1.214***	1.240***
	(0.045)	(0.045)	(0.043)	(0.062)	(0.059)	(0.039)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2511	2511	2511	2511	2511	2511
R-squared	0.175	0.172	0.169	0.181	0.171	0.173

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The second regression results further explore the effects of different dimensions of digital finance on county economic resilience. Among the six dimensions, payment (-0.016***) and insurance (-0.013**) have negative impacts on economic resilience, likely due to increased short-term costs leading to market adaptation difficulties. Monetary funds (-0.003) show no significant effect on economic resilience, while investment (0.045***) and credit (0.018) significantly enhance economic resilience, emphasizing the importance of capital investment and a good credit mechanism. Investigation (0.012**) also has a positive effect on economic resilience to some extent. These results

indicate that when promoting digital finance, attention should be paid to the characteristics of different financial products and their specific contributions to economic resilience.

5. Summary

In summary, this study reveals the differential effects of the breadth, depth and degree of digitalization of digital finance on county economic resilience. The degree of digitalization significantly and positively affects economic resilience, reflecting the important role of digital technology in enhancing county risk resistance. In contrast, the improvement of breadth and depth did not show a significant positive effect, suggesting that simple financial coverage or complexity is not enough to directly enhance resilience. Among the six dimensions of digital finance depth, investment and credit significantly enhance economic resilience, verifying the role of capital investment and credit management in promoting risk resistance, while the promotion of payment and insurance may bring about adaptation costs in the short term. Therefore, future policies should focus on the balance between short-term adaptation and long-term development in the promotion of digital finance, and promote the steady development of county economies.

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