

The Impact of “Fintech + Financial Regulation” Matching Level on Financial Risk: Evidence from China

Xiaopeng Sun*

College of Economics and Management, Beijing University of Technology, Beijing 100124, China

*Corresponding author: Xiaopeng Sun, sunxgh@foxmail.com

Copyright: © 2024 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Preventing financial risk is an important topic that academic circles and the government have paid attention to for a long time. The development of fintech and the improvement of financial regulation will affect the level of financial risk. The relationship between the degree of matching between fintech and financial regulation and financial risk is explored, which is crucial for reducing financial risk. Panel data from 31 provinces in China from 2011 to 2020 is used to explore the impact of fintech and financial regulatory matching levels on financial risk. The study finds that the improved matching level between fintech and financial regulation helps reduce financial risk. The degree of matching between fintech and financial regulation affects financial risk through financial efficiency.

Keywords: Fintech; Financial regulation; Financial risk

Online publication: August 26, 2024

1. Introduction

The financial system and regulatory framework have significantly improved, strengthening financial institutions. New financial models are emerging, and inclusive finance has advanced. The integration of technology with finance has deepened, and major adjustments to the regulatory structure now include functional, behavioral, and institutional supervision. This refined regulatory system has enhanced supervision capacity and intensity, effectively preventing systemic financial risk.

However, a mismatch between financial regulation and fintech persists. Traditional supervision models often fail to fully incorporate fintech due to its technical characteristics and transactional complexity, creating regulatory gaps^[1]. These gaps have led to unchecked growth and bubbles in certain sectors, increasing overall risk. Existing studies focus on the relationship between fintech and regulation, innovation, regulatory application of fintech, and the effects of coordinated fintech-regulation development on financial efficiency^[1-3]. There is less emphasis on fintech and financial regulation’s role in preventing financial risk. This paper uses panel data from 31 Chinese provinces (2011 to 2020) to measure fintech-regulation matching levels and explore

their relationship with financial risk, analyzing the role of financial efficiency in this process.

This paper makes the following contributions: First, it expands research perspectives by using “fintech and financial regulation matching” to understand factors influencing financial risk. Second, it emphasizes “preventing financial risk” and confirms the importance of aligning fintech with financial regulation in mitigating risks. Third, it reveals the role of financial efficiency in transmitting the effects of fintech-regulation matching on financial risk. This provides a practical basis for promoting financial innovation, improving the regulatory system, and achieving both “stable growth” and “risk prevention.”

2. Theoretical analysis and research hypotheses

The rapid development of fintech is driven by three main factors: breakthroughs in underlying technologies, imbalances in financial market supply and demand, and widespread network technology use. This growth has expanded inclusive finance and alleviated mismatches in financial services for small enterprises and long-tail customers, reducing information asymmetry and enhancing capital market efficiency ^[4]. Fintech innovation often thrives in relaxed regulatory environments, such as China’s, which boosts micro-market vitality. However, lenient regulations can lead to supervisory shortcomings, necessitating stronger oversight. Fintech innovation drives financial development, while regulation ensures security and compliance. Balancing the two is crucial for healthy fintech development and risk prevention ^[5]. Given that fintech inherently carries risks, such as technology application and data security risks, excessive development could destabilize the financial market system. Effective financial regulation can mitigate these risks, requiring a regulatory system that functions properly to maximize the benefits of fintech while addressing fund allocation imbalances ^[6]. Thus, adaptive development of fintech and financial regulation can ensure both the optimal utility of fintech and a controlled risk level across the market system. Based on this, the research hypothesis is proposed:

Hypothesis 1 (H1), the matching level of fintech and financial regulation can curb financial risk: Improving the matching level between fintech and financial regulation can further enhance financial efficiency and social welfare ^[7]. This alignment helps effectively prevent risks related to information technology, legal issues, and even systemic risks stemming from the development of fintech, thereby increasing the effectiveness of financial regulation. On one hand, by enhancing the compatibility of fintech and regulation, legal incompleteness can be addressed ^[8]. This can promote the completion of financial transactions, improve the operational efficiency of financial markets, enhance service quality, and mitigate the inherent vulnerabilities and instabilities within the financial market. On the other hand, a high degree of compatibility between fintech and regulation can lead to more reasonable savings rates, investment rates, and investment efficiency, supported by institutional guarantees through standardized information disclosure and improved profitability and management levels of financial institutions. This matching development supports the stable development of financial institutions by smoothing credit efficiency fluctuations, boosting the growth rate of bank credit, and promoting the sustainable development of financial institutions’ credit business ^[9]. Ultimately, these improvements enable the financial sector to play a more effective role in the national economy. Based on this, the research hypothesis is proposed: Hypothesis 2 (H2), the matching level of fintech and financial regulation will affect the level of financial risk through financial efficiency.

3. Research design

3.1. Model construction

The fixed-effect model is used to examine the impact of the matching level of fintech and financial regulation

on financial risk. The model is set as follows:

$$fr_{it} = \alpha_0 + \alpha_1 d_{it} + \xi_1 control_{it} + u_i + q_t + \varepsilon_{it} \quad (1)$$

In **Equation (1)**, i and t represent regions and periods, respectively. fr is the financial risk level. d is the level of matching between fintech and financial regulation. $control$ is the control variable. u_i and q_t are individual and time-fixed effects respectively. ε_{it} is the random disturbance term.

3.2. Indicator explanation

3.2.1. Explained variable

Financial risk (fr) is the explained variable. The Financial Stress Index is constructed from the financial, corporate, government, household, and macroeconomic environments to measure the level of financial risk. The specific indicators are shown in **Table 1**.

Table 1. Financial risk index system

Indicator type	Indicator name	Calculation formula	Indicator property
Financial sector	Non-performing loan ratio	Non-performing loans/total loans	Positive
	Rate of credit expansion	Loan growth/GDP growth	Moderate
	Loan-to-deposit ratio	Total bank loans/total bank deposits	Positive
	Safe depth	Premium income/GDP	Negative
	Price-to-income ratio	Sales of commercial housing/disposable income of households	Moderate
	Development degree of stock market	Total stock market value/GDP	Positive
Enterprise sector	Asset-liability ratio	Total liabilities/total assets	Moderate
	Degree of enterprise loss	Loss of loss-making enterprises/GDP	Positive
Government sector	Fiscal gap	(Revenue - expenditure)/GDP	Negative
	Local government debt	Urban investment debt/GDP	Positive
Household sector	Income growth rate	Growth rate of per capita household income	Negative
	Unemployment rate	Urban unemployment rate	Positive
Macroeconomic environment	Invest	Fixed asset investment/GDP	Negative
	Foreign Trade	Exports/GDP	Negative
	CPI	Measure the level of inflation	Moderate

Financial risk indicators are categorized into positive, moderate, and negative based on their correlation with financial risk (fr). Positive indicators correlate positively with fr , negative indicators correlate negatively, and moderate indicators indicate increased fr with deviations from their optimal values. To reduce subjective bias, the entropy weighting method is used for its objectivity to determine the weight of each index. This allows for the calculation of financial risk levels over the years.

3.2.2. Core explanatory variable

The key explanatory variable is the matching degree of “fintech + financial regulation” (d). To measure local financial regulation through fiscal expenditure, the ratio of financial regulation expenditure to the general budget expenditure of local finance is used. The Peking University Digital Financial Inclusion Index serves as

a proxy for fintech development. The coupling coordination degree model is used to assess the matching level between fintech and financial regulation. The calculation steps are as follows:

The first step is to process the indicators to eliminate the impact of dimensions. The entropy weight method is used to calculate the weight of each index. The comprehensive order parameters of the fintech subsystem and financial regulation subsystem are obtained.

$$U_h = \sum_{j=1}^n \lambda_{hj} X_{hj}, \sum_{j=1}^n \lambda_{hj} = 1, h = 1, 2 \quad (2)$$

The second step is to calculate the coupling degree between the fintech subsystem and the financial regulation subsystem.

$$C = 2 \times \left[U_1 U_2 / (U_1 + U_2)^2 \right]^{1/2} \quad (3)$$

In **Equation (3)**, C represents the coupling degree of the fintech and financial regulation subsystems, ranging from 0 to 1. U_1 represents the level of fintech system development, and U_2 represents the development level of the financial regulation system.

The third step is to calculate the matching level between the fintech subsystem and the financial regulation subsystem:

$$D = \sqrt{C \times T} \quad (4)$$

$$T = \alpha U_1 + \beta U_2 \quad (5)$$

Where D represents the matching level between the fintech subsystem and the financial regulation subsystem. T is the comprehensive evaluation index of these subsystems. α and β represent the importance levels of the fintech and financial regulation subsystems, respectively ($\alpha = \beta = 0.5$).

3.2.3. Control variables

Referring to existing literature, to enhance the empirical results, additional variables are included, namely city size (cs), residents' consumption level (rcl), aging degree ($aging$), depth of financial deepening (fd), and level of regional development (rdl).

3.2.4. Transmission channel variable

Financial efficiency (fe) as a transmission channel variable. The proportion of the added value of the financial industry in Gross Domestic Product (GDP) serves as the proxy variable for financial efficiency. The sample comprises 31 provinces in China, covering the period from 2011 to 2020. Primary data sources are from the Choice database.

4. Empirical results analysis

4.1. Basic regression and transmission mechanism

The fixed effect model is used to analyze the relationship between financial risk and the matching level of fintech and financial regulation. The results are shown in **Table 2**. In **Table 2 (1)**, without control variables but accounting for individual and time effects, the coefficient of d is notably negative and significant at the 10% level. This suggests that higher matching levels may reduce financial risk, even without other variables being controlled. In **Table 2 (2)**, additional variables influencing financial risk are included. The coefficient of d remains significantly negative at the 5% level, reinforcing that an improved matching level between fintech

and financial regulation reduces financial risk. These results support Hypothesis 1 (H1). **Table 2 (2)** to **Table 2 (4)** presents the results of the analysis on the transmission effects of financial efficiency. The Sobel Z test value is significant at the 5% level, indicating that the degree of matching between fintech and financial regulation influences financial risk via financial efficiency. This confirms Hypothesis 2 (H2).

Table 2. The results of basic regression and transmission mechanism test

Variables	(1)	(2)	(3)	(4)
<i>d</i>	-0.4354*	-0.5654**	-0.0068	-0.5736**
	(-1.70)	(-2.18)	(-1.59)	(-2.20)
<i>fe</i>				-1.2001
				(-0.32)
Controls	NO	YES	YES	YES
Year	YES	YES	YES	YES
Area	YES	YES	YES	YES
Constant	0.3619***	-1.4569	0.5989***	-0.7382
	(3.83)	(-0.17)	(4.13)	(-0.08)
Observations	310	310	310	310
R-Squared	0.1014	0.1424	0.7576	0.1427
Sobel Z	-	2.105**		

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively. The T statistics are in parentheses.

4.2. Endogeneity handling and robustness testing

There is a complex interaction between fintech and financial regulation, suggesting a potential two-way causal relationship. To address endogeneity, the approach outlined in existing research was followed, using data from 31 Chinese provinces (excluding those that share borders)^[10]. The average fintech and financial regulation matching levels were calculated for each province, excluding itself, for the same year. This, along with a one-year lag of its matching level, served as an instrumental variable. Using two-stage least squares regression, the results in **Table 3 (1)** show that after accounting for endogeneity, the coefficient of *d* remains significantly negative, consistent with previous findings.

A robustness test was carried out, including re-measuring financial risk, reducing sample interval, and robustness regression. The results shown in **Table 3 (2)** are regression results of the financial risk index constructed from the financial sector and the government sector. **Table 3 (3)** shows the results of the remaining samples after removing the sample of stock market volatility in 2015. **Table 3 (4)** is the result of robust regression. It can be seen that the direction of the regression coefficient of *d* is consistent with the previous results, which indicates that the previous results are robust.

Table 3. Results of endogenetic treatment and robustness test

Variables	(1)	(2)	(3)	(4)
d	-0.3711** (-1.96)	-0.5373* (-1.84)	-0.5654** (-2.26)	-0.2048** (-2.58)
Controls	Yes	Yes	Yes	Yes
Year	-	Yes	Yes	Yes
Area	Yes	Yes	Yes	Yes
Constant	0.5425 (-0.66)	-0.3827 (-0.08)	-1.4569 (-0.38)	-2.9755 (-1.13)
Number of observations	279	310	310	279
R-square	0.6020	0.2911	0.1424	0.4763

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusions and implications

This study utilizes panel data from 31 provinces in China, covering the period from 2011 to 2020, to examine the impact of fintech and financial regulatory matching levels on financial risk using fixed-effect models. The findings indicate that improving the alignment between fintech and financial regulation helps reduce financial risk, even after accounting for endogeneity issues and conducting robustness tests. Additionally, financial efficiency serves as a mediator in the process by which the matching degree of fintech and financial regulation affects financial risk.

Based on the above research conclusions, the following policy recommendations are put forward. Support for fintech innovation should be strengthened to promote the application of new technologies in the financial field, thereby improving financial efficiency. Concurrently, financial regulators need to continuously optimize their regulatory framework to ensure they adapt to the rapidly changing technological environment, avoiding both over-regulation and under-regulation. Furthermore, cooperation and information sharing between regulators and technology companies should be enhanced, along with the establishment of a sound risk early warning, prevention, and control mechanism. Through such comprehensive measures, the efficiency and stability of the financial system can be improved, while effectively preventing and resolving potential financial risk.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Bu Y, Li H, Wu X, 2022, Effective Regulations of FinTech innovations: The case of China. *Economics of innovation and new technology*, 31(8): 751–769.
- [2] Yang R, 2022, Development and supervision of financial technology based on blockchain. *Computational Intelligence and Neuroscience*, 2022(1): 2615153.
- [3] Xu Y, Bao H, Zhang W, et al., 2021, Which financial earmarking policy is more effective in promoting FinTech innovation and regulation? *Industrial management and data systems*, 121(10): 2181–2206.

- [4] Lai X, Yue S, Guo C, et al., 2023, Does FinTech reduce corporate excess leverage? Evidence from China. *Economic Analysis and Policy*, 77: 281–299.
- [5] Bromberg L, Godwin A, Ramsay I, 2017, Fintech sandboxes: Achieving a balance between regulation and innovation. *Journal of Banking and Finance Law and Practice*, 28(4): 314–336.
- [6] Cai F, 2024, Research on the Evolution Mode and Risk Control of Financial Supervision System. *Information Systems and Economics*, 5(1): 67–73.
- [7] Lv P, Xiong H, 2022, Can FinTech improve corporate investment efficiency? Evidence from China. *Research in International Business and Finance*, 60: 101571.
- [8] Hodge L, 2020, Financial technology: opportunities and challenges to law and regulation. *Artificial Intelligence and the Law*, 2020: 31–48.
- [9] Restoy F, 2019, Regulating fintech: what is going on, and where are the challenges. *Bank for International Settlements*, 2019: 1–7.
- [10] Gao X, Long C X, 2014, Cultural border, administrative border, and regional economic development: Evidence from Chinese cities. *China Economic Review*, 31: 247–264.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.