Do different forms of government ownership matter for bank capital behavior?[1]

Evidence from China.

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Abstract

This version: 10 November 2018

This study attempts to reconcile the conflicting theoretical predictions regarding how government ownership affects bank capital behaviour. Using a unique Chinese bank dataset over 2006-2015 we find that government-owned banks have higher target capital ratios and adjust these ratios faster compared to private banks, supporting the 'development/political' view of the government's role in banking. This effect is stronger for local government-owned and state enterprise-owned banks than for central government-owned banks. We also find that undercapitalized government-owned banks increase equity while undercapitalized foreign banks contract assets and liabilities as their respective main strategy to adjust their capital ratios.

Key words: Banking, Capital, Adjustment Speed, Government ownership, China

JEL: G21; G28; C32

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Acknowledgement: We are grateful for comments from Iftekhar Hasan (the Editor), three anonymous referees, Kose John, Bill Francis, and participants at various seminars, the IFABS Barcelona Conference (2016), and Wolpertinger Conference Santander (2017). All errors and omissions are of course the responsibility of the authors. This research is financially supported by National Natural Science Foundation of China (No.: 71363014).

1. Introduction

The role of bank capital has received extensive attention after the Great Recession. It is particularly important for systemically important banks (SIBs) because capital shortfalls here can have economy-wide consequences when the rest of the financial system is undercapitalized (Brownlees and Engle 2017). This also provides the economic rationale for the Basel Committee on Banking Supervision to introduce new regulations under Basel III specifically requiring SIBs to provide greater capital surcharges. In contrast to banking systems in developed counties where SIBs are privately owned, in developing countries SIBs are more likely to be government-owned. Whether these government-owned SIBs should hold higher capital as required by privately-owned SIBs in developed countries depends on a fundamental and yet unsolved issue – the role of government ownership in banking that can affect capital behaviour. This paper is particularly motivated by these issues and aims to better understand the effect of government ownership on bank capital behaviour, especially given the potential implications for financial stability and the well-being of the economy as a whole.

Whether government-owned banks have higher or lower target capital ratios than their private sector counterparts is open to debate. Although government-owned banks (especially SIBs) with large capital shortfalls have high levels of systemic risk, they are implicitly guaranteed by governments as these banks are perceived as “Too-big-to-fail (TBTF)” or “Too-important-to-fail (TITF)”. Under state safety net protection government-owned banks are more likely to obtain capital injections at times of crisis. Capital shortfalls in government-owned banks can be recovered in a short period of time by the state and this may not lead to systemic distress even if the rest of the banking system is undercapitalized. This would give government-owned banks a special advantage in comparisons with their private sector counterparts. Government-owned banks backed by abundant state funds can make different capital

decisions. We propose a “government support” view and argue that government ownership may induce banks to hold a lower level of capital and adjust capital levels slower towards the target levels in comparison to private banks because of the greater likelihood of readily available government support when in distress.

This argument, however, may not hold when we consider government-owned bank’s main functions in the economy. There are two broad views of government’s participation in banks. The “development” view (Gerschenkron, 1962) believes that government-owned banks act ‘‘benevolently’’ and direct resources toward strategic and socially desirable long-term projects to foster growth. The "political" view (Shleifer and Vishny, 1994) argues that state ownership does not provide the relevant incentives to ensure socially desirable investments and is more likely to encourage government-owned banks to finance inefficient but politically desirable projects (in exchange for votes, political contributions, and bribes). These two views, although different in nature, both predict that government-owned banks should hold more capital than private banks to finance preferred development/political projects and/or to strengthen state finances (through the purchase of government debt), and their desire to adjust capital towards target levels may be stronger than for private banks.

In this paper we attempt to reconcile these conflicting theories in predicting whether government-owned banks should hold higher or lower capital than private banks thereby advancing our understanding of the role of government ownership in banking, particularly in affecting bank capital behaviour. We examine the impact of government ownership on bank target capital ratios and the adjustment speed towards their target levels. We conduct this study on banks from a single country – China, which enables us to analyse the effects of government ownership in a uniform operating and regulatory environment. The Chinese banking system has experienced significant changes since market-oriented reforms

commenced in the late 1970s. Various reforms since 2003 have resulted in a mixture of ownership types where the government plays a key role alongside domestic private and foreign banks. These reforms focus on prudential and risk management regulations following the Basel capital rules.[2] As the country became increasingly influential on the world stage, the solvency of its banking system inevitably became more important. China is now home to the world's largest banking sector (in assets size) including four of the world's top ten largest banks by market capitalization.[3]

We use granular ownership data hand-collected from the annual reports of banks operating in China, matched with financial data from the Bureau van Dijk Bankscope database. Banks' capital ratios are modelled using a partial adjustment framework that allows for bank-specific and time-varying target capital ratios and heterogeneous adjustment speeds in a three-step procedure (Flannery and Rangan, 2006; De Jonghe and Öztekin, 2015). We find that, compared to private banks, government-owned banks have higher capital ratios and adjustment speeds, suggesting that the "development/political" view outweighs the "government support" view.

The existing finance literature generally treats government owners as a homogeneous group although the political economy literature has long recognized differences among levels of government with respect to responsibilities, functions, values, and resource allocation (Olson, 1969; Sharpe, 1970). In our study, we consider three main types of government ownership: central government- (CGOBs), local government- (LGOBs), and state enterprise-owned (SEOBs) banks. We conjecture that CGOBs are more likely to obtain capital injections at times of crisis than other types of government-owned banks (LGOBs and SEOBs). This is

[2] China has committed to global regulatory reform under Basel rules. The first issuance of the *Regulation Governing Capital Adequacy of Commercial Banks* in 2004 came into effect on 1 March 2004. The recent adoption of the Basel III framework – *the Capital Rules for Commercial Banks* in 2012 came into force on 1 January 2013 with full implementation by March 2019.

[3] For the top bank rank, see http://www.thebanker.com/Top-1000-World-Banks.

because CGOBs are mainly SIBs and central government can provide CGOBs easy access to relatively abundant state funds. Moral hazard problems are more profound for CGOBs, which may dis-incentivise their desire to hold more capital and adjust capital quickly. Our empirical evidence supports this conjecture. Specifically, we find that LGOBs and SEOBs have higher target capital ratios and adjustment speeds than private banks, and CGOBs have lower capital ratios and adjustment speeds than both LGOBs and SEOBs. These results suggest that the "development/political" view and the "government support" view have an offsetting effect on CGOBs' capital behaviour.

Our evidence also shows that banks react to their capital gaps (the difference between target and actual capital ratios) through balance sheet channels and banks' rebalancing strategies vary by the ownership type. Consistent with our main findings, we find that, relative to overcapitalized banks[4], undercapitalized LGOBs and SEOBs achieve their target capital levels by boosting equity directly, undercapitalized CGOBs do not make any significant changes in their balance sheets, and undercapitalized foreign banks contract various types of assets and liabilities without increasing equity capital.

Our paper provides new insights into bank capital behaviour from the perspective of government ownership, with particular attention to different forms of state owners. Research on capital structure, including studies of non-financial firms, focus on ownership effects in terms of managerial and external block ownership (Friend and Lang, 1988), control and cash flow rights (Johnson et al., 2000; Lepetit et al., 2015), and ownership concentration (Shehzad, et al., 2010). The influence of government ownership on bank capital behaviour has not previously been adequately addressed. In a study by Memmel and Raupach (2010), private

[4] We also test for whether overcapitalized banks' balance sheet movements vary with ownership type and evidence suggests no significant differences in the changes of balance sheet items across different ownership types. Hence we treat overcapitalized banks as the default group regardless of ownership types.

banks are found to adjust capital ratios more quickly than savings and co-operative banks in Germany.[5] As far as we are aware, the literature is silent on the impact of various types of government owners even though they may differ in many aspects, such as the source of capital, strategic objectives, and political and economic influence, all of which can impact the dynamics of bank capital behaviour. Our unique dataset allows us to explore these issues and the findings are of use to policy makers in formulating reforms and maintaining stability in banking systems with prevalent levels of government ownership.

This study is also related to the empirical literature on government ownership in the financial sector, including its impact on bank performance (Bonin et al., 2005; Jiang et al., 2013), lending behaviour (Sapienza, 2004), financial development (Barth et al., 1999), and economic growth (La Porta et al., 2002). It also relates to work on the role of bank capital during and after the global financial crisis in 2008 which covers issues concerning: the cyclicality of capital requirements (Andersen, 2011; Agenor and Silva, 2012), bank behaviour in capital management/adjustment (Berger et al., 2008; Memmel and Raupach, 2010), the effects of capital on lending (Berrospide and Edge, 2010), stock returns (Demirguc-Kunt et al. 2010) and liquidity creation (Berger and Bouwman, 2013).

Our findings shed light on the debate over post-crisis regulatory reform from the perspective of emerging and developing countries, most of these countries have adopted new international capital rules – Basel III standards – that will become effective by 2019.[6] The extant bank capital literature mainly focuses on developed countries. To this end, we analyse bank capital behaviour in an emerging market setting and this is linked to government

[5] As pointed out by the authors, "the sample (of the study) is biased towards large banks and is therefore not representative of the German banking sector".

[6] As of end-March 2017, all 27 member jurisdictions of the Basel Committee, including 10 emerging and developing countries, have risk-based capital rules, liquidity coverage ratio regulations and capital conservation buffers in force (BCBS, 2017). The ten emerging and developing countries include Argentina, Brazil, China, India, Indonesia, Mexico, Russia, South Africa, Turkey, and Saudi Arabia.

ownership and a range of bank-level and macroeconomic characteristics. Our findings are likely to be of interest to policymakers and bankers in countries where government-owned banks have a substantial market presence (as in Argentina, Brazil, China, India and Indonesia) as well as in other smaller emerging economies (such as Slovenia and the United Arab Emirates).

The paper proceeds as follows. Section 2 develops hypotheses. Section 3 describes the sample and research methodology. Section 4 presents the empirical results. Section 5 provides evidence that banks react to capital gaps and their adjustment strategies vary by the ownership type. Section 6 concludes.

2. Ownership and bank capital behaviour: hypotheses

The literature on bank capital structure suggests the existence of an optimal capital ratio (Myers and Rajan, 1998; Allen et al., 2011). This optimal capital ratio is theoretically determined by the trade-off between various costs, such as the expense of bank failure as a result of under-capitalization (Acharya, 1996), tax savings from deposits or debt financing (Kraus and Litzenberger, 1973; Graham, 2000), and a potential fall in the stock price as raising equity may be interpreted as a sign of overpricing (Myers and Majluf, 1984). Banks operate in a dynamic world and respond to changes in the internal and external operating environment. The dynamic trade-off theory predicts that capital adjustment takes place to remove deviations from targets – when the cost of deviation from the target exceeds the cost of adjustment toward the target (Fischer et al., 1989). When transaction costs are significant, banks may slow down the capital adjustment process and operate at a sub-optimal level (Flannery and Rangan, 2006). Ownership, as an important corporate governance mechanism, can have a major influence on management decisions and hence on bank capital behaviour.

A number of theories offer conflicting predictions that government-owned banks may set lower or higher target capital ratios than private banks. Our "government support" view stems from the budget constraint theory (Kornai 1979, 1986; Kornai et al., 2003) that government-owned banks face soft budget constraints (they are not allowed to fail and can rely on government capital support when requested) and we argue that these banks are more likely to hold less capital than private banks. While budget constraints may soften for private ownership, especially for 'too-big-to-fail' private banks in the event of a crisis, government-owned banks with strong political connections are more likely to be bailed out than those without these connections (Faccio et al., 2006). Government interventions for failing large private commercial banks may be delayed (and can be unpredictable) even in times of crisis due to political concerns and/or mutual forbearance (Brown and Dinç, 2005), while state support for government-owned banks is more likely to prevail over time. In many emerging and developing economies, there are no (or limited) explicit deposit insurance schemes and government-owned banks have implicit government guarantees (that can be viewed as quasi deposit insurance). These banks are less likely to face depositor runs and if this happens the government is expected to bailout those in trouble. Therefore government-owned banks are likely to hold lower capital ratios because of the greater potential for obtaining government support. Moreover, while government and private banks are subject to the same supervisory rules, in practice, regulatory forbearance is more likely to apply to government-owned banks. This lowers the cost of non-compliance for government-owned banks and may also induce them to operate at lower capital ratios.

Different ownership features also determine banks' incentives and ability to adjust capital ratios. Private banks subject to capital market discipline have stronger incentives to make prompt capital adjustments to keep their capital ratios within a narrow range around the target so as to maximise stockholder wealth (Memmel and Raupach, 2010). Government-owned

banks in contrast have less incentive to adjust capital ratios promptly because state protection may shield these banks from market discipline (Iannotta et al., 2013). In short, due to more readily available resources/support and moral hazard problems, banks with state ownership lack the incentives to hold more capital and are more likely to have lower capital targets and slower adjustment speeds. Hence, based on the "government support" view, we hypothesize that:

Hypothesis 1a: *government-owned banks have lower target capital ratios than private banks*.

Hypothesis 1b: *government-owned banks adjust capital at a slower speed toward the target capital ratio than private banks.*

Economists hold different views about the role of government ownership in banking. The "development" view (Gerschenkron, 1962) argues that government-owned banks act ''benevolently'' and direct resources toward strategic and socially desirable long-term projects to foster growth. The "political" view (Shleifer and Vishny, 1994) argues that the lack of incentives to ensure socially desirable investments encourages government-owned banks to finance inefficient but politically desirable projects, in exchange for votes, political contributions, bribes, and the like. Both views highlight the importance of government-owned banks in the economy. Also government-owned banks can be used as a source of ready demand to acquire government debt, or at least the authorities will find it easier to coerce government-owned banks to buy government debt, compared to private banks. This seems to be the case in China where we find that over 2006-2015, government-owned banks on average held more government-issued debt (8.04 % of their total assets) compared to private domestic (5.23%) and foreign banks (5.98%).[7] When government-owned banks fulfil these

[7] We test the statistical significance of correlations between bank ownership types and government debt holdings by regressing the ratio of government debt holdings to total assets against the ownership variables

functions their strategic focus is more likely to be directed towards political, social and other objectives. They may well be forced to hold more capital and react faster to capital gaps than their private sector counterparts. Based on the "development/political" view, the following contrasting hypotheses may hold:

Hypothesis 2a: *government-owned banks have higher target capital ratios than private banks*.

Hypothesis 2b: *government-owned banks adjust capital at a higher speed toward the target capital ratio than private banks.*

State ownership can be at different levels, through central or local government holdings, or through state-owned enterprises (SOEs), state-owned financial institutions, and through other agencies (such as the Ministry of Finance). In this study we focus on the three most common state ownership forms, namely banks owned by the central government, local government, and state-owned enterprises (SOEs). These state owners differ significantly in incentives and ability to provide support for their banks. The central government normally has the strongest political and economic position in the country as it is responsible for maintaining financial stability and promoting national economic development. CGOBs are usually the mainstay of a country's financial system – the SIBs. When CGOBs face financial difficulties, the central government has a strong incentive to provide support in order to alleviate systemic risk pressures. Support can be provided readily (in most cases at least) due to government's access to abundant state funds.

Local governments have more divergent economic and social interests. Unlike their central counterparts, local governments cannot create money and so have limited financial capacity to provide support for LGOBs. LGOBs are mainly smaller regional banks and their failure is

(private banks are treated as the default group). Results (available on request) confirm that government-owned banks provide more support to financing government than private banks do and there is no significant difference between foreign and private banks (regardless of whether or not we control for size and year fixed effects).

unlikely to pose a systemic treat to the financial system as a whole. Also, maintaining financial stability is not local governments' main concern. As a consequence, when LGOBs are in trouble they are less likely to obtain prompt bailout support.

SEOBs share greater commonalities with private banks in that they focus more on value-maximization rather than promoting national/regional economic development, social and financial stability. Usually SEOBs operate to facilitate the financing of the commercial activities of their state owners, while the failure of SEOBs are less likely to have significant impacts on the owners' main businesses as these large SOEs normally have access to and depend more on CGOBs. SEOBs are also less likely to pose a significant threat to financial stability. Therefore, in the event of crisis, SEOBs may not get the same level of supports as CGOBs.

All in all, implicit government guarantees of support are more certain for CGOBs than for LGOBs and SEOBs. As we have noted already, government support may induce moral hazard problems that dis-incentivise banks to hold higher capital ratios and adjust capital quickly. Hence, we expect CGOBs to have lower capital targets and slower adjustment speeds, while LGOBs and SEOBs that face less certain government support have stronger incentives to hold higher capital and quickly close any capital shortfall. Based on the above discussions, we formulate the following hypotheses:

Hypotheses 3a: CGOBs have lower target capital ratios than LGOBs and SEOBs

Hypotheses 3b: CGOBs adjust capital at slower speeds than LGOBs and SEOBs.

3. Model, variables, and data

3.1. The empirical model

Following the literature on capital structure (Flannery and Rangan, 2006; Öztekin and Flannery, 2012; De Jonghe and Öztekin, 2015), we apply a variable speed partial adjustment model to empirically examine how bank ownership affects target capital ratios and the adjustment speed to achieve the targets. The target capital ratio ($k_{i,t}^{*}$) is modelled as a function of firm characteristics as in equation (1):

$$k_{i,t}^{*} = \frac{K_{i,t}^{*}}{A_{i,t}} = \beta X_{i,t-1} + \theta D_{year} \qquad (1)$$

where $K_{i,t}^{*}$ is the book value target capital; $A_{i,t}$ the book value of risk-weighted assets; β is a vector of coefficients, $X_{i,t-1}$ is a set of ownership variables and controls for bank-specific features, and D_{year} is the year dummy for controlling year fixed effects.

Banks may hold excess capital or operate below the target due to potentially high adjustment costs. In a partial adjustment model, a bank's current capital ratio ($k_{i,t}$) is a weighted average of its target capital ratio ($k_{i,t}^{*}$) and the previous period's capital ratio ($k_{i,t-1}$) and random shock ($\tilde{\delta}_{i,t}$):

$$k_{i,t} = \lambda k_{i,t}^{*} + (1-\lambda) k_{i,t-1} + \tilde{\delta}_{i,t} \qquad (2)$$

Substituting equation (1) for the target capital ratio into equation (2) yields the following specification for equation (3), which is used to test *H1* and *H2* under a constant adjustment speed.

$$k_{i,t} = \lambda(\beta X_{i,t-1} + \theta D_{year}) + (1-\lambda) k_{i,t-1} + \tilde{\delta}_{i,t} \qquad (3)$$

Equation (4) further allows for a firm-specific adjustment speed ($\lambda = \Lambda Z_{i,t-1}$), which varies with annual bank characteristics:

$$k_{i,t} - k_{i,t-1} = (\Lambda Z_{i,t-1})(\beta X_{i,t-1} - k_{i,t-1} + \theta D_{year}) + \tilde{\delta}_{i,t} \qquad (4)$$

where $k_{i,t}$ is the observed bank capital ratio, λ is a scalar for adjustment speed, Λ is a vector of coefficients for the adjustment speed function, $Z_{i,t-1}$ is a set of bank characteristics that affect adjustment speed λ, $X_{i,t-1}$ is a set of ownership variables and variables of bank-specific characteristics that affect target capital ratios, D_{year} is year dummy for controlling year fixed effects, and $\tilde{\delta}_{i,t}$ is a random error.

The model is estimated using a three-step procedure. First, we assume a constant adjustment speed λ for all banks and estimate a standard partial adjustment model in equation (3). As the lagged dependent variable is present on the right hand side of equation (3), we employ the System GMM estimator (Blundell and Bond, 1998) using both lags in levels (2-4 lags) and differences as instruments with the Windmeijer correction (Windmeijer, 2005). We use the Hansen test to examine the validity of over-identifying restrictions in the GMM estimation (Hansen, 1982). We also use the AR test for the second-order autocorrelation in the residuals from the GMM estimation to determine the number of lags that ensure no second-order autocorrelation in the error term. The main purpose here is to obtain estimated $\hat{\beta}s$ that are used to calculate an initial set of target capital ratios $\hat{k}^{*}_{i,t} = \hat{\beta} X_{i,t-1}$ for each bank each year. These estimates, however, may be biased because the adjustment speed (λ) is assumed to be constant.

In the second step, the gap ($\hat{G}_{i,t}$) between the estimated target capital ratio and observed actual capital ratio in the previous year is calculated as in equation (5), which is substituted into equation (3).

$$\hat{G}_{i,t} = \hat{\beta}X_{i,t-1} - k_{i,t-1} \tag{5}$$

$$k_{i,t} - k_{i,t-1} = (\Lambda Z_{i,t-1})\hat{G}_{i,t_t} + \tilde{\delta}_{i,t} \tag{6}$$

Equation (6) is a linear model that regresses changes in the capital ratio against the product of capital gap ($\hat{G}_{i,t}$) and exogenous variables affecting the adjustment speed. Equation 6 is essentially in first difference and we use pooled OLS to estimate $\hat{\Lambda}$ that are required to calculate the varying adjustment speed $\lambda_{i,t}$ for each bank in each year. The literature suggests that banks adjust their capital towards desired targets at different speeds (Memmel and Raupach, 2010). We derive bank-specific variable adjustment speeds in this step, which are then used in the third step.

In the third step, target capital ratios are re-estimated by substituting the variable adjustment speeds $\hat{\Lambda}Z_{i,t-1}$ obtained from the second step into equation (3). After rearranging the equation, we have the following model (7) which is estimated using a fixed effects estimator:

$$k_{i,t} - k_{i,t-1}(1 - \hat{\Lambda}Z_{i,t-1}) = \beta[(\hat{\Lambda}Z_{i,t-1})X_{i,t-1}] + \tilde{\delta}_{i,t} \tag{7}$$

In this step, bank-specific adjustment speeds are used to obtain estimates of the unbiased target capital ratio. The estimates of β in equation (7) capture the effects on bank target capital ratios of ownership and other bank-specific characteristics.[8]

3.2. Sample, capital ratio and ownership variables

We restrict our analysis to 2006 onwards when ownership data for most banks became available and operational restrictions on foreign banks' Renminbi business were removed. Financial data are collected from the Bureau van Dijk Bankscope database. Our initial sample includes 112 commercial banks (621 observations) with complete data on Tier1 and Total capital ratios. In order to ensure all banks have time to adjust their capital positions we keep banks with data for at least 4 consecutive years. The final sample is an unbalanced panel of 73 banks over the period 2006-2015 with 487 observations, accounting for 86% of total assets of commercial banks in the Chinese banking system at the end of 2014. Variables are defined in Table 1 and summary statistics are presented in Table 2. All variables are winsorized at the 2% and 98% levels to mitigate the impact of outliers.[9]

We consider two regulatory capital ratios: *Tier1Cap* is the ratio of Tier 1 capital to total risk-weighted assets; and *TotalCap* is the ratio of total capital (Tier1+Tier 2 capital) to total risk-weighted assets.[10] Table 2 shows mean Tier 1 capital ratios of 12.97 % and Total capital ratios of 14.78 %. On average, banks regulatory capital ratios are well above the minimum

[8] One concern could be the simultaneity bias between changes in ownership and capital behaviour. In this paper, we are interested in whether government-owned banks hold more or less capital, relative to their targets, compared to private banks. From this setting ownership structure is exogenous to the target capital ratio because ownership features are pre-determined. Moreover, in our sample, ownership characteristics are relatively stable – only two small city commercial banks changed ownership from private to become local-government owned over the period under study. As such, we do not believe that the simultaneity bias (endogeneity) is a major concern in our analysis.

[9] We perform a correlation analysis for the dependent and explanatory variables and multicollinearity is not a major issue in our sample.

[10] Capital definitions are from the *Regulation Governing Capital Adequacy of Commercial Banks (2004)* issued by the China Banking Regulatory Commission. Tier 1 core capital includes paid-up capital/common stock, reserves, capital surplus, retained earnings and minority interests, while Tier 2 supplementary capital constitutes revaluation reserves, general loan-loss reserves, preference shares, convertible bonds and long-term subordinated debt.

requirements of 4% for the Tier 1 capital ratio and 8% for the total capital ratio. Bank capital mainly constitutes Tier 1 core capital that is more than 87% of total capital.

[Table 1 around here]

[Table 2 around here]

Ownership data are hand-collected from bank annual reports that disclose information on the ten largest stockholders who on average hold 73.4% of banks' outstanding stock ranging from 27% to 100%. The ten largest stockholders fall into three categories – government, domestic private, and foreign. The literature suggests that a bank is considered as controlled if it has at least one stockholder who owns more than 5% (Azofra and Santamaria, 2011) or 10% (Lepetit et al., 2015; Laeven and Levin, 2009) of total outstanding stock.

As the relationship between stockholders' stakes and their influences on bank management decisions is non-linear, we use dummy variables to proxy for different ownership types instead of their actual shares.[11] We classify banks into three mutually exclusive types – government-owned, domestic privately-owned (which we call 'private'), and foreign-owned banks. We further classify government-owned banks into central government- (CGOBs), local government- (LGOBs), and state enterprise-owned (SEOBs) institutions. A set of ownership dummy variables are defined as follows. *Government* is a dummy variable that equals 1 for government-owned banks and 0 otherwise and a bank is classified as government-owned if the largest shareholder is government (central, local or SOE) that holds more than 5% of total outstanding stock. *Foreign* is a dummy variable that equals 1 for foreign banks and 0 otherwise where a bank is classified as foreign if the largest shareholder is a foreign investor holding more than 5% of total outstanding stock. *Private* is a dummy

[11] According to international accounting reporting standards, a change in stakes from 49% to 51% (19% to 21%) grants the corresponding stockholder majority control (significant influence).

variable that equals 1 for domestic private banks and 0 otherwise where a bank is classified as a domestic private bank if the bank is neither a government-owned nor a foreign bank.[12] We further differentiate government-owned banks into three sub-categories and define three dummy variables: *CGOB* that equals 1 if the central government is the largest shareholder and 0 otherwise, *LGOB* that equals 1 if the local government is the largest shareholder and 0 otherwise, and *SEOB* that equals 1 if a SOE is the largest shareholder and 0 otherwise. As a bank's top ten owners holdings may change over time, our measures allow for changes in a bank's ownership type accordingly. As shown in Table 2, on average, the largest shareholder holds 86% of total outstanding stock in foreign banks, 60% in CGOBs, more than a quarter in LGOBs and SEOBs, and 10% in private banks. For LGOBs, SEOBs and private banks, the (average) total shares held by the same ownership type dominates other ownership types with no close ultimate owners of different types. This ensures that our ownership classification represents the interest of the dominant type of owners.

Our approach to defining ownership is based on the nature of the controlling owner following the convention in the academic literature. It is different from the majority of existing research on Chinese banking that defines ownership according to a historical classification, namely: state-owned commercial banks, joint-stock commercial banks, and city commercial banks. This classification has become inadequate since major ownership reforms commenced in 2003 and the distinction between these types of banks has become blurred. For instance, some joint-stock commercial banks have more than 50% of their shares owned by the government, while all government-owned and city commercial banks have gone through substantial joint-stock ownership restructuring.

[12] When applying a threshold of 10%, changes in ownership classification is small and our main conclusions hold (results are available from the authors on request).

In addition to the above ownership variables, we also control for the effect of institutional investors on capital adjustment speeds (but not on the target capital ratio).[13] Following ownership reforms, financial institutions (FIs) have started to take stakes in banks and 41% of our sample have such investors. The total institutional investors' shareholdings average 3.8% and the proportion of institutional investors with more than a 5% shareholdings is small, so it seems that these owners may not have a significant influence on management decisions and hence a limited influence on target capital ratios. Moreover, the majority of institutional investors in fact are state-owned and are normally dominated by other types of state owners as part of overall state funding arrangements. These FIs are treated as SOEs when classifying ownership and hence we do not separately exam FIs' impact on target capital ratios. On the other hand, the literature suggests that institutional investors perform active monitoring which can reduce information asymmetries (Chen et al. 2007) and may help lower capital costs (Ferreira and Matos, 2008), namely, by lowering financing and/or transaction expenses associated with raising capital. FIs' ownership may provide better access to markets and therefore can influence capital adjustment speeds. Banks with financial institutional ownership therefore are expected to adjust capital faster than those without such shareholders. We define *Financial Institution* as a dummy variable that takes a value of 1 for banks with financial institution investors and 0 otherwise.

3.3. Control variables

In order to more accurately model target capital ratios and the adjustment process, we introduce a set of control variables. In particular, when estimating bank target capital ratios we control for the effect of bank profitability, risk, size, income growth and diversification.

[13] Literature suggests that different institutional investors vary in incentives and ability to influence management decisions (Chen et al., 2007; Ferreira and Matos, 2008; Ruiz-Mallorquí and Santana-Martín, 2011) and it would be ideal to distinguish independent institutional investors (i.e. pension and mutual funds and investment companies) from dependent institutional investors (i.e., banks and insurance companies that have business relationship). However, given that institutional investors in Chinese banking are still at an early stage of development and not large, we leave this for future research.

We employ *ROE* as a measure of profitability that is closely linked to retained earnings as a major internal source of capital, and the literature suggests it has a positive impact on capital (Flannery and Rangan, 2008; Fonseca and Gonzalez, 2010).[14] Both standard corporate finance arguments and the regulatory view indicate a prominent role of risk and suggest a positive impact on capital ratios. Some studies find supportive evidence for non-financial firms (Lemmon et al., 2008) and banks (Gropp and Heider, 2010), while others find that this effect is insignificant (Titman and Wessels, 1988). We control for the impact of bank credit risk and *Risk* is proxied by the non-performing loans (NPL) ratio. Large banks may have lower target capital ratios because of their "too-big-to-fail" status or are better known to the market (Gropp and Heider, 2010; Brewer et al., 2008), while they may also hold larger buffers due to increased complexity and heightened asymmetric information problems. We control for the size effect using *Size* – defined as a dummy variable that takes a value of 1 if a bank's total assets is greater than the average total assets of all banks in the sample and 0 otherwise. Fast-growing firms face higher agency costs of debt as shareholders have more flexibility to expropriate wealth from debtors (Titman and Wessels, 1988). This suggests a positive link between growth opportunities and capital ratios. Banks with greater growth potential may also hold higher capital to be financially prepared when investment opportunities emerge. We include *Income growth* and expect a positive impact on the target capital ratio. Deregulation and increased competition has induced banks to diversify their income sources by performing new activities that generate non-interest income. More diversified income sources (non-interest activities) are often associated with profitability gains but higher risk due to their unstable nature (Stiroh, 2004, 2006; Stiroh and Rumble, 2006). Profitability gains provide a source of capital (through greater retained earnings) and

[14] As expected, there is a negative correlation between equity to total assets and ROE (-0.59) – greater leverage (lower equity to total assets ratio) increases ROE. Moreover, we also cross check using ROA as an alternative measure of profitability and our main conclusions still hold (results are available from authors on request).

higher risk also demands more capital. We include *Diversification* defined as the ratio of non-interest income to total operating income.

When modelling bank-specific adjustment speeds we control for the effects of the cost of capital, risk, size, income diversification, liquidity, GDP growth, and inflation. Adjustment costs are important factors affecting adjustment speeds, although it is difficult to measure these costs. Following Ayuso et al., (2004) and Jokippi and Milne (2008), we include *ROE* to proxy for the direct cost of raising equity capital and *Risk* (measured by NPL ratios) to proxy the cost of failure. *Size* is measured by the log of banks' total assets and large banks are expected to adjust capital slower than small banks due to potential moral hazard problems linked to "too-big-to-fail". Jokipii and Milne (2008) find that banks with well-diversified income sources have a lower probability of experiencing a large decline in their capital ratios. Such banks tend to have stable capital ratios and hence we speculate these banks adjust capital slowly. The literature also suggests that undercapitalized banks may lack incentives to quickly close the gap to target compared to banks whose capital ratios are above target (De Jonghe and Öztekin, 2015). To control this effect, we define a dummy variable – *Below* that takes the value of 1 if a bank's actual capital ratio is below the target and 0 otherwise. We control for the effect of the macro-economic environment using *GDP growth* – the annual percentage change in gross domestic product and *Inflation* is the annual percentage change in the average consumer price index.[15]

Panel A in Table 3 shows the mean values for key bank-specific variables across different ownership types. Foreign banks hold the highest capital ratios by all measures – Tier 1 capital of 17.98% and Total capital ratios of 18.96% that are much higher than those of domestic

[15] There is an extensive literature on the impact of board structure on bank capital structure (e.g., Arnaboldi et al., 2018). However, little work (as far as we are aware) has been undertaken on how the composition of boards may influence bank's decisions to adjust capital towards their target level - a potential direction for future research.

banks. Variations in capital ratios among banks of different ownership types may also relate to bank-specific features, an issue we investigate in section 4. CGOBs are the most profitable (ROE) and largest banks in the market, while foreign banks are the smallest in total assets with the least diversified income sources and lowest propensity for (credit) risk-taking (NPL ratio).

[Table 3 around here]

As a preview from Panel B in Table 3, we observe that the use of the constant adjustment model tends to underestimate the target capital ratios of LGOBs and SEOBs, and overestimates those for CGOBs, foreign banks and private banks, compared to the results from the bank-specific variable adjustment speed set-up in step 3. We observe significant variations in estimated adjustment speeds among banks with different ownership. CGOBs have the lowest adjustment speed at 0.20, while SEOBs have the highest adjustment speeds at 0.60 (see a more detailed discussion in section 4.2). The differences across ownership types are economically significant. For instance, private banks and LGOBs close 70% of the distance to the target Tier1 capital ratios in 4 years (1-(1-0.26)×4=0.70), and the figures for CGOBs, foreign banks, and SEOBs are 59%, 68%, and 97%, respectively.

4. Empirical analysis

We test the hypotheses developed in section 2 using the three-step model described in section 3.1. Bank capital is measured using two risk-weighted regulatory capital ratios, namely, the Tier 1 capital ratio (*Tier1Cap*) and total capital ratio (*TotalCap*). We treat private (domestic) banks as the default group.

4.1. Ownership and bank target capital ratios under a constant adjustment speed (Step 1)

This section investigates ownership effects on bank target capital ratios by estimating equation (3) using the System GMM estimator. Panel A in Table 4 reports the results where government-owned banks are treated as a single group in columns 1-2 and differentiated into three sub-groups (CGOBs, LGOBs and SEOBs*)* in columns 3-4. Results from the Hansen and AR(2) tests suggest that the instruments are valid and there is no evidence of second-order serial correlation in the error term. The constant adjustment speed of the Tier1 capital ratio is 0.432 per year (=1- 0.568, where 0.568 is the coefficient of the lagged capital ratio reported in the first specification). Banks adjust their total capital ratio slightly quicker than the Tier1 capital ratio.

We find no difference between the target capital ratios of government and private banks as the coefficients on *Government* are insignificant in columns 1-2, thus rejecting both *Hypothesis 1a* and *Hypothesis 2a*. When we consider the three types of government-owned banks, the coefficient on *LGOBs* is negative and significant in column 4 suggesting that LGOBs have lower target capital ratios than private banks providing limited evidence supporting *Hypothesis 1a*. We also find no evidence supporting *Hypothesis 3a*: *CGOBs have lower target capital ratios than LGOBs and SEOBs*. We find foreign banks have higher target capital ratios compared to private banks. Results from the control variables suggest that credit risk, income growth, and inflation induce banks to choose higher target capital ratios, while profitability, size and income diversification fail to show any significant impacts. As we noted earlier, the results from this step, however, need to be interpreted with caution due to the strong assumption of a constant adjustment speed across banks and over time.

[Table 4 around here]

4.2.Ownership and bank capital adjustment speeds (Step 2)

In this section, we obtain estimates of bank-specific adjustment speeds from equation (6) and examine how ownership and other bank-specific and macroeconomic factors jointly explain the heterogeneity (across banks and over years) in adjustment speeds. The mean variable adjustment speed is 0.29 for Tier1 capital and 0.31 for total capital, which is consistent with De Jonghe and Öztekin's (2015) estimate of 0.29 for a worldwide sample of banks, but lower than that found for large banks in the U.S. (0.45-0.57 by Berger et al., 2008) and Europe (0.47 by Gropp and Heider, 2010). Panel B in Table 4 reports the results where government-owned banks are treated as a single group in columns 5-6 and differentiated into three sub-groups in columns 7-8.

The coefficient on *Government* is positive and significant in columns 5-6, suggesting that government-owned banks adjust capital at a faster speed than private banks, thus rejecting *Hypothesis 1b* but supporting the alternative *Hypothesis 2b.* Our explanations are as follows. First, government-owned banks take advantage of soft budget constraints and speed-up the adjustment process using state funds. Second, the literature suggests that government-owned banks face lower funding costs and higher credit ratings compared to private banks because of government support (Iannotta et al., 2013). Potentially low financing/transaction costs give these government-owned banks incentives to close capital gaps quickly. Third, unlike private banks that may decide to operate at sub-optimal capital levels due to higher transaction costs, this may not deter government-owned banks from adjusting capital towards targets since profit maximization is often not their main goal. Finally, the faster adjustment speeds may also be driven by the role of such banks to serve development/political and other goals such as financing government expenditure (see discussions in section 2 and evidence in footnote 6).

As shown in columns 7-8, LGOBs are faster in adjusting Tier1 capital and SEOBs adjust both Tier1 and total capital more rapidly compared to private banks. The coefficient on

CGOBs is insignificant, which can be attributed to stronger moral hazard problems due to government support and protections that are more likely for CGOBs than for LGOBs and SEOBs. The evidence supports *Hypotheses 3b: CGOBs adjust capital at slower speeds than LGOBs and SEOBs*.

The coefficient on *Foreign* is negative and significant, so foreign banks adjust their capital slower than domestic private banks. The results are consistent with expectations. Foreign banks on average have much higher capital ratios than other types of banks and also their target levels are much lower than actual capital ratios (as indicated by the negative GAPs in Table 3), so the need for adjustment is less pressing. It could also be because other factors such as geographical remoteness from headquarters exacerbate asymmetric information problems and reduce responsiveness to changing operating conditions.

Coefficients on *Financial institutions* are positive and significant in three out of four regressions in columns 5-8 (Table 4), consistent with our expectations that banks with financial institution ownership adjust capital faster than banks that do not have such investors. This suggests that financial institutions' monitoring reduces information asymmetries between shareholders and management and induces more rapid capital adjustment. Financial institutions have information advantage in financial markets which may also provide banks quick access to capital. Banks with financial institution ownership adjust toward their target capital ratios roughly 28 to 44 percentage points faster than those without this type of investor.

As for the control variables, we find that a higher return on equity (ROE) slows down capital adjustment speeds. Banks with a greater ability to generate internal sources of capital (through enhanced retained earnings) may face less urgency in having to make prompt capital adjustments. We also find that income diversification slows down banks' capital adjustment

speed, but the size of coefficients is small. Adjustment speeds are faster in a favourable macroeconomic environment (proxied by GDP growth) but do not appear to be influenced by credit risk (*Risk*), asset size and inflation. Moreover, we find no evidence that adjustment speeds are different for banks with capital ratios above or below their target levels.

4.3. Ownership and bank target capital ratios under variable adjustment speeds (Step 3)

In this section, we re-estimate target capital ratios in equation (7) allowing for bank-specific variable adjustment speeds obtained from step 2 and test for ownership effects on bank target capital ratios. We apply a fixed effect estimator and the results are reported in Panel C of Table 4. These are our preferred results given the more realistic assumption of variable bank-specific capital adjustment speeds. The coefficient on *Government* is positive and significant in columns 9-10, rejecting the *Hypothesis 1a* but supporting the *Hypothesis 2a: government-owned banks have higher target capital ratios than private banks*. This result is consistent with the "development/political" view that government-owned banks have higher capital targets as they need more capital to finance development, politically preferred projects, or to help finance other government spending via the purchase of sovereign debt. Columns 11-12 show that the positive government ownership effect exists for LGOBs and SEOBs, but not for CGOBs. Target capital ratios of CGOBs are the same as private banks, but lower than those of other two types of government banks, supporting *Hypothesis 3a: CGOBs have lower target capital ratios than LGOBs and SEOBs.* Compared to LGOBs and SEOBs, CGOBs enjoy more certain government support and the resultant moral hazard effects presumably tend to slacken their incentives and desire to hold higher capital and adjust capital quickly. Facing less certain government support, LGOBs and SEOBs tend to set higher target capital ratios than private banks by more than 6 percentage points in terms of Tier1 capital ratio and about 8 percentage points in terms total capital ratios. Moreover, the coefficient on *Foreign* is

positive and significant. On average, foreign banks' target Tier1 and total capital ratios are higher than those of private banks roughly by 11 and 13 percentage points, respectively.

Consistent with the literature (Flannery and Rangan, 2008; Fonseca and Gonzalez, 2010), we find a positive and economically significant impact of bank profitability on target capital ratios. Results in column 11 indicate that a one standard deviation increase in ROE will boost regulatory Tier1 capital ratios roughly by about 1.1 percentage points (0.157×7). Banks with income growth potential have higher target capital ratios, but the economic impact is small. More diversified banks have higher target capital ratios, consistent with the literature (Stiroh, 2004, 2006; Stiroh and Rumble, 2006). As in column 11, a one standard deviation increase in the ratio of non-interest income to total operating income will boost Tier1 capital ratios roughly by 2.2 percentage points (0.28×8.03). Our results show no significant influence of bank risk and size on target capital ratios.

We conduct an array of robustness tests, including (1) using a 10% threshold when classifying ownership types; (2) using alternative measures for control variables (return on assets (ROA) as a performance measure) and include extra control variables for bank liquidity and listing status; and also (3) using a subsample excluding foreign banks. Findings from these unreported results are generally consistent and our main conclusions hold (these results are available from the authors on request).

5. Bank ownership and capital adjustment strategy

One might question the foundations of the above analysis: Do banks actually react to target capital ratios? In this section, we empirically address this issue by answering the following two questions: How do banks react to target capital ratios? And for undercapitalized banks' (those with capital ratios below their targets), how do they adjust and does the process systematically vary by ownership type?

5.1. Capital adjustment through bank balance sheet

When banks react to capital GAPs – the difference between target and actual capital ratios, their rebalancing strategies should be translated into changes in their balance sheet. We link GAPs to banks' balance sheet movements to investigate whether and how banks achieve their target capital ratios. Banks are grouped into tertiles based on GAPs of their Tier1 capital ratios.[16] The first, second, and third tertile represents overcapitalized banks with negative GAPs, banks with capital ratios close to their targets, and undercapitalized banks with positive GAPs, respectively. The average growth rates of key balance sheet items for each tertile are reported in Table 5.

[Table 5 around here]

Panel A reports relevant information on bank capital variables. Column 1 reports the sample means of balance sheet items, showing that banks on average have negative GAPs. Overcapitalized banks in tertile 1 (column 2) have the lowest equity growth (16.43%) and the highest in total assets (24.96%). This is consistent with the expectation that overcapitalized banks speed up assets expansion to adjust toward their targets. Undercapitalized banks in tertile 3 (column 4) rebalance their capital ratios by boosting equity at the fastest rate of 28.81% and a more moderate total assets growth rate of 22.65%. The mean equality tests (columns 5-6) indicate that differences in the mean of capital variables between tertiles 1 and 2 and between tertiles 2 and 3 are statistically significant.

Panel B presents the growth rates of key assets and liabilities. Overcapitalized banks in tertile 1 expand all types of assets and liabilities at the fastest speeds (except for non-earning assets). The mean equality test in column 5 indicates that differences in the average growth rates of assets and liabilities between tertiles 1 and 2 are significant (except for fixed assets). As for

16 Results from tertiles based on the GAPs of Total capital ratio are consistent and not reported to save space.

undercapitalized banks in tertile 3, despite significant capital shortfalls (larger GAPs), they adjust balance sheet similar to banks in tertile 2 – indicating a relatively more aggressive strategy and attitude to risk. As shown in column 6, the average growth rates of most assets and liabilities are statistically insignificant between tertiles 2 and 3. Overall evidence suggests that banks react to capital GAPs and move toward their target capital ratios through balance sheet adjustment.

5.2. Bank ownership and balance sheet characteristics

We are particularly interested in how undercapitalized banks (banks with capital ratios below their targets) adjust their balances sheets in order to move towards targets and whether their adjustment process is systematically correlated with ownership type. In our sample, 35% of banks are undercapitalized viewing the Tier 1 capital ratio, of which 21% are government-owned and 14% foreign, while all private banks are overcapitalized.[17] Overcapitalized banks (with capital ratios above target) do not differ materially in adjusting their balance sheets and (as they are not of our main interest) we treat these as the default group. We regress the growth rates of key balance sheet items – *Total asset, Loan, Other earning assets*, *Deposits*, and *Equity* against ownership variables. $Foreign_{under}$ and $Government_{under}$ ($CGOB_{under}$, $LGOB_{under}$, *and* $SEOB_{under}$) act as proxy variables for undercapitalized foreign- and government-owned banks, respectively. Results are reported in Table 6 and all regressions control for size and year fixed effects. Government-owned banks are treated as one group in columns 1-5 and differentiated into three subgroups in columns 6-10.

[Table 6 around here]

[17] Here target capital ratios are derived under bank specific variable adjustment speeds. Results for Tier 1 capital ratio and Total capital ratio are consistent and the results presented in this section are based on Tier 1 capital ratio.

We observe strong correlations between ownership features and key balance sheet items. Undercapitalized government-owned banks (columns 1-5) rapidly boost equity capital, but the growth rates of other balance sheet items are not significantly different from those of the control group – overcapitalized banks. These results are consistent with our main findings that government-owned banks tend to hold higher capital ratios and adjust their capital to the target level at faster speeds. Undercapitalized foreign banks, however, achieve target ratios by contracting total assets, loans and deposits at a faster rate, while their equity growth rate is not significantly different from that of overcapitalized banks. This is perhaps because foreign bank's parent companies are reluctant to increase equity investment overseas.

In columns 6-10, we observe variations in the rebalancing process across different government-owned banks. The growth rates of key balance sheet items of undercapitalized CGOBs are similar to those of overcapitalized banks, indicating that undercapitalized CGOBs do not actively rebalance towards target capital ratios. LGOBs boost equity capital at a higher rate, while SEOBs take a more active rebalancing approach by downsizing total assets and deposits while boosting equity. In short, our evidence suggests that varying types of government ownership have a differential impact on banks' capital ratio rebalancing strategies.

6. Conclusion

This paper investigates the influence of ownership on bank capital behaviour with particular attention to different forms of government ownership using a unique dataset of Chinese banks from 2006 to 2015. We distinguish between banks owned by the central government (CGOBs), local government (LGOBs), state-owned enterprises (SEOBs), and (domestic) private and foreign stockholders. Our key finding is that ownership features matter for banks' target capital ratios, adjustment speeds, and rebalancing strategies. First, compared with

private banks, government-owned banks have higher target capital ratios and faster adjustment speeds, supporting the "development/political" view of government ownership in banks. Second, CGOBs' target capital ratios are similar to those of private banks and significantly lower than other types of government-owned banks – LGOBs and SEOBS, after controlling for size effects. This is likely due to more profound moral hazard problems associated with CGOBs stemming from a combination of various factors, such as implicit government guarantees for support and regulatory forbearance. Third, regulatory capital requirements are not binding in China. Banks' capital ratios are in excess of the regulatory minimum requirements and the majority of banks (65%) hold capital ratios above their targets. Fourth, we find that banks react to target capital ratios through balance sheet channels and undercapitalized banks' rebalancing strategies vary with ownership type. In particular, benchmarking to overcapitalized banks, undercapitalized LGOBs and SEOBs increase equity directly, undercapitalized CGOBs make no effort to rebalance, and undercapitalized foreign banks contract assets and liabilities with no increase in equity.

Our results shed light on the current debate on bank capital regulation and regulatory reforms by providing insights into how private and government ownership (central government, local government and SOEs) have a differential influence on bank capital behaviour. Ownership is an important parameter to consider when designing capital regulatory reforms and risk controls, especially in the post-crisis era with increased government involvement in banking. Our results help inform regulators as to the costs and speed of adjustment for banks of different ownership features when they are required to boost their capital positions in the event of a crisis. Future research on the potential effects of capital behaviour over longer economic cycles (after taking into account ownership effects) could also yield more fruitful information for policy makers and regulators.

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Table 1. Definition of Variables

Variable	Definition
Tier1Cap	The ratio of Tier 1 capital to total risk-weighted assets.
TotalCap	The ratio of total capital (Tier 1+ Tier2) to total risk-weighted assets.
Government	A dummy variable that equals 1 if the largest owner is the government or state-owned enterprise that hold more than 5% of total outstanding stock and 0 otherwise.
CGOB	A dummy variable that equals 1 if the largest owner is the central government that hold more than 5% of total outstanding stock and 0 otherwise.
LGOB	A dummy variable that equals 1 if the largest owner is the local government that hold more than 5% of total outstanding stock and 0 otherwise.
SEOB	A dummy variable that equals 1 if the largest owner is a state-owned enterprise that hold more than 5% of total outstanding stock and 0 otherwise.
Private	A dummy variable that equals 1 if a bank is neither a government-owned bank nor a foreign bank and 0 otherwise.
Foreign	A dummy variable that equals 1 if the largest owner is a foreign investor that holds more than 5% of total outstanding stock and 0 otherwise.
Financial institutions(FIs)	A dummy variable that takes a value of 1 for banks with financial institution investors and 0 otherwise.
ROE	Return on equity: the ratio of net income over total equity.
Risk	NPL ratio: the ratio of non-performing loans to gross loans.
Size	A dummy variable that takes a value of 1 if a bank's total assets is greater than the average total assets of the banks in our sample and 0 otherwise.
Income growth	The annual growth rate of total operating income.
Diversification	The ratio of non-interest income to total operating income.
Below	A dummy variable that takes the value of 1 if a bank's actual capital. ratio is below the target capital ratio and 0 otherwise.
GDP growth	The annual percentage change in gross domestic product.
Inflation	The annual percentage change in the average consumer price index.
Government debt	The ratio of government debt holdings to bank total assets.

Table 2 Summary Statistics

Variable	Obs	Mean	SD	Min	Max
Capital ratios					
Tier1Cap	487	12.97	6.38	3.18	62.62
TotalCap	487	14.78	6.03	3.24	62.62
Equity to total assets	487	7.94	3.60	2.20	31.34
Ownership					
Government	263	33.11	23.39	5.86	100
CGOBs	48	60.29	19.79	26.48	100
LGOBs	135	26.27	17.46	8.23	90.15
SEOBs	80	28.81	22.49	6.94	100
Private	41	10.31	4.99	5.07	80.45
Foreign	146	86.53	30.53	10.63	100
Financial institutions (dummy)	487	0.41	0.49	0.00	1.00
Financial institutions (total shareholding)	487	3.8	7.68	0.00	42.64
Control variables for partial adjustment model					
ROE (return on equity)	487	13.19	7.00	-4.42	58.17
Risk (NPL ratio)	487	1.30	1.57	0.00	18.11
Size	487	0.18	0.39	0.00	1.00
Income growth	438	29.48	41.29	-35.87	381.97
Diversification	487	8.03	37.19	-792.50	44.48
Below (Tier1Cap targets from step1)	487	0.61	0.49	0.00	1.00
Below (TotalCap targets from step1)	487	0.58	0.49	0.00	1.00
GDP growth	487	8.74	1.76	6.90	14.23
Inflation	487	2.78	1.73	-0.70	5.86
Government debt holdings	406	6.98	5.74	0	29.53
Balance sheet variables					
Total assets	487	1478	3567	4.35	22200
Loans (net loan)	487	730	1818	3.21	11700
Other earning assets	487	527	1179	0.39	6700
Deposits	487	1101	2746	0.73	16300
Equity	487	95	240	0.35	1721

Notes: (1) This table reports the descriptive sample statistics. (2) Government: government-owned banks; CGOB/LGOB/SEOB: central government/local government/state enterprise-owned banks; Private: private (domestic) banks; Foreign: foreign banks. (3) All balance sheet variables are in billion RMB and other variable are either dummy variables or ratios.

Table 3: Key variables, target capital ratios and adjustment speeds across ownership types

		CGOBs	LGOBs	SEOBs	Foreign	Private
Panel A: Key bank-specific variables						
Tier1Cap		10.39	11.22	10.59	17.98	10.64
TotalCap		12.94	13.18	12.95	18.96	12.73
Total assets		10692	380	1225	140	471
Loans		5403	151	606	62	232
Deposits		8280	238	848	91	326
ROE (return on equity)		17.16	16.12	14.20	6.99	16.27
Non-performing loan (NPL) ratio		1.74	1.55	1.15	0.91	1.51
Income growth		16.98	30.65	40.65	29.11	23.68
Diversification		12.74	6.42	8.94	5.55	11.58
Panel B: Estimated target capital ratios, GAPs, and adjustment speed						
Target capital ratio:						
Under constant adjustment speed (results from step1)	Tier1Cap	10.81	10.21	9.27	16.07	11.11
	TotalCap	13.37	12.05	11.82	17.36	13.37
Under variable adjustment speed (results from step3)	Tier1Cap	8.79	10.02	9.74	16.27	5.31
	TotalCap	11.84	12.40	12.73	16.54	8.29
GAP = Target capital ratio - capital ratio$_{t-1}$:						
Under constant adjustment speed	Tier1Cap	0.72	-1.47	-1.66	-2.99	0.83
	TotalCap	0.68	-1.55	-1.45	-2.61	1.03
Under variable adjustment speed	Tier1Cap	-1.23	-1.64	-1.10	-2.75	-5.00
	TotalCap	-0.78	-1.18	-0.49	-3.41	-4.07
Mean variable adjustment speeds (results from step2)	Tier1Cap	0.20	0.26	0.60	0.25	0.26
	TotalCap	0.20	0.24	0.60	0.30	0.27

Notes: (1) Panel A reports the mean of selected key bank-specific variables, while Panel B reports the mean of estimated target capital ratios, GAPs and adjustment speeds. (2) Government: government-owned banks; CGOB/LGOB/SEOB: central government/local government/state enterprise-owned banks; Private: private banks; Foreign: foreign banks. Tier1Cap is Tier1 capital ratio, TotalCap is total capital ratio. (3) Total assets, loans and deposits are in billion RMB.

Table 4: The impact of ownership on bank target capital ratios and adjustment speeds

	Panel A: Step 1 Target capital ratios CS (Obs365)				Panel B: Step 2 Adjustment speeds (Obs 341)				Panel C: Step 3 Target capital ratios VS (Obs341)			
	Tier1Cap	TotalCap	Tier1Cap	TotalCap	Tier1Cap	TotalCap	Tier1Cap	TotalCap	Tier1Cap	TotalCap	Tier1Cap	TotalCap
	1	2	3	4	5	6	7	8	9	10	11	12
Capital ratio$_{t-1}$	0.568***	0.506***	0.575***	0.517***								
	(0.000)	(0.000)	(0.000)	(0.000)								
Government$_{t-1}$	-0.415	-0.584			0.399**	0.345*			5.244**	6.708***		
	(0.196)	(0.111)			(0.015)	(0.061)			(0.023)	(0.004)		
CGOB$_{t-1}$			0.352	0.425			0.036	0.079			4.983	6.216
			(0.418)	(0.345)			(0.863)	(0.746)			(0.198)	(0.130)
LGOB t-1			-0.475	-0.748**			0.348*	0.279			6.272**	7.668***
			(0.110)	(0.027)			(0.086)	(0.202)			(0.024)	(0.008)
SEOB $_{t-1}$			-0.558	-0.566			0.684***	0.694**			6.292**	8.030***
			(0.141)	(0.104)			(0.006)	(0.015)			(0.027)	(0.003)
Foreign $_{t-1}$	2.297***	1.983***	2.197***	1.876***	-0.261*	-0.371**	-0.232	-0.350*	13.129***	11.844***	12.502***	11.647***
	(0.004)	(0.007)	(0.004)	(0.006)	(0.087)	(0.048)	(0.150)	(0.078)	(0.000)	(0.000)	(0.000)	(0.000)
FIs $_{t-1}$					0.439**	0.360*	0.381**	0.276				
					(0.013)	(0.076)	(0.016)	(0.120)				
ROE$_{t-1}$	0.011	-0.010	0.013	-0.004	-0.037***	-0.042***	-0.032***	-0.037***	0.184**	0.166**	0.157*	0.160*
	(0.790)	(0.838)	(0.768)	(0.932)	(0.000)	(0.001)	(0.001)	(0.000)	(0.030)	(0.030)	(0.066)	(0.055)
Risk$_{t-1}$	0.187*	0.208*	0.166	0.187*	-0.029	-0.018	-0.016	-0.008	-0.219	-0.182	-0.037	0.068
	(0.074)	(0.089)	(0.122)	(0.096)	(0.523)	(0.688)	(0.710)	(0.863)	(0.665)	(0.755)	(0.943)	(0.894)
Size$_{t-1}$	-0.050	0.192	-0.471	-0.379	-0.024	-0.021	-0.017	-0.016	-2.859	-2.102	-2.357	-1.970
	(0.863)	(0.582)	(0.177)	(0.296)	(0.383)	(0.526)	(0.554)	(0.612)	(0.182)	(0.345)	(0.291)	(0.405)
Income growth $_{t-1}$	0.001***	0.001**	0.001***	0.001**					0.001*	0.001**	0.001**	0.001**
	(0.004)	(0.048)	(0.002)	(0.038)					(0.093)	(0.045)	(0.046)	(0.024)
Diversification $_{t-1}$	-0.012	-0.012	-0.012	-0.017	-0.001***	-0.001**	-0.001***	-0.001***	0.290**	0.373***	0.283**	0.340***
	(0.604)	(0.687)	(0.602)	(0.589)	(0.008)	(0.022)	(0.002)	(0.007)	(0.013)	(0.002)	(0.019)	(0.007)
Below$_{t-1}$					-0.125	-0.077	-0.148	-0.105				
					(0.249)	(0.477)	(0.164)	(0.318)				
GDP$_{t-1}$					0.064**	0.071**	0.049*	0.061**				
					(0.030)	(0.034)	(0.065)	(0.048)				
Inflation $_{t-1}$	0.935***	0.031	0.933***	0.034	0.002	-0.006	0.006	-0.002	0.031	0.186	-0.129	0.017
	(0.004)	(0.735)	(0.005)	(0.697)	(0.920)	(0.774)	(0.754)	(0.909)	(0.917)	(0.550)	(0.662)	(0.955)
AR(2)/Hansen	0.10/0.29	0.10/0.11	0.10/0.31	0.10/0.13								
R-squared					0.32	0.28	0.34	0.30	0.25	0.33	0.21	0.31

Notes: (1) This table provides results from the three-step partial adjustment model applied to a sample of commercial banks operating in China over 2006 to 2015. Two different definitions of capital ratios are considered in our regression analysis – the Tier 1 capital ratio and the total capital ratio. (2) Panel A provides results of the first step partial adjustment model ($k_{i,t} = \lambda(\beta X_{i,t-1} + \theta D_{year}) + (1-\lambda)k_{i,t-1} + \tilde{\delta}_{i,t}$) for the determinants of bank target capital ratios under a constant adjustment speed (CS), using the system GMM estimator. All explanatory variables enter regressions with a one year period lag. (3) Panel B provides results of the second step partial adjustment model ($k_{i,t} - k_{i,t-1} = (\Lambda Z_{i,t-1})\hat{G}_{i,t_t} + \tilde{\delta}_{i,t}$) for the determinants of capital adjustment speeds, using the pooled OLS estimator. (4) Panel C provides results of the third step partial adjustment model ($k_{i,t} - k_{i,t-1}(1-\hat{\Lambda}Z_{i,t-1}) = \beta[(\hat{\Lambda}Z_{i,t-1})X_{i,t-1}] + \tilde{\delta}_{i,t}$) for the determinants of bank target capital ratios under variable adjustment speeds (VS) using the fixed effects estimator. We relax the constraint on constant adjustment speed and allow it to vary across banks and over time. (5) ROE: return on equity; Government: government-owned banks; CGOB/LGOB/SEOB: central government/local government/state enterprises-owned banks; Foreign: foreign banks; and FIs: financial institutions. Private banks are omitted as the default group for comparison purpose. (6) Figures in parentheses are p-values; *, **, *** represents the significance level at 10%, 5% and 1%, respectively.

Table 5. Bank-level characteristics and capital adjustment

	Sample mean	Tertile 1	Tertile 2	Tertile 3	Tertile 1 vs.2	Tertile 2 vs.3
	1	2	3	4	5	6
Panel A: Capital variables						
GAP_Tier1Cap	-2.40	-9.12	-1.37	3.33	0.00***	0.00***
GAP_TotalCap	-2.44	-9.34	-1.27	3.35	0.00***	0.00***
Equity growth rate		16.43	21.39	28.81	0.03**	0.02**
Total asset growth rate		24.96	19.29	22.65	0.03**	0.13
Panel B: Balance growth rates						
Assets: Loan	47.60	22.18	17.89	18.15	0.09*	0.87
Other earning assets	37.75	33.46	23.82	28.76	0.08*	0.40
Non-earning assets	13.93	123.43	59.04	213.88	0.10*	0.00***
Fixed assets	0.73	25.26	21.90	21.79	0.66	0.98
Liabilities: Deposit	77.96	25.42	17.89	20.74	0.01***	0.18
Other funding	22.04	113.92	32.34	57.94	0.03**	0.07*

Note: (1) This table presents bank-level characteristics with respect to GAPs in the Tier1 capital ratio. GAPs are the difference between the target capital ratio and actual capital ratios in the previous year, and a negative GAP indicates that banks' actual capital ratio is higher than target. (2) Panel A shows information on capital variables, and Panel B presents average growth rates of banks' key assets and liability components. (3) Column 1 reports sample means of capital variables, assets components (scaled by total assets), and liabilities components (scaled by total liabilities); banks are grouped in to tertiles based on GAPs in Tier1 capital ratio under variable adjustment speed in columns 2-4; columns 5 and 6 report *p*-values of pairwise *t*-test of equality of means of tertiles 1 versus 2, and tertiles 2 versus 3, respectively; *, **, *** represents the significance level at 10%, 5% and 1%, respectively. (4) The sample is unbalanced with 487 bank-year observations, which is reduced to 414 when calculating growth rates and each tertile contains 113 observations.

Table 6. Correlates between the growth rates of balance sheet items and ownership features

	Total Assets	Loans	Other earning assets	Deposit	Equity	Total Assets	Loans	Other earning assets	Deposit	Equity
	1	2	3	4	5	6	7	8	9	10
Government$_{under}$	-3.921	0.129	-1.118	-5.509	14.321***					
	(0.219)	(0.944)	(0.841)	(0.107)	(0.000)					
CGOB$_{under}$						-0.988	4.268	-21.912	-2.779	2.531
						(0.870)	(0.293)	(0.107)	(0.664)	(0.715)
LGOB$_{under}$						0.945	1.620	7.947	3.551	18.765***
						(0.853)	(0.539)	(0.307)	(0.510)	(0.001)
SEOB$_{under}$						-11.174**	-3.519	-4.536	-16.869***	19.046***
						(0.028)	(0.188)	(0.547)	(0.002)	(0.001)
Foreign$_{under}$	-11.606**	-5.686**	-8.837	-14.973***	3.500	-11.596**	-5.819**	-8.235	-14.956***	3.509
	(0.011)	(0.012)	(0.183)	(0.002)	(0.503)	(0.011)	(0.010)	(0.213)	(0.002)	(0.500)
Size	-1.183	-2.581	-20.535***	7.239	-24.603***	-2.186	-2.754	-16.858***	5.530	-24.682***
	(0.862)	(0.255)	(0.000)	(0.320)	(0.002)	(0.748)	(0.239)	(0.004)	(0.444)	(0.002)
Constant	25.251***	19.892***	34.686***	26.638***	18.893***	23.751***	22.320***	26.870***	23.269***	20.232***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. Obs	341	341	341	341	341	341	341	341	341	341

Note: This table reports the correlates between the growth rates of key balance sheet items and ownership features. The dependent variables are the growth rates of Total asset, Loan, Other earning assets, Deposits, and Equity. Explanatory variables are dummy variables for undercapitalized government- (central government-, local government-, and SOEs-) and foreign-owned banks. The default group is overcapitalized banks irrespective of ownership features, and therefore the coefficients capture the ownership effect on undercapitalized banks' balance sheet adjustment process relative to overcapitalized banks.