The Impact of the Development of Digital Finance on Regional Financial Risks

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Abstract:Based on the inter-provincial panel data in China from 2015 to 2022, this paper uses the fixed effect model and the intermediary effect model to explore the impact and mechanism of digital finance development on regional financial risks. The results show that: (1) the development of digital finance significantly reduces regional financial risk on the whole, and the regional financial risk index decreases by 0.234 percentage points for every 1 percentage point increase in the level of digital finance development; (2) the development of digital finance affects regional financial risk through three channels: information efficiency improvement, risk diversification and market structure optimization, and the intermediary effect of information efficiency improvement is the most significant, accounting for 42.6% of the total effect; (3) There is significant regional heterogeneity in the inhibitory effect of digital finance development on regional financial risks, with the most obvious effect in the eastern region, followed by the central and western regions. (4) The impact also shows different characteristics at the level of different economic cycles and industrial structures. Based on the research conclusions, this paper puts forward policy suggestions such as improving the digital financial regulatory system and optimizing the regional risk prevention and control mechanism.

Keywords: Digital Finance Development; Regional Financial Risks; Mediating Effect; Regional Heterogeneity; Risk Prevention And Control

1. Introduction

In the context of the deep integration of digital technology and finance, the digital financial industry represented by mobile payment, Internet wealth management, online lending, digital currency, etc., is booming, profoundly changing the traditional financial service model and financial market pattern. Especially in the post-epidemic era, digital finance is playing an increasingly important role in improving the availability of financial services, reducing transaction costs, and optimizing resource allocation. However, with the rapid development of digital finance, new financial risks such as cyber security risks, data privacy leaks, and illegal financial activities are also emerging, bringing new challenges to regional financial stability. In this context, it is of great significance to study the impact of digital finance development on regional financial risks: firstly, it will help deepen the theoretical understanding of the evolution law of financial risks in the digital era; Secondly, it can provide an empirical basis for improving the digital financial regulatory system. Finally, it has important policy reference value for constructing a long-term mechanism for regional financial risk prevention and control.

2. Theoretical Analysis of the Development of Digital Finance and Regional Financial Risks

2.1 The Connotation and Characteristics of Digital Finance

Digital finance is a new financial format that provides financial services through the Internet, big data, cloud computing, artificial intelligence and other new-generation information technologies with the support of digital technology and data as the key factor of production. Its core characteristics are mainly reflected in: first, technology-driven, the innovative application of digital technology continues to reshape the financial service model; The second is inclusiveness, breaking through the time and space limitations of traditional financial services and lowering the threshold of financial services; The third is scene integration, which is deeply embedded in various life scenarios to realize the seamless connection between financial services and the real economy; Fourth, data dependence, through the collection, analysis and application of massive data to optimize risk control and decision-making efficiency. In addition, digital finance also has derivative characteristics such as platformization, intelligence and openness, which together constitute the essential attributes of digital finance that distinguish it from traditional finance.

2.2 Definition and Performance of Regional Financial Risks

Regional financial risk refers to the hidden systemic or regional financial risks caused by factors such as financial market imbalances, poor operation of financial institutions, and lack of financial supervision within a specific geographical area. Its main manifestations include: credit risk, such as the rise in regional non-performing loan ratios; market risks, such as sharp fluctuations in regional asset prices; liquidity risks, such as tight capital chains of regional financial institutions; operational risks, such as operational failures of financial infrastructure; and the risk of cross-regional contagion. In the digital financial environment, regional financial risks also present new characteristics: the speed of risk transmission is accelerated, the risk form is more complex, and the risk boundary is more blurred, which poses new challenges to the traditional risk prevention and control system.

2.3 The Theoretical Mechanism of Digital Finance Influencing Regional Financial Risks

Digital finance affects regional financial risks through multiple mechanisms, mainly including the following three aspects: First, in terms of information transmission mechanism, digital finance improves the efficiency of information acquisition and processing through big data analysis and intelligent algorithms, reduces the degree of information asymmetry, and helps financial institutions to assess and manage risks more accurately. Secondly, in terms of risk contagion mechanism, the networked characteristics of digital finance accelerate the speed and scope of financial risks, but at the same time, it also provides a new channel for risk diversification and hedging, which is conducive to the stability of the regional financial system. Finally, in terms of market structure and mechanism, digital finance promotes the diversified development of the financial market, optimizes the structure of market entities and the competitive landscape, which may not only increase the complexity of systemic risks, but also enhance the resilience of the financial system through market constraint mechanisms. These three mechanisms interact and influence each other, and together determine the ultimate impact of digital finance development on regional financial risks. By understanding these mechanisms, we can better grasp the intrinsic relationship between the development of digital finance and regional financial risks, and lay a theoretical foundation for subsequent empirical research.

3. An Empirical Study on the Development of Digital Finance and Regional Financial Risks

3.1 Study Design

In this study, panel data from 30 provinces (autonomous regions and municipalities directly under the central government) in China from 2015 to 2022 were selected as research samples, and the data were mainly derived from the National Bureau of Statistics, China Financial Statistical Yearbook, Provincial Statistical Yearbooks and Wind database. In terms of variable design, the digital finance index was selected as the core explanatory variable, and the index was constructed from three dimensions: coverage, depth of use and digital service capability. The regional financial risk index of the explanatory variable is comprehensively calculated by multi-dimensional indicators such as credit risk, market risk, and liquidity risk. At the same time, the control variables such as economic development level, industrial structure, financial deepening degree, and government governance are included. In terms of model construction, a fixed-effect benchmark regression model is constructed to test the overall impact of digital financial development on regional financial risks, and then an intermediary effect model is designed to verify the specific mechanism. The model settings are as follows:

$$Risk_{i,t} = \alpha + \beta Digfin_{i,t} + \gamma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

Among them, i and t represent the region and time, respectively, Risk represents the regional financial risk index, Digfin represents the digital financial development index, and Control is the control variable vector, μ_i which is the individual fixed effect, λ_t is the time fixed effect, and $\varepsilon_{i,t}$ is the random perturbation term.

3.2 Analysis of Empirical Results

The descriptive statistical results show that the overall development level of digital finance in China shows an upward trend, but the problem of unbalanced development between regions is prominent. The regional financial risk index fluctuates greatly and has a certain correlation with the level of economic development. The correlation analysis shows that there is a significant negative correlation between the development of digital finance and regional financial risks, which preliminarily supports the research hypothesis. The results of regression analysis show that: (1) the development of digital finance has a significant inhibitory effect on regional financial risk, and the regional financial risk index decreases by 0.234 percentage points on average for every 1 percentage point increase of digital financial development index;(2) the results of intermediary effect test show that the three channels of information efficiency improvement, risk diversification and market structure optimization play a significant role, and the intermediary effect of information efficiency improvement is the most obvious, accounting for 42.6% of the total effect; (3) In terms of control variables, the level of economic development and the degree of financial market development have a significant impact on regional financial risks, while the impact of industrial structure is not significant.

3.3 Robustness Test

In order to ensure the reliability of the research conclusions, this paper uses a variety of methods to test the robustness: (1) replacing the measurement methods of the core variables, and using the digital financial inclusion index and the Internet financial penetration rate as alternative indicators; (2) to deal with the endogeneity problem, using the instrumental variable method and the systematic GMM method for estimation; (3) Eliminate abnormal samples, remove the samples of municipalities directly under the central government, and re-perform regression; (4) Different econometric model methods were adopted, including dynamic panel model and threshold regression model. The results of the robustness test show that the main conclusions of this paper remain stable, the inhibitory effect of digital finance development on regional financial risks is significant and stable, and the existence of various influencing mechanisms is verified.

4. The Heterogeneous Impact of Digital Finance Development on Regional Financial Risks

4.1 Regional Heterogeneity Analysis

Considering the reality of unbalanced regional economic development in China, this part divides the sample into three regions, eastern, central and western regions based on geographical location and economic development level, and examines the differences in the impact of digital financial development on regional financial risks. The empirical results show that the impact effect is the most significant in the eastern region, with the regional financial risk index decreasing by 0.312 percentage points for every 1 percentage point increase in the digital finance development index, followed by the central region with a decrease of 0.245 percentage points, and the impact effect in the western region is relatively weak, decreasing by 0.156 percentage points. This regional heterogeneity is mainly due to the following factors: first, the eastern region has a better digital infrastructure and a higher level of financial market development, which is conducive to the better role of digital finance in risk prevention and control; Secondly, the eastern region has a higher level of scientific and technological innovation capacity and human capital, and is more likely to accept and apply digital financial instruments. Finally, the eastern region has a strong financial regulatory capacity and is better able to cope with the new risks and challenges brought about by the development of digital finance.

4.2 Heterogeneity Analysis over Time

In order to explore the temporal evolution characteristics of the impact of digital finance development on regional financial risks, this study divides the sample period into three stages: the initial stage of digital finance (2015-2017), the rapid development period (2018-2020), and the deepening innovation period (2021-2022). The results show that the risk inhibition effect of digital finance development shows dynamic characteristics: in the initial stage, due to the limited scale of digital finance development, its impact on regional financial risks is relatively weak; After entering the period of rapid development, with the maturity of digital technology and the enrichment of application scenarios, the risk suppression effect has been significantly enhanced. In the period of deepening innovation, although the overall effect remained significant, the intensity of the effect fluctuated due to factors such as the new crown epidemic and changes in the international economic environment. This period heterogeneity reflects the dynamic evolution of the relationship between digital finance and regional financial risks, and has important implications for grasping the key points of risk prevention and control at different stages of development.

4.3 Industry Heterogeneity Analysis

Based on the differences in industry characteristics, this study classifies the sample according to the secondary and tertiary industries, and further subdivides them into sub-industries such as traditional manufacturing, high-tech industry, modern service industry and traditional service industry, and examines the differential impact of digital finance development. The results show that: (1) At the level of industrial categories, the development of digital finance has a more obvious inhibitory effect on the financial risk of the tertiary industry, which is related to the high degree of digital transformation of the service industry; (2) At the level of sub-industries, high-tech industries and modern service industries benefited the most, with risk inhibition effects of 0.289 and 0.276 percentage points, respectively, while the effects of traditional manufacturing and traditional service industries were relatively weak. This finding has important reference value for formulating differentiated industry risk prevention and control policies.

5. Conclusions and Policy Recommendations

5.1 Key Findings

Based on theoretical analysis and empirical research, this paper draws the following main conclusions: First, the development of digital finance has significantly reduced regional financial risks in general, and this impact is realized through three main channels: information efficiency improvement, risk diversification and market structure optimization, among which the mediating effect of information efficiency improvement is the most significant. Second, there is significant regional heterogeneity in this impact, with the effect being the most obvious in the eastern region, followed by the central region, and relatively weak in the western region, which is closely related to the digital infrastructure, financial development level and regulatory capacity of each region. Thirdly, from the perspective of time, the risk inhibition effect of digital finance presents a dynamic evolution characteristic, and the effect is most significant in the rapid development period. Fourth, there are differences in the degree of impact of different industries, and high-tech industries and modern service industries have benefited more, which reflects the important impact of the level of digitalization of the industry on the effectiveness of risk prevention and control.

5.2 Policy Recommendations

Based on the conclusions of the study, this paper puts forward the following policy suggestions: firstly, in terms of the digital financial regulatory system, a new regulatory framework of "technology + supervision" should be established, the application of regulatory technology should be strengthened, and real-time monitoring and early warning of digital financial risks should be realized; improve data governance rules and strengthen the protection of personal information; Establish a cross-departmental coordinated supervision mechanism to prevent a regulatory vacuum. Secondly, in terms of regional financial risk prevention and control mechanism, it is recommended to build a multi-level risk early warning system and strengthen inter-regional joint prevention and control of financial risks. Formulate differentiated risk prevention and control strategies according to local conditions, focusing on the construction of digital financial infrastructure in underdeveloped regions. Finally, in terms of promoting the healthy development of digital finance, we should increase support for digital technology innovation. cultivating diversified digital financial market players; improve the evaluation system of digital financial services; Strengthen financial consumer education and protection of rights and interests.

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