The effect of leverage and liquidity on earnings and capital management: Evidence from U.S. commercial banks

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ABSTRACT

Prior research shows that firms can manage earnings aggressively through making accounting choices affecting discretionary current accruals surrounding equity offerings as a means of smoothing earnings over time. Some evidence indicates that aggressive earnings management carries over to aggressive management of capital structure in the form of higher leverage and aggressive management of working capital in the form of lower liquidity. Earnings management by banks is achieved instead by managing accruals dealing with payment behavior on loans: the loan loss provision and net charge-offs. A regulatory change expressed in the Basel III accords has tightened requirements on leverage and liquidity and could have affected earnings and capital management.

This study examines the effect of leverage and liquidity on the behavior of earnings and capital management in U.S. commercial banks over the period from 1999 to 2013. If aggressive earnings management behavior carries over to aggressive leverage and liquidity policies, we should expect a negative relation between earnings management measures and capital measures and a negative relation between earnings management and liquidity measures. We show that earnings and capital management measures consistently have a significant positive relationship with capital ratios and a significant negative relationship with liquidity ratios. These results suggest that regulators should be on guard for all forms of aggressive management behavior. In the post-crisis period, our results also show evidence of additional regulatory scrutiny with a significant positive relation between liquidity and earnings management, which could indicate that less liquid banks are prevented from engaging in earnings management by regulators.

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1. Introduction

Considerable evidence shows that managers engage in opportunistic earnings management practices in order to smooth earnings over time or to show higher earnings prior to an equity financing event (Teoh, Welch, & Wong, 1998a, 1998b; Rangan, 1998). Gao and Shreves (2002); Cohen, Dey, and Lys (2004); Cheng and Warfield (2005), and Bergstresser and Philippon (2006) all find that the use of discretionary accruals and earnings management is more common at firms where top management compensation is more closely tied to the value of stock and particularly when tied to options. When earnings management is particularly aggressive, managers and the company can be subject to civil or even criminal fraud charges (Karpoff, Lee, and Martin, 2008a, 2008b, 2007). Aggressive earnings management behavior could be linked to other aggressive management practices in managing the firm's working capital or its financial structure.

Non-financial firms can manage earnings through management of accruals or by management of real operations. Accruals management involves accounting choices in the timing of recognition of revenues and expenses and can be measured by some

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variation of the discretionary current accruals measure employed by Jones (1991) in a study of earnings-reducing accruals by companies lobbying in favor of tariff restrictions on foreign imports. Companies could also manage earnings through timing of real activities such as research and development in an effort to produce the desired earnings level.

Aggressive earnings management could be related to aggressive management practices in other firm policies, including financial leverage and working capital management. An aggressive leverage policy would be indicated by a high degree of financial leverage and an aggressive working capital policy would be indicated by a low level of liquid assets. In this case a positive relation between leverage and earnings management would be observed and a negative relation between liquidity and earnings management measures would be observed.

Bank managers share some of the same incentives for earnings management as non-financial companies with some of the same needs to generate consistently growing earnings that consistently meet or beat analyst estimates. The regulatory process under which banks operate places additional constraints and incentives for earnings management. The financial crisis and the central involvement of banks in that crisis have changed the regulatory environment in which they operate and could have changed some of the regulatory incentives and constraints.

Instead of managing earnings through discretionary accruals, banks can manage earnings through estimation of loan losses or by the timing of loan charge-offs. The two accrual items for banks include the loan loss provision (LLP) and the net charge-off (NCO). The loan loss provision is an estimate of future losses that will be suffered on outstanding loans. The loan loss provision is a relatively large accrual for commercial banks and, therefore, has a significant impact on banks' earnings and regulatory capital. In principle, the purpose of the loan loss provision is to adjust banks' loan loss reserves to reflect expected future losses on their loan portfolios (Ahmed et al., 1999). Net charge-offs is the result of considering a loan to be uncollectible. Considerable accounting and managerial discretion is available in the estimation of either of these accrual items for banks.

Several related studies that analyze the loan loss provision and net charge-off for U.S. banks prior to the 1989 regulatory change in bank capital ratio determination highlight that banks might have used discretionary net charge-offs for capital management (Moyer, 1990; Beatty et al., 1995; Collins et al., 1995; Kim and Kross, 1998). Net charge-off is deducted from loan loss reserve (loan loss reserve = lagged loan loss reserve + loan loss provision − loan charge-off). Therefore, banks were able to decrease their net charge-off in order to increase their regulatory capital. High loan loss reserves improve the banks' ability to absorb losses without becoming financially distressed or failing. However, the direct consequence of an increase in a bank's loan loss reserve is merely increasing the reserve and reducing reported net income. The reduction in net income has the direct effect of reducing a bank's retained earnings and owners' equity. On the other hand, the loan loss provision and capital requirements are linked through the coverage of credit risk.

Banks need to set a loan loss provision to face expected losses in their credit portfolio, whereas bank capital has to cover the unexpected component of loan losses (Abou El Sood, 2012). Bikker and Metzemakers (2005) indicate that there is a general agreement that unexpected losses should be covered by bank capital, whereas expected losses should be covered by loan loss provisions or by future margin income. The so-called "statistical provision" forces banks to set aside provisions for the expected losses that are embedded in their expanding credit portfolios during good times, and allows banks to use the reserve to cover realized losses during bad times (Wall and Koch, 2000). The banks should be concerned whether the loan loss provision can cover expected loan losses, and the influence of earnings' change in financial statements. Hasan (2006) presents the hypothesis that capital management can be implemented via the loan loss provision. This hypothesis is based on the concept that bank managers use the loan loss provision to avoid the costs associated with the violation of capital adequacy requirements.

The Basel Committee on Banking Supervision in their Basel III accords raised banks' required capital reserves at the end of 2010 and further strengthened capital requirements by increasing banks' capital requirements and liquidity in 2013. In addition, the Basel Committee enacted the countercyclical capital buffer requirement to mitigate the effects of procyclical capital buffer allowing banks to become vulnerable in the 2008 financial turmoil. According to Basel III, banks must adopt new technology or upgrade internal systems to manage liquidity risk, and reduce their financial leverage, both of which will restrict operational flexibility and affect earnings. Specifically, tangible common equity, Tier 1 capital and total capital must be at least 7%, 8.5% and 10.5% of risk weighted assets, respectively, by 2018. Two liquidity ratios, liquidity coverage and net stable founding were introduced to ensure the short-term and medium-term liquidity of the banking sector. These regulatory changes could change leverage and liquidity policies by banks. Furthermore, a poorly capitalized bank is subject to increased oversight by federal regulators, which suggests that the opportunity for earnings management is minimized. In contrast, a better capitalized bank experiences less scrutiny by regulators and can more easily manage earnings.

Our study employs data from 124 active U.S. commercial banks with 1890 observations during the period from 1999 to 2013. By incorporating a sample period within the financial crisis of 2008–2009, we can examine whether earnings management is observed during the crisis period, which could lead regulators to take action to reduce or eliminate the practice of inflating capital or managing earnings in a crisis period.

Section 2 discusses relevant prior literature. Section 3 develops testable hypotheses. Section 4 discusses the research methodology and variables used in the study. Section 5 explains the data and sample selection. Section 6 presents the results of the research and the final section presents the conclusions.

2. Literature review

2.1. Capital management (CM)

Prior to 1989, banks were required to hold primary capital (defined as Tier 1 capital to include book value of equity, loan loss reserve, perpetual preferred stock and mandatory convertible debt) exceeding 5.5% of total assets and total capital (total capital

was defined as the sum of primary capital, subordinated debt and limited life preferred stock) exceeding 6% of total assets. In this period, the banks have an incentive to manipulate loan loss provisions to improve the capital adequacy ratio since the loan loss reserve was included as a component of bank capital in constructing capital adequacy ratios in the U.S. The bank managers could adjust loan loss reserve and the capital ratio at the same time. Several studies indicate that that banks might have used LLP and NCO for capital management purposes prior to 1989 (Moyer, 1990; Scholes et al., 1990; Beatty et al., 1995; Collins et al., 1995).

NCO is deducted from loan loss reserve, which is part of primary capital; thus banks could increase regulatory capital by decreasing NCO. Moyer (1990) finds that reported NCO, LLP, and securities gains or losses were all managed to meet regulatory capital adequacy guidelines. Similarly, Beatty et al. (1995) conclude that NCO and LLP are used as mechanisms of capital management. Collins et al. (1995) conclude that banks use NCO rather than LLP for capital management.

After 1989, loan loss reserves are no longer included in bank capital for constructing capital adequacy ratios. Some studies performed with post-1989 data find no association between LLP and capital management (Kim and Kross, 1998). Other studies find that LLP remain used as a tool for capital management. For example, Ahmed et al. (1999) find that LLP is used for capital management and find a negative relationship between LLP and Tier 1 capital.

2.2. Earnings management (EM)

Earnings management, through the LLP, could be used as a tool for risk management, avoiding capital adequacy regulation, reducing earnings volatility and enhancing managers' compensation. One of the primary objectives of earnings management is income smoothing to reduce the variability of profits over time. During good times, managers use some discretionary items (LLP and NCO) in the profit and loss account in order to decrease the amount of profits. During bad times, those items can be reversed to increase the amount of profit that would otherwise have been reported (Pérez et al., 2006).

Studies of earnings management via the LLP reach conflicting conclusions. Collins et al. (1995), Bhat (1996), and Hasan and Hunter (1999) conclude that banks engage in earnings management using LLP. However, Wetmore and Brick (1994), Beatty et al. (1995) and Ahmed et al. (1999) find evidence that LLP is not used for the purpose of earnings management. Similar disagreement across studies is shown from NCO. Ma (1988) finds that NCO is used as mechanisms to smooth earnings, but Collins et al. (1995) do not find similar results. Ahmed et al. (1999) attribute this difference in results to the different models used. Wall and Koch (2000) explain the contradictory findings by attributing it to sample selection and the use of different time periods.

Since findings on LLP do not agree across studies, an estimate of abnormal LLP might more accurately depict the extent that the LLP is used for earnings management. Construction of this abnormal LLP (AbLLP) measure removes non-discretionary LLP, leaving discretionary LLP as the residual. Discretionary LLP is estimated from a linear regression model incorporating loan types, the amount and dynamics of the non-performing loans, the NCO, and the stock of loan loss reserve (Wahlen, 1994).

Chang et al. (2008) examine the relationship between discretionary LLP and operating performance of banks listed on the Taiwan Stock Exchange. They find that banks have a tendency to increase or decrease AbLLP for the purpose of earnings management. The findings of the study indicate a positive relationship between AbLLP and the banks' stock returns and future cash flows (Mohammad et al., 2011).

2.3. The effect of leverage and liquidity on earnings and capital management

Holding capital reduces the probability of bankruptcy and therefore the costs of failure. Banks with weak core capital could engage in more capital management to meet regulatory requirements or strengthen their capital. Banks can use LLP decisions to manage regulatory capital directly. The recent trend in bank regulation is to set capital requirements based on risk assets held rather than setting capital requirements based on a simple book measure. Eetrella et al. (2000) compare the ability of a book leverage ratio and risk-based capital ratio in predicting bank failures. They find that the book leverage ratio can predict bank failure about as well as the more complex risk-based capital ratio. Wheelock and Wilson (2000) find that the probability of bankruptcy is higher for banks with lower book leverage ratios. Berger and Bouwman (2013) examine the effect of pre-crisis leverage ratios on bank performance during crises and normal times using U.S. data from 1984 to 2010. They find that banks with higher capital ratios performed better during banking crises either measured in their survival or market share. Huang and Xiong (2015) document that capital buffers, that is the gap between the capital ratio and regulatory requirement, countercyclically change over business cycles and primarily established by increasing the numerator of capital ratio in China.

The theoretical literature provides views of the crowding-out and financial fragility. A higher capital ratio crowds out deposits, thereby reducing liquidity creation, while financial fragility, characterized by lower capital, tends to favor liquidity creation (Diamond and Rajan, 2000, 2001) since banks can accept more deposits and make more loans with less capital. Fungacova et al. (2010) find that better capitalized banks tend to create less liquidity, which supports the crowding-out and financial fragility hypothesis. Distinguin et al. (2013) investigate the relationship between liquidity and regulator capital for European and U.S. commercial banks. They find that banks decrease their regulatory capital ratios when they face higher illiquidity or when they create more liquidity.

Some instances of bank illiquidity have been observed during financial crises. For instance, Gatev et al. (2004) find that not all U.S. banks had sufficient liquidity to withstand the 1998 crisis. Gonzalez-Eiras (2004) shows that Argentinian banks reduced liquidity holdings before the 2001 crisis. Allen and Gale (2004) indicate that liquidity creation increases the bank's exposure to risk, as its losses increase with the level of illiquid assets to satisfy the liquidity demands of customers. Besancenot and Vranceanu (2011) indicate that abnormal accumulated risk by banks results in the 2007–2009 recession and banks with high

Table 1
Definitions of variables.

Variable	Definition	Measurement method
LLP	Loan Loss Provision	Loan loss provision scaled by the beginning of total assets
NCO	Loan Net Charge-Off	Loan net charge-off scaled by the beginning of total assets
AbLLP	Abnormal Loan Loss Provision	Abnormal loan loss provision scaled by the beginning of total assets
Lev1	Tier 1 Regulatory Capital Ratio	Tier 1 capital divided by risk weighted assets
Lev2	Total Regulatory Capital Ratio	Total capital divided by risk weighted assets
Lev3	Tangible Common Equity Ratio	Tangible Common Equity divided by tangible assets
Liq1	Liquidity Ratio	Liquid assets divided by total Deposit and short-term funding
Liq2	Liquidity Ratio	Liquid assets divided by total assets
Assets	Total Assets	The nature log of assets
EBTP	Earnings before Taxes and Loan Loss Provisions	EBTP scaled by the beginning of total assets
Loans	Gross Loans	Gross loans scaled by the beginning of total assets
NPL	Non-Performing Loans	Non-performing loans scaled by the beginning of total assets
LLR	Loan Loss Reserve	Loan loss reserve scaled by total assets
CNPL	Change in NPL	Change in non-performing loans scaled by the beginning of total assets

operating costs tend to take more risk above their perfect information optimal level to deliver higher returns and signal themselves as highly efficient banks.

In this study, we use three measures of leverage and two measures of liquidity to test whether earnings and capital management are affected by leverage and liquidity.

3. Hypotheses

3.1. Leverage and earnings and capital management

Higher LLP could be mechanically associated with low capital since earnings and equity capital are depleted by the LLP. However, Davis and Zhu (2009) and Craig et al. (2006) find that there is no significant relation between capital and LLP. A negative relation is shown by Ahmed et al. (1999) and Bikker and Metzemakers (2005). They find that banks with relatively higher costs of violating capital requirements tend to engage in more capital management.

In the banking sector, the banks with higher financial leverage (debt to assets ratio) and thus lower banks' leverage ratios (capital to assets ratio) are more likely to engage in EM and CM in order to meet capital requirements. Specifically, our first hypothesis is as follows:

H1. Bank leverage is negatively related to earnings and capital management.

3.2. Liquidity and earnings and capital management

Higher capital enhances the ability of banks to create liquidity. Liquidity creation increases the bank's exposure to risk, and losses increase with the level of illiquid assets to satisfy the liquidity demands of customers (Allen and Gale, 2004). Sawada (2010) finds that banks exposed to the liquidity shock tend to increase the cash holdings by selling and buying securities owned rather than by liquidating bank loans in Japan. Bank capital allows the bank to absorb greater risk (Bhattacharya and Thakor, 1993; Repullo, 2004; Von Thadden, 2004). Berger and Bouwman (2009) empirically test these recent theories of the relationship between capital and liquidity creation. Using a sample of U.S. commercial banks from 1993 to 2003, they find that the relationship is positive for large banks when liquidity creation includes off-balance sheet activities and not significant when liquidity creation only accounts for on-balance sheet activities. The relationship is significantly negative for small banks considering both liquidity creation measures.

In general, if banks care about whether the capital can protect their expected and unexpected risk, they will increase their liquidity since the higher liquid assets could help banks meet their financial needs and reduce liquidity risk. Moreover, banks will enhance their capital to absorb greater risk by liquidity creation. Thus, the higher the bank's capital ratio, the higher the liquidity.

Based on the above points and H1, we confirm that leverage and liquidity are related. Thus, combined with H1 hypothesis, the second hypothesis is established as follows:

H2. Liquidity is significantly negatively related to earnings and capital management.

3.3. The financial crisis of 2008–2009 and earnings and capital management behavior

Earnings management through the loan loss provision can be used to smooth earnings over economic cycles, reducing earnings during good times and building up a reserve that can be used to boost earnings during a recession. According to

Table 2
LLP estimation.

Variable	Coefficient	t Value	Pr > |t|
NCO	1.0027	63.31	<.0001***
Loans	0.0032	7.30	<.0001***
NPL	0.0497	4.81	<.0001***
LLR	− 0.4099	− 17.81	<.0001***
CNPL	0.0330	3.18	0.0015**
Constant	− 0.0003	− 0.03	0.9762
Fixed two effects (firm and year fixed)		Yes	
Observations		1860	
R-squared		0.8955	
Breusch Pagan Test		<.0001***	
Hausman Test		<.0001***	

Table 2 shows results based on a **Fixed-Effects model** (1) $LLP_{i,t} = \beta0 + \beta1NCO_{i,t} + \beta2Loans_{t-1} + \beta3NPL + \beta4LLR_{i,t-1} + \beta5CNPL_{i,t} + \mu t$ according to Kanagaretnan et al. (2010) and Riepe (2014). ***, **, and * represent 1%, 5% and 10% significance, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **LLR** is loan loss reserve scaled by total assets. **CNPL** in the change of NPL scaled by the beginning of total assets.

Table 3
Time series of variables—1999 to 2013.

Panel A. Dependent variables of LLP, NCO and AbLLP

	Loan loss provision			Net charge-off			Abnormal loan loss provision		
Year	Mean	Median	Std Dev	Mean	Median	Std Dev	Mean	Median	Std Dev
1999	67	5	241	67	4	231	32	5	123
2000	83	6	263	77	4	257	45	6	158
2001	159	8.75	474	141	7	460	60	8	161
2002	188	10	767	175	8	684	67	8	225
2003	125	9	516	145	6.8	608	48	8	143
2004	91	5	395	121	6	534	27	7	137
2005	98	5	470	122	5	536	18	5	198
2006	97	6	381	99	4	379	32	6	136
2007	264	10	1108	169	7	650	108	9	454
2008	779	30	2807	428	23	1468	370	15	1434
2009	1208	75	4145	886	55	2947	436	21	1612
2010	707	59	2214	861	59	2702	152	14	905
2011	388	21	1409	576	36	2089	113	6	773
2012	280	13	1030	443	19	1616	119	11	435
2013	133	6	544	281	9	1056	71	7	219
Total	**311**	**10**	**1583**	**306**	**10**	**1400**	**114**	**8**	**678**

LLP is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. The unit is million USD.

Panel B. Independent variables of leverage and liquidity ratios

	Lev1			Lev2			Lev3			Liq1			Liq2		
Year	Mean	Median	Std Dev	Mean	Medium	Std Dev	Mean	Medium	Std Dev	Mean	Medium	Std Dev	Mean	Medium	Std Dvd
1999	11.23%	10.10%	0.0357	12.94%	11.55%	0.0316	7.61%	7.30%	0.0247	9.52%	6.96%	0.0988	8.94%	6.77%	0.0789
2000	11.11%	10.10%	0.0360	12.83%	11.60%	0.0330	7.98%	7.66%	0.0272	9.71%	6.77%	0.0995	9.22%	6.05%	0.0826
2001	11.31%	10.40%	0.0424	13.13%	11.90%	0.0401	8.31%	7.91%	0.0374	10.74%	8.05%	0.1127	9.91%	7.93%	0.0967
2002	11.47%	10.30%	0.0449	13.27%	11.90%	0.0425	8.58%	7.98%	0.0345	10.77%	8.07%	0.1146	9.64%	7.69%	0.0886
2003	11.40%	10.15%	0.0520	13.22%	11.90%	0.0500	8.53%	7.69%	0.0529	10.14%	6.21%	0.1247	8.85%	5.74%	0.0888
2004	11.53%	10.16%	0.0584	13.30%	11.63%	0.0564	8.57%	7.79%	0.0522	9.20%	6.08%	0.1110	8.30%	5.90%	0.0962
2005	11.49%	10.12%	0.0640	13.23%	11.62%	0.0620	8.57%	7.71%	0.0643	9.47%	6.06%	0.1087	8.52%	5.74%	0.0838
2006	11.68%	10.26%	0.0632	13.44%	11.82%	0.0612	8.73%	7.87%	0.0569	9.73%	6.38%	0.1115	8.44%	5.54%	0.0914
2007	10.91%	9.78%	0.0429	12.71%	11.41%	0.0390	8.41%	7.83%	0.0379	10.16%	5.79%	0.1176	8.86%	5.01%	0.0981
2008	10.89%	10.80%	0.0366	12.74%	11.62%	0.0332	7.92%	7.67%	0.0224	9.91%	6.05%	0.1244	9.36%	5.08%	0.1354
2009	12.14%	11.54%	0.0375	14.01%	13.56%	0.0351	8.55%	8.08%	0.0252	11.12%	7.47%	0.1109	10.05%	6.36%	0.0999
2010	13.15%	12.68%	0.0393	14.91%	14.29%	0.0367	8.97%	8.82%	0.0253	10.50%	7.38%	0.1062	9.35%	5.95%	0.0989
2011	13.73%	13.38%	0.0332	15.37%	15.01%	0.0307	9.27%	9.06%	0.0218	11.21%	7.45%	0.1125	10.39%	6.49%	0.1135
2012	13.89%	13.13%	0.03744	15.37%	14.67%	0.0356	9.41%	9.17%	0.0219	12.38%	7.16%	0.1240	11.26%	6.74%	0.1140
2013	13.99%	13.19%	0.0403	15.39%	14.58%	0.0392	9.49%	9.12%	0.0244	11.57%	7.61%	0.1291	10.14%	6.59%	0.1107
Total	**12.00%**	**10.97%**	**0.0465**	**13.73%**	**12.67%**	**0.0439**	**8.59%**	**8.07%**	**0.0382**	**10.41%**	**6.86%**	**0.1140**	**9.42%**	**6.14%**	**0.0995**

Lev1 (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common equity ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets.
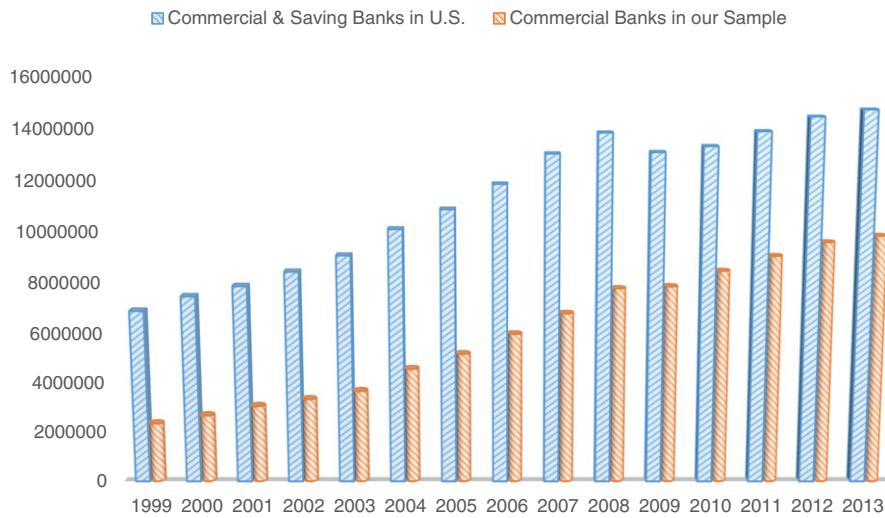
Fig. 1. Total assets in sample and all banks in the U.S. The unit is million USD. These commercial banks in our sample hold 34.18% and 66% of assets in U.S. commercial banking industry in 1999 and 2013, respectively.

Bikker and Metzemakers (2005) and Beatty and Liao (2009), the loss provisioning behavior of banks is largely procyclical with greater loss provisioning during booms and less during recessions. Agarwal et at. (2007) document that earnings management behavior by Japanese banks differ considerably in different economic time periods and conclude that banks used gains from
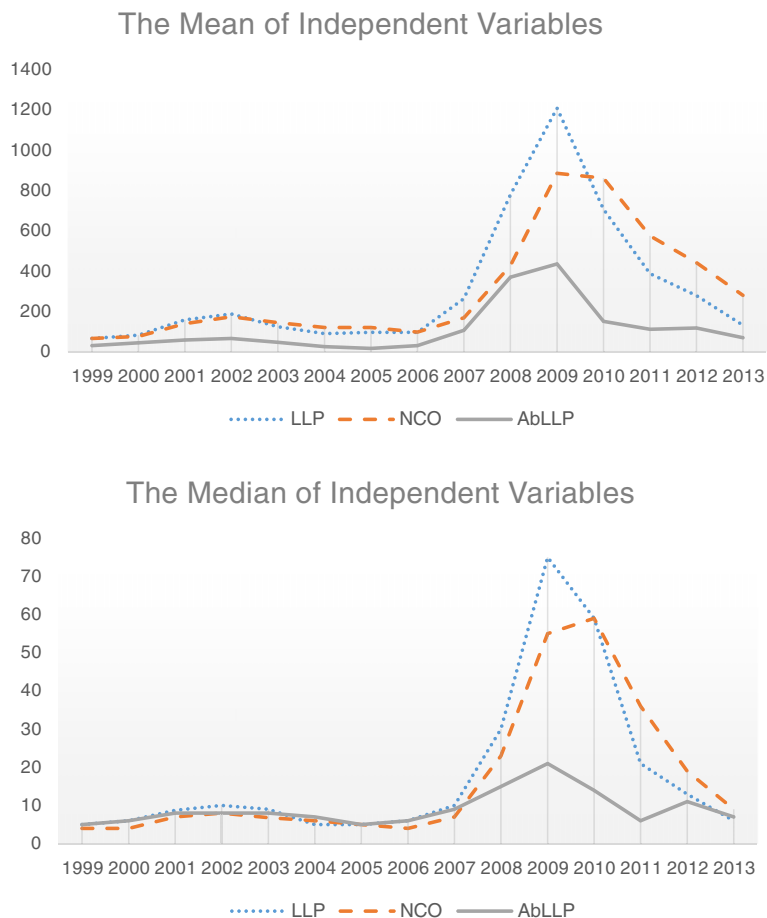
Fig. 2. Mean and median of independent variables. The unit is million USD.

sale of securities to offset the influence of loan loss provision on income to manage earnings, whereas the earnings management behavior became weaker during financial distress with stagnant growth (1991–1996) and severe recession with credit crunch (1997–1999). In addition, Abou El Sood (2012) finds that banks use LLP more extensively during the financial crisis period to smooth income upward. Therefore, we predict that of banks differs before and after the financial crisis periods. Thus, the third hypothesis is stated as follows:

H3. Earnings management behavior is different between pre and post financial crisis periods.

4. Methodology

4.1. Proxies for earnings and capital management

Prior literature lacks of evidence regarding the effect of leverage and liquidity on the earnings and capital management behavior in the banking sector. To examine the impact of leverage and liquidity on the banks' earnings and capital management, we use three leverage ratios including Tier 1 capital ratio (Lev1), total capital ratio (Lev2), equity ratio (Lev3) and two liquidity ratios including
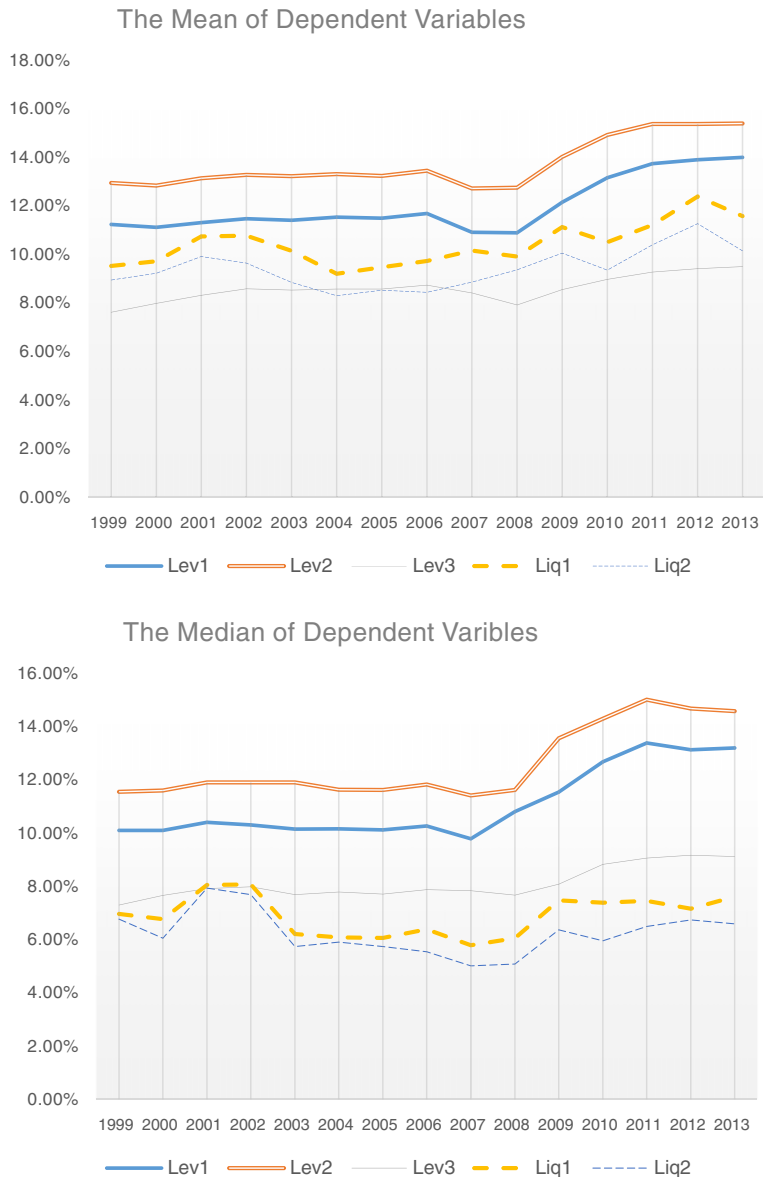
Fig. 3. Mean and median of dependent variables. The unit is million USD.

Table 4
Descriptive statistics of all variables.

Variable	Mean	Median	Std Dev	Min	Max
LLP	0.00598	0.00277	0.01116	−0.02225	0.18345
NCO	0.00554	0.00242	0.01033	−0.00411	0.18607
AbLLP	0.00255	0.00187	0.00426	−0.04671	0.07912
Lev1	0.11840	0.10760	0.04652	0.02420	0.64400
Lev2	0.13594	0.12400	0.04393	0.04650	0.65710
Lev3	0.08561	0.07980	0.04079	−0.00640	0.73920
Liq1	0.10353	0.06918	0.11316	0.00023	1.13662
Liq2	0.08491	0.05805	0.08595	0.00020	0.65134
Assets	8.70870	8.62441	1.85963	4.54648	14.4810
EBTP	0.01645	0.01671	0.01738	−0.12906	0.22997
Loans	0.71455	0.70099	0.25475	0.07178	4.75521
NPL	0.01175	0.00591	0.01605	0.00002	0.17997
LLR	0.01280	0.01076	0.00853	0.00031	0.11826
CNPL	0.00121	0.00019	0.01157	−0.11903	0.13984

LLP is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common equity ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **LLR** is loan loss reserve scaled by the beginning of total assets. **CNPL** is the change in NPL scaled by the beginning of total assets.

liquid assets divided by deposits and short-term funding (Liq1) and liquid assets divided by total assets (Liq2). Measures of earnings and capital management include the loan loss provision (LLP), net charge-off (NCO), and abnormal loan loss provision (AbLLP) for U.S. commercial banks.[1] The next section describes the estimation of the abnormal loan loss provision variable. Table 1 provides a definition of all variables used in our study.

4.2. Measures of abnormal LLP for earnings management

To estimate Abnormal LLP, we first estimate the normal or non-discretionary component of LLP by regressing LLP on total loans outstanding (Loans), nonperforming loans (NPL), beginning-of-period loan loss reserve (LLR), change in nonperforming loans (CNPL), net charge-off (NCO), Year Control and Firm Control. Following Kanagaretnan et al. (2010) and Riepe (2014), we estimate the normal or non-discretionary level of LLP from Eq. (1):

$$\widehat{LLP}_{i,t} = \beta0 + \beta1 Loans_{i,} + \beta2 NPL_{i,} + \beta3 LLR_{i,t-1} + \beta4 CNPL_{i,t} + \beta5 NCO_{i,t+} Year\ Control + Firm\ Control + \mu t \tag{1}$$

where $Loans_t$ represents reported gross loans in year t and NPL_t represents the total amount of non-performing loans in year t. LLR_{t-1} refers to the loan loss allowance at the beginning of year t. $CNPL_t$ refers to the change of non-performing loans in year t. NCO_t refers to the net charge-off in year t. All variables are scaled by assets at the beginning of year t. Fixed-effects are employed for each bank i and year t.After obtaining the estimate of the normal level of loan loss provision in Eq. (1), we estimate the abnormal loan loss provision as the difference between reported LLP and estimated LLP in Eq. (2):

$$Abnormal\ LLP_{i,t} = Reported\ LLP_{i,t} - Estimated\ LLP_{i,t} \tag{2}$$

where Estimated $LLP_{i,t}$ is obtained from Eq. (1).

All coefficients (see Table 2) are estimated in year regressions that include only observations known at that point in time. Results are similar if we only use yearly observations or use Fixed-Effects regression (Fixed-Effects provides a better fit as indicated by the Hausman test being less than 0.0001***) for the entire sample period. If a bank builds positive AbLLP, we will call this over-reserving in the following analyses. Conversely, if a bank reports negative AbLLP, we will refer to this as under-reserving.

4.3. Effect of leverage and liquidity ratios on earnings and capital management

We estimate the relation between leverage and liquidity ratios and dependent variables LLP and NCO in Eqs. (3) and (4). Using the regression model expressed in Eq. (5), we estimate the association between liquidity, leverage ratio and the AbLLP. Each regression model is defined as follows:

$$LLP_{i,t} = \beta0 + \beta1 Lev_{i,t-1} + \beta2 Liq_{i,t-1} + \beta3 Assets_{i,t} + \beta4 EBTP_{i,t} + \beta5 NPL_{i,t} + \beta6 Loans_{i,t} + Year\ Controls + Firm\ Controls + \varepsilon \tag{3}$$

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[1] During the financial crisis, there were more increases in unexpected losses for banks. It would result in higher motivation to manage or manipulate earnings and capital through LLP and NCO.

Table 5
Correlations matrix.

	LLP	NCO	AbLLP	Lev1	Lev2	Lev3	Liq1	Liq2	Assets	EBTP	Loans	NPL	LLR	CNPL
LLP	1.00000	0.90818 <.0001	0.56988 0.0173	0.05520 0.0006	0.07963 <.0001	0.32197 <.0001	−0.02006 0.3872	−0.06177 0.0077	0.13784 <.0001	−0.03492 0.1323	0.38453 <.0001	0.41185 <.0001	0.80776 <.0001	0.28949 <.0001
NCO		1.00000	0.26193 <.0001	0.06821 0.0032	0.09779 <.0001	0.29029 <.0001	−0.00436 0.8510	−0.03969 0.0871	0.15970 <.0001	−0.04070 0.0793	0.30358 <.0001	0.44117 <.0001	0.79231 <.0001	0.15217 <.0001
ABLLP			1.00000	0.07963 0.0006	0.03540 0.1270	0.24750 <.0001	−0.06215 0.0073	−0.08692 0.0002	0.03651 0.1154	0.07422 0.0014	0.14169 <.0001	0.02277 0.3264	0.52386 <.0001	0.08685 0.0002
Lev1				1.00000	0.97791 <.0001	0.75425 <.0001	0.30114 <.0001	0.24994 <.0001	−0.23192 <.0001	0.14702 <.0001	−0.08868 0.0001	0.04496 0.0525	−0.00504 0.8281	−0.06303 0.0065
Lev2					1.00000	0.74728 <.0001	0.34984 <.0001	0.29213 <.0001	−0.12209 <.0001	0.15686 <.0001	−0.09749 <.0001	0.04707 0.0424	0.02299 0.3217	−0.06012 0.0095
Lev3						1.00000	0.11534 <.0001	0.02967 0.2010	−0.15836 <.0001	0.36461 <.0001	0.24004 <.0001	0.07622 0.0010	0.27992 <.0001	−0.00765 0.7416
Liq1							1.00000	0.98086 <.0001	0.20708 <.0001	0.01663 0.4735	−0.24425 <.0001	0.00338 0.8840	−0.08580 0.0002	−0.03248 0.1615
Liq2								1.00000	0.17004 <.0001	−0.03166 0.1722	−0.29190 <.0001	−0.00221 0.9240	−0.11861 <.0001	−0.03983 0.0859
Assets									1.00000	0.07617 0.0010	−0.05322 0.0217	−0.02146 0.3550	0.09173 <.0001	0.02525 0.2765
EBTP										1.00000	0.37613 <.0001	−0.41570 <.0001	0.08499 0.0002	−0.11535 <.0001
Loans											1.00000	0.07523 0.0012	0.51103 <.0001	0.18411 <.0001
NPL												1.00000	0.40713 <.0001	0.37880 <.0001
LLR													1.00000	0.16956 <.0001
CNPL														1.00000

***, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common equity ratio) is tangible common equity divided by tangible assets, **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **LLR** is loan loss reserve scaled by the beginning of total assets. **CNPL** is the change in NPL scaled by the beginning of total assets. The **Variance Inflation** is less than 3 and the **Tolerance** is greater than 0.2 in model (3), (4) and (5) indicating that there are no multicollinearity problem.

Table 6
Fixed-effects regression results for entire sample.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable: LLP						
Intercept	−0.0131	−0.0137	−0.0176	−0.0128	−0.0133	−0.0176
	0.0109**	0.0077**	0.0002***	0.0133*	0.0095***	0.0002***
$Lev1_{(t-1)}$	0.0437			0.0431		
	<.0001***			<.0001***		
$Lev2_{(t-1)}$		0.0466			0.0458	
		<.0001***			<.0001***	
$Lev3_{(t-1)}$			0.0948			0.0939
			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0058	−0.0063	−0.0052			
	0.0307*	0.0193*	0.0409*			
$Liq2_{(t-1)}$				−0.0081	−0.0085	−0.0045
				0.0190*	0.0137*	0.1701
$Assets_{(t)}$	0.00001	−0.00001	0.0004	−0.000003	−0.00003	0.0004
	0.9847	0.9787	0.3235	0.9952	0.9594	0.3164
$EBTP_{(t)}$	−0.3142	−0.3155	−0.3533	−0.3155	−0.3168	−0.3537
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$Loans_{(t)}$	0.0197	0.0198	0.0186	0.0196	0.0197	0.0186
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$NPL_{(t)}$	0.1712	0.1687	0.1480	0.1704	0.1679	0.1476
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	1860	1860	1860	1860	1860	1860
R-squared	0.7238	0.7249	0.7501	0.7239	0.7250	0.7497
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Panel B. Dependent variable: NCO						
Intercept	−0.0068	−0.0076	−0.0085	−0.0064	−0.0073	−0.0086
	0.17820	0.12310	0.06910*	0.19350	0.13560	0.06740
$Lev1_{(t-1)}$	0.0393			0.0389		
	<.0001***			<.0001***		
$Lev2_{(t-1)}$		0.0434			0.04293	
		<.0001***			<.0001***	
$Lev3_{(t-1)}$			0.0726			0.0721
			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0037	−0.0043	−0.0028			
	0.1477	0.0965*	0.2509			
$Liq2_{(t-1)}$				−0.0051	−0.0056	−0.0020
				0.1193	0.0890*	0.5198
$Assets_{(t)}$	−0.0003	−0.0003	−0.00006	−0.0003	−0.0003	−0.00006
	0.4825	0.4875	0.8891	0.4724	0.4693	0.9022
$EBTP_{(t)}$	−0.2590	−0.2609	−0.2862	−0.2598	−0.2617	−0.2864
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$Loans_{(t)}$	0.0142	0.0143	0.0132	0.0141	0.0142	0.0132
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$NPL_{(t)}$	0.1784	0.1759	0.1612	0.1779	0.1753	0.1610
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	1860	1860	1860	1860	1860	1860
R-squared	0.7025	0.7042	0.7182	0.7025	0.7042	0.7180
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Panel C. Dependent variable: AbLLP						
Intercept	0.0030	0.0027	−0.0001	0.0033	0.0030	0.00001
	0.3253	0.3792	0.9673	0.2844	0.3321	0.9952
$Lev1_{(t-1)}$	0.0124			0.0120		
	0.0005***			<.0001***		
$Lev2_{(t-1)}$		0.0139			0.0134	
		<.0001***			0.0002***	
$Lev3_{(t-1)}$			0.0382			0.0373
			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0044	−0.0046	−0.0045			
	0.0065**	0.0047**	0.0040**			
$Liq2_{(t-1)}$				−0.0062	−0.0064	−0.0051
				0.0027**	0.0022**	0.0117*
$Assets_{(t)}$	−0.0004	−0.0004	−0.0001	−0.0004	−0.0004	−0.0001
	0.1617	0.1615	0.5645	0.1518	0.1519	0.5566

Table 6 (continued)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
EBTP$_{(t)}$	−0.0535	−0.0541	−0.0716	−0.0545	−0.0551	−0.0721
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans$_{(t)}$	0.0014	0.0015	0.0011	0.0014	0.0014	0.0010
	0.0023**	0.0018**	0.0179*	0.0034**	0.0027**	0.0218*
NPL$_{(t)}$	−0.0185	−0.0193	−0.0283	−0.0191	−0.0199	−0.0287
	0.0282*	0.0220*	0.0006***	0.0233*	0.0182*	0.0005***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	1860	1860	1860	1860	1860	1860
R-squared	0.3045	0.3056	0.3386	0.3051	0.3062	0.3379
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets, **Lev3** (tangible common equity ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **Breusch Pagan Test** is less than 0.0001.

where LLP is loan loss provision scaled by the beginning of total assets.

$$NCO_{i,t} = \beta 0 + \beta 1 Lev_{i,t-1} + \beta 2 Liq_{i,t-1} + \beta 3 Assets_{i,t} + \beta 4 EBTP_{i,t} + \beta 5 NPL_{i,t} + \beta 6 Loans_{i,t} + \text{Year Controls} + \text{Firm Controls} + \varepsilon \tag{4}$$

where NCO is net charge-off scaled by the beginning of total assets.

$$AbLLP_{i,t} = \beta 0 + \beta 1 Lev_{i,t-1} + \beta 2 Liq_{i,t-1} + \beta 3 Assets_{i,t} + \beta 4 EBTP_{i,t} + \beta 5 NPL_{i,t} + \beta 6 Loans_{i,t} + \text{Year Controls} + \text{Firm Controls} + \varepsilon \tag{5}$$

where AbLLP is abnormal loan loss provision scaled by the beginning of total assets as estimated in Eq. (3).

In all three regression models above, Lev1 (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. Lev2 (total regulatory capital ratio) is total capital divided by risk-weighted assets. Lev3 (tangible common equity ratio) is tangible common equity divided by tangible assets. Liq1 is liquid assets divided by deposits and short-term funding. Liq2 is liquid assets divided by the beginning of total assets. Assets is the natural log of total assets. EBTP is earnings before taxes and loan loss provisions scaled by beginning-of-year total assets, Loans is gross loans scaled by the beginning-of-year total assets. NPL is non-performing loans scaled by the beginning of year of total assets.

Under the Basel II definition, regulatory capital includes, in addition to common equity, goodwill, minority interest, deferred tax assets, and investments in other financial institutions. Because some of these components have limited loss-absorbing ability, Basel III proposes removing them and retaining only common equity and equity-like debt instruments that can cushion the effect of losses. In light of these proposals, we consider alternative measures of capital, such as the traditional Tier 1 capital ratio (Lev1) and total regulatory capital (Lev2), as well as tangible common equity ratio (Lev3) that are close in spirit to Basel III. In this study, therefore, we use three leverage ratios for independent variables, separately. In addition, following Deléchat et al. (2012), we use two liquidity ratios for independent variables which are Liq1 (liquid assets divided by deposit and short founding) and Liq2 (liquid assets divided by total assets).

There are four control variables in the regressions, which are: (1) total assets (Assets), (2) earnings before taxes and loan loss provision (EBTP), (3) gross loans (Loans) and (4) non-performing loans (NPL).[2]

Regarding proposed relations for control variables, we do not have an expected sign for Assets, which is used to control for firm size. Larger banks could be more diversified, thereby reducing risk exposure compared to smaller banks with less diversified loan portfolios. The control variable EBTP$_t$ (earnings before taxes and loss provisions) is included to control for a tendency of banks to understate (overstate) LLP when earnings are expected to be low (high). If banks use LLP to smooth earnings, then we would expect a positive relation between earnings before taxes and LLP (Bouvatier et al., 2014). The control variables Loans$_t$ and NPL$_t$ are used to control for credit risk. More loans and more non-performing loans should be the result of higher risk tolerance of bank managers. The coefficients of NPL$_t$ and Loans$_t$ are expected to be positive. In addition to the four control variables described above, we use year and firm controls.

We use contemporaneous values of the dependent variables and lagged values of the independent variables to avoid potential endogeneity problems (Lindquist, 2004; Floro, 2010; Abou El Sood, 2012; Distinguin et al., 2013).

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[2] We use total assets from the beginning of the t as the scaling factor for all control variables except Assets.

Table 7
Fixed-effects regression results pre and post financial crisis.

Variable	Pre crisis 1999–2006						Post crisis 2009–2013					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable: LLP												
Intercept	−0.0017	−0.0016	−0.0115	−0.0017	−0.0016	−0.01163	0.00439	0.0055	−0.0101	0.0045	0.0055	−0.0097
	0.7926	0.8044	0.0698*	0.7914	0.8039	0.0664*	0.8304	0.7887	0.0224*	0.8264	0.7864	0.6220
Lev1$_{(t-1)}$	−0.0169			−0.017			−0.0221			−0.0212		
	0.0110*			0.0103*			0.1454			0.1615		
Lev2$_{(t-1)}$		−0.0163			−0.0165			−0.0235			−0.0226	
		0.0144*			0.0134*			0.1181			0.1322	
Lev3$_{(t-1)}$			0.0343			0.0336			0.03176			0.0321
			<.0001***			<.0001***			<.1451			0.1414
Liq1$_{(t-1)}$	−0.0017	−0.0016	−0.0041				0.01258	0.01273	0.01302			
	0.6281	0.6540	0.2357				0.0115*	0.0107*	0.0095**			
Llq2$_{(t-1)}$				−0.0017	−0.00157	−0.0031				0.0151	0.01523	0.0159
				0.7008	0.7251	0.4897				0.0112*	0.0105*	0.0083**
Assets$_{(t)}$	−0.00006	−0.00005	0.0006	−0.00006	−0.00005	0.00067	−0.0008	−0.0008	0.0001	0.0008	−0.0009	0.0001
	0.9326	0.9370	0.3249	0.9351	0.9392	0.3135	0.7819	0.6929	0.9536	0.7090	0.6842	0.9729
EBTP$_{(t)}$	−0.2310	−0.2310	−0.2781	−0.2307	−0.2308	−0.2769	−0.4574	−0.4573	−0.4687	−0.4577	−0.4576	−0.4688
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans$_{(t)}$	0.0175	0.0175	0.0176	0.0175	0.0175	0.0175	0.0258	0.0258	0.0252	0.0258	0.0258	0.0251
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
NPL$_{(t)}$	0.0450	0.0457	0.0289	0.0457	0.0464	0.0318	0.1372	0.1372	0.1420	0.1374	0.1374	0.1421
	0.2222	0.2155	0.4305	0.2139	0.2077	0.3855	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	992	992	992	992	992	992	620	620	620	620	620	620
R-squared	0.8280	0.8297	0.8307	0.8280	0.8279	0.8315	0.8421	0.8422	0.8421	0.8421	0.8422	0.8422
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Panel B. Dependent variable: NCO												
Intercept	0.0025	0.0023	−0.0010	0.0022	0.0021	−0.0013	0.0179	0.0163	0.0011	0.0179	0.0163	0.0015
	0.5636	0.5932	0.8087	0.5981	0.6248	0.7568	0.4749	0.5175	0.9623	0.4734	0.5174	0.9503
Lev1$_{(t-1)}$	−0.0095			−0.0098			−0.0206			−0.0195		
	0.0298*			0.0241*			0.2700			0.2932		
Lev2$_{(t-1)}$		−0.0083			−0.0087			−0.0159			−0.0149	
		0.0566*			0.0451*			0.3891			0.4206	
Lev3$_{(t-1)}$			0.0063			0.0059			0.0500			0.0509
			0.2073			0.2380			0.0612*			0.0570*
Liq1$_{(t-1)}$	−0.00146	−0.0015	−0.0023				0.0169	0.0165	0.0178			
	0.5280	0.5324	0.3186				0.0067**	0.0072**	0.0039**			
Llq2$_{(t-1)}$				0.0002	0.0002	−0.0005				0.0206	0.0205	0.0224
				0.9531	0.9467	0.8589				0.0048**	0.0051**	0.0024**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Assets$_{(t)}$	−0.00031	−0.00029	−0.00007	−0.00029	−0.00027	−0.00004	−0.0028	−0.0027	−0.0018	−0.0028	−0.0027	−0.0019
	0.4859	0.5094	0.8755	0.5170	0.5396	0.9230	0.2821	0.3030	0.4732	0.2768	0.2983	0.4594
EBTP$_{(t)}$	−0.1413	−0.1420	−0.1549	−0.1407	−0.1413	−0.1541	−0.3660	−0.3673	−0.3803	−0.3662	−0.3676	−0.3804
	<.0001***	0.5094	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans$_{(t)}$	0.0080	0.0080	0.0081	0.0080	0.0080	0.0081	0.0338	0.0338	0.0330	0.0338	0.0338	0.0330
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
NPL$_{(t)}$	0.0653	0.0656	0.0619	0.0671	0.0674	0.0644	0.0616	0.0622	0.0677	0.0624	0.0624	0.0678
	0.0070**	0.0068**	0.0110*	0.0055**	0.0053**	0.0081**	0.0323*	0.0306*	0.0185*	0.0316*	0.0300*	0.0181*
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	992	992	992	992	992	992	620	620	620	620	620	620
R-squared	0.8861	0.8859	0.8856	0.8860	0.8859	0.8855	0.7862	0.7860	0.7872	0.7864	0.7862	0.7876
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

Panel C. Dependent variable: AbLLP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Intercept	0.00313	0.0031	−0.0036	0.0032	0.0013	−0.0036	0.0169	0.0176	0.0146	0.0170	0.0177	0.0145
	0.4324	0.4441	0.3541	0.4193	0.4313	0.3536	0.2254	0.2087	0.2770	0.2238	0.2068	0.2790
Lev1$_{(t-1)}$	−0.0092			−0.0091			−0.0168			−0.0171		
	0.0246*			0.0249*			0.1062			0.0997*		
Lev2$_{(t-1)}$		−0.0085			−0.0084			−0.0176			−0.0178	
		0.0392*			0.0397*			0.0889*			0.0831*	
Lev3$_{(t-1)}$			0.0277			0.0272			−0.0297			−0.0303
			<.0001***			<.0001***			0.0463*			0.0426*
Liq1$_{(t-1)}$	−0.0012	−0.0012	−0.0029				−0.0062	−0.0061	−0.0080			
	0.5821	0.5951	0.1759				0.0709*	0.0758*	0.0206*			
Liq2$_{(t-1)}$				−0.0020	−0.0020	−0.0028				−0.0082	−0.0081	−0.0102
				0.4607	0.4713	0.2987				0.0448*	0.0474*	0.0130*
Assets$_{(t)}$	−0.0002	−0.0002	0.0003	−0.0002	−0.0002	0.0003	−0.0008	−0.0009	−0.0005	−0.0008	−0.0009	−0.0005
	0.5860	0.6015	0.4989	0.5723	0.5880	0.4964	0.5823	0.5610	0.7190	0.5841	0.5622	0.7205
EBTP$_{(t)}$	−0.0644	−0.0648	−0.0990	−0.0644	−0.0648	−0.0983	−0.0924	−0.0924	−0.0913	−0.0925	−0.0925	−0.0912
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans$_{(t)}$	0.0046	0.0046	0.0046	0.0046	0.0046	0.0045	−0.0097	−0.0097	−0.0096	−0.0097	−0.0097	−0.0095
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
NPL$_{(t)}$	−0.0444	−0.0440	−0.0570	−0.0445	−0.0442	−0.0555	−0.0133	−0.0132	−0.0139	−0.0133	−0.0133	−0.0139
	0.0504*	0.0522*	0.0108*	0.0493*	0.0510*	0.0128*	0.4072	0.4091	0.3867	0.4047	0.4067	0.3834
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	992	992	992	992	992	992	620	620	620	620	620	620
R-squared	0.5937	0.5933	0.6079	0.5938	0.5935	0.6075	0.4251	0.4254	0.4267	0.4260	0.4264	0.4277
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **Breusch Pagan Test** is less than 0.0001.

Table 8
Summary of fixed-effects regression results for subsamples pre and post financial crisis.

Variable	Pre financial crisis			Post financial crisis		
	LLP	NCO	AbLLP	LLP	NCO	AbLLP
Lev1	$-^*$	$-^*$	$-^*$	$-$	$-$	$-^*$
Lev2	$-^*$	$-^*$	$-^*$	$-$	$-$	$-^*$
Lev3	$+^{***}$	$-$	$+^{***}$	$+$	$+^*$	$-^*$
Liq1	$-$	$-$	$-$	$+^*$	$+^{**}$	$-^*$
Liq2	$-$	$-/+$	$-$	$+^*$	$+^{**}$	$-^*$

***, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided total assets. **Assets** is the nature log of total assets.

In this study, we use balanced panel data. Employing the procedure for balanced panel data in SAS offers the Breusch Pagan test and Hausman test. The Breusch Pagan test indicates whether the Random or Fixed-Effects models fit better than a Pooled OLS model. The Hausman test indicates whether a Random-Effects or Fixed-Effects model is superior. In this study, all regression results indicate that a Fixed-Effects model is more appropriate than Random-Effects and Random-Effects is more appropriate than Pooled OLS.[3]

5. Data and sample selection

We collect the data from the Fitch IBCA's Bankscope database. We follow a selection strategy based on two criteria: (1) only select active U.S. commercial banks; (2) use the data for unconsolidated financial statements whenever available in Bankscope.[4] In order to achieve consistency needed for a balanced panel data design, each commercial bank in every year has to offer all variables needed. If a commercial bank has a missing value for any variable in any one year (including independent, dependent and control variables), we will delete all data for that bank. Our final sample includes 124 active U.S. commercial banks across 15 years with 1890 observations in our balanced panel sample data.

Our sample of 124 banks is only 1.85% of the 6694 commercial banks in the U.S. but held $US9.8 trillion out of the $US14.7 trillion held by all U.S. financial institutions in 2013. This is 66% of all assets held by the entire industry.[5]

5.1. Yearly values of dependent variables—LLP, NCO and AbLLP

Table 3 presents the year-by-year mean, median, and standard deviation of all independent and dependent variables. Panel A of Table 3 and Fig. 2 contain yearly information for dependent variables LLP, NCO and AbLLP. Panel B of Table 3 and Fig. 3 contain yearly information for independent variables that provide leverage and liquidity measures. Panel A of Table 3 shows that the mean (median) of LLP for the sample is $311 (10) million. The mean (median) of NCO for the sample is $306 (10) million. Investigation by year indicates a significant increase in both LLP and NCO during the crisis period, which decreased in every year following the peak year of 2009. Similar behavior is shown for abnormal LLP.[6]

5.2. Yearly values of independent variables—leverage and liquidity ratios

Panel B of Table 3 indicates a gradual decline in leverage and liquidity ratios with leverage ratios reaching minima in 2008 and liquidity measures reaching minima in 2006 or 2007 and increasing thereafter. Notably, leverage ratios reached their peaks at the end of the sample period, eclipsing values shown for earlier years in the sample. Similar behavior is also shown for liquidity ratios, although increases following the financial crisis period are not as dramatic as those for leverage ratios. The dramatic increases in capital shown for the post-crisis period in Panle B of Table 3 are probably the result of increased regulatory pressure.

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[3] Fixed-Effects regression models are used to analyze longitudinal data with repeated measures on both independent and dependent variables. Fixed-Effects regression methods provide a relatively easy and effective way to control for stable variables that cannot be measured.

[4] There are two forms of statements in Bankscope, the consolidated financial statements include C1 and C2 and the unconsolidated financial statements include U1 and U2. When a bank reports both unconsolidated and consolidated financial statements in the sample, we keep only the unconsolidated financial statements to avoid double counting.

[5] Fig. 1 shows important research value to our sample since the 1.85% of banks have more than half of total assets according to the bank data retrieved from FDIC database.

[6] If EM and CM exists during financial crisis, regulator would take stronger action to avoid banks inflating their capital or manipulating financial statements.

5.3. Descriptive statistics and correlations

Table 4 provides descriptive statistics of all dependent and independent variables, including control variables. Two items are of note in this Table. First, our estimate of Abnormal LLP is almost half of reported LLP. Presuming that an accurate estimate of non-discretionary LLP is obtained from Eq. (2) the relative size of LLP and AbLLP indicates that bank managers employ earnings management to a great extent. Second, we observe negative values in the minima of LLP, NCO and AbLLP. Negative values could arise because of recoveries and/or write-backs of previously recorded provisions to bring down the balance of allowance for loan losses. The means of Lev1, Lev2, and Lev3 are 11.96%, 13.73%, and 8.59% respectively. These values far exceed the regulatory minima ratio of 8.5%, 10.5%, and 7%.

Table 5 displays the Pearson correlation coefficients for all independent and dependent variables used in the regression analysis. The leverage ratios are significantly positively related to LLP, NCO and AbLLP, indicating that more highly capitalized banks will tend to have more earnings management. The liquidity ratios are significantly negatively related to LLP, NCO and AbLLP, indicating that that banks with high liquidity will tend to have less earnings management. In addition, there is no multicollinearity problem in the testable regressions given that the Variance Inflation is less than 3 and the Tolerance is greater than 0.2.

6. Regression results

6.1. The entire sample

Table 6 provides results of estimating regression models with dependent variables including LLP, NCO and AbLLP, with LLP as the dependent variable shown in Panel A, NCO as the dependent variable in Panel B, and AbLLP in Panel 3. Panel A of Table 6 provides evidence of a significant positive relation between all three leverage ratios and LLP, which is consistent with the correlation results shown in Table 5. Also consistent with the correlation measures shown in Table 5, there is a significant negative relation between either of two liquidity measures and LLP.

Panel B provides evidence of a significant positive relation between all three leverage ratios and NCO, which is again consistent with the correlation results indicating that banks with high leverage ratios tend to have more NCO. Also as shown in Panel B, there is evidence of a significant negative relation between either of two liquidity ratios and NCO, which is also consistent with correlation results that banks with high liquidity ratios tend to have less NCO. Panel C also shows a significant positive relation between all three leverage ratios and AbLLP and a significant negative relation between both liquidity measures and AbLLP.

Our results shown in Table 6 are inconsistent with Hypothesis I. Instead of a significant negative relation between leverage measures and our three measures of earnings management hypothesized, we find the opposite: a significant positive relation between leverage and LLP, NCO and AbLLP. The results shown in Table 6 are consistent with Hypothesis II, which hypothesizes a negative relation between liquidity measures and earnings management.

Our findings for the relation between leverage ratios and LLP run counter to Liu and Ryan (2006), who find a significant positive relation between capital and LLP. Their results would be consistent with better capitalized banks tending to have higher LLP since charge-offs (NCO) will be recorded more quickly. Better capitalized banks can afford this faster charge-off than poorly capitalized banks. Our results are the opposite, that poorly capitalized banks have larger LLP and NCO and AbLLP. Our results might be due to regulatory pressure on more poorly capitalized banks, whereby regulators require more conservative earnings measurement for banks with lower level of capital. Similarly, banks with lower level of capital have incentives to build up reserves in good times because they can ill afford to take charge-offs in bad times if they are less well capitalized.

6.2. Pre and post financial crisis regressions

Table 7 provides results of separate regression estimates for the pre-crisis 1999–2006 period and the post-crisis 2009–2013 period with results for LLP shown in Panel A, results for NCO shown in Panel B, and results for AbLLP shown in Panel C. Panel A indicates a significant negative relation between Lev1, Lev2 and LLP but a significant positive relation between Lev3 in the pre-crisis period. During the post-crisis period signs of relations are similar, but the degree of significance is much less.

The relation between liquidity measures and measures of earnings management changes dramatically between the pre-crisis and post-crisis period. In the pre-crisis period, the relation between liquidity ratios and LLP is negative but insignificant. In the post-crisis period the relation is positive and significant, which is opposite to our finding of a significant negative relation shown in Table 6. Consequently, we must conclude that the relation between liquidity measures and earnings management measures is highly dependent on sample period chosen.

Results shown in Panel C for AbLLP indicate that the relation between leverage measures and abnormal LLP differs greatly between the pre-crisis period and post-crisis period. For example, we find a significant positive relation between Lev3 (equity capital) and AbLLP in the pre-crisis period but a significant positive relation in the post-crisis period.

Results shown in Table 7 indicate that effects of leverage and liquidity on earnings management measures are obviously different pre-crisis and post-crisis. In particular, the liquidity ratios post financial crisis in Panels A and B are significantly positively related to LLP and NCO instead of negatively, as shown for the entire sample period.

Table 8 summarizes the results above. As an alternative, we also use a dummy variable approach, with the dummy variable equal to 1 for the period after 2008 and 0 for the period before 2006 in Pooled OLS and Random-Effects regressions. The results are shown in Tables A.1 and A.2 of Appendix. We find that the dummy variable is significant in the results of

Table 9
Fixed-effects regression results for subsamples with high vs. low leverage.

Variable	High leverage						Low leverage					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable: LLP												
Intercept	0.0110	0.0181	−0.0029	0.0107	0.0183	−0.0028	−0.0105	−0.0151	−0.0275	−0.0104	−0.0149	−0.0278
	0.2251	0.0855*	0.6870	0.2379	0.0817*	0.6915	0.0590*	0.0008***	<.0001***	0.0626*	0.0009***	<.0001***
$Lev1_{(t-1)}$	0.0476			0.0470			−0.0137			−0.0145		
	<.0001***			<.0001***			0.2044			0.1760		
$Lev2_{(t-1)}$		0.0479			0.0466			−0.0101			−0.0111	
		<.0001***			<.0001***			0.2395			0.1940	
$Lev3_{(t-1)}$			0.0448			0.0441			0.1087			0.1077
			0.0004***			0.005***			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0012	−0.0043	−0.0084				−0.0122	−0.0092	−0.0059			
	0.7716	0.3221	0.0159*				0.0002***	0.0006***	0.1390			
$Liq2_{(t-1)}$				0.0021	−0.0015	−0.0089				−0.0153	−0.0112	−0.0016
				0.6948	0.7856	0.0399*				0.0003***	0.0011**	0.7589
$Assets_{(t)}$	−0.0029	−0.0038	−0.0008	−0.0029	−0.0039	−0.0008	0.0008	0.0013	0.0014	0.0008	0.0013	0.0014
	0.0013**	0.0003***	0.2791	0.0014**	0.0003***	0.2704	0.1515	0.0251**	0.0251*	0.1479	0.0021**	0.0228*
$EBTP_{(t)}$	−0.3050	−0.2950	−0.3947	−0.3047	−0.2960	−0.3942	−0.3078	−0.3238	−0.2978	−0.3071	−0.3230	−0.2976
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$Loans_{(t)}$	0.0262	0.0280	0.0167	0.0262	0.0280	0.0168	0.0125	0.0107	0.0173	0.0125	0.0106	0.0172
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$NPL_{(t)}$	0.1638	0.1240	0.1303	0.1643	0.1233	0.1304	0.1321	0.1733	0.1422	0.1327	0.1737	0.1421
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	855	840	915	855	840	915	1005	1020	945	1005	1020	945
R-squared	0.7413	0.7348	0.7920	0.7414	0.7345	0.7916	0.7618	0.8072	0.7088	0.7617	0.8070	0.7081
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Panel B. Dependent variable: NCO												
Intercept	0.0032	0.0016	−0.0019	0.0030	0.0019	−0.0020	0.0019	0.0025	−0.0145	0.0020	0.0003	−0.0146
	0.6651	0.8764	0.8141	0.6871	0.8536	0.8061	0.7690	0.9558	0.0019**	0.7583	0.9415	0.0019**
$Lev1_{(t-1)}$	0.0489			0.0487			−0.0204			−0.0208		
	<.0001***			<.0001***			0.0966*			0.0903*		
$Lev2_{(t-1)}$		0.0529			0.0517			−0.0162			−0.0166	
		<.0001***			<.0001***			0.0573*			0.0509*	
$Lev3_{(t-1)}$			0.0580			0.0577			0.0748			0.0742
			< .0001***			<.0001***			<.0001***			<.0001***
$Liq1_{(t-1)}$	0.0001	−0.0051	−0.0035				−0.0059	−0.0037	−0.0032			
	0.9697	0.2363	0.3731				0.1147	0.1654	0.3013			
$Liq2_{(t-1)}$				0.0022	−0.0032	−0.0032				−0.0076	−0.0046	−0.0015
				0.6192	0.5653	0.5136				0.1101	0.1759	0.7046

Assets$_{(t)}$	−0.0017	−0.0017	−0.0011	−0.0017	−0.0017	−0.0011	−0.0003	−0.0001	0.0006	−0.0003	−0.0001	0.0006
	0.0241*	0.0962*	0.1792	0.0252*	0.0925*	0.1793	0.6613	0.9894	0.2285	0.6636	0.9893	0.2208
EBTP$_{(t)}$	−0.3056	−0.2713	−0.3555	−0.3050	−0.2727	−0.3551	−0.1970	−0.2269	−0.1514	−0.1967	−0.2265	−0.1519
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans$_{(t)}$	0.0192	0.0209	0.0168	0.0192	0.0208	0.0169	0.0082	0.0062	0.0074	0.0082	0.0062	0.0073
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
NPL$_{(t)}$	0.1766	0.1459	0.1256	0.1770	0.1453	0.1257	0.1440	0.1859	0.1899	0.1443	0.1861	0.1898
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	855	840	915	855	840	915	1005	1020	945	1005	1020	945
R-squared	0.7709	0.7108	0.7357	0.7710	0.7104	0.7356	0.6719	0.7660	0.7175	0.6791	0.7660	0.7172
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

Panel C. Dependent variable: AbLLP

Intercept	0.0182	0.0286	0.0160	0.0183	0.0287	0.0163	0.0021	−0.0017	−0.0081	0.0022	−0.0015	−0.0083
	0.0004***	<.0001***	0.0007***	0.0004***	<.0001***	0.0006***	0.5808	0.5209	0.0125*	0.5593	0.5638	0.0118*
Lev1$_{(t−1)}$	0.0048			0.0043			0.0073			0.0068		
	0.2597			0.2297			0.3139			0.3500		
Lev2$_{(t−1)}$		0.0026			0.0021			0.0150			0.0142	
		0.6256			0.6704			0.0032**			0.0047**	
Lev3$_{(t−1)}$			−0.0102			−0.0108			0.0523			0.0509
			0.2261			0.2003			<.0001***			<.0001***
Liq1$_{(t−1)}$	−0.0022	−0.0025	−0.0062				−0.009	−0.0071	−0.0074			
	0.3554	0.3614	0.0059**				<.0001***	<.0001***	0.0006*			
Llq2$_{(t−1)}$				−0.0012	−0.0021	−0.0081				−0.0115	−0.0089	−0.0045
				0.6758	0.5494	0.0047**				< .0001***	< .0001***	0.1112
Assets$_{(t)}$	−0.0021	−0.0032	−0.0009	−0.0021	−0.0032	−0.0009	0.0002	0.0004	0.0005	0.00015	0.0004	0.0005
	<.0001***	<.0001***	0.0798*	<.0001***	<.0001***	0.0710*	0.6735	0.1093	0.1283	0.6655	0.1102	0.1172
EBTP$_{(t)}$	0.0089	−0.0112	−0.0634	0.0083	−0.0120	−0.0634	−0.1181	−0.1123	−0.1224	−0.1176	−0.1173	−0.1235
	0.4501	0.4287	<.0001***	0.4821	0.3975	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans$_{(t)}$	0.0026	0.0035	−0.0042	0.0026	0.0034	−0.0041	0.0010	0.0007	0.0046	0.0010	0.0007	0.0045
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	0.1735	0.1537	<.0001***	0.1734	0.1582	<.0001***
NPL$_{(t)}$	−0.0204	−0.0401	−0.0332	−0.0206	−0.0411	−0.0332	−0.0329	−0.0227	−0.0384	−0.0324	−0.0224	−0.0387
	0.0684*	0.0038**	0.0049**	0.0665*	0.0035	0.0049**	0.0069**	0.0073**	0.0006***	0.0078**	0.0083**	0.0006***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	855	840	915	855	840	915	1005	1020	945	1005	1020	945
R-squared	0.3450	0.3196	0.3675	0.3444	0.3192	0.3678	0.3740	0.4739	0.4282	0.3740	0.4736	0.4220
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

, **, and * represent 1%, 5% and 10% significance levels, respectively. The subsamples with high vs. low leverage are in terms of median of leverage. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **Breusch Pagan Test** is less than 0.0001.

Table 10
Fixed-Effects Regression Results for Subsamples with High vs. Low Liquidity.

Variable	High Liquidity						Low Liquidity					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable: LLP												
Intercept	−0.0100	−0.0114	−0.0183	−0.0067	−0.0077	−0.0094	−0.0143	−0.0145	−0.0168	−0.0188	−0.0190	−0.0219
	0.2625	0.2012	0.0261*	0.3690	0.3048	0.2082	0.0047**	0.0043**	0.0006***	0.0065**	0.0059**	0.0004***
$Lev1_{(t-1)}$	0.0505			−0.0070			0.0069			0.0610		
	<.0001***			0.4827			0.3888			<.0001***		
$Lev2_{(t-1)}$		0.0546			−0.0013			0.0078			0.0622	
		<.0001***			0.8977			0.3287			<.0001***	
$Lev3_{(t-1)}$			0.0974			0.01188			0.0430			0.1090
			<.0001***			0.4098			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.00262	−0.0035	−0.0017				−0.0121	−0.0121	−0.0118			
	0.5425	0.4138	0.6718				<.0001***	<.0001***	<.0001***			
$Llq2_{(t-1)}$				0.0016	0.0012	0.0013				−0.0195	−0.0200	−0.0162
				0.6964	0.7796	0.7565				0.0008***	0.0006***	0.0025**
$Assets_{(t)}$	−0.0011	−0.0011	−0.0002	−0.0002	−0.0001	−0.0001	0.0013	0.0013	0.0013	0.0003	0.0003	0.0008
	0.2069	0.1859	0.7950	0.8332	0.8752	0.9405	0.0100*	0.0099**	0.0094**	0.6356	0.6967	0.2006
$EBTP_{(t)}$	−0.3088	−0.3105	−0.3571	−0.3324	−0.3335	−0.3378	−0.3402	−0.3405	−0.3501	−0.3129	−0.3149	−0.3597
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$Loans_{(t)}$	0.0249	0.0250	0.0235	0.0169	0.0170	0.0171	0.0103	0.0103	0.0101	0.0206	0.0207	0.0189
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$NPL_{(t)}$	0.1665	0.1641	0.1345	0.1416	0.1426	0.1423	0.1369	0.1363	0.1351	0.1924	0.1864	0.1536
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	840	840	840	825	825	825	1020	1020	1020	1035	1035	1035
R-squared	0.7068	0.7088	0.7399	0.7426	0.7425	0.7427	0.8063	0.8063	0.8094	0.7274	0.7253	0.7656
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Panel B. Dependent variable: NCO												
Intercept	−0.0058	−0.0074	−0.0056	−0.0061	−0.0076	−0.0065	−0.0065	−0.0072	−0.0131	−0.0105	−0.0111	−0.0129
	0.4320	0.3139	0.4338	0.3966	0.2941	0.3664	0.2999	0.2511	0.0289*	0.1120	0.0920*	0.0348*
$Lev1_{(t-1)}$	0.0514			0.0129			−0.0033			0.0467		
	<.0001***			0.1832			0.7389			<.0001***		
$Lev2_{(t-1)}$		0.0562			0.0203			0.0007			0.04923	
		<.0001***			0.0392*			0.9433			<.0001***	
$Lev3_{(t-1)}$			0.0656			0.0214			0.0702			0.0839
			<.0001***			0.1250			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0032	−0.0041	−0.0010				−0.0057	−0.0059	−0.0059			
	0.3756	0.2459	0.7752				0.1211	0.1118	0.1013			
$Llq2_{(t-1)}$				0.0028	0.0021	0.0042				−0.0106	−0.0110	−0.0081
				0.4807	0.5935	0.2815				0.0570*	0.0478*	0.1274

Assets(t)	−0.0010	−0.0010	−0.0009	−0.0005	−0.005	−0.0005	0.0007	0.0007	0.0008	−0.000002	−0.00002	0.0004
	0.1626	0.1458	0.2287	0.4700	0.4789	0.4818	0.2332	0.2261	0.2027	0.9970	0.9725	0.5514
EBTP(t)	−0.2719	−0.2740	−0.2944	−0.2867	−0.2880	−0.2920	−0.2528	−0.2537	−0.2722	−0.2074	−0.2102	−0.2436
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans(t)	0.0184	0.0185	0.0172	0.0187	0.0188	0.01870	0.0062	0.0063	0.0062	0.0011	0.0112	0.0097
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
NPL(t)	0.1894	0.1867	0.1704	0.1466	0.1477	0.1434	0.1392	0.1340	0.1371	0.1979	0.1925	0.1680
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	840	840	840	825	825	825	1020	1020	1020	1035	1035	1035
R-squared	0.7336	0.7369	0.7433	0.7431	0.7439	0.7433	0.7074	0.7074	0.7162	0.6852	0.6867	0.7154
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

Panel C. Dependent variable: AbLLP

Intercept	0.0152	0.0144	0.0071	0.02279	0.0222	0.0200	−0.0021	−0.0027	−0.0007	−0.0047	−0.0048	−0.0061
	0.0027**	0.0042**	0.1299	<.0001***	<.0001***	<.0001***	0.5660	0.5413	0.8386	0.2676	0.2621	0.1273
Lev1(t−1)	0.0104			−0.0133			0.0048			0.0226		
	0.0336*			0.0126*			0.4111			<.0001***		
Lev2(t−1)		0.0125			−0.0095			0.0054			0.0230	
		0.0109*			0.0797*			0.3559			<.0001***	
Lev3(t−1)			0.0442			0.0040			−0.0061			0.0417
			<.0001***			0.6072			0.4364			<.0001***
Liq1(t−1)	−0.0033	−0.0036	−0.0040				−0.0066	−0.0066	−0.0064			
	0.1750	0.1389	0.0793*				0.0026**	0.0025**	0.0032**			
LIq2(t−1)				−0.0061	−0.0064	−0.0071				−0.0094	−0.0096	−0.0081
				0.0057**	0.0041**	0.0011**				0.0087**	0.0075**	0.0192*
Assets(t)	−0.00153	−0.0015	−0.0008	−0.0014	−0.0014	−0.0013	0.0004	0.0004	0.0004	0.0002	0.0001	0.0003
	0.0020**	0.0021**	0.0837*	0.0003***	0.0004***	0.0008***	0.2510	0.2503	0.2692	0.7106	0.7501	0.3848
EBTP(t)	−0.0243	−0.0253	−0.0535	−0.0440	−0.0448	−0.04783	−0.1033	−0.1035	−0.1006	−0.1016	−0.1022	−0.1201
	0.0497*	0.0400*	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Loans(t)	0.0023	0.0023	0.0018	−0.0053	−0.0053	−0.0051	0.0001	0.0001	0.00003	0.0052	0.0052	0.0045
	0.0008***	0.0006***	0.0044**	<.0001***	<.0001***	<.0001***	0.8780	0.8625	0.9630	<.0001***	<.0001***	<.0001***
NPL(t)	−0.0359	−0.0366	−0.0524	−0.0307	−0.0300	−0.0284	−0.0179	−0.0183	−0.0180	−0.0043	−0.0065	−0.0194
	0.0058**	0.0049**	<.0001***	0.0014**	0.0019**	0.0030	0.1019	0.0949*	0.1004	0.7457	0.6243	0.1312
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	840	840	840	825	825	825	1020	1020	1020	1035	1035	1035
R-squared	0.2995	0.3013	0.3668	0.4142	0.4118	0.4096	0.3716	0.3717	0.3715	0.3425	0.3430	0.3814
Hausman	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***

, **, and * represent 1%, 5% and 10% significance levels, respectively. The subsamples with high vs. low liquidity are in terms of median of liquidity. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **Breusch Pagan Test** is less than 0.0001.

Table 11
Summary of fixed-effects regression results for subsamples with high and low leverage and liquidity.

	Variable	Subsamples by leverage			Subsamples by liquidity		
		LLP	NCO	AbLLP	LLP	NCO	AbLLP
H	Lev1	$+^{***}$	$+^{***}$	$+$	$-/+^{***}$	$+^{***}$	$+^*/-^*$
	Lev2	$+^{***}$	$+^{***}$	$+$	$-/+^{***}$	$+^{***}$	$+^*/-^*$
	Lev3	$+^{***}$	$+^{***}$	$-$	$+^{***}$	$+^{***}$	$+^{***}$
	Liq1	$-^*$	$-$	$-^{**}$	$-$	$-$	$-^*$
	Liq2	$-^*$	$-/+$	$-^{**}$	$+$	$+$	$-^{**}$
L	Lev1	$-$	$-^*$	$+$	$+^{***}$	$-/+^{***}$	$+^{***}$
	Lev2	$-$	$-^*$	$+^{**}$	$+^{***}$	$+^{***}$	$+^{***}$
	Lev3	$+^{***}$	$+^{***}$	$+^{***}$	$+^{***}$	$+^{***}$	$-/+^{***}$
	Liq1	$-^{***}$	$-$	$-^{***}$	$-^{***}$	$-$	$-^{**}$
	Liq2	$-^{***}$	$-$	$-^{***}$	$-^{***}$	$-^*$	$-^{**}$

***, **, and * represent 1%, 5% and 10% significance levels, respectively. The subsamples with high vs. low leverage (liquidity) are in terms of median of leverage (liquidity). **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets. **Assets** is the nature log of total assets.

Random-Effects and Pooled OLS regressions. Overall, the effects of Lev and Liq on EM and CM are consistent with our Fixed-Effects regression results of entire sample. The dramatic differences between the pre-crisis and post-crisis period provide support for Hypothesis III.

6.3. High vs. low leverage banks

Table 9 provides results for the effects of leverage on LLP, NCO and AbLLP for subsamples with high vs. low leverage measured by median leverage. In Panel A, showing results for LLP, Lev1 and Lev2 are significantly positively related to LLP for the banks with high leverage, which is consistent with our results of entire sample. Banks with low leverage have the opposite results: leverage is significantly negatively related to LLP.

In Panel B, which shows results for NCO, Lev1 and Lev2 are significantly positively related to NCO for high-leverage banks, which is again consistent with results for the entire sample. Banks with low leverage show opposite results: leverage is significantly negatively related to NCO. In Panel C, which shows results for AbLLP, high-leverage banks have and insignificant relation between AbLLP and leverage, but the banks with low leverage have a significantly positive relation between leverage and AbLLP.

6.4. High vs. low liquidity banks

Table 10 provides results for the effects of liquidity on LLP, NCO and AbLLP for subsamples with high vs. low liquidity measured by median liquidity. In Panel A, which shows results for LLP, there is a significant negative relation between liquidity and LLP for banks with low liquidity. Results shown in Panel B for NCO and in Panel C for AbLLP are similar in that low-liquidity banks have a negative relation between liquidity and the earnings management measure.

Table 11 summaries the evidence as follows according to above results in Sections 6.3 and 6.4: (1) banks with high leverage are more likely to engage in EM and CM than banks with low leverage and (2) banks with low liquidity are less likely engage in EM and CM than banks with high liquidity.

Table 12
Testing for differences in LLP, NCO, and AbLLP between high and low leverage and high and low liquidity banks.

Variable		LLP			NCO			AbLLP		
		H-L	Pr > |t|	Pr > |Z|	H-L	Pr > |t|	Pr > |Z|	H-L	Pr > |t|	Pr > |Z|
Mean	Lev1	-0.00199	0.0002^{***}		-0.00209	$<.0001^{***}$		-0.00040	0.0465^*	
	Lev2	-0.00018	0.7388		-0.00016	0.7578		0.00020	0.3490	
	Lev3	0.00104	0.0451^*		0.00117	0.0152^*		0.0004	0.0417^*	
	Liq1	0.00022	0.6847		0.00003	0.9553		-0.0004	0.8568	
	Liq2	-0.00104	0.0434^*		-0.00094	0.0502^*		-0.00027	0.1700	
Median	Lev1	-0.00114		$<.0001^{***}$	-0.00123		$<.0001^{***}$	-0.00033		$<.0001^{***}$
	Lev2	-0.00076		$<.0001^{***}$	-0.00080		$<.0001^{***}$	-0.00006		0.3197
	Lev3	0.00010		0.4677	-0.00023		0.2404	0.00023		0.0480^*
	Liq1	-0.00002		0.9322	-0.00019		0.3768	-0.00016		0.1168
	Liq2	-0.00016		0.2405	-0.00037		0.0332^*	-0.00007		0.2454

***, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets.

6.5. Differences in LLP, NCO and AbLLP across leverage and liquidity classes of banks

This section provides some evidence supporting the relation between leverage and earnings management and between liquidity and earnings management by testing for differences in earnings management measures across high leverage versus low leverage banks and across high liquidity versus low liquidity banks. Hypothesis I would be consistent with a higher level of earnings management for banks with higher leverage ratios and Hypothesis II would be consistent with lower levels of earnings management measures for banks with greater levels of liquidity.

Table 12 contains evidence on differences in means and medians of three earnings management measures across classes of banks differentiated by three levels of leverage and two measures of liquidity. This table shows significantly larger mean LLP, NCO and AbLLP for banks with higher Lev3. Conversely, it also shows a significantly lower mean of Lev1 for firms with higher leverage ratios. Differences in earnings management measures across high liquidity and low liquidity banks are much more consistent and also consistent with results of the overall sample. Banks with higher levels of liquidity show lower levels of earnings management measures, which is consistent with Hypothesis II and with the results of the overall sample.

The differences of median of AbLLP for banks between high and low Lev3 is significantly positive and the difference of median of NCO with high and low Liq2 is significantly negative which are all consistent with our results of entire sample.

6.6. A robustness check

The results may also be subject to firm survivorship bias in our balanced panel data analysis. However, our results also hold in the cross-section, a snapshot of 2003, 2007 and 2011 data, where they cannot be driven by survivorship bias. Table A.3, shown in the Appendix, shows that the results in 2003 (2011) are nearly consistent with our results for subsamples pre (post) financial crisis in Table 8. In addition, the results in 2007 are nearly consistent with our results for entire sample in Table 6.

7. Conclusions

Our findings indicate that the loan loss provision, net charge-off, and abnormal loan loss provision have a significant positive relationship with leverage ratios whether leverage is measured by the Tier 1 ratio, the total capital ratio, or tangible common equity ratio. Our findings also indicate a significant negative relationship between these earnings management measures and liquidity ratios, whether liquidity is measured by liquid assets divided by deposits and short-term founding or by liquid assets divided by total assets. Overall, this study documents evidence that (1) the banks tended to increase their capital and liquid assets after the financial crisis; (2) the earnings management behavior measured by the loan loss provision, net charge-offs and abnormal loan loss provision is significantly positively related to leverage; (3) the earnings management behavior measured by the loan loss provision, net charge-off and abnormal loan loss provision is significantly negatively related to liquidity; (4) the earnings management behavior measured by the loan loss provision, net charge-off and abnormal loan loss provision has changed post financial crisis; (5) the banks with high leverage are more likely to engage in earnings and capital management behavior than the banks with low leverage when leverage increases; (6) the banks with low liquidity are less likely to engage in earnings and capital management behavior than the banks with high liquidity when liquidity increases.

To sum up, our findings indicate that better capitalized banks tend to set aside greater reserves created by loss provisions to convey a positive signal that their financial condition is strong. By maintaining a larger reserve for losses they can better afford to accelerate loan charge-offs while still keeping the loss reserve at a high level.

Appendix A

Table A.1
Summary of pooled OLS and random-effects regression results with dummy variable of financial crisis.

Variable	Pooled OLS			Random-effects		
	LLP	NCO	AbLLP	LLP	NCO	AbLLP
Lev1	+***	+***	+***	+***	+***	+***
Lev2	+***	+***	+***	+***	+***	+***
Lev3	+***	+***	+***	+***	+***	+***
Liq1	−	−	−***	−	−	−**
Liq2	−	−	−***	−	−	−***
Dummy	−***	−	−*	−*	−*	−

***, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **Dummy** variable equals 1 for the period after 2008 and 0 for the period before 2006.

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Table A.2
Pooled OLS and random-effects regression results with dummy variable of financial crisis.

Variable	Pooled OLS						Random-effects					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable: LLP												
Intercept	−0.0238	−0.0240	−0.0254	−0.0238	−0.0240	−0.0254	−0.0238	−0.0240	−0.0254	−0.0238	−0.0240	−0.0254
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$Lev1_{(t-1)}$	0.0375			0.0383			0.0375			0.0383		
	<.0001***			<.0001***			<.0001***			<.0001***		
$Lev2_{(t-1)}$		0.0410			0.0417			0.0410			0.0417	
		<.0001***			<.0001***			<.0001***			<.0001***	
$Lev3_{(t-1)}$			0.0970			0.0967			0.0970			0.0967
			<.0001***			<.0001***			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0001	−0.0007	−0.0006				−0.0001	−0.0007	−0.0006			
	0.9448	0.7525	0.7466				0.9448	0.7525	0.7466			
$LIq2_{(t-1)}$				−0.0015	−0.0021	−0.0004				−0.0015	−0.0021	−0.0004
				0.6004	0.4531	0.8616				0.6004	0.4531	0.8616
$Assets_{(t)}$	0.0011	0.0011	0.0013	0.0012	0.0011	0.0013	0.0011	0.0011	0.0013	0.0012	0.0011	0.0013
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$EBTP_{(t)}$	−0.0609	−0.0619	−0.1402	−0.0610	−0.0621	−0.1402	−0.0609	−0.0619	−0.1402	−0.0610	−0.0621	−0.1402
	0.0005***	0.0003***	<.0001***	0.0004***	0.0003***	<.0001***	0.0005***	0.0003***	<.0001***	0.0004***	0.0003***	<.0001***
$Loans_{(t)}$	0.0186	0.0187	0.0162	0.0185	0.0185	0.0163	0.0186	0.0187	0.0162	0.0185	0.0185	0.0163
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$NPL_{(t)}$	0.2592	0.2571	0.2247	0.2596	0.2574	0.2245	0.2592	0.2571	0.2247	0.2596	0.2574	0.2245
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Dummy	−0.0013	−0.0012	−0.0020	−0.0013	−0.0013	−0.0020	−0.0013	−0.0012	−0.0020	−0.0013	−0.0013	−0.0020
	0.0238*	0.0305*	0.0003***	0.0207*	0.0275*	0.0003***	0.0238	0.0305*	0.0003***	0.0207*	0.0275*	0.0003***
Obs	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612
R-squared	0.3440	0.3458	0.4148	0.3441	0.3460	0.4123	0.3440	0.3458	0.4148	0.3441	0.3460	0.4148
Panel B. Dependent variable: NCO												
Intercept	−0.0209	−0.0214	−0.0220	−0.0209	−0.0213	−0.0220	−0.0209	−0.0214	−0.0220	−0.0209	−0.0213	0.0220
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$Lev1_{(t-1)}$	0.0313			0.0316			0.0313			0.0316		
	<.0001***			<.0001***			<.0001***			<.0001***		
$Lev2_{(t-1)}$		0.0357			0.0359			0.0357			0.0359	
		<.0001***			<.0001***			<.0001***			<.0001***	
$Lev3_{(t-1)}$			0.0772			0.0768			0.07722			0.0768
			<.0001***			<.0001***			<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0010	−0.0016	−0.0012				−0.0010	−0.0016	−0.0012			
	0.6406	0.4455	0.5402				0.6406	0.4455	0.5402			
$LIq2_{(t-1)}$				−0.0020	−0.0028	−0.0010				−0.0020	−0.0028	−0.0010
				0.4625	0.3167	0.6850				0.4623	0.3167	0.6850
$Assets_{(t)}$	0.0012	0.0011	0.0013	0.0012	0.0011	0.0013	0.0012	0.0011	0.0013	0.0012	0.0011	0.0013
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$EBTP_{(t)}$	−0.0259	−0.0280	−0.0878	−0.0260	−0.0281	−0.0878	−0.0259	−0.0280	−0.0878	−0.0260	−0.0281	−0.0878
	0.1265	0.0982*	<.0001***	0.1252	0.0970*	<.0001***	0.1265	0.0982*	<.0001***	0.1252	0.0970*	<.0001***
$Loans_{(t)}$	0.0135	0.0135	0.0115	0.0134	0.0135	0.0116	0.0135	0.0135	0.0115	0.0134	0.0135	0.0116
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
$NPL_{(t)}$	0.2663	0.2643	0.2390	0.2665	0.2644	0.2387	0.2663	0.2643	0.2390	0.2665	0.2644	0.2387
	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***	<.0001***
Dummy	−0.0002	−0.0002	−0.0007	−0.0002	−0.0002	−0.0007	−0.0002	−0.0002	−0.0007	−0.0002	−0.0002	−0.0007
	0.6803	0.7095	0.1785	0.6694	0.7076	0.1878	0.6803	0.7095	0.1785	0.6694	0.7076	0.1872
Obs	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612
R-squared	0.3150	0.3716	0.3626	0.3151	0.3177	0.3625	0.3150	0.3176	0.3626	0.3151	0.3177	0.3625
Panel C. Dependent variable: AbLLP												
Intercept	−0.0004	−0.0007	−0.0020	−0.0003	−0.0006	−0.0019	−0.0004	−0.0007	−0.0020	−0.0003	−0.0006	−0.0019
	0.5237	0.3076	0.0009***	0.6356	0.3998	0.0026**	0.5237	0.3076	0.0009***	0.6356	0.3998	0.0024**
$Lev1_{(t-1)}$	0.0077			0.0079			0.0077			0.0079		
	0.0033**			0.0023**			0.0033**			0.0023**		
$Lev2_{(t-1)}$		0.0098			0.0100			0.0098			0.0100	
		0.0003***			0.0002***			0.0003***			0.0002***	
$Lev3_{(t-1)}$			0.0350			0.0344*			0.0350			0.0344
			<.0001***						<.0001***			<.0001***
$Liq1_{(t-1)}$	−0.0024	−0.0026	−0.0033				−0.0024	−0.0026	−0.0033			
	0.0193*	0.0090**	0.0004***				0.0193*	0.0090**	0.0004***			
$LIq2_{(t-1)}$				−0.0039	−0.0042	−0.0043				−0.0039	−0.0042	−0.0043
				0.0029**	0.0013**	0.0003***				0.0029**	0.0013**	0.0003***
$Assets_{(t)}$	0.00007	0.00006	0.0001	0.00007	0.00006	0.0001	0.00007	0.00006	0.0001	0.00007	0.00006	0.0001
	0.2086	0.2602	0.0006***	0.1976	0.2610	0.0010**	0.2086	0.2602	0.0006***	0.1976	0.2610	0.0010**
$EBTP_{(t)}$	0.0120	0.0107	−0.0214	0.0119	0.0106	−0.0211	0.0120	0.0107	−0.0214	0.0119	0.0106	−0.0211

Table A.2 (continued)

Variable	Pooled OLS						Random-effects					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Loans$_{(t)}$	0.1258	0.1715	0.0071**	0.1288	0.1761	0.0080**	0.1258	0.1715	0.0071**	0.1288	0.1761	0.0080**
	0.0018	0.0019	0.0011	0.0017	0.0018	0.0011	0.0018	0.0019	0.0011	0.0017	0.0018	0.0011
	0.0002***	0.0001***	0.0176*	0.0003***	0.0002***	0.01745*	0.0002***	0.0001***	0.0176*	0.0003***	0.0002***	0.0175*
NPL$_{(t)}$	0.0098	0.0092	−0.0032	0.0098	0.0091	−0.0034	0.0098	0.0092	−0.0032	0.0098	0.0091	−0.0034
	0.2284	0.2603	0.6832	0.2276	0.2626	0.6662	0.2284	0.2603	0.6832	0.2276	0.2626	0.6662
Dummy	−0.0002	−0.0002	−0.0006	−0.0002	−0.0002	−0.0006	−0.0002	−0.0002	−0.0006	−0.0002	−0.0002	−0.0006
	0.3250	0.2933	0.0100*	0.3248	0.2984	0.0130*	0.3250	0.2933	0.0100*	0.3248	0.2984	0.0130*
Obs	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612
R-squared	0.0294	0.0320	0.1065	0.0315	0.0341	0.1067	0.0294	0.0320	0.1026	0.0315	0.0341	0.1067

***, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets. **Lev3** (tangible common ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided total assets. **Assets** is the nature log of total assets. **EBTP** is earnings before taxes and loan loss provisions scaled by the beginning of total assets. **Loans** is gross loans scaled by the beginning of total assets. **NPL** is non-performing loans scaled by the beginning of total assets. **Dummy** variable equals 1 for the period after 2008 and 0 for the period before 2006.

Table A.3
Summary of pooled OLS regression results for subsamples in 2003, 2007, and 2011.

Variable	2003			2007			2011		
	LLP	NCO	AbLLP	LLP	NCO	AbLLP	LLP	NCO	AbLLP
Lev1	−	−*	+*	+*	+***	−	−	−*	+*
Lev2	−	−*	+*	+*	+***	−	−	−*	+*
Lev3	+	−	+*	+**	+***	−	+	−	+*
Liq1	−	−/+	−*	−	−	−*	−	−/+	−*
Liq2	−	−/+	−*	−	−	−*	−*	−	−*

***, **, and * represent 1%, 5% and 10% significance levels, respectively. **LLP** is loan loss provision scaled by the beginning of total assets. **NCO** is loan net charge-off scaled by the beginning of total assets. **AbLLP** is abnormal loan loss provision scaled by the beginning of total assets. **Lev1** (Tier 1 regulatory capital ratio) is Tier 1 capital divided by risk-weighted assets. **Lev2** (total regulatory capital ratio) is total capital divided by risk-weighted assets, **Lev3** (tangible common equity ratio) is tangible common equity divided by tangible assets. **Liq1** is liquid assets divided by deposit and short-term funding. **Liq2** is liquid assets divided by total assets.

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