Risk Measurement and Empirical Test of Chinese city Commercial banks

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Abstract-In the process of preventing and resolving systemic financial risks, compared with large commercial banks, the risk prevention and control ability of urban commercial banks has attracted more and more attention from regulators and academic circles. This paper selects the corresponding index data of 14 urban commercial banks from 2012 to 2019, evaluates the liquidity risk and credit risk of the sample urban commercial banks by adopting the relatively mature risk assessment methods in the current academic world, and measures the operational risk by using the income model. Research finding: first, the liquidity risk of the same bank fluctuates greatly during the sample period, while the credit risk fluctuates less; second, the liquidity risk gap between the sample banks is smanll, while the credit risk gap is large; third, liquidity risk and credit risk significantly restrict the profitability of banks, and the liquidity of banks with higher asset scale is more serious, while the credit risk of banks with lower asset scale is more serious; fourth, the lower level of the asset scale of the city business facing the operating risk loss higher than the higher asset scale of the city business. The conclusion of this paper has a certain reference value to grasp the risk problems of current urban commercial banks.

keywords-Urban commercial banks; Bank risk; Evaluation system; Entropy method; Income model

1 INTRODUCTION

As the regulator of economic activity, the steady operation of commercial banks plays a negligible role in the healthy development of the national economy. Therefore, the problem of bank risk has always been paid great attention to. Especially in recent years, with the decline of domestic economic growth and enterprise operation difficulties, the decline of bank profit margin and the increase of bad debts, credit expansion caused by investment to drive economic development has long become a huge hidden danger in the current credit market (He Zhuojing et al., 2018)[1]. In addition, the decentralization of financial media, interest rate liberalization and the promotion of Internet finance seriously restrict the traditional

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development mode of commercial banks with mainly deposit and loan business (Baiyun Tao et al., 2016)[2], which increases the business pressure on traditional commercial banks. Overall, the research on bank risk problems is mainly reflected in the effectiveness of macroeconomic policies (Gu Haifeng and Yu Jiajun, 2019[3], Pan Pan et al., 2020[4]), financial innovation (Yang Wenjie et al., 2020)[5], corporate governance (Zhang Guangli et al., 2019)[6], transmission channel research (Zhou Shunxing, 2018)[7], evaluation research (Liu Songlin et al., 2018)[8], etc.On August 28, 2020, the China Banking and Insurance Regulatory Commission issued the Three-Year Action Plan for Improving Corporate Governance in the Banking and Insurance Industry (2020-2022), helping to enhance the risk resistance from the perspective of improving the level of corporate governance. The 2021 Government Work Report pointed out that the task of preventing and defusing risks in the financial sector remains arduous. The 14th Five-Year Plan also clearly proposes to promote financial innovation in an orderly manner under the premise of prudent supervision, and improve the regulatory framework for covering all risks. It can be seen that at this stage, preventing and resolving financial risks is still the focus of the work.

Compared with the risk-sharing mechanism that large commercial banks can rely on national reputation when faced with risk shocks (Shi Xiaokun et al., 2020)[9], small and medium-sized banks with the main representative of urban commercial banks face more severe risk challenges. Especially in recent years, the rapid expansion of small and medium-sized commercial interbank liabilities and off-balance-sheet assets has lengthened the arbitrage chain (Xue Yuhua and Wang Qiao, 2019)[10], increasing the risks of the banking system and may be transmitted to others through some risks (Lv Jiangling and Zhang Rui, 2019)[11]. In addition, the risks of small and medium-sized banks often have the trend of cross-market, cross-regional spread and infection, which has become the main content of preventing systemic financial risks (Lu Minfeng and Zhou Junyu, 2020)[12]. The research shows that in the development process of urban commercial banks in recent years, there are problems such as intensified competition, declining performance, pressure on asset quality and insufficient governance mechanism (Xu Xuming and Lu Minfeng, 2020)[13]. In addition, with the deepening of China's financial system and the increase of opening up to the outside world, the corporate governance and risk exposure problems of urban commercial banks with local governments as the main shareholders continue to emerge (Zhang Guangli et al., 2019)[14]. In 2019 Baoshang bank serious credit risk was taken over by the People's Bank of China and the banking insurance regulatory commission, jinzhou bank of non-performing loans and wenzhou bank, a series of events shows in the economic downturn, represented by urban commercial Banks are more likely to impact, facing greater risk exposure, overall financial risk is high (Hou Yiheng et al., 2018)[15]. At the same time, urban commercial banks, based on serving the local economy, supporting the development of small, medium and micro enterprises, have the characteristics and advantages of practicing inclusive finance, improving the banking system structure, and filling in the lack of financial services (Shi Yongdong and Wang, 2017)[16]. With the transformation of China's economic structure, consumption and service industry have become important engines driving economic growth, and we need to increase our support for small and medium-sized enterprises. In terms of capital demand, small and medium-sized banks have well met the practical needs of private enterprises (Xue Yuhua and Wang Qiao, 2019)[10].

On this basis, it is of great practical significance to study the risk management problems of

urban commercial banks. The research on urban commercial banks focuses on financial risks themselves, internal management and external intervention (Tu Jun and Yang Fan, 2018)[17]. Few literature measures the overall risk level of urban commercial banks alone at the national level, and the risk types involved are incomplete and the selection of evaluation indicators is relatively single. This paper believes that how to take effective methods to accurately measure its risk level is not only conducive to city commercial banks to grasp their own risk situation, but also provides a reference for decision-making to prevent and defuse bank risks and achieve regional financial stability and high-quality economic development. Based on this, this paper builds a set of risk indicators to measure the measurement of the current risk situation of urban commercial banks.

Different from the previous research on the risk problems of urban commercial banks, the innovation of this article is reflected in the following aspects: first, the risk types involved are more comprehensive. In the past, most scholars have worked based on a certain risk problem. This paper comprehensively considers three more important risk types: liquidity risk, credit risk and operational risk; second, the evaluation system is relatively novel. In the past, a single indicator was used as a proxy variable for a certain risk to measure the risk level. This paper builds a set of evaluation system covering many indicators, and uses the entropy weight method to measure the weight of each index; third, because most of the urban commercial banks serve the local economy, and the differences between China are relatively huge, resulting in the different development level of different urban commercial banks. Therefore, heterogeneity tests are necessary during the analysis. Specifically, this paper analyzes the difference in the operational risk loss of city business banks with different asset scale levels, and enriches the research on the operational risk of city commercial banks.

2RISK INDEX SELECTION AND MEASUREMENT

2.1Construction of the index system

On the basis of fully drawing on the indicators selected by previous scholars when assessing bank risk, this paper constructs two risk evaluation systems: liquidity risk and credit risk (shown in Table 1 and 2).

Table 1 Liquidity risk evaluation index system

Indicators	Definition	Direction
Liquidity ratio	Liquidity asset balance / liquidity debt balance, a minimum regulation of not less than 25%, measures the ability to repay short-term debt.	reverse
Loan-to-deposit ratio	Customer loans / customer deposits, monitoring indicators to prevent bank overexpansion.	positive
Liquidity cover rate	The net outflow of qualified quality liquidity assets / cash in the next 30 days, the minimum regulatory standard is not less than 100%, measures to meet the liquidity demand in the next 30 days under a certain pressure scenario.	reverse

Leverage ratio	Net Tier 1 capital / adjusted balance, the CBRC requires a minimum regulatory standard of 4% to measure the bank's repayment capacity.	reverse

Note: "Direction" indicates the relationship between the index value and the liquidity risk direction, "positive" indicates that the greater the index value, the greater the risk; "reverse" indicates that the greater the index value, the smaller the risk.

Table 2. Credit risk evaluation index system

Indicators	Definition	Direction
Capital adequacy ratio	Total capital (minus capital deductions) / weighted risk assets, regulatory requirements, not less than 11.5% and non-systemically important banks not be less than 10.5%. It reflects the extent to which banks can bear losses with their own capital before the assets of depositors and creditors are lost.	reverse
Tier 1 capital adequacy ratio	Tier 1 Capital (minus Tier 1 Capital deductions) / weighted risk assets, regulatory requirements for not less than 9.5% and non-systemically important banks not less than 8.5%.	reverse
Core tier-I capital adequacy ratio	Core Tier 1 capital (minus core Tier 1 capital deductions) / total weighted risk assets, regulators require that systemically important banks should not be less than 8.5%, and non-systemically important banks should not be less than 7.5%.	reverse
Bad performing loan rate	Non-performing loan / total loan balance, a measure of bank loan quality.	positive
Set are cover rate	Bad debt reserves / bad loans to measure the robustness of bank operations.	reverse
Single maximum customer loan ratio	Maximum one customer loan total / net capital, regulatory requirements not higher than 10%, measure loan concentration.	positive
Maxten customer loan ratio	Maximum ten customers' total loans / net capital, regulatory requirements not higher than 50%, measure loan concentration.	positive

Note: "Direction" indicates the relationship between the index value and the credit risk direction, "positive" indicates that the greater the indicator value, the greater the risk; "reverse" indicates that the greater the indicator value, the smaller the risk.

2.2Index quantification method

In the specific research process, the above liquidity risk and credit risk indicators were quantified by entropy power method. The method is often used to measure the degree of discrete of a given indicator, the deeper the impact of the indicator on comprehensive evaluation. In previous studies, some scholars have adopted this method to measure the bank risk level (Yu Shenghua and Yang Nyingchi, 2019[18]; Xu Hongfen et al., 2019[19]), which has achieved good results. Unlike previous scholars who added time variables to perform the bank

risk measures using the entropy power method, this paper still adopts the traditional cross-sectional data for analysis. Specific operation steps are as follows:

1. first calculates the information entropy of each indicator X_{ij} (the value of the j index of the i sample bank in a given year)

$e_j = -k\sum_{i=1}^{n}\left(Y_{ij} \times \ln Y_{ij}\right) Y_{ij} = \frac{X_{ij}}{\sum_{i=1}^{n} X_{ij}}$ $k = \frac{1}{\ln(n)}$, n is the sample size.

2.calculatesthe information entropy redundancy $\left(d_j = 1 - e_j\right)$

and determines the weights of each index $w_j = \frac{d_j}{\sum_{j=1}^{m} d_j}$, m is the number of indicators.

3. determines the index weights.

In addition, in terms of operational risk loss quantification, domestic and foreign scholars use more models for research. Among them, income model has strong applicability in China , so this paper plans to use income model to measure the operating risk loss of urban commercial banks. Specific analysis procedures are shown in part 3 of this paper.

2.3 Comparative analysis of the risk degree

Based on the index weights determined by the above entropy power method, the liquidity risk and credit risk scores of urban commercial banks were obtained, and the change trend chart from 2012-2019 was made (shown in Figures 1 and Figure 2) was made. This article has found that the:

First, the liquidity risk scores of a few banks are in a downward trend (Bank of Chengdu, Bank of Guangzhou, Bank of Ningbo and Bank of Shanghai), and most banks' liquidity risk is stable (6) or upward trend (4). Bank of Wenzhou, in particular, has increased liquidity risk in recent years, from 0.512 in 2017 to 0.841 in 2019 (limited to length, detailed data is no longer listed separately in this paper). In terms of credit risk, 6 banks are in the downward trend (Bank of Beijing, Bank of Jiangsu, Bank of Nanjing, Bank of Chengdu and Bank of Ningbo), 3 banks are stable, and the credit risk of 6 banks is on the rising trend. Similarly, Bank of Wenzhou credit risk rose sharply, from 0.381 in 2014 to 0.680 in 2019. It can be found that the risk situation of Chinese urban commercial banks has not been well improved in recent years, and the risk problems of individual banks are particularly prominent.

Second, the liquidity risk of the same sample bank fluctuates greatly, while the credit risk fluctuation is small. It is widely believed that liquidity mismatch is the fundamental cause of liquidity risk (Gao Lei et al., 2019)[20]. Past city bank in the process of development, in order to expand the scale of assets buying business, and in recent years strong regulatory policy makes business tightening, trade debt costs, high interbank debt not only leads to term mismatch phenomenon, but also intensified the liquidity pressure, once credit default, liquidity risk along the trade chain, cause systemic risk (Liu Xiangming, etc., 2020)[21]. The study found

in this paper is that during the sample period, most urban commercial banks fluctuate greatly, which shows that they are currently at the threshold of strictly controlling liquidity risk. Urban commercial banks attach great importance to the management of liquidity risk, but the overall effect is not ideal. In addition, the credit risk fluctuations of most urban commercial banks are small, so it can be seen that most urban commercial banks can manage their own capital adequacy according to the regulatory requirements, and control the credit risk within a reasonable range.

Third, it can be found that the liquidity risk gap between the sample banks is small, and the credit risk gap is large. The liquidity risk of the sample banks was mostly maintained between 0.4 and 0.6, while the extreme difference in credit risk was close to 0.9. Among them, the Bank of Wenzhou index is the most "prominent", not only liquidity risk is on the rising trend, credit risk is also soaring. According to the data released by the China Banking and Insurance Regulatory Commission, from 2017 to March 2021, the Bank of Wenzhou was fined 10.56 million yuan for various illegal problems, most of which involved loan problems. Only from the perspective of risk in bank management, the index system designed in this paper can fit the reality to a certain extent and reflect the rationality of the index system design.

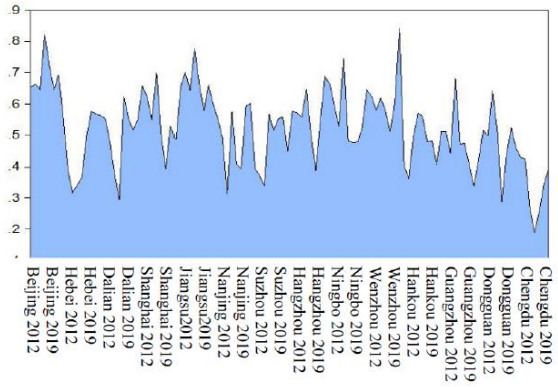

Figure 1 Change trend of liquidity risk

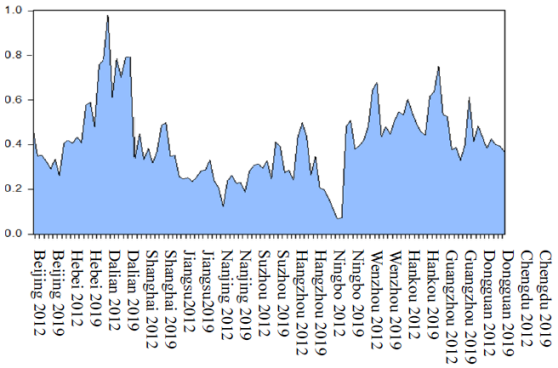

Figure 2 Change trend of credit risk

3 RESEARCH DESIGN AND EMPIRICAL TEST

3.1Selection of data sources and variables

3.1.1 data source

Based on the " urban commercial banks in the 2019 Top 100 China Banking List (ranked by core tier 1 net capital) released by the China Banking Association, combined with the availability of data, 14 sample banks were finally obtained. The sample interval was set from 2012 to 2019, and the data came from the annual reports of various companies and the flush iFind database. Notably, when individual index data is missing, this paper interpolates using the data averaging over the last two years.

3.1.2 variable selection

The income model takes the net profit of the target bank as the explanatory variable, and the quantifiable index reflecting bank risk, which is often adopted by scholars in the operational risk of commercial banks. It can be believed that in the fluctuation of net profit, excluding the liquidity risk and credit risk that can be explained, the remaining parts that cannot be explained reflect the operating risk. In the research process, liquidity risk, credit risk size have been measured in the above article, which will not be repeated here.

In addition, the fluctuations in bank net profit are affected by other factors. Chen Yihong and Liang Peijin (2020)[22] from the decomposition of net profit growth drivers, from the perspective of the profit growth of urban commercial banks analysis, reached more valuable conclusions. The article divides the fluctuation factors of net profit into six categories: scale, net profit difference, non-interest income, business and management fees, asset impairment loss, and income tax. Since the net profit difference often jointly affects the net profit of the bank, in the background of narrowing interest spread, commercial banks often increase the net profit by expanding the asset scale, so this variable is abandoned in the empirical analysis of this paper. The remaining five variables are all presented in this paper.

Unlike the static panel data used by previous scholars to construct revenue models, this paper measures operational risk using the revenue model under the dynamic panel data. Specifically, this paper believes that due to the special operating nature of bank enterprises, the net profit of the current bank not only depends on the financial situation of the current period, but also the business activities of the previous bank will also have an impact on the net profit of the current bank. Therefore, the lagging phase term of net profit is added in the construction of the model.

3.2 Model setting and description of variables

Considering the above indicators, the model is constructed as follows:

$$\begin{aligned}\Pr ofits_{it} &= \alpha_0 + \alpha_1 \Pr ofits_{i,t-1} + \alpha_2 Liquidity_{it} + \alpha_3 Credit_{it} + \alpha_4 Scale_{it} \\ &+ \alpha_5 Nii_{it} + \alpha_6 Cost_{it} + \alpha_7 Loss_{it} + \alpha_8 Tax_{it} + \varepsilon_{it} \qquad (1)\end{aligned}$$

In the above formula, “Profits”represents net profit, measures the profitability of the bank; Liquidity represents the liquidity risk; Credit represents the credit risk; Scale represents asset

size; Nii represents the non-interest income; Cost represents business and management expenses; Loss represents the asset impairment loss; Tax represents the income tax expense; ε represents the residual. Based on the constructed dynamic panel data model, in order to avoid the endogenous problem between the explained variables and the partially explained variables, and to consider the existence of the unit root.

Excluding the portion explained by the explanatory variable, the remaining unexplained fluctuations in bank net profit may be considered as caused by operational risk. So is that part of the fluctuation in net profit for which the available model could not explain:

$$\sigma_{oprisk}^2 = \sigma^2(1 - R^2) \tag{2}$$

As a basis for measuring operational risk, in Eq, σ^2 is the variance of the bank net profit and R^2 is the goodness-of-fit coefficient of the regression model. Assuming that the bank's net profit is subject to a normal distribution, the maximum loss that the bank may suffer from operational risk at the 99% confidence under the requirements of the new capital agreement is:

$$\text{Operational Risk Loss}=3.1\,\sigma_{oprisk} \tag{3}$$

Table 3 is the descriptive statistical results of various variables used in the empirical process, which mainly analyzes the bank net profit, liquidity risk and credit risk. It can be seen that the difference in net profit between sample banks is large, which reflects the polarization in the current process of development. The profitability of the better urban commercial banks is far higher than that of the urban commercial banks with a general level of development. skewness 1.30, in the right form, indicating that the profitability of most urban commercial banks is below the average level, and the development is relatively slow. The kurtosis of 3.70, not very different from the normal distribution, indicates few extreme values.

Compared with liquidity risk and credit risk, it can be seen that the average liquidity risk is 0.52, while the average credit risk is 0.41, indicating that the liquidity risk faced by the current city commercial banks is higher than the credit risk it faces. Similarly, both are very poor, reflecting the significantly different risk control capabilities of different city banks. In addition, the liquidity risk skewness is-0.12, on the left, and the credit risk bias is 0.74, on the right, which reflects the relatively serious liquidity risk. Both kurtosis is similar to the normal distribution, with few extreme values.

It should be emphasized that some processing of the raw data is done to ensure the empirical analysis. Specifically, given the huge differences in liquidity risk and credit risk size and the remaining variables, the remaining variables are treated logarithmically.

Table 3 The variable descriptive statistics

Variables	Mean	Standard deviation	Maximum	Minimum	skewness	Kurtosis

Profits	5606	5238	21441	510	1.30	3.70
Liquidity	0.52	0.12	0.84	0.19	-0.12	2.90
Credit	0.41	0.17	0.98	0.07	0.74	3.80
Scale	6724	6202	27370	833	1.47	4.30
Nii	3474	4721	24997	122	2.58	9.94
Cost	4420	3351	14667	1025	1.18	3.45
Loss	3747	4184	22547	122.70	2.14	7.91
Tax	1087	1029	4375	102	1.56	4.56

3.3Empirical results and analysis

The Eviews9.0 statistical software was used to calculate the above revenue model to estimate the operating risk. At the same time, 14 urban commercial banks were classified. In this study, the sample bank was divided into two types: higher asset size and lower asset size based on the average asset size of the asset bank within eight years.

From Table 4, the first-order lag term of bank net profit (Profits(-1)) coefficient is significantly positive, indicating that the bank financial behavior has obvious sustainability, the profitability of the current period is affected by the early stage, and this is particularly realized in the sample banks with low production scale.

In the full sample, the liquidity risk and the Credit Risk is significantly negative, and the significance level of credit risk is higher than the liquidity risk, indicating that the liquidity risk and credit risk indeed affect the profitability of banks. In the process of risk reduction, the credit risk should be considered. From the perspective of heterogeneity in asset scale, it is found that the liquidity risk of banks with higher asset scale is more serious, while the credit risk of banks with lower asset scale is more serious. This reflects that the current small urban commercial banks in China are facing more serious credit problems in the process of development, and for slightly larger urban commercial banks, liquidity problems are more sensitive and have a greater impact on the steady operation of banks.

Asset Scale Significant positive in the full sample and sample banks with lower asset size. It can be believed that as the net interest margin has narrowed in recent years, the commercial banks have maintained the growth of net profit by expanding the scale of assets and replenishing prices in quantity. However, it is not reflected in the sample banks with higher asset scale, indicating that the pulling effect is gradually weakening.

Non-interest income (Nii) is positive, but not significant. In the development of recent years, City Commercial Bank has vigorously expanded the non-interest business, increasing the proportion of non-interest business income in the overall operating income from 12.07% in 2009 to 23.38% in 2018 (Chen Yihong and Liang Peijun, 2020)[22]. It can be believed that the development of non-interest business is a main support for the profit growth of city commercial banks in the future, and should be paid enough attention.

Business and administrative expenses (Cost) And the asset impairment loss (Loss) are important part of commercial banks' operating expenditure, affecting the net profit of banks. Compared with the insignificant business and administrative expenses, asset impairment losses are found (Loss) Significantly restricts the bank's net profit. As the domestic economy enters a downward cycle, industries with overcapacity, especially the manufacturing and

wholesale and retail industries, which account for a relatively high proportion of urban commercial bank loans, are facing a huge impact, resulting in the asset quality of urban commercial banks continue to be under pressure. In order to ensure the steady operation of the bank, the city commercial bank will use a large number of profits to make provision, which significantly restricts the growth of the bank net profit. In addition, the income tax (Tax) had no significant impact on the bank's net profit.

From the test results table, R^2Values are used to indicate the extent to which the selected explanatory variable is able to explain the explanatory variable. The closer its value is to 1, the higher the goodness of fit of the model, and the stronger the explanatory power of the selected index factors. While the 1-R^2 indicates the part that cannot be explained by the above variables, that is, the unexplained fluctuations in bank net profit, as defined here as operating risk. In the full sample, the goodness of fit was 0.972, indicating that among the factors affecting the net profit, 97.2% can be explained by the model, and the operational risk accounts for 2.8%.

Considering the huge internal differences in the development process of city commercial banks, this paper classifies the sample city commercial banks from the perspective of asset scale. Found in the different asset scale level, R^2 is certain differences, while indicating that operational risk loss is different between different types of banks. Specifically, operational risk losses are in the sample banks with high asset sizes accounted for 8.4%, which reached 10.2% in lower asset banks, but both are below 20% international standards. according to the R^2, make provision of operating risk capital (Table5 Shown).

Table 4 Regression Results

Variables	Full sample	Asset scale heterogeneity	
		High asset scale	Low scale of assets
Profits(-1)	0.935***	1.310*	0.702***
	（6.952）	(1.885)	（7.415）
Liquidity	-0.353*	-1.226*	-0.260
	（-1.824）	(-1.815)	（-1.210）
Credit	-0.455**	-0.711	-0.486***
	（-2.075）	(-0.757)	（-3.093）
Scale	0.222*	0.469	0.128*
	（1.730）	(0.659)	（1.856）
Nii	0.046	0.273	0.017
	（0.430）	(0.650)	(0.316)
Cost	0.250	0.687	0.215
	（1.302）	(0.934)	（1.311）
Loss	-0.164**	-0.093	-0.096*
	（-2.128）	(-0.218)	（-1.849）
Tax	-0.153	-0.086	-0.053
	（-0.699）	(-0.415)	（-0.876）
Constant	-1.342***	0.421	-1.653**
	（-2.799）	(0.172)	（-2.117）
N	84	36	56
R^2	0.972	0.916	0.898
sargan	0.900	0.852	0.900

Note: t values in parentheses, * * *, * * and * indicate the significance level of 1%, 5% and 10%, sangan test's result is a p value.

Table 5 provision of operational risk capital

Bank classification	R^2	σ^2	σ^2_{oprisk}	loss
Full sample	0.972	27199717	761592.	2705.35
High asset scale	0.916	27554959	2314616	4716
Low scale assets	0.898	839740	85653	907

Note: The unit of loss is million yuan.

4 CONCLUSIONS

This paper selects relevant index data of 14 urban commercial banks from 2012 to 2019, constructs a evaluation system of liquidity risk and credit risk, and measures operating risk using income model. The study found that: first, the overall liquidity risk and credit risk status of Chinese urban commercial banks have not been effectively alleviated, and the risk level of individual banks has increased sharply; second, the liquidity risk fluctuates greatly, and the credit risk is relatively stable. The high volatility of liquidity risk reflects that the current urban commercial banks are facing more serious liquidity problems and have a weak ability to resist risks. The stable credit risk indicates that capital regulatory policy is working in recent years; third, liquidity risk and credit risk significantly restrict bank profitability, and bank liquidity risk with higher asset scale has serious credit risk with low asset scale; finally, the study found that city banks with lower asset scale face higher operational risk losses than city banks with higher asset scale.

In the process of the development of urban commercial banks, we should not only pay attention to microprudential supervision to ensure the healthy development of every bank, but also focus on the application of macro-prudential policies and prevent systemic financial risks. Due to a large number of inter-bank businesses among urban commercial banks, the balance sheet is highly related. Once one of them has problems, it is easy to infect each other, causing systemic financial risks. In addition, a macro-prudential policy with relatively good practical effect can weaken the pro-periodicity of the financial system and enhance the antiperiodicity, and maintain the resilience and stability of the financial system. At present, China has established counter-cyclical capital buffer and other mechanisms, but compared with the international prevailing macro-prudential policy tools, there is still a great room for expansion in the future.

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