

Does Bank Competition Exacerbate the Build-Up of Regional Financial Risk ?

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Abstract— Banks occupy this important position in China's financial system, and the increase of bank competition can affect the stability of the financial system. This paper empirically examines the relationship between bank competition and regional risk using provincial panel data from 2011-2019, taking bank competition as an entry point. It is found that: bank competition leads to the accumulation of regional financial risk, there is spatial autocorrelation and a significant positive spatial effect of bank competition on regional financial risk; there is a full mediation effect of interest rate. In this regard, the central bank should pay moderate attention to the regulation of bank credit when formulating relevant policies, improve the rationality of commercial banks' lending rates, and establish a sound inter-regional financial risk prevention and control mechanism to achieve high-quality financial development.

Keywords— Bank competition; regional financial risk; spatial econometric models; mediating effects.

I. INTRODUCTION

The 2022 Central Bank Work Conference pointed out that China has made new achievements in preventing and resolving financial risks, and the overall financial risks have converged, but there is still a long way to go to prevent and resolve major risks and maintain economic stability. This paper is the result of the National Social Science Foundation's project "Research on the overlapping derivation of financial technology risks, contagion spillover and regulatory policies under the new network of association".

The intensification of bank competition can change corporate cash holding decisions (Chen, Ping, 2021) and promote corporate innovation (Fu, Yingjun, 2021), but it also has a significant impact on financial risks that cannot be ignored. The risk of the banking sector is directly related to financial security and the smooth development of the economy. Commercial banks are important liquidity providers, and liquidity is an important cause of financial crises. Excessive liquidity can cause liquidity risk in financial institutions and may spread to financial institutions and even related real economy industries through various ways, forming risk spillovers; insufficient liquidity can reduce bank stability or even trigger liquidity crises (Ma, Y. and Li, Z., 2019). And bank competition can change liquidity creation and thus reduce financial risk or exacerbate the accumulation of financial risk. It is of strong practical significance to accurately grasp the relationship between bank competition and regional financial risk in China and effectively reduce financial risk for the high-quality development of China's economy.

In recent years, scholars at home and abroad have overwhelmingly focused on the impact of bank competition on risk-taking in the banking industry, credit risk of listed companies, corporate risk-taking, and the liquidity of monetary policy transmission. There is a lack of research on whether bank competition exacerbates regional risk accumulation, for which this paper selects provincial panel data on bank competition and

regional financial risk from 2011 to 2019 for empirical testing. First, this paper compares the literature and measures regional financial risk, which is important for studying the accumulation of regional financial risk. Second, the study of the spatial correlation of bank competition on regional financial risk can further enrich the theoretical system of risk spillover. Third, risk prevention and control policies are formulated in response to the research analysis, which provide policy references for preventing and controlling financial risks, taking targeted preventive measures, and stabilizing financial markets against cross-regional risk spillovers.

II. THE DEVELOPMENT DESCRIPTION OF BANK COMPETITION AND REGIONAL FINANCIAL RISK RESEARCH REVIEW

A. Description of the development of bank competition

In recent years, with the deepening reform of China's domestic financial system and the implementation of financial marketization measures such as interest rate market liberalization, the number of domestic commercial banks has continued to grow and competition in China's banking industry has intensified. The intensification of competition in China's commercial banks may intensify the competition for deposits, induce credit risk in enterprises and reduce the stability of banks causing the accumulation of risks.

Competition is measured by the market structure, CR5 is the industry concentration, which can measure the concentration of the market structure of the whole industry, CR5 is chosen to measure the proportion of the five largest state-owned banks in the region, calculated as the proportion of the number of new branches of the five largest state-owned banks in each province to the total number of new branches of twenty commercial banks in the region. The calculation formula is:

$$CR_5 = \frac{\text{Five major state-owned bank indicators}}{\text{Twenty commercial banks}} \quad (1)$$

The value of CR5 is between 0 and 1, and the smaller the value indicates that the degree of competition in the banking

industry is smaller. With the gradual relaxation of access restrictions to the banking industry in China, the banking industry has opened a new change and the pattern of market competition in the Chinese banking industry has begun to unfold, as can be seen from Figure I, although the level of economic and financial development in each province, policy changes differ, and new bank branches are added in each region from 2011 to 2019, the CR5 value in 2019 is generally lower than that in 2011, indicating that from the national level the proportion of China's five state-owned banks is decreasing, the banking industry market structure is changing, and the level of bank competition is improving.

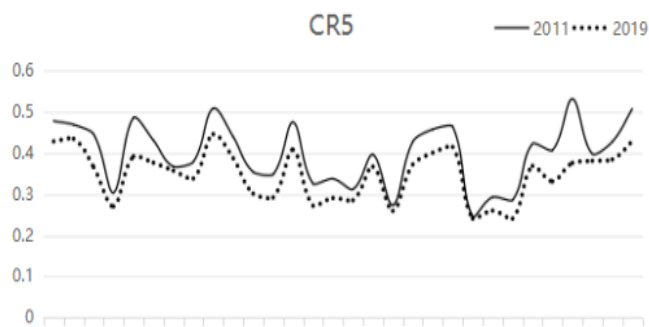


Figure 1. Concentration of Banks in China in 2011 & 2019 (CR5).

This paper also collects data related to 39 commercial banks for the time period from 2013 to 2020. The data are obtained from WIND database, China Financial Statistics Yearbook, etc. A larger Lerner index represents a smaller degree of bank competition.

Using Stata 16.0 for data processing, the Lerner index used to measure the degree of competition of commercial banks varied between 0.144379778-0.522315122 during the sample period, with large differences and fluctuations in the degree of competition among banks. This indicates that there is a large variation among commercial banks.

Figure II shows the average value of Lerner index, from which it can be seen that the average Lerner index of commercial banks in China fluctuates between 0.36-0.52 from 2013-2020. This shows that the overall competitiveness of Chinese commercial banks is low. The average Lerner index of Chinese commercial banks is decreasing year by year, and the degree of competition of Chinese commercial banks is increasing. It can also be seen from the figure that the degree of competition of state-controlled commercial banks is higher than that of other commercial banks, which indicates that state-owned banks are more stable in operation and have a better ability to cope with shocks.

B. Current status of research on regional financial risks

In the study of regional financial risk contagion, Mengjie Rong and Gang Li (2020) studied the spatial association of financial risk, risk contagion and its risk systemic sources in three major economic regions. Shen, Li et al. (2019) studied the overall correlation of local financial risk spatial correlation networks and examined the effect of network structure on the level of local financial risk, concluding that the local financial risk spatial correlation network in China is a "scale-free

network", and the number of correlations in each province has uneven distribution and also has "The spatial correlation and contagion effects of local financial risks are obvious. Tan, C. et al. (2021) demonstrated the spatial agglomeration phenomenon of FinTech based on spatial econometric model as a positive effect on regional financial risk contribution through interest rate and monetary policy.

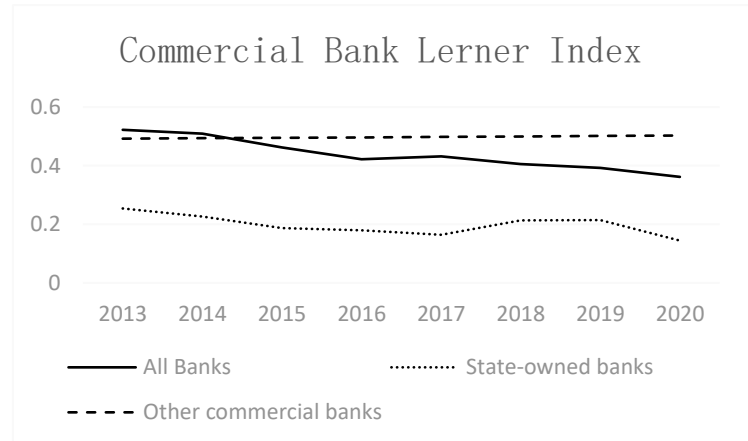


Figure 2. China Commercial Bank Lerner Index.

C. Current status of research on the impact of bank competition on regional financial risk

1. Increased bank competition helps reduce financial risks

The more competitive the banks are, the lower interest rates they will charge to their credit customers, reducing the pressure of repayment on enterprises, and due to the lower costs enterprises will choose low-risk projects to invest, to reduce the default rate of enterprises and the bad debt rate of banks, and to avoid moral hazard and adverse selection (Zhang Zongyi et al. 2012); although the increased competition of commercial banks will lead to the accumulation of credit risk, reasonable internal and external institutional factors help to reduce the probability of management decision errors and avoid misbehavior, thus reducing the negative impact on credit risk due to increased bank competition (Yang, Gang et al. 2021); competition also helps to increase bank stability, which is proportional to the enhancement effect.

2. The accumulation of risks exacerbated by bank competition

First, the direct impact, bank competition can act directly on bank risk-taking, the intensification of competition will affect the monopoly power of the market, reduce the value of the bank's franchise, so that the overall credit quality of the bank's portfolio decreases and becomes unstable, which may lead to the generation of risk-taking behavior such as bank adverse selection moral hazard (Keeley, 1990; Guo Ye and Zhao Jing, 2017); with the Internet financial development and interest rate marketization, banks lose a large amount of deposits, which intensifies bank competition, and banks will expand credit scale by issuing high-yield and high-risk loans while lowering lending standards, which also raises banks' credit risk; marketization of deposit rates and its price competition effect also increase bankruptcy risk and credit risk of urban commercial banks (Peng, Xing et al., 2014); commercial competition in a period of monetary easing has a

higher effect of credit risk enhancement of listed companies; fierce bank competition has a negative impact on banks' innovation enthusiasm, which can reduce innovation behavior and is not conducive to banking institutions to transfer risk, avoid regulation, reduce transaction costs, increase liquidity, and other behaviors that reduce systemic risk.

Second, the indirect effect, bank competition can indirectly act on financial risk by affecting interest rates, competition among banks will reduce the interest rate on loans, which subsequently reduces the return and makes banks less able to resist risk (Martinez-Miera & Repullo, 2010); the degree of bank competition increases, the relationship between banks and customers is unstable, the market power of banks will gradually decrease, financing difficulty will decrease increase, financing liquidity will decrease, when the bank liquidity investment is insufficient, it will lead to the price and scale of financing is restricted, in order to solve the problem banks will charge higher interest rates on loans, while excluding some low-risk borrowers, resulting in the accumulation of risk caused by the increase of non-performing assets (Li, Minghui et al., 2018); under the fierce bank competition, commercial banks deposit and loan spread space becomes smaller, due to performance pressure and expected return target, in order to meet the capital adequacy requirements, banks may provide more loan supply, a large number of loan assets without bad debt provisioning, while the excessive focus on high-risk assets driven by profits, leading to the expansion of risk exposure, resulting in the accumulation of risk and increased bank risk (Peón and Antelo 2019); due to the central bank's control, commercial banks cannot adjust their lending rates too much, and bank competition increases regional credit supply and reduces credit supervision, inducing management misconduct to raise the probability of credit default (Yang Gang et al. 2021).

In addition, Tong Yufen et al. (2019) argue that the marginal effect of profit and risk transfer effect can jointly act on commercial bank competition and credit risk with asymmetry, and the level of commercial bank competition is too high or too low will lead to increased credit risk and the degree of impact of bank competition on risk is more significant in the stage of economic downward pressure; Beck and DeJonghe (2013) argue that bank competition (2013) found that increased bank competition increases bank vulnerability, and the impact of competition on bank vulnerability is greater in countries with more developed stock and foreign exchange markets; Guo Weidong (2013) found that small joint-stock banks contribute less to risk volatility compared to large commercial banks; and commercial bank competition has a higher degree of credit risk enhancement for local state-owned listed companies compared to private listed companies.

Therefore, based on the above analysis of the impact of bank competition on regional financial risk, the following two hypotheses are proposed.

Hypothesis 1: The increase of bank competition will intensify the accumulation of regional financial risks.

Hypothesis 2: Bank competition will diminish regional financial risk by affecting interest rates, and there is a mediating effect of interest rates.

III. STUDY DESIGN

A. Variable description

1. Main explanatory variables. At present, the main measures of bank competition are the structural index Herfindahl Index (HHI) and the price index Lerner Index (LERNER). In recent years, the number of operating institutions of each bank in China has increased rapidly, and the degree of bank competition in each province and city has changed significantly. In order to better measure the degree of bank competition in each province, the number of operating branches of 20 commercial banking institutions in each province is chosen as a proxy variable for banking competition in this paper. In this paper, drawing on the study of J. Zhang et al. (2017), bank competition indicators are measured using the Herfindahl index, which is calculated as follows:

$$RHHI = 1 - HHI_t = 1 - \sum_{k=1}^{20} (bank_{k,i,t} / \sum_{k=1}^{20} bank_{k,i,t})^2 \quad (1)$$

In Equation 1: bank_{k, i, t} the number of new branches of different types of banking institutions k in province i in year t; k=1, 2, 3... 20 represents Bank of China, Industrial and Commercial Bank of China, and other 20 commercial banks. rHHI takes values in the range of [0-1], the larger the value indicates that the smaller the HHI, the greater the degree of bank competition.

2. Explained variables. Regional financial risk stress index (RISK), this paper constructs the regional financial risk index based on Tan, Zhongming et al. (2020), and draws on Shen, Li (2019) and other methods, and mainly selects seven main indicators such as bank non-performing loan ratio, insurance depth, deposit to loan ratio, foreign trade, investment level, asset and liability ratio of state-owned enterprises and non-state-owned enterprises above the scale to construct the regional financial risk index, where the negative indicators are positively processed by taking the inverse, and moderate indicators are positively processed by referring to Xu Guoxiang and Li Bo (2017), which are calculated as the following formula:

$$y_i = \frac{1}{|x_i - k|} \quad (2)$$

The fitness value k in Equation 2 is taken as the average value of the indicator.

Due to the different magnitudes of individual indicators, each indicator needs to be dimensionless. In this paper, we choose to use the standardization method for processing, taking into account the different attributes of the indicators, different standardization formulas are used for the indicators for processing.

Positive index standardization: $[X_{ij} - \min(X_{ij})] / [\max(X_{ij}) - \min(X_{ij})]$

Inverse indicator normalization: $[\max(X_{ij}) - X_{ij}] / [\max(X_{ij}) - \min(X_{ij})]$

The component coefficients of each dimensional indicator were calculated separately by using spss20. The first K components corresponding to the principal components with eigenvalues greater than 1 are selected, and the component coefficients of each principal component are obtained by dividing the component matrix by the square root of the initial

eigenvalues measured, and finally the final regional financial risk stress index is calculated based on the proportion of the eigenvalue corresponding to each principal component of each indicator to the sum of the total eigenvalues of the extracted principal components as the weights.

TABLE I. Regional financial risk indicators.

	Indicator	Calculation method	Nature of indicator
Financial Sector	Bank Non-Performing Loan Ratio	Non-performing loans/all loans	Positive
	Insurance Depth	Premium income/GDP	Reverse
	Deposit to Loan Ratio	Loan balance / Deposit balance	Positive
Government Departments	Financial Gap (Fiscal expenditure/revenue)/GDP		Positive
Macroeconomic Environment	Foreign Trade	Export volume/GDP	Reverse
	Investment Level	Fixed asset investment/GDP	Reverse
Corporate Sector	Assets and liabilities ratio of state-owned enterprises and non-state-owned enterprises above the scale		Moderate

3. Control variables. In this paper, by combing through relevant literature and drawing on related literature, the following control variables are selected: (1) economic structure (IS), the ratio of secondary industry to tertiary industry is used to measure the regional economic structure, the intensification of bank competition will make commercial banks pay extra attention to enterprises in emerging industry fields, China's financial system is bank-led, and the industrial structure also determines the credit structure of banks; (2) financial development (FDI), the use of regional commercial banks to borrow total loans to GDP ratio to measure, regional finance in the process of synergistic development, the inter-regional interconnectivity and self-propagation, inevitably accompanied by the occurrence of financial risk transmission; (3) economic development level (EDL), the regional economic development level is chosen to measure the logarithm of regional GDP per capita, regional systemic financial risk and the regional economic development level (4) government support (FS), the use of fiscal spending to GDP ratio to measure, fiscal pressure and financial pressure have a close link, China's fiscal and financial functions have a complex cross and overlap, the direct relationship between financial funds and financial funds is the starting point of risk linkage.

4. Intermediary variables. Referring to Liu, Jinqun and Xie, Yaoshu (2016), the 7-day interbank lending rate is chosen as the proxy variable for interest rate (Ibr), and the data obtained are the current month values, so the required data are obtained by weighting the average of them after collecting monthly data from 2011-2019.

B. Data description

In this paper, based on the availability of data, provincial panel data between 2011 and 2019 are selected, and the underlying data are obtained from WIND, the Flush database, and the China Statistical Yearbook, and missing data are complemented using Lagrangian interpolation. The names, descriptions, and characteristics of each variable are shown in Table II. The mean value of bank competition is 0.1817 and the standard deviation is 0.04105, indicating that there is regional variability in bank competition.

TABLE II. Descriptive statistics of variables.

Describe statistics					
The variable name	Number of samples	minimum	maximum	mean	Standard deviation
RHHI	270	.09	.28	.1817	.04105
RISK	270	-2.53	2.20	.0000	.46688
IS	270	.53	5.17	1.2769	.71734
FDI	270	1.53	8.13	3.1729	1.13859
EDL	270	9.69	12.01	10.7573	.44179
FS	270	.11	.63	.2494	.10340

C. Spatial autocorrelation analysis

MoranI index tests the spatial correlation of economic variables, when the index is greater than 0 means the indicator presents positive spatial correlation among regions, and when the index is less than 0 means the indicator presents negative spatial correlation. In this paper, we use the economic distance weight W1 and the geographic neighborhood weight matrix W2; the regional financial risk and bank competition level of 30 provinces from 2011-2019 are used as the analyzed variables to measure the MoranI index.

As can be seen from Table III, the MoranI index values of China's bank competition level (RHHI) in both economic distance weight matrix and geographic neighborhood weight matrix from 2011-2019 are above 0.28 and both are significant, with significant spatial autocorrelation; while regional financial risk (risk) fails the significance test in 20132014 under economic distance weight matrix and in geographic neighborhood weight The fact that the regional financial risk (risk) did not pass the significance test under the economic distance weight matrix in 2013 2014 and did not pass the significance test under the geographical neighborhood weight matrix in 2011 does not mean that there is no autocorrelation, just that it is not significant, indicating that regional financial risk has also been autocorrelated in recent years.

D. Model construction and selection test

The spatial correlation test is shown in Table IV. Spatial correlation tests were performed based on the LM statistics, and both LM-Lag and LM-Error statistics passed the significance test at the 1% level proving the existence of significant spatial correlations. Subsequently, further R-LMLag test and R-LMerror test were performed, and both were still significant, then the spatial Durbin model was selected for further LR test and Wald test. the LR test and Wald test passed the significance level proving that the SDM model could not be simplified to SLM model and SEM model, so the SDM model was used.

TABLE III. Moran I values of bank competition and regional financial risk under two weighting matrices.

Year	Bank Competition				Regional Financial Risks			
	Economic distance weighting matrix	P	Geographic adjacency weight matrix	P	Economic distance weighting matrix	P	Geographic adjacency weight matrix	P
2011	0.327	0.006	0.332	0.002	0.213	0.048	-0.007	0.405
2012	0.289	0.015	0.298	0.003	0.240	0.030	0.174	0.038
2013	0.279	0.018	0.300	0.003	0.181	0.091	0.160	0.049
2014	0.283	0.017	0.285	0.005	0.191	0.075	0.167	0.043
2015	0.309	0.010	0.284	0.005	0.271	0.016	0.269	0.005
2016	0.310	0.009	0.290	0.004	0.329	0.004	0.313	0.001
2017	0.324	0.007	0.296	0.004	0.379	0.001	0.338	0.001
2018	0.330	0.006	0.298	0.003	0.303	0.001	0.228	0.003
2019	0.336	0.005	0.295	0.004	0.352	0.001	0.247	0.005

TABLE IV. Spatial model selection test results.

Model	Economic distance weighting matrix				Economic distance weighting matrix			
	Spatial error model		Spatial lag model		Spatial error model		Spatial lag model	
	Statistical values	P	Statistical values	P	Statistical values	P	Statistical values	P
LM test	38.433	0.000***	19.703	0.000***	5.014	0.025***	5.195	0.014***
R-LM test	38.981	0.000***	20.252	0.000***	7.972	0.005***	4.153	0.042***
LR-test	60.35	0.000***	60.17	0.000***	17.69	0.0034***	20.51	0.001***
Wald-test	16.51	0.0055***	23.33	0.0003***	12.17	0.0326***	16.45	0.0057***

Note: *, ** and *** indicate passing significance tests at 10%, 5% and 1% levels, respectively (same below)

The Hausman index in the geographic neighborhood weight matrix was 30.36 and passed the significance level test of 0.01, and the Hausman index in the economic distance weight matrix was 37.63, so it was more appropriate to use fixed effects.

IV. EMPIRICAL ANALYSIS

A. Spatial model regression results

The results of the SDM model regression of bank competition on regional financial risk are shown in Table 5. Based on the values of σ^2 , R^2 , and LogL under the geographic weight matrix can be seen to indicate that the SDM model is chosen with high confidence. From Table 5, it can be seen that the effect of bank competition (RHHI) on regional financial risk is positive and passes the 1% significance level test, which proves that hypothesis 1 holds, that is, bank competition exacerbates the accumulation of regional financial risk. In terms of the interaction W^*RHHI , the sample coefficient is 3.131, which is significant at the 1% level. Since there is a significant risk association among banks and there are differences in the direction and intensity of the dynamic interaction of risk among banks, the banking sector is also a source of risk contagion, which further confirms that the intensification of bank competition exacerbates the accumulation of regional risk. In terms of control variables, industrial structure has a positive impact on regional financial risk and passes the 1% significance level, industrial restructuring is closely related to local enterprises, and the level of financial risk of enterprises is affected by industrial restructuring; the impact of financial development on regional risk is negative, indicating that the positioning of financial development is clearer under the leadership of the Party Central Committee, the goal of financial services is clearer, and financial development is moving in the direction of The impact of financial development on regional financial risk is negative, indicating that the orientation of

financial development is clearer under the leadership of the central party, the goal of financial services is clearer, and financial development is moving in the direction of high quality; the impact of economic development level and government support on regional financial risk is positive.

TABLE V. SDM model regression results.

Variables	SDM Model
	Geographic adjacency matrix
RHHI	0.612*** (2.83)
IS	0.118*** (12.79)
FDI	-0.0216*** (-4.60)
EDL	0.148*** (5.91)
FS	0.137** (2.04)
W^*RHHI	3.131*** (8.70)
W^*IS	0.149*** (6.71)
W^*FDI	-0.0113 (-1.22)
W^*EDL	-0.234*** (-5.33)
W^*FS	-0.146 (-1.18)
N	270
σ^2	0.04668
R^2	0.587
LogL	765.8168

B. Effect decomposition

In this paper, a geographic adjacency matrix is used to decompose the spatial spillover effects. The empirical results are shown in Table VI, and the direct effect refers to the impact of intra-regional bank competition on regional financial risks. From the direct effect, the influence coefficient of bank

competition (RHHI) on regional financial risk is positive, with a value of 0.502, indicating that bank competition has a significant positive effect on regional financial risk in the region, and the intensification of bank competition will effectively aggravate the accumulation of risks. Indirect effects refer to the impact of the degree of bank competition in neighboring regions on regional financial risks in the region. From the perspective of indirect effects, the positive spatial spillover of bank competition to regional financial risks is more obvious. The overall effect is still positive, indicating that bank competition will not only aggravate the accumulation of financial risks in the region, but also increase the financial risks of adjacent regions, with positive spatial effects, because the intensification of bank competition leads to the accumulation of bank risks, and changes the local credit structure leads to the rise of credit risks, and due to the spatial correlation of local financial risks, local financial risks have obvious spatial correlation and contagion effects.

C. Intermediary effect testing

In order to ensure the robustness of the results, this paper further adopts the estimation method of Bootstrap repeated sampling (5000 repeated sampling) to test the mediation effect of asset prices. Referring to the parameter test of intermediary variables by Wen Zhonglin et al. (2004), the results show that

bank competition is significantly negatively correlated with interest rate level. The results show that although bank competition will aggravate the accumulation of regional financial risks, the pace of risk accumulation will be slowed down through the intermediary effect of interest rates, and interest rates are the only intermediaries. According to the empirical results, hypothesis 2 is true, bank competition will weaken regional financial risks by affecting interest rates, and interest rates have an intermediary effect.

TABLE VI. Direct and indirect effects of bank competition on regional financial risks.

	Geographic adjacency weight matrix		
	Direct effects	Indirect effects	Total effect
rhi	0.502** (2.41)	2.735*** (7.88)	3.237*** (8.03)
is	0.113*** (15.57)	0.115*** (6.45)	0.228*** (11.32)
fdi	-0.0209*** (-4.03)	-0.00807 (-1.06)	-0.0290*** (-3.51)
edl	0.160*** (5.78)	-0.237*** (-5.62)	-0.0777** (-1.97)
fs	0.134* (1.73)	-0.142 (-1.28)	-0.00787 (-0.07)

Note: t statistics in parentheses* p < 0.1, ** p < 0.05, *** p < 0.01

TABLE VII. Mediation Model Test.

		b (Normalize regression coefficients)	SE	T	LLCI	ULCI	R2	F
Libor1w	C	-0.1243	0.0154	-8.0612**	-0.1546	-0.0939	0.3211	24.9712**
	RHHI	-0.0437	0.0127	-3.4508**	-0.0686	-0.0188		
Risk	C	-0.8567	0.9496	-0.9021	-2.7265	1.0131	0.4217	31.9613**
	LIBOR1W	30.8574	3.3963	9.0856***	24.1700	37.5449		
	RHHI	0.6317	0.7141	0.8846	-0.7744	2.0377		

TABLE VIII. Test of the mediating effect of interest rates.

	Effect	BootSE	T	95 confidence interval	
				LLCI	ULCI
Indirect effects	-1.3509	0.3923	8.892**	-2.1619	-0.6283

TABLE IX. Robustness tests.

Variable	Economic distance matrix
RHHI	5.513* (1.70)
IS	-0.271** (-2.05)
FDI	0.0401 (0.56)
EDL	-0.689* (-1.80)
FS	3.029*** (2.95)
W*RHHI	45.75*** (8.06)
W*IS	0.102 (0.35)
W*FDI	-0.231* (-1.68)
W*EDL	1.593*** (2.42)
W*FS	2.623 (1.39)
N	270
σ ²	0.06345
R ²	0.529
LogL	710.4622

D. Robustness test

In this paper, the spatial Durman model under the economic distance matrix is used to regress the data and carry out the robustness test, the results are shown in Table 9, it can be seen from the regression results that bank competition has a positive impact on regional financial risk, and the influence coefficient of bank competition on regional financial risk is 5.513, and it has passed the 10% robustness test. There is a significant spatial positive correlation between the level of bank competition, that is, the spatial spillover effect of bank competition exists.

V. CONCLUSIONS AND ENLIGHTENMENT

It is found that (1) the positive impact of bank competition on regional financial risk is significant, and there is a significant positive spatial spillover effect. (2) Interest rates have a complete intermediary effect in bank competition and regional financial risks, although the intensification of bank competition will cause a decline in loan interest rates and reduce bank returns, but the decline in interest rates will reduce the

probability of default, reduce the bank's bad debt rate, and alleviate the accumulation of risks.

The research in this paper has important theoretical and practical significance for rationally regulating bank competition and preventing and resolving financial risks. Based on the conclusions of the study, the following recommendations are made. First, strengthen the control of the expansion of the number of banks, supervise the expansion of the scale of banks, clarify the direction of loans, and control and optimize the unreasonable credit scale of banks. Second, to strengthen bank supervision, pay equal attention to innovative development and strengthen supervision, and government supervision departments should adopt a guiding role to improve the stability of banks. Third, promote the optimization of the market interest rate system, improve the rationality of commercial bank loan interest rates, promote the development of bank competition in a good pattern, and make interest rate pricing more conducive to reducing financial risks. Fourth, bank competition will aggravate regional financial risks, and a healthy interregional financial risk prevention and control mechanism should be established in a timely manner to achieve high-quality financial development.

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