FinTech and Regional Financial Development: Empirical Evidence from China

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Abstract: With the rapid proliferation of financial technology, its influence on regional financial development has become increasingly significant. This study examines the extent to which financial technology reshapes regional financial ecosystems, utilizing a balanced panel data-set comprising provincial-level observations from 2014 to 2024. A rigorous empirical framework is adopted, incorporating advanced quantitative techniques to ensure the credible identification of causal relationships while mitigating potential endogeneity and unobserved heterogeneity. The empirical results indicate that financial technology functions as a critical catalyst for regional financial advancement. Moreover, the diffusion of financial technology is found to exert a profound and persistent influence on regional economic transformation. The progress of financial technology considerably enhances financial depth and efficiency, providing robust empirical evidence to inform institutional framework refinement and strategic governance development.

Keywords: Financial Technology; Regional Financial Development; Empirical Analysis; Institutional Framework; Economic Transformation

1. Introduction

Financial technology, defined as the integration of technological innovation into the products and services of the traditional financial sector, has expanded rapidly worldwide and reshaped the industry in profound ways. China, as the world's second-largest economy and one of the largest consumer markets, is undergoing a rapid transformation of its financial system. The country's accelerated economic growth and digital transition have fostered widespread adoption of financial technology, which has begun to exert a significant influence on regional financial development. As China's economy continues to grow steadily, the role of financial technology in shaping regional financial systems has become increasingly evident. Against this backdrop, the present study provides an empirical analysis of how financial technology affects regional financial development in China, offering both theoretical grounding and robust statistical evidence to inform innovation and policy in the financial sector.

Using China as a case study, this research examines the mechanisms and effects of financial technology on regional financial development through an empirical analysis based on domestic data. The empirical design employs panel econometric techniques with robust identification strategies, ensuring credible estimation of causal effects and mitigating concerns of unobserved heterogeneity. The study provides evidence on the relationship between financial technology and regional economic development, offering insights of both theoretical and practical importance.

The findings underscore three critical contributions of financial technology. First, it improves the efficiency and dynamism of financial services, thereby fostering innovation. Second, it advances financial inclusion by broadening access to financial resources. Third, it strengthens risk management and enhances the stability of the financial system.

The rapid rise and widespread application of financial technology in China have accelerated the digital transformation of the financial sector. Understanding its impact on regional financial development has direct policy relevance. The results of this study can inform government policy design, guide financial institutions in optimizing their strategies, and assist enterprises in long-term planning. By revealing the tangible role of financial technology in China's regional financial development, the research provides a scientific and rigorous foundation for further innovation and transformation within the

financial industry.

A growing body of literature has examined the nexus between financial technology and regional financial systems. Zhang focuses on the dynamic relationship between financial technology and risk management in commercial banks, identifying a distinctive inverted U-shaped pattern: the initial adoption of financial technology may temporarily exacerbate risks, but over time it alleviates them. The study also questions whether financial technology might weaken the effectiveness of macroprudential regulation [1]. Liu finds that digital finance exerts both direct and indirect effects on regional financial risk. The development of digital finance alleviates financing constraints, reduces the debt-servicing pressure on local governments, and suppresses regional financial risk, thereby fostering regional financial development [2]. Guo et al. argue that financial technology has significantly improved financial development and service levels nationwide and narrowed regional disparities in service provision, although no clear convergence in regional financial development levels has been observed [3].

From the perspective of the broader financial system, Guo analyzes the practical applications and future trends of financial technology in China. He argues that financial technology has not only reshaped the architecture of the financial system but has also generated regional heterogeneity, particularly in the diffusion and scaling of financial services. Further evidence indicates that low unemployment rates and optimized human resources amplify the long-term structural impact of financial technology [4]. In a related line of inquiry, Yao explore the intersection of financial technology and regional financial development, observing that financial technology has stimulated nationwide financial activity and promoted more equitable access to services. Nevertheless, regional financial development remains uneven, displaying persistent diversity across provinces [5].

Beyond the Chinese context, Phuoc offers a complementary perspective by introducing an innovative framework to rank and evaluate the success factors of sustainable financial technology in Vietnam. His findings highlight agility, security, and innovation as the most critical determinants of success in the Vietnamese fintech industry [6]. Collectively, these studies illustrate the multifaceted ways in which financial technology influences financial structures, both in terms of systemic transformation and regional heterogeneity.

2. Theoretical Framework and Hypotheses

The theoretical foundation of this study lies in the multidimensional role of financial technology in driving financial innovation and shaping regional financial development.

First, Chen et al. report that technological advances promote the upgrading and diversification of financial products [7]. Emerging applications of blockchain, artificial intelligence, and big data provide financial institutions with advanced analytical tools that enable them to identify client needs more accurately and design products that are both competitive and efficient. Wang further argues that financial technology alleviates the cost burden traditionally associated with financial innovation [8]. Whereas conventional innovation required substantial capital and human resources, the rapid spread of mobile payments and online financial platforms has markedly reduced infrastructure and operational costs. These developments lower entry barriers, allowing small enterprises and individual users to obtain financial services more easily and at lower cost.

Second, financial technology broadens financial inclusion by digitizing traditional services and delivering them through internet-based platforms. Xiong notes that mobile banking and online interfaces enable underserved populations to access financial services without geographical constraints [9]. Furthermore, innovations such as mobile payments and blockchain technologies have substantially reduced transaction costs, rendering even small-scale transactions economically viable and expanding the reach of inclusive finance.

Third, financial technology enhances institutional efficiency and decision-making capacity. Zhao et al. demonstrate that advanced data analytics — particularly the mining of transaction records—strengthen fraud detection, improve the accuracy of credit risk assessment, and accelerate institutional responses within complex financial environments [10]. These analytical capabilities enable financial institutions to anticipate and mitigate potential crises more effectively, thereby contributing to the resilience and stability of the financial system.

Based on these arguments, the study proposes the following hypotheses:

H1. Financial technology promotes regional financial development by stimulating financial innovation.

H2. Financial technology enhances regional financial development by expanding financial inclusion.

H3. Financial technology improves regional financial development by strengthening risk management and institutional resilience.

To evaluate these hypotheses, the study employs a fixed-effects regression framework using regional panel data, thereby providing rigorous evidence on the impact of financial technology on regional financial development.

3. Data and Empirical Strategy

The study employs a regional panel dataset covering 31 provinces in China over the period 2014–2024, yielding a total of 341 observations. Descriptive statistics are first used to provide an overview of the data. Correlation analysis is then conducted to obtain preliminary insights into the relationships among variables. The empirical framework proceeds with regression analysis to estimate the impact of financial technology on regional financial development, followed by a series of robustness checks to validate the reliability of the results. This sequential design ensures that the conclusions are grounded in both statistical rigor and empirical consistency.

4. Model Construction

This study establishes an empirical model to examine whether Financial Technology influences regional financial development.

$$FGDP_{it}=\alpha_0+\alpha_1 Tech_{it}+\alpha_2 GOV_{it}+\alpha_3 OPEN_{it}+\alpha_4 IND_{it}+\alpha_5 GDPR_{it}+\alpha_6 FDI_{it}+\varepsilon_{it}$$

Here, α_0 denotes the constant term (intercept). The coefficients α_1 to α_6 are parameters to be estimated. The subscripts i and t index the province and year, respectively. The error term, ε_{it}, captures all unobserved factors affecting financial development.

5. Variable Definitions and Summary Statistics

5.1 Dependent Variable

The dependent variable, regional financial development (FGDP), is defined as the value added of the financial sector as a percentage of regional GDP. This ratio measures the financial sector's relative size and direct economic contribution. It reflects the sophistication of regional financial markets, the stability of financial institutions, and the breadth of financial services. A higher FGDP signifies a more developed, resilient, and sustainable regional financial system.

5.2 Core Explanatory Variable

The core explanatory variable is the Financial Technology Index (Tech). This index provides a comprehensive measure of FinTech development at the regional level. It synthesizes multiple dimensions, including investment volume, the number and scale of FinTech firms, technology adoption rates, and innovation capacity. For this study, the index is constructed by collecting data related to keywords such as "financial technology," "internet finance," and "Baidu Index." The collected data are then analyzed using the entropy method to derive the final composite index.

5.3 Control Variables

5.3.1 Government expenditure intensity

Government Expenditure Intensity (GOV) is measured as the ratio of general government budgetary expenditure to regional GDP. This variable captures the scale of government presence in the local economy. A higher ratio indicates more active fiscal policy and greater government intervention in economic activity, including financial markets. Consequently, GOV serves as a crucial control variable in studies examining financial development and other economic outcomes.

5.3.2 Trade openness

Trade Openness (OPEN) defined as the ratio of total international trade to regional GDP. A higher ratio signals greater dependence on external markets and increased sensitivity to global economic fluctuations. This metric reflects fundamental structural characteristics of a regional economy. Economies with high trade openness typically play significant roles in international markets, with their growth and stability substantially influenced by global trade conditions. Conversely, economies with lower ratios rely more on domestic demand and maintain greater independence from international trade dynamics.

5.3.3 Industrial structure

Industrial Structure (IND) is measured as the combined output value of the secondary and

tertiary industries as a percentage of regional GDP. This metric reflects the composition and relative importance of different economic sectors. It captures the degree to which a regional economy has transitioned from agricultural production to industrial and service-oriented activities. Controlling for industrial structure is essential in estimating the effect of financial technology on regional financial development. Structural economic shifts correlate with both FinTech adoption and financial sector growth. Failure to control for this variable may introduce omitted variable bias, distorting the estimated relationship between the key variables of interest.

5.3.4 Economic growth

Economic Growth (GDPR) is measured by the annual growth rate of a region's gross domestic product (GDP). This variable controls for the overall pace of economic expansion. Including GDPR isolates the relationship between FinTech development and financial outcomes from general business cycle effects. This specification ensures that the estimated coefficients capture the distinct effects of the explanatory variables, rather than conflating them with broader economic fluctuations.

5.3.5 Foreign direct investment intensity

Foreign Direct Investment Intensity (FDI) represents the ratio of actually utilized foreign direct investment to regional GDP. This metric quantifies the relative importance of foreign capital in a local economy, reflecting the depth of international economic integration. As a control variable, FDI accounts for capital inflows that may simultaneously affect financial development and FinTech adoption. These investments facilitate knowledge transfer, create employment, and potentially influence industrial upgrading. Including FDI in the empirical model helps isolate the relationship between financial technology and regional financial development from confounding effects driven by foreign capital penetration.

Variable definitions are provided in Table 1. The analysis employs data from the China Stock Market & Accounting Research (CSMAR) database, a comprehensive source for Chinese economic and financial research.

Table 1. Variable Definitions

Category	Variable	Notation	Definition and Measurement
Dependent Variable	Regional Financial Development	FGDP	Value-added of the financial sector as a percentage of regional GDP.
Explanatory Variable	Financial Technology Development	Tech	Provincial financial technology index, calculated using the entropy method.
Control Variables	Government Expenditure Intensity	GOV	General government budgetary expenditure as a share of GDP.
	Trade Openness	OPEN	Total value of imports and exports as a percentage of GDP.
	Industrial Structure	IND	Output value of the secondary and tertiary industries as a share of GDP.
	Economic Growth	GDPR	Annual growth rate of gross domestic product.
	FDI Intensity	FDI	Actually utilized foreign direct investment as a percentage of GDP.

5.4 Descriptive Statistical Analysis of Variables

Table 2 presents the descriptive statistics for all variables. The sample contains 341 observations. Regional Financial Development (FGDP) shows a mean value of 0.0746 with a standard deviation of 0.0309, ranging from 0.0274 to 0.1970. The relatively small standard deviation compared to the mean indicates limited volatility in this measure, suggesting most observations cluster near the average value.

The Financial Technology Index (Tech) displays a mean of 0.2128, reflecting generally low development levels across regions. Its wide range (0.0020 to 0.8420) reveals substantial cross-provincial variation and significant uncertainty in FinTech advancement trajectories.

For control variables, Government Expenditure Intensity (GOV) averages 0.2914, while Trade Openness (OPEN) stands at 0.2597. Industrial Structure (IND) shows a high average of 0.9035, consistent with China's economic transition toward secondary and tertiary industries. Economic Growth (GDPR) averages 0.0871, and FDI Intensity reports a mean value of 0.8515.

5.5 Correlation Analysis

From the data presented in Table 3, the correlation coefficient between the FinTech

index (Tech) and regional financial development (FGDP) is 0.3687, indicating a moderate positive association. This correlation is statistically significant at the 1 percent level, suggesting that the observed relationship is unlikely to result from random variation. Nonetheless, since other potential control variables and individual fixed effects have not yet been incorporated, the significance of these additional variables provides justification for their inclusion. Across alternative model specifications, the correlations between explanatory variables and controls do not exhibit excessive strength, implying that multicollinearity is unlikely to bias the precision of the estimates.

Table 2. Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
FGDP	341	0.0746	0.0309	0.0274	0.1970
Tech	341	0.2128	0.1585	0.0020	0.8420
GOV	341	0.2914	0.2052	0.1050	1.3538
OPEN	341	0.2597	0.2664	0.0076	1.3541
IND	341	0.9035	0.0522	0.7473	0.9978
GDPR	341	0.0871	0.0428	-0.0534	0.2823
FDI	341	0.8515	4.2713	0.0476	55.9380

Table 3. Correlation Matrix

Variables	FGDP	Tech	GOV	OPEN	IND	GDPR	FDI
FGDP	1						
Tech	0.3687***	1					
GOV	0.0124	-0.4825***	1				
OPEN	0.6709***	0.4802***	-0.3225***	1			
IND	0.5441***	0.5113***	-0.2042***	0.6240***	1		
GDPR	-0.1643***	-0.1363**	0.1170**	-0.0533	0.0067	1	
FDI	0.0418	-0.0277	-0.0162	0.0621	-0.1417***	-0.0161	1

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

6. Regression Results Analysis

6.1 Model Analysis

The regression estimates reported in Table 4 provide robust evidence of the significant influence of financial technology on regional financial development. Model (2) reports an R-squared value of 0.5028, indicating that the explanatory variables account for 50.28% of the variation in regional financial development. The model exhibits strong overall significance (F-statistic = 540.19, $p < 0.01$), confirming the collective importance of the specified determinants.

The coefficient estimates reveal that a one-unit increase in the FinTech index corresponds to an average rise of 0.0330 units in regional financial development. This positive relationship highlights FinTech's role as a driver of financial sector growth.

Among the control variables, industrial structure shows a significant positive association with financial development. In contrast, trade openness and economic growth display significant negative relationships. Government expenditure intensity and FDI intensity demonstrate no statistically significant relationship with the dependent variable in this specification.

Table 4. Regression Results

	(1)	(2)
VARIABLES	FGDP	FGDP
Tech	0.0664***	0.0330***
	(13.5808)	(5.0899)
GOV		0.0008
		(0.0550)
OPEN		-0.0426***
		(-5.4120)
IND		0.2582***
		(4.4930)
GDPR		-0.0668***
		(-6.0551)
FDI		-0.0002
		(-1.3147)
Constant	0.0605***	-0.1489***
	(52.9693)	(-2.8823)
Observations	341	341
R-squared	0.3738	0.5028
Number of id	31	31
F	184.4387***	51.2365***

Notes: ***p<0.01, **p<0.05, *p<0.1; t-statistics in parentheses.

6.2 Robustness Tests

To further validate the robustness of the findings, the study re-estimates the model after excluding the pandemic years of 2020 and 2021. As shown in Table 5, the impact of the Financial

Technology Index (Tech) on regional financial development (FGDP) remains statistically significant. Therefore, it can be concluded that the model successfully passes the robustness check, implying that the results are reliable. Even after accounting for the effects of the pandemic, the positive association between financial technology and regional financial development remains stable and persistent.

Table 5. Robustness Tests

	(1)	(2)
VARIABLES	FGDP	FGDP
Tech	0.0622***	0.0323***
	(12.5126)	(4.8073)
GOV		0.0512***
		(2.8071)
OPEN		-0.0314***
		(-3.5976)
IND		0.2577***
		(4.2630)
GDPR		-0.0966***
		(-6.4744)
FDI		-0.0002
		(-1.1162)
Constant	0.0604***	-0.1643***
	(53.1235)	(-3.0249)
Observations	279	279
R-squared	0.3880	0.5356
Number of id	31	31
F	156.5650***	46.5178***

Notes: ***p<0.01, **p<0.05, *p<0.1; t-statistics in parentheses.

6.3 Conclusion

The findings of this study indicate that financial technology, as an important explanatory variable, plays a significant role in regional financial development. The Financial Technology Index (Tech) exerts a significant positive effect on the level of regional financial development (FGDP), suggesting that the advancement of financial technology contributes to the enhancement of regional financial performance. Therefore, Hypothesis 1 is confirmed. Fiscal expenditure intensity (GOV) and foreign direct investment intensity (FDI) are also found to have positive impacts on FGDP, indicating that government spending and foreign investment serve as important drivers of regional financial development. Moreover, trade openness (OPEN) and industrial structure (IND) exert certain effects on the proportion of value added in the financial sector to GDP (FGDP), but the influence of the Financial Technology Index (Tech) proves to be more significant. This can be attributed to the fact that financial technology directly enhances the efficiency of financial services and promotes innovation in financial institutions and products. Hence, Hypotheses 2 and 3 are validated. In addition, the impact of GDP growth rate (GDP) on FGDP suggests that overall macroeconomic growth provides a favorable external environment for the advancement of regional finance.

7. Recommendations

7.1 Strengthening the Construction of Financial Technology Infrastructure

The development of financial infrastructure constitutes a cornerstone of modern financial systems and plays a critical role in the advancement and application of financial technology. Public authorities should expand investment in such infrastructure, including the establishment of data centers capable of providing storage capacity and high-speed computational power. These facilities underpin technologies such as machine learning and big data analytics, which, in turn, enable financial institutions to better understand client needs, enhance customer satisfaction with financial services, and furnish robust data support for risk management.

7.2 Promoting Financial Technology Education and Talent Development

Human capital constitutes a decisive factor in the advancement of financial technology. The education sector should strengthen collaboration with industry by jointly developing curricula and training programs in financial technology. Such cooperation ensures that educational content aligns with market demand, producing practitioners with practical expertise and enhancing the relevance of education. Scholarships and research grants can further stimulate student and researcher engagement in the field, attract top talent, and advance scholarly inquiry into financial technology. In addition, a certification framework for financial technology professionals can be established. This framework would define clear standards and classifications for talent, thereby guiding the cultivation of a workforce that is systematic, standardized, and scientifically grounded.

7.3 Formulating Policies Conducive to FinTech Innovation

A supportive policy environment exerts a significant influence on the advancement of financial development. Tax incentives represent one effective measure. Governments may grant tax credits and reductions to firms engaged in financial technology, thereby lowering the cost of innovation. Public authorities can also act as intermediaries. Through institutions such as the People's Bank of China, they may guide the establishment of innovation platforms that foster information exchange and resource sharing between financial institutions and technology enterprises, accelerating the process of digital transformation. Regulatory procedures may likewise be adjusted. Streamlined oversight, combined with controlled regulatory sandboxes, can allow evaluated start-ups to test novel financial products under supervision, encouraging experimentation while containing risk.

References

[1] Haijun Zhang, Feng Huang. The Effect and Mechanism of FinTech on Alleviating Financing Constraints of Private Enterprises. Journal of Technology Economics and Management Research, 2024, 10(01):66-71.

[2] Kefu Liu, Yunping Hao, Weiwei Mou. Regional Disparities and Spatial Convergence of FinTech in China. Science and Technology Management Research, 2023, 43(10):88-97.

[3] Jinlu Guo, Ping Yu, Zheng Fu. FinTech and Changes in Financial Structure: A Study from the Perspective of Credit. Economic Review, 2023, 06(06):117-128.

[4] Yan Guo, Liguang Zhang, Qingxiao Han. Does FinTech Promote Regional Financial Development and Financial Service Convergence? Journal of University of Jinan (Social Science Edition), 2023, 33(06):64-75+176.

[5] Dequan Yao, Runkun Liu. The Impact of FinTech on the Structure of Financial System. The Theory and Practice of Finance and Economics, 2023, 44(06):2-12.

[6] Phuoc V N. Evaluating the FinTech success factors model to achieve a sustainable financial technology business: An empirical study in Vietnam. Cogent Engineering, 2022, 09(01):17-26.

[7] Daojin Chen, Yuanyuan Guo, Jishun Liu, et al. The interactive effects of FinTech development and financial industry efficiency. Financial Regulation Research, 2023, 11(07):24-44.

[8] Rong Wang, Li Ye, Yin Fang. Dynamic evolution, regional disparities and convergence of FinTech development in China. Contemporary Economic Management, 2023, 45(04):83-96.

[9] Yi Xiong, Qin Su. Local government debt, financial development level and high-quality development of new urbanization. Statistics & Decision, 2022, 38(23):112-116.

[10] Jianhua Zhao, Jin Song, Yuebin Xia, et al. Monetary policy, financial development level and the cost of debt financing. Investment Research, 2020, 39(04):65-76.

