The Comprehensive Effects of Ownership Concentration and External Governance on Banks' Capital Buffers

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Abstract
We investigate the effect of ownership structure on banks' capital buffers with a method of System GMM, for a sample of main commercial banks in China. The increase of ownership concentration can promote the buildup of capital buffers, while implicit guarantee from government can reduce this effect for the systemically important banks. The relative lower ratio of interbank deposit to total deposits weaken the supervision from peer banks for the accumulation of capital buffers. Adequately increase the ratio of major shareholders, accelerate the development of interbank deposit market and reduce government implicit guarantees are very essential for Chinese financial stability.

Keywords: banks' capital buffers, large shareholder control, external governance, System GMM

1. Introduction
The latest financial crisis has verified the importance of adequate capital for individual banks and financial system once again. Better-capitalized banks generally performed better during that crisis and have higher probability to survive. What can we do to avoid future crises? The topic of bank capital buffers has gained particular attention, since the proposal of further capital buffer requirements from Basel III. The safety net due to more capital can improve banks efficiency, but excessive capital can also make banks reduce lending and jeopardize their performance. What influences the level of bank capital and capital buffers? The bankruptcy of Baoshang Bank in 2018 indicates the importance of corporate governance and market constraint for banks' stability. This paper focus on the effects of owner control and external constraints on bank capital buffer[1].

There are contradicting statements about the influence of bank owner control. On one hand, to protect bank's charter value, the controlling shareholder have enough capacity and incentive to supervise managers and mitigate risk-taking and mitigates the owner-manager agency problem. On the other hand, for their limited liability, banks' shareholders may take more risks. What is

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[1] We use the ratio of excess capital to risk-weighted assets as the measurement of a bank's capital buffer, which is calculated from the difference between actual capital ratio and the minimum ratio required by Basel Committee on Banking Supervision.

the net effects of control shareholders and external governance on a bank's capital buffers? Our study shows ownership control has some extent stabilizing effect, while external factors such as market discipline and government implicit guarantees mitigate it.

Market discipline is important for banking system stability, for investors in banks' liabilities may demand a higher yield, which will limit bank's risk-taking.Banks have to hold capital commensurate with the risks they take, which make bank capital levels deviate from adequate rate of return perceived by the shareholders. Thus, market forces can have deep impacts on the behavior of bank owners. On the other hand, for systemically important banks, implicit guarantee from government will affect the risk-taking behavior of controlling shareholders. For the severe risk externalities caused by government guarantees, banks' shareholders have less incentive to build larger capital buffers. We empirically test the above external impacts on bank shareholders behavior.

Shehzad et al. (2010) show that ownership concentration mitigates bank riskiness measured in non-performing loan and adequate capital, but stronger supervisory makes this affection less significant. Based on their study, we investigate the effect of ownership concentration on Chinese banks' capital buffers, and consider the role of market discipline and government implicit guarantees on ownership, which is unexplored by now. We choose 18 large banks which includes 5 state owned banks and 13 joint-stock commercial banks for the period 2010-2020 from the database of CSMAR. Different from previous studies (Laeven and Levine, 2009; Shehzad et. al., 2010; Haw et al., 2010), our study uses annually varying shareholdings. We use generalized method of moments (GMM) estimation for the potential endogenous problem of explanatory variables, the unobservable bank specific effects and the adjustment costs of capital buffers. Unlike previous literatures, we test the impacts of several shareholder concentration ratios on bank capital buffers, which indicates both the level of ownership concentration and the number of shareholders influence banks' capital buffers.

We find larger capital buffers accompany with higher ownership concentration, but it is negative related to the number of control shareholders. For the case of concentrated ownership, the large shareholders bear the main cost of risk-taking, thus they have enough incentives to monitor the behavior of manager. Moreover, the dispersion of ownership will reduce the efficiency of shareholder's regulation. Thus, the concentration of ownership can promote bank capitalization and make it more stability. On the other hand, the interest conflict between large shareholder and minority ones may weaken the efficiency of decision-making and mitigate the increase of bank capital buffers. The presence of multiple shareholders may constitute an expropriation threat that reduces the management's initiatives and essential investments.

We also find that market discipline does not have significant influence on capital buffers increase. That is to say, the effects of ownership concentration on capital buffers do not change with the variation of market discipline. The lower scale of inter-bank deposits in China, which means weaker market discipline, could be the possible reason. Thus, we can conclude that market discipline cannot substitute government regulation to maintain the stability of bank system stability. Strengthen the market discipline, such as increase the ratio of inter-bank deposits, could make controlling shareholders be more alert on risk increase.

Further, we find that implicit guarantees from government mitigate the impacts of ownership concentration on capital buffers. This is consistent with the view that large shareholders of a

bank may expected rescues from government when confronted with financial distress and reduce holding additional capital buffers.

Overall, ownership concentration is help for building up of excess capital, the increase of number of large shareholders and the implicit guarantees from government can mitigate this effect, while the market discipline does not have such an influence. For the complex nexus between ownership and market constraint, implicit guarantees, we should consider the adequacy of bank capital roundly.

The rest of our paper is organized as follows. The next section introduces the relevant literatures and our hypotheses. Section 3 presences the dataset and methodology. Section 4 discuss our results and Section 5 is the robustness analysis. Section 6 concludes with final remarks.

2. Related literatures and hypothesis development

2.1 The effect of ownership on capital buffers

In the case of diffused ownership, shareholders have not enough incentives to control risk-taking behaviour of manager for the reason of "free ride problem", since shareholders who do monitor receive small portion of benefits but undertake the full monitoring costs. The difficulty in coordinating the profits of multiple shareholders can also reduce the efficiency of controlling manager's risk-taking behaviour while in the case of concentrated ownership, large shareholders undertake all the gain and costs of monitor, the conflict between owners almost does not exist. There are two opposite hypotheses for the impacts of concentrate ownership on banks' risk-taking behaviour and capital buffers building up.

On one side, bank shareholders gain from upside risk and protected from downside risk for their limited liabilities, so they have incentives to risk-taking. And the subsidies of deposit insurance and government guarantees increases with the rise of risks. Thus, the concentrated ownership may cause increase of risk-taking. Saunder et al. (1990) state that banks controlled by large shareholders exhibit more risk-taking behaviour than those with less ownership concentration. Laeven and Levine (2009) find banks risk-taking measured in Z-score and returns volatility positively related to ownership concentration.

On the other side, the charter value theory argues there is a negative relationship between ownership concentration and banks' risk-taking behaviour, for the large loss of future profits caused by excessive risk-taking. Thus, bank's large owners prefer to preserve capital buffers exceeding the minimum requirement to avoid insolvency and defend their charter value. Shehzad et al. (2010) and Chalermchatvichien et al. (2016) find owner concentration has a positive effect on regulatory capital ratio. Anginer et al. (2016) also find a positive relationship between ownership concentration and banks' capitalization with an international sample of banks.

From above on, we can see the diverse relations between ownership structure and banks' capital, which need further research. This paper focuses on the impact of ownership on bank's capital buffers, we expect the incentive to protect future charter value may exceed the tendency of risk-taking. Banks may hold excess capital to impede the need of raising new equity for financial distress. For the serious loss of charter value caused by not reaching the requirement of capital, large shareholders have stronger incentives to accumulate more capital buffers.

Hypothesis 1. Bank capital buffers increases with the concentration of ownership.

2.2 The effect of external factors on large owners' behaviour

Market discipline is a main external factor that may affect large owners' role on capital buffers. Banks with capital buffers can protect the interest of depositors when their assets are not fully covered by deposit insurance. Nier et al. (2006) examine the effectiveness of market discipline in providing incentive for banks to reduce their insolvency risk. They find that stronger market discipline, measured in higher ratio of interbank deposits and uninsured liabilities to total liabilities, causes banks accumulate more capital buffers. Flannery et al. (2008) state market incentive to control and price the bankruptcy risk caused the rapid growth of U.S banks' capital in the 1990s. Fonseca et al. (2010) detect that the cost of deposits promoted the increase of bank capital buffers. It means that higher capital ratio by decreasing banks' leverage can reduce risk, thus the cost of funding. Compared to junior debt holders, senior debt holders who have a lower priority in time of bank insolvency exert more pressure on banks for greater capital buffers (Distinguin et al. (2012)).

Benefited from the risk decreasing of market discipline, controlling shareholders may increase banks leverage and reduce capital buffers to make up for the decreased return prospects. However, market discipline exhibits much dynamic property; market participants can adapt their behaviour to bank owner decisions, such as capital buffers reduction. Bennett et al.(2015) show that the rapid reaction from uninsured creditors leaves time for regulators to carry out possible corrective actions. The more strictness of market discipline, the more tendency of banks switching to insured deposits to reduce the exposure to market discipline. The rapid and effective reactions from market participants make banks owners avoid risk increase. On the other hand, banks owners also rely on the strength of market discipline to control bank capitalization. Thus, market discipline reduces the incentive of owners to monitor banks. Forssbaeck (2011) finds that the increase of market discipline and shareholder control induces asset risk decrease, but causes banks leverage increase.

Hypothesis 2: Whether market discipline weaken the impact of ownership, concentration on capital buffers in China banking system?

Next, we investigate the joint impact of implicit guarantees and ownership on banks' capital buffers. Shareholder of large banks may rely on implicit guarantees from government. This is so called phenomena of "too big to failure", since the government aims at preventing adverse spill over in banking system. Therefore, the reciprocity of bank ownership concentration with its systemic importance is key for capital buffers. Berger et al.(2008) show that the diversified ownership of larger banks generally induced lower capital buffers, for their strong ability to coordinate risks management and more easily to raise new equity when needed. Severe risk externalities caused by government implicit guarantees makes large banks take more risky behaviour (Boyd and Runkle, 1993; Schnabel, 2009; Gropp et al., 2011).

Government implicit guarantees may reduce the impact of bank owners' control of managements. The implicit bailout guarantees may decrease owners' incentive to control banks' risk-taking behaviour, resulting less capital buffers compared to non-significant smaller banks.

Hypothesis3. The higher level of implicit guarantees mitigate the positive effect of ownership concentration on capital buffers.

3. Data and methodology

3.1 Model specification

The below equation presents the baseline model for the effect of ownership concentration on bank capital buffers and the influence of external factors on it.

$$Cap\_Buf_{i,t} = \beta_1.Own_{i,t} \times Ext\_Fac_{i,t} + \beta_2.Own_{i,t} + \beta_3.Ext\_Fac_{i,t}$$

$$+ \beta_4.Cap\_Buf_{i,t-1} + '.Fun\_Ments_{i,t} + \tau'.Macs_{i,t} + \omega'.Year + \epsilon_{i,t}$$

Cap_Buf is the dependent variables in all regressions, representing the capital buffer of bank i at time t, which is measured as the difference of actual capital ratio and the minimum required ratio. According to Basel III, banks should hold regulatory capital at least cover 8% of their risk-weighted assets. These capital include Tier 1 and Tier 2 capital, the former is consist of common equity, retained earnings and certain kinds of preferred equity; the latter contains tier 1 and subordinated debt, hybrid instruments, loan loss reserves, and revaluation reserves. To enhance banks' loss absorbing capabilities, Basel agreement III has increased the minimum ratio of Tier 1 capital to 6%.

Following Anginer et al. (2016), we focus on Tier 1 capital buffer in the main study for some constituents of Tier 2 can only be used for covering losses, cannot be served as a buffer to keep a bank from insolvency, and use the total regulatory capital as dependent variable to check for the robustness of the results. For banks may adjust their buffers dynamically [24], we use the lagged dependent variable CAP_BUF_{t-1} to capture the important influence of capital adjustment costs.

The variable of "Own" measures ownership concentration. Dummy variables was used to present whether a bank has a controlling owner. We use 10% ($OC_{10\%}$), 25% ($OC_{25\%}$) and 40% ($OC_{40\%}$) of the cash-flow rights of the largest shareholder as critical value to indicate the degree of ownership concentration. In addition, we use concentration ratios to express the share of the largest owner (CR1), the largest two owners (CR2), and the largest three owners (CR3), when each of them holds at least 5% of the whole shares.

The variable EXT_GOV represents the above-mentioned external factors that affect owners' monitor behaviour, market discipline and implicit guarantees for systemically important institutions. Furthermore, we estimate several regression models including each interaction term ($OWN \times EXT\_GOV$)

To exam the joint impact of ownership concentration and market discipline on capital buffers, we add market discipline and the corresponding interaction term in our baseline model. For market discipline to play a role, market agents should have sufficient information about the banks' actual riskiness and feel at risk. Moreover, their responses to these risks must be costly. Banks can identify the risks of other banks and manage interbank borrowing relationships better. Thus, we use IDEP measured in the share of interbank deposits to total deposits to measure market discipline, which can restrict banks risk-taking behaviour effectively.

To consider the interaction between ownership concentration and systemic importance, we add the dummy variable of systemically important institution (D_SII) as the proxy for the TBTF phenomenon, and the corresponding interaction term in the baseline model. According to the criterion announced in November 2018 by the People's Bank of China, if a bank is systemically important, the dummy variable is one, otherwise zero.

We add several variables (Fun Ments) to capture the impact of banks' characteristics on capital buffers. Banks with higher ratio of liquid assets (LIQUIDITY) need less secure against possible

violation of the minimum capital requirements (Jokipii and Miline (2011)). Forssbeck (2011) states that higher leverage will hinder the accumulate of capital buffers and cause manager take more risky behavior, thus, we control for leverage. Taking account of the effect of loan default risk on capital buffers, we also control for the share of loans in total assets (LOANS). We use the ratio of loan loss provision to total loans (LLP) to control for variety in asset risk and the cost to income ratio (CIR) to capture managerial efficiency, as less efficiency causes higher fluctuation of bank risk and lower bank returns spoiling the capital ratio. Other thing being equal, capital requirements will grow with the increase of assets (ASSET_GR), and capital buffers decreases. Furthermore, we include the annual percentage GDP growth rate at market prices and INFLATION as the annual percentage change in the consumer price index to capture the impact of macro environment (MACROS). At last, we use dummies (YEAR) to control time fixed effect in our model. Table 1 summarizes the variables applied in the study, their definitions and data sources.

Table 1. Overview of the description of the variables and data sources

Variable	Description	Data source
Dependent variable		
CAP_BUF	Ratio of Tier 1 capital in exceed of the required minimum to risk-weighted assets	CSMAR; author's calculation
Ownership		
OC	Binary dummy variable: it is 1, when there exists a concentrated ownership (using 10%,25% and 40% as cut-off points), otherwise 0.	CSMAR; author's calculation
CR	Percentage ownership of the largest, the two largest, and the three largest shareholders with at least 5% shareholding	CSMAR; author's calculation
External governance		
IDEP	Ratio of interbank deposits to total deposits	CSMAR; author's calculation
D_SII	Dummy variable: 1 for systematically important bank, otherwise 0	Official website of People's Bank of China[2]
Fundamentals		
LIQUIDITY	Ratio of liquid assets to total assets	CSMAR; author's calculation
LEVERAGE	Ratio of liabilities to total assets	CSMAR; author's calculation
LOANS	Ratio of loans to total assets	CSMAR; author's calculation
LLP	Ratio of loan loss provisions to total assets	CSMAR; author's calculation
CIR	Cost to income ratio	CSMAR; author's calculation
ASSET_GR	Annual growth rate of total assets	CSMAR; author's calculation
MACROS		
GDP_GR	Annual growth rate of GDP at market prices	National Bureau of Statistics of the People's Republic of China
INFLATION	Annual growth rate of the consumer price index	National Bureau of Statistics of the People's Republic of China
Robustness		
TOT_CAP_BUF	Ratio of total regulatory capital in exceed of required	CSMAR; author's calculation

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[2] https://www.financialnews.com.cn/jg/dt/202110/t20211018_230700.html

	minimum to risk weighted assets	
SIZE	Logarithmic of total volume in millions of RMB	CSMAR; author's calculation
SII	Dummy variable: 2 for global systemic importance, 1 for other systemic importance, 0 for no importance	Official website of People's Bank of China, author calculated

3.2 Sample and descriptive statistics

We choose 19 large banks in China during the period of 2010 to 2020, as the data of ownership structure is often missing for smaller banks. We follow PBC 's Evaluation Measures to specify Systemically Important Banks. Macro financial data are obtained from China National Bureau of Statistics. Data of ownership with at least 5% direct shareholding is from "China Stock Market & Accounting Research Database", which is simplified as CSMAR. Our final balanced panel dataset includes 198 bank-year observations.

Table 2 provides the summary statistics for the observations of variables. The mean of Tier 1 capital buffer in the sample is 8.40%, which decreases from 10.49% in 2011 to 6.5% in 2020 (see fig 1).

78.19% of banks have an owner with at least a 10% holding (OC10%), and average share of the largest owner (CR1) is 34.7%, the Chinese banks ownership is not so concentrated as that of European banks. Klein et al. (2021) consider the sample of Europe banks, who report the average ownership concentration of 90.4% for the largest owner.

Fig 2 shows that the distribution of large shareholders is much dispersive, more than 10% of large owners hold less than 20% shares, which means a large part of owners are not dominant shareholder. Ownership concentration is often regarded as the main property of Chinese banking, while the simple statistics shows that this has changed tremendously since China joined WTO and promised its banking system even greater openness to domestic and foreign investors.

We observe a 4.55% share of interbank deposits to total deposits, which is significantly lower than that of Europe banks (see, Klein et al., 2021). Compared to other region, such as Europe and U.S, China has less number of banks, but the bank size is much larger. About 70% of the banks in the sample are systemically important; this is relatively high, for many small banks are not comprised in our study for the problem of data availability. For the profound effect of large banks on financial stability, our study has particular contribution for government regulation.

Table 2: descriptive statistics of variables

variable	Mean	SD	Min	P10	P50	P90	Max	N
Dependent variable								
Cap_buf (%)	8.40	4.36	1.04	3.1	7.79	15.51	17.83	192
Ownership variables								
OC10%	0.9840	0.1256	0	0	1	1	1	188
OC25%	0.5426	0.4995	0	0	0	1	1	188
OC30%	0.4415	0.4979	0	0	0	1	1	188
CR1 (%)	34.62	17.82	11.67	18.03	25.43	64.95	83.08	188
CR2 (%)	51.16	25.92	0	24.12	44.99	90.15	96.97	188
CR3 (%)	58.98	27.04	0	24.12	58.59	93.51	96.97	188
External governance variables								
I_Dep (%)	4.55	4.04	0.3	1.3	3.16	10.51	22.3	191
D_Sii	0.7245	0.4479	0	0	1	1	1	196
Bank specific Control variables								
Liquidity (%)	17.15	5.41	7.62	10.17	16.80	23.60	42.40	192
Leverage (%)	93.50	1.31	90.54	91.81	93.53	95.05	97.47	192
Loan (%)	48.66	7.88	26.0	35.4	50.42	57.03	61.74	193
Llp (%)	2.7955	1.1270	1.44	2.1	2.62	3.48	15.56	193
CIR (%)	31.36	40.36	0	4.24	19.92	68.14	335.68	192
Asset_Gr(%)	7.1981	2.0157	2.3	6	7.04	9.55	10.64	196
Macroeconomic variables								
Inflation (%)	2.60	1.04	1.44	1.56	2.5	3.32	5.39	196
GDP_Gr (%)	7.19	2.02	2.3	6	7.84	9.55	10.64	196
Variables in robust check								
Total_cap_buf (%)	9.6	4.98	1.22	3.31	8.57	17.79	21.66	192
Size	15.24	1.14	12.29	13.73	15.31	16.79	17.32	192
G_SII	1.06	0.78	0	0	1	2	2	196

This table provide summary statistics of variables appeared in the regression models of our study. SD stands for standard deviation, Min and Max are the minimum and maximum value respectively, while P10, P50, and P90 means the 10th, 50th and 90th percentile, N is the number of observations for the variables.

3.3 Empirical approach

To estimate the regression model specified in Eq. (1), we use the system generalized method of moments developed in Blundell and Bond (1998) for dynamic panel data models. First, we eliminate the unobserved bank-specific effects by taking first-differences of all variables. Second, to control the potential endogenous of CAP_BUF with main explanatory variables, we use lagged values of these variables as instruments. Third, we add CAP_BUF_{t-1} as an explanatory variable to present the dynamic of CAP_BUF, as banks adjust their capital buffers gradually due to adjustment costs. We check the effectiveness of the instruments through the Sargan test of over-identifying restrictions. We use Arellano-Bond test for the serial correlation of the first differences in error terms. Both tests verify the fitting of the dynamic models.
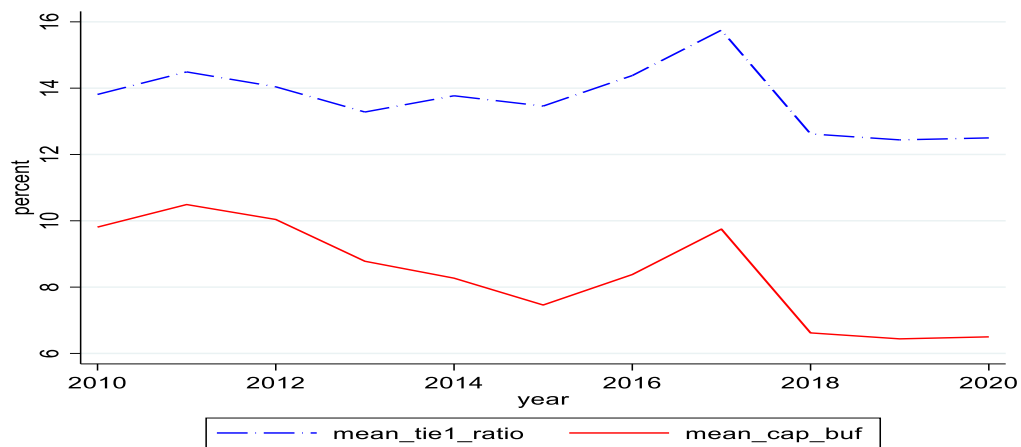
Fig 1. The tendency of mean Tier 1 capital and the mean buffer for Tier 1 capital for sample banks during 2010 to 2020 in China.
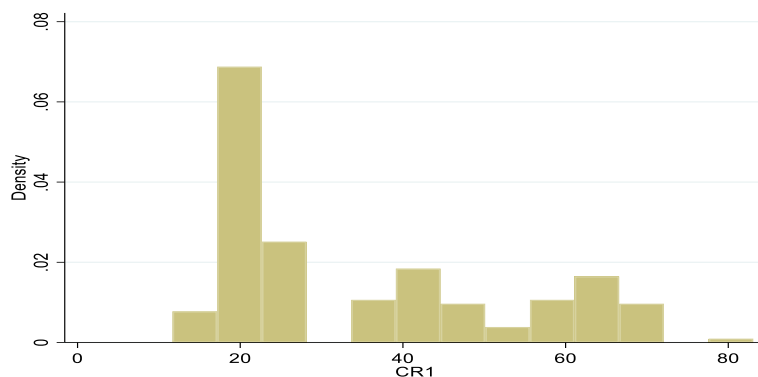

Fig 2 The ownership distribution of largest shareholders (CR1) for the China banks during 2010 to 2020.

4. Empirical results

This section provides the main empirical results on, first, the impact of ownership concentration, then their interaction with external factors on bank capital buffers. We begin with the test of hypothesis 1, whether the ownership concentration promote the build-up of capital buffers.

4.1 The effect of bank ownership on capital buffers

We estimate the model given in Eq. (1) without the interaction term $\beta_1.Own_{i,t} \times Ext\_Fac_{i,t}$ to capture the impact of bank ownership concentration on capital buffers. The results in Table 3 show that except CR1, the other five variables measuring ownership concentration have positive and significant effect on bank capital buffers. A bank with a shareholder owning at least 25% cash-flow rights will raise its capital buffer 1.85 percentage points, about 22% of the capital buffer's mean. Bank's capital buffers significantly rise up with the increase of ownership measured in cash-flow rights or in the continuous concentration ratios, which is consistent with

our first assumption.

However, ownership concentration has a negative effect on capital buffers for the lower cut-off point of 10%. This may be caused by the higher coordination and agreement efforts between various owners. Thus, capital buffers decrease with the dispersion degree of ownership. Larger shareholders, especially those who hold more than 50% of bank shares, have stronger incentive and ability to control bank management. To protect bank's charter value, banks with larger shareholder (exceed 25%) increase their capital buffers significantly. At last, the lagged dependent variables in all regression models have a positive and highly significant coefficient, which shown that banks adjust their regulatory capital face costs or time restriction.

Table 3, The effect of ownership concentration on capital buffers

	Dependent variable: CAP_BUF					
	$(1)OC_{10\%}$	$(2)OC_{25\%}$	$(3)OC_{30\%}$	$(4)CR_1$	$(5)CR_2$	$(6)CR_3$
OWN	-1.1059^{**}(0.5514)	1.8535^{**} (0.9250)	2.8146^{**} (1.3300)	0.0334 (0.0295)	0.0917^{***} (0.0355)	0.1065^{**}(0.0379)
I_DEP	0.0040 (0.0800)	0.0363 (0.0846)	0.0669 (0.1016)	0.0229 (0.0834)	0.0590 (0.0990)	0.0504 (0.0867)
D_SII	0.0070 (1.5680)	-0.5786 (2.0413)	0.0890 (1.4175)	-0.3149 (1.8172)	-1.4269 (1.5128)	-1.1654 (2.8021)
CAP_BUF_{t-}	0.3924^{***} (0.0571)	0.3849^{***} (0.0671)	0.3679^{***} (0.0955)	0.3930^{***} (0.0674)	0.3541^{***} (0.0955)	0.3351^{***} (0.0799)
LIQUIDITY	0.3718^{***} (0.1059)	0.3256^{***} (0.0999)	0.3004^{***} (0.0998)	0.3480^{***} (0.1092)	0.3095^{***} (0.0969)	0.3139^{***} (0.1126)
LEVERAGE	7.3155 (43.5229)	20.1973 (45.6609)	27.942 (44.439)	12.720 (45.438)	24.745 (43.783)	28.651 (43.476)
LOANs	0.1691^{**} (0.0677)	0.1392^{**} (0.0667)	0.1781^{***} (0.0759)	0.1663^{**} (0.0707)	0.1437^{**} (0.0758)	0.1187 (0.0838)
LLP	-0.5082 (0.5326)	-0.5239 (0.5452)	-0.4377 (0.6208)	-0.4379 (0.5700)	-0.5145 (0.6186)	-0.5351 (0.5747)
CIR	-0.0163^{**} (0.0077)	-0.0141^{**} (0.0069)	-0.0143^{**} (0.0064)	-0.0152^{**} (0.0073)	-0.0123^{*} (0.0064)	-0.0120^{*} (0.0063)
ASSET_GR	-0.0502^{*} (0.0292)	-0.0529^{*} (0.0276)	-0.0475^{**} (0.0239)	0.0495^{*} (0.0295)	-0.0461^{*} (0.0238)	-0.0455 (0.0313)
GDP_GR	0.1874 (0.1312)	0.1842 (0.1260)	0.2627^{*} (0.1596)	0.1945 (0.1384)	0.2379 (0.1553)	0.2069 (0.1474)
INFLATION	-0.4365^{***} (0.1650)	-0.4166^{**} (0.1830)	-0.4984^{**} (0.2321)	-0.4256^{**} (0.1816)	-0.4062^{*} (0.2283)	-0.3689 (0.2281)
CONSTANT	-12.9608 (43.059)	-24.5067 (45.238)	-34.455 (43.778)	-19.88 (45.00)	-32.425 (43.182)	-36.58 (42.68)
N	168	168	168	168	168	168
p-value of AR(2)	0.0903	0.1968	0.2759	0.1105	0.2232	0.1798
Sargan test-p	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000

This table presents the estimated impacts of banks' ownership concentration on capital buffers. The regression model is Eq. (1) using a System GMM method with lags of endogenous variables as instruments. Numbers in parentheses are robust standard errors.
* indicates $p<0.1$, ** indicates $p<0.05$ and *** indicates $p<0.01$.

4.2 The interaction of market discipline and ownership on capital buffers

To analysis the effect of external governance and internal control, we add the interaction term of ownership and external governance factors, market discipline. Table 4 reports the relevant results.

Five of six coefficients of market discipline, IDEP show there is no statistically significant interdependence between ownership concentration and market discipline on capital buffers. This may be due to the weaker strength of market discipline for the low level of interbank deposits in China. The mean of interbank deposits in China is 4.55%, which is far below 33.82%, the mean in European banks (see Klein et al. (2021)) . Market agents may react quickly when there is an increase of risk in a bank; however, the much lower of interbank deposits weakened such incentives to supervise the target bank's behavior. Constraint from other banks could promote the buildup of capital buffers, regulators and supervisors can guide or demand banks to increase the ratio of inter-banks business for financial stability.

Table 4: the effect of market discipline and ownership concentration on capital buffers

	Dependent variable: CAP_BUF					
	$(1)OC_{10\%}$	(2) $OC_{25\%}$	(3) $OC_{30\%}$	$(4)CR_1$	$(5)CR_2$	$(6)CR_3$
$OWN \times I\_DEP(\beta_1')$	0.8957*	0.0705	0.1143	0.0031	0.0051	0.0028
	(0.4654)	(0.1236)	(0.1669)	(0.0035)	(0.0032)	(0.003)
$OWN(\beta_2')$	−3.6393*(2.0138)	1.4443*	2.5166*	0.0159	0.0599*	0.0857**
		(0.8602)	(1.3891)	(0.0368)	(0.0316)	(0.0341)
I_DEP	−0.8788*	0.0147	0.0393	-0.07	-0.1630	0.0964
	(0.4691)	(0.045)	(0.1081)	(0.0939)	(0.1290)	(0.1933)
CAP_BUF_{t-1}	0.3614***	0.3776***	0.3628***	0.3822***	0.3404***	0.3281***
	(0.0946)	(0.0619)	(0.0946)	(0.0678)	(0.0746)	(0.0931)
LIQUIDITY	0.3823***	0.3127***	0.2867***	0.3385***	0.2733***	0.2872***
	(0.0912)	(0.0920)	(0.0972)	(0.1012)	(0.1200)	(0.0912)
LEVERAGE	3.164	29.439	33.778	20.751	47.625	46.998
	(39.093)	(37.637)	(40.469)	(32.244)	(35.151)	(39.547)
LOANs	0.1674**(0.0724)	0.1543**(0.0612)	0.1859*** (0.0735)	0.1781**(0.0579)	0.1796*** (0.0642)	0.1476** (0.0722)
LLP	-0.7158	-0.5742	-0.4415	-0.4363	-0.6224	-0.6389
	(0.6015)	(0.4835)	(0.5878)	(0.4961)	(0.4990)	(0.5787)
CIR	−0.0178***	−0.0142**	−0.0149**	−0.0159**	−0.0122*	−0.0119*
	(0.0062)	(0.0070)	(0.0063)	(0.0078)	(0.0066)	(0.0062)
ASSET_GR	−0.0495**	−0.0513*	−0.0443**	0.0469*	−0.0414*	−0.0436*
	(0.0237)	(0.0265)	(0.0243)	(0.0285)	(0.0307)	(0.0234)
GDP_GR	0.2225	0.1827	0.2664*	0.1893	0.2274	0.1973
	(0.1544)	(0.1339)	(0.1584)	(0.1495)	(0.1647)	(0.1492)
INFLATION	−0.5073***	−0.4247**	−0.5104**	−0.4385**	−0.4287*	−0.3861*
	(0.2311)	(0.1796)	(0.2315)	(0.1749)	(0.1939)	(0.2221)
CONSTANT	-5.918	-33.695	-40.022	-27.381	-53.958	-53.868
	(38.792)	(37.282)	(39.859)	(32.354)	(34.776)	(39.034)
N	168	168	168	168	168	168
p-value of AR(2)	0.1173	0.2834	0.3219	0.15	0.3504	0.2386
Sargan test-p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

To evaluate the influence of market discipline on the behavior of control shareholders on capital buffers, we add the variable of I_DEP and the interaction term of I_DEP and ownership. The regression method, the meaning of numbers in parentheses, and the symbols of significance are the same as those in Table 3.

4.3 The effect of government implicit guarantee and ownership on capital buffers
We add the interaction term of dummy variable, D_SII indicating the system important banks

and ownership concentration in the base model, eq (1). The corresponding results were presented in Table 5; we can see that government implicit guarantees have some influences on banks' controlling owners, as the coefficients of the interaction term are significantly negative in model (1), (3) and (4). From the view of economics, government guarantee has mitigated a large part of the positive impact of ownership on capital buffers, for the sum of coefficients is near to zero (shown in the first and second rows in Table 5). The insignificant Wald tests in the last row of the table furtherly verified our finding. Thus, we can state that for the existence of government implicit bailouts, controlling owners of systemically important banks have little incentives to accumulate enough capital buffers to hedge counter parties' possible default risks.

Overall, we detect that government implicit bailout has significant influence on the internal control of bank owners, but the market discipline does not. Specifically, the effect that banks with controlling shareholders reveal more capital buffers is less profound in the case of implicit government bailouts. While the increase of capital buffers is almost not affected by market discipline measured by interbank deposits. The results tell us there does not exist a significant substitution effect between internal control of bank owners and external governance mechanisms such as market discipline consistent with the second hypothesis raised in Section 2. For systemically important banks, controlling shareholders will reduce capital buffers for the reliance on government implicit guarantees. Further study on the question of how market discipline and government guarantees are interacted and affect the banks risk status could be of special interest.

Table 5. The effect of government implicit guarantee and ownership concentration on capital buffers

	Dependent variable: CAP_BUF					
	$(1)OC_{10\%}$	(2) $OC_{25\%}$	(3) $OC_{30\%}$	$(4)CR_1$	$(5)CR_2$	$(6)CR_3$
$OWN \times D\_SII(\beta_1''')$	-1.1296^{**} (0.5525)	-1.8498 (1.8733)	-7.8834^{**} (3.2964)	-0.2105^* (0.1145)	-0.1251 (0.0999)	-0.0510 (0.0853)
$OWN(\beta_2''')$	NA	2.6582^* (1.3845)	8.8970^{***} (2.9103)	0.1862^* (0.1032)	0.1826^* (0.0865)	0.1332^{**} (0.0654)
D_SII	1.7797 (1.5130)	1.4950 (1.9043)	4.2197^{**} (2.1282)	7.5398^* (4.1865)	5.8949 (5.6499)	3.0058 (6.3292)
CAP_BUF_{t-1}	0.4191^{***} (0.0571)	0.4002^{***} (0.0988)	0.3704^{***} (0.0917)	0.4101^{***} (0.0933)	0.3630^{***} (0.0934)	0.3544^{***} (0.0922)
LIQUIDITY	0.3655^{***} (0.0873)	0.3442^{***} (0.0751)	0.3527^{***} (0.0738)	0.3695^{***} (0.0748)	0.3403^{***} (0.0734)	0.3349^{***} (0.0726)
LEVERAGE	8.2281 (42.174)	18.9376 (43.203)	25.839 (42.375)	11.8605 (42.694)	23.633 (42.565)	31.966 (42.406)
LOANs	0.1646^{**} (0.0677)	0.1465^{**} (0.0740)	0.1556^{**} (0.0722)	0.1467^{**} (0.0733)	0.1459^{**} (0.0721)	0.1313^* (0.0719)
LLP	-0.8094 (0.5409)	-0.7769 (0.4835)	-0.8318 (0.5961)	-0.8238 (0.6124)	-0.8108 (0.6022)	-0.7771 (0.5929)
CIR	-0.0168^{***} (0.0074)	-0.0145^{**} (0.0064)	-0.0137^{**} (0.0062)	-0.0152^{**} (0.0064)	-0.0131^* (0.0063)	-0.0131^{**} (0.0062)
ASSET_GR	-0.0522^{**} (0.0277)	-0.0490^* (0.0229)	-0.0502^{**} (0.0222)	-0.0153^* (0.0226)	-0.0432^{**} (0.0225)	-0.0461^{**} (0.0220)
GDP_GR	0.1248 (0.1374)	0.1038 (0.1567)	0.1356 (0.1557)	0.0846 (0.1576)	0.1542 (0.1532)	0.1299 (0.1500)
INFLATION	0.3914^{***} (0.1777)	-0.3725 (0.2324)	-0.3850^* (0.2286)	-0.3481 (0.2295)	-0.3710^* (0.2253)	0.3337 (0.2232)
CONSTANT	-14.0451 (41.718)	-23.908 (42.457)	-32.868 (41.754)	-21.949 (42.151)	-35.434 (41.810)	-41.661 (41.508)
N	168	168	168	168	168	168
p-value of AR(2)	0.1173	0.2238	0.3251	0.1231	0.2345	0.2346
Sargan test-p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test $\beta_1''' + \beta_2''' = 0$		0.37	0.57	0.18	1.89	3.76

The variable of D_SII indicating the system important banks and its interaction term with ownership concentration were added in the base model to investigate the effect of government implicit guarantees and ownership on capital buffers. The method used in this model was the same as the former, the number in parentheses and the symbols of significance have the same definitions as those in Table 3 and Table 4.

Note: coefficient for $OWN(\beta_2''')$ specified in $OC_{10\%}$ is dropped because of collinearity.

5. Robustness checks

To check the robustness of our findings, we carry out additional tests. First, we regress all the models with the new dependent variables of total regulation capital buffers excess the minimum ratio 8% set by the Basel Committee on Banking Supervision. Table 6 presents the case of 30% ownership concentration; the results for all primary variables are still valid. Second, we include a control variable SIZE in all models, since the size a bank has significant influence on its capital allocation (Berger et al. (2008)). The main results maintain unchanged, significantly, we do not include SIZE in the analysis of TBTF phenomena for the highly correlation between SIZE and other variables D_si (the pair wise correlation coefficient is 0.73^{***})[3]. Third, we exclude some control variables such as $LOAN_{i,t}$ and $LIQUIDITY_{i,t}$ for their high correlations to other controls, and the results are similar for each case. Finally, we change the variable of systemically important where the variable of SII is 2 for a globally systemically important bank; 1 for the local important institution, and otherwise 0. Table 7 presents the corresponding results, which are similar with the main regressions.

Table 6: robustness check for the use of total regulatory capital buffer.

	(1)	(2)	(3)	(4)	(5)
$OC_{30\%} \times I\_DEP$	0.2953				
	(0.1990)				
$OC_{30\%} \times SII$		-5.8157			
		(4.4712)			
$OC_{30\%}$	3.0670**	7.7064**			
	(1.3906)	(3.6540)			
$cr3\_ \times I\_DEP$			0.0043		0.0055
			(0.0037)		(0.0037)
$cr3 \times SII$				-0.0486	
				(0.1075)	
$cr3$			0.0818**	0.1271	0.1070**
			(0.0388)	(0.0828)	(0.0514)
I_DEP	0.0366		-0.1700		-0.2674
	(0.1275)		(0.2321)		(0.2346)
SII		3.0852		2.6480	
		(3.0119)		(7.9754)	
$TOT\_CAP\_BUF_{t-1}$	0.4376***	0.4548***	0.4731***	0.4831***	0.4738***
	(0.0984)	(0.0974)	(0.0955)	(0.0962)	(0.0960)
Ln_size					-0.9082
					(1.0592)
N	168	168	168	168	168
AR(2)-p	0.1378	0.1194	0.1757	0.1650	0.1248
Sargan-p	0.0000	0.0000	0.0000	0.0000	0.0000
CONTROLS	yes	yes	yes	yes	yes

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[3] See the appendix Table A.1 the correlations between all independent continuous variables.

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This table test the interaction of market discipline, government implicit guarantees and ownership on capital buffers with total regulatory capital buffers. We use a System GMM method with lags of endogenous variables as instruments for the regression. Numbers in parentheses are robust errors and * indicates p<0.1, ** for p<0.05, *** for p<0.01.

Table 7: Robustness check for a categorical measurement of systemically important institutions.

	Dependent variable: CAP_BUF					
	$(1)OC_{10\%}$	$(2)OC_{25\%}$	$(3)OC_{30\%}$	$(4)CR_1$	$(5)CR_2$	$(6)CR_3$
$OWN \times SII(\beta_1)$	-1.1840^*	-0.4951	-4.5272	-0.0816	-0.0611^*	-0.07^*
	(0.6122)	(0.79)	(3.3063)	(0.0782)	(0.0351)	(0.0417)
$OWN(\beta_2)$		0.4849	6.3787^*	0.0492	-0.0637	-0.0595
		(0.8579)	(3.4089)	(0.0948)	(0.0670)	(0.0441)
SII		1.5050^*	3.6610^*	4.8324	-2.5118	4.1768
		(0.8569)	(2.0092)	(3.0957)	(3.4704)	(3.2023)
CAP_BUF_{t-1}	0.1952**	0.2058*	0.3421***	0.3742***	0.1855*	0.1810*(0.1053)
	(0.0774)	(0.1113)	(0.0930)	(0.0932)	(0.0162)	
LIQUIDITY	0.0187	0.3442***	0.3139***	0.3209***	0.0130	0.0123
	(0.0815)	(0.0751)	(0.0745)	(0.0747)	(0.0837)	(0.0821)
LEVERAGE	-109.0009^{***}	18.9376	48.8578	50.8046	-106.2982^{**}	-106.8046^{***}
	(39.3042)	(43.203)	(42.375)	(42.9201)	(38.5016)	(38.7729)
LOANs	0.3171***	0.1465**(0.0740)	0.1866**(0.0745)	0.1923**(0.0750)	0.3329***(0.0897)	0.3351***
	(0.0965)					(0.0882)
LLP	0.1166	-0.7769	-0.9092	-1.0615^*	0.1044	0.1102
	(0.4495)	(0.4835)	(0.5864)	(0.5944)	(0.4516)	(0.4534)
CIR	-0.0061^{**}	-0.0145^{**}	-0.0134^{**}	-0.0148^{**}	-0.0066^{**}	-0.0060^{**}
	(0.0074)	(0.0064)	(0.0061)	(0.0062)	(0.0028)	(0.0029)
ASSET_GR	-0.0249	-0.0490^*	-0.0493^{**}	-0.0491^{**}	-.0249	-.0239
	(0.0225)	(0.0229)	(0.0222)	(0.0221)	(0.0198)	(0.0197)
GDP_GR	1.3507***	0.1038	0.1733	0.1088	1.3772***	1.3853***
	(0.2532)	(0.1567)	(0.1528)	(0.1520)	(0.2468)	(0.2529)
INFLATION	-0.2832	-0.3725	-0.4354^*	-0.4257^*	-0.3078	-0.3278
	(0.2574)	(0.2324)	(0.2305)	(0.2268)	(0.2453)	(0.2437)
CONSTANT	83.6487**	-23.908	-54.7659	-55.9833	83.6642**	84.8637***
	(38.3988)	(42.457)	(42.9925)	(43.0547)	(38.1831)	(37.6455)
Time fixed effects	yes	yes	no	no	yes	yes
N	170	170	170	170	170	170
N(G)	18	18	18	18	18	18
AR(2)-p	0.5654	0.6477	0.4167	0.1976	0.5909	0.7196
Sargan-p	0.0028	0.0042	0.0000	0.0000	0.0043	0.0039

Note: variables of oc10 and SII are dropped from regression (1) for collinearity. This table presents the joint impacts of government implicit guarantee and ownership concentration on banks' capital buffers with the categorical variable for systemically importance. To do so, we use a system GMM method with the basic model shown in Eq (1). Numbers in parentheses are robust standard errors, and * p<0.1, ** p<0.05, *** p<0.01.

6. Conclusions and policy implication

In this paper, we use System GMM for the dynamic panel data of Chinese main banks to investigate the interaction of external governances and ownership concentration on banks' capital buffers. We analyze three key matters in our study. First, we find that the increase of ownership concentration caused larger capital buffers which is consistent with the theory of charter value (Marcus,1984; Keeley,1990) .In other words, the existence of dominant shareholder makes a bank to increase its capital buffers to protect her profits. Second, market discipline or the supervisory of peer-banks does not have significant influence on banks' capital buffers, which is due to the much lower size of interbank deposits in China banks. This illustrates that lower interbank deposits prevent external supervision on bank's risk-taking. Third, we test the effect of TBTF on China banks' capital buffers. The implicit guarantees from government undermines the incentives of main owners to pursue higher capital buffers, while market discipline does not have such an effect. This indicates the phenomena of TBTF weaken the internal control of a systemically important bank.

Overall, banks with a control shareholder will maintain higher capital buffers, which strengthen their ability to survive in the financial distress. We find that there exists interaction between internal control and external governance, implicit guarantees. The effect of market discipline on capital buffers is much smaller, but there is some extent substitution effect between market discipline and large shareholder. Base on the above findings, the policy implications are as the following.

First, large owners of systemically important banks rely on implicit bailout from government when they are fronted with financial difficulties. To countervail the interaction of TBTF status and major shareholders on banks' capital buffers, additional equity requirement is essential for comprehensive protection of banks against losses.

Second, to enhance the peer supervision on banks' behavior, China should accelerate the development of interbank market, which is also the third pillar of financial stability in the Basel framework. A desired research direction in the future is the interaction of contingent convertible capital, market discipline, and shareholder structure on banks' capital buffers.

Third, appropriate ownership concentration can give large shareholder enough incentives to build up adequate capital buffers; even external governance mechanism has such a function. Adequately increasing the ratio of large shareholders and reducing excessive commitment of government rescue are very essential for banks' recovery and resolution from financial distress.

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