

How does Factors Effect on Bank Risk? Evidence from China

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ABSTRACT: How does factors effect on bank risk? This paper develops models with a sample of 24 commercial banks in China by measuring risk with Z-score, loan loss reservation ratio and non-performing loan ratio. Capital ratio is negative to bank insolvency probability. Two factors, including liquid ration and bank size, are positive to loan loss reservation ratio and non-performing loan ratio. Other factors, including ROA and banking market concentration, are positive to loan loss reservation ratio. State-owned bank risk is higher than non-State-owned bank risk. GDP growth rate and Realestate price index effects on solvency probability significantly.

KEYWORD: Bank risk; Capital regulation; Z-score

1 INTRODUCTION

Based on the lessons from the global financial crisis, financial regulators pay more attention to the stability of the banking system and soundness of banking development. Recently, Basel Committee's Basel III regulatory standards revised require banks to raise the minimum capital adequacy, promote the establishment of buffer capital, and introduce minimum standards of global liquidity. The financial regulatory standards will lead to changes in bank risk-taking.

The relationship between Capital regulation and bank risk-taking seems to be no consistent. Capital regulation will lead banks to reconfigure their assets, may increase risk-taking (Koehn and Santomero, 1980). The risk weight corrected in theory will reduce risk-taking (Kim and Santomero, 1988). In some cases, banks are likely to become risk-lovers in limited liability, the minimum capital ratio to ensure that banks take prudent actions (Rochet, 1992). The latest research does not support the strict capital regulation is negative to bank risk-taking. Capital regulation may not reduce bank risk-taking (Laeven and Levin, 2009). Bankruptcy policy should be matched with a strong asset monitoring for failure banks to strictly limit their risk selection. Incentive compatibility of the banking regulatory system, based on moral hazard and adverse selection, may solve the incentive problem and achieve optimal results depending on bank performance (Nagarajan and Sealey, 1998). Appropriate information disclosure

and private sector monitoring banks, are also an effective way (Barth, Caprio and Levine, 2004).

How does factors effect on bank risk? The main innovation of this paper is to measuring risk aversion by Z-score. The remainder of this paper is presented as follows. The Section II consists of data and methodology. The Section III discusses empirical results. The Section IV is conclusions.

2 DATA AND METHODOLOGY

This paper selects 24 commercial banks from 2004 to 2012, including Industrial & Commercial Bank of China, Agricultural Bank of China, China Construction Bank, Bank of China, Bank of Communications, China CITIC Bank, China Merchants Bank, China Minsheng Bank, Industrial Bank, Shanghai Pudong Development Bank, Guangdong Development Bank, China Everbright Bank, Bank of Beijing, Hua Xia Bank, Zheshang Bank, Bank of Nanjing, Ping An Bank, Bank of Ningbo, Bank of Shanghai, Hankou Bank, Evergrowing Bank, Huishang Bank, Bank of Jiangsu, and Bank of Bohai. Financial data of 24 banks is from Bankscope. This paper focus on $\ln Z$, Lg , $NPLs$, TCR , LD , ROA , $\ln asset$, $state$, $stru$ and ΔGDP , $\ln CIV$ variables as table 1.

Table 1 Variable

Variable	Abbreviation	Definition
Risk	LnZ	$Z=(CAR+\mu ROA)/\sigma ROA$
	Lg	Lg=loan loss res/gross loans
	NPLs	NPLs=impaired loans/gross loans
Capital	TCR	TCR=total capital /weighted risk assets
Liquidity	LD	LD=liquid assets/Dep&ST funding
Bank – specific	ROA	ROA =return/equity
	lnasset	Take the natural logarithm of bank total assets.
	State	state-owned bank=1, non-state-owned bank=0
Industry specific	Stru	Banking market concentration=CR ₄
Macroeconomics	Δ GDP	GDP growth rate per year
	lnCIV	Take the natural logarithm of the construction industry added value

As can be seen in Table 2, the mean of lnZ is 2.820, and the standard deviation value is 0.880. The mean of loan loss reservation ratio is 83.40, and the standard deviation value is 41.09. The mean of the non-performing loan ratio is 75.70, and the standard deviation value is 49.18. The mean of total capital ratio is 83.83, and the standard deviation value is 52.61. The mean of liquid ratio is 127.3 and the standard deviation value is 65.99. The mean of loan to deposit ratio is 115.8 and the standard deviation value is 66.08. The mean of ROA is 76.22, and the standard deviation value is 32.10. The mean of lnasset is 4.530, and the standard deviation value is 1.030. The mean of dummy variable is 0.170, and the standard deviation value is 0.380. The mean of banking market concentration is 0.500, and the standard deviation value is 0.0300. The mean of GDP growth rate per year 0.160, and the standard deviation value is 0.380. The mean of lnCIV is 9.810, and the standard deviation value is 0.470.

Tables 2 Summary statistics

Variable	mean	sd	min	max
lnZ	2.820	0.880	0.420	5.420
Lg	83.40	41.09	6	162
NPLs	75.70	49.18	1	177
TCR	83.83	52.61	1	187
LD	127.3	65.99	2	232
ROA	76.22	32.10	2	131
lnasset	4.530	1.030	0	5.530
State	0.170	0.380	0	1
stru	0.500	0.0300	0.450	0.540
Δ GDP	0.160	0.0400	0.0900	0.230
lnCIV	9.810	0.470	9.070	10.48

3 EMPIRICAL RESULTS

According to variable selected and model setup, the empirical model is as follows:

$$Risk_{i,t} = \beta_0 + \beta_1 TCR_{i,t} + \beta_2 LD_{i,t} + \beta_3 ROA_{i,t} + \beta_4 \ln asset_{i,t} + \beta_5 state + \beta_6 stru_{i,t} + \beta_7 \Delta GDP_t + \beta_8 \ln CIV_t + \varepsilon_{i,t}$$

We will choose right the model with F test, BP test, and Hausman test among mixed regressive model, fixed effects model and random effects model.

Table 3 F test and BP test

Test	F test	BP test
risk	Risk=lnZ, Risk=Lg, Risk=NPLs	
results	Reject mixed regressive model	Reject mixed regressive model

The results of F test reject mixed regressive model comparing to fixed effects model, and BP test reject mixed regressive model comparing to random effects model from table 3.

Table 4 Hausman test

Ho	Difference in coefficients not systematic	
	Chi ²	p>chi ²
Risk=lnZ	17.13	0.0166
Risk=Lg	2.53	0.8651
Risk=NPLs	3.60	0.8247

Notes : $\chi^2 = (b-B)[(V_b - V_B)^{-1}](b-B)$; b = consistent under Ho and Ha; obtained from xtreg; B = inconsistent under Ha, efficient under Ho; obtained from xtreg.

Using lnZ as the proxy variable for risk, the equation rejects random effects model. Using loan loss reservation ratio and non-performing loan ratio as the proxy variable for risk, the equation does not reject random effects model.

Table 5 Coefficients of model

	(1)	(2)	(3)
Variable	lnZ	Lg	NPLs
TCR	0.0021**(2.0625)	-0.0201(-0.5136)	0.0307(0.8644)
LD	-0.0008(-0.6034)	0.1332**(2.5307)	0.1192**(2.5233)
ROA	-0.0038(-1.5441)	0.1891*(1.6499)	0.0182(0.1724)
lnasset	-0.0005(-0.0099)	5.0872*** (2.7582)	4.1616*** (2.5337)
state	-0.4496** (2.2279)	35.6931** (2.4158)	28.2602** (2.2208)
stru	-7.7214 (-1.6212)	-411.9131** (-2.3151)	128.3899 (0.8059)
Δ GDP	-3.9578*** (-3.0005)	-63.4509 (-1.2583)	-25.3416 (-0.5606)
lnCIV	1.2504*** (4.0825)	-14.4135 (-1.2274)	-97.2745*** (-9.2879)
Constant	-4.7641** (-2.4058)	386.2142*** (4.8435)	929.1068*** (13.0195)

Notes : ***, **, * denotes significant 1%, 5%, and 10% level.

We get several results from table 5. Total capital ratio is positive to Z-score significantly. Liquid ratio is positive to loan loss reservation ratio and non-performing loan ratio significantly. ROA is positive to loan loss reservation ratio. Bank size is positive to loan loss reservation ratio and non-performing loan ratio. State-owned bank risk is higher than non-State-owned bank risk. Banking market concentration is higher, loan loss reservation ratio bigger. GDP growth rate is negative to bank insolvency probability. Realestate price index is negative to loan loss reservation ratio and non-performing loan ratio.

4 CONCLUSIONS

This paper examines factors effecting on bank risk in China. It develops models with a sample of 24 commercial banks in China by measuring risk with Z-score, loan loss reservation ratio and non-performing loan ratio. It denotes that the more increase capital ratio greatly, lower solvency probability. However, capital ratio is not significant to loan loss reservation ratio and non-performing loan ratio. Liquid ration and bank size effects on loan loss reservation ratio and non-performing loan ratio,

but does not solvency probability. Only loan loss reservation ratio is correlated with ROA positively. Bank Government structure effects on all bank risk variable. Banking market concentration is higher, the smaller loan loss reservation ratio. Macroeconomics variable, including GDP growth rate and Realestate price index effects on solvency probability. With the development of Chinese solvency law, deposit insurance institute and interest rate liberation, more and more commercial banks join in to find how to apply Basel III accords in business, which is helpful for Chinese financial system soundness.

REFERENCES

- [1] Barth, J.R., Caprio, G., & Levine, R. 2004. Bank Regulation and Supervision: What Works Best, *Journal of Finance Intermediary* 13 (1): 205–248.
- [2] Koehn, M. & Santomero, A.M. 1980. Regulation of Bank Capital and Portfolio Risk, *Journal of Finance* 35(2): 1235–1244.
- [3] Kim, D. & Santomero, A.M. 1988. Risk in Banking and Capital Regulation, *Journal of Finance* 43 (3):1219-1233.
- [4] Laeven, L. & Levine, R. 2009. Corporate Governance, Regulation and Bank Risk-taking, *Journal of Finance Economics* 9 (3): 259-275.
- [5] Rochet, J.C. 1992. Capital Requirements and the Behavior of Commercial Banks, *European Economics Review* 36 (2): 1137–1178.