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Keeping up with the Joneses? Evidence from Peer Performance in the Banking Industry

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Abstract

This paper traces the reaction of US banks to ROE underperformance on liquidity creation, equity capital, and loan loss provisions. We find that banks change their structures in the subsequent quarter after underperformance by increasing their on-balance and off-balance sheet liquidity creation to increase profitability. Banks tend to increase their equity capital and improve their loan quality by lowering non-discretionary loan loss provisions to become safer. Banks signal their ability to overcome underperformance by increasing their discretionary loan loss provisions. Our results reveal that large banks rely mainly on off-balance sheet liquidity creation as their primary tool to recover from underperformance while medium-size and small banks adjust their equity capital to increase their safety.

KEYWORDS
Liquidity creation, Earnings management, Financial performance, (non-) discretionary loan loss provisions Risk management

JEL CLASSIFICATION
G20, G21, G32, M41

1 | INTRODUCTION

Profitability ratios such as return on equity (ROE) and return on assets (ROA) are closely followed performance measures in the banking industry (Klaassen & Van Eeghen, 2015; Massari et al., 2014). The inadequacy of earned bank profits can have serious consequences. Banks that lend to the underperforming bank, depositors (especially large corporate depositors), holders of long-term debt capital, bank stockholders, potential investors, and regulators become concerned. Funding costs increase for underperforming banks, which can further erode their profitability if these

banks do not improve their profitability quickly. Therefore, bank management needs to react quickly to any signs of underperformance which can affect the bank's future strategies and risk levels. Hence, this paper's main objective is to empirically investigate how underperforming banks dynamically modify their liquidity creation, equity capital, and loan loss provision strategies in their attempt to recover from a period of underperformance.

While abundant literature focuses on the determinants of the profitability of banks (e.g., Athanasoglou et al., 2008; Bikker & Vervliet, 2017; Delis & Kouretas, 2011; Dietrich & Wanzenried, 2011; Dietrich et al., 2014; García-Herrero et al., 2009; Trujillo-Ponce, 2013), our paper investigates the impact of profitability underperformance relative to peers on the liquidity creation (*LC*) of banks and other profitability determinants, especially risk and discretionary and non-discretionary loan loss provisions. Banks can try to offset lost margin income by either seeking higher net interest income through on-balance sheet activities or higher fee income through increased off-balance sheet activities. Based on this reasoning, we decompose the dynamics of *LC* to separately study on-balance sheet and off-balance sheet dynamics following underperformance using the *LC* measure developed by Berger and Bouwman (2009). We use a decomposition of this *LC* measure to show the relative importance of each component in generating profitability for banks of different size groups. This approach is consistent with the research by Hasan and Soula (2017) that finds that size influences the decision to create on-balance sheet or off-balance sheet liquidity. Small banks, usually experienced in processing soft information and relationship-based lending, depend on on-balance sheet *LC*. In contrast, large banks, mainly experienced in hard information and transaction-based lending, tend to rely more on off-balance sheet *LC*. Thus, it is of considerable interest to see the reaction of banks to underperformance and which *LC* component for each size group the banks target to bounce back. Addressing these crucial questions leads to a better understanding of the dynamics of *ROE* and market competition.

The second objective of this paper is to examine the impact of underperformance on banks' equity capital, which protects against failure and unexpected risk. This issue is crucial for medium-size and small banks as regulators do not perceive them as too big to fail. A third objective is to examine the impact of underperformance on loan loss provisions (*LLP*). Provisions and capital requirements are closely linked since both aim to handle credit risk. *LLP* generally covers expected losses, while bank capital covers unexpected losses (Bouvatier & Lepetit, 2012). To properly assess the effect of underperformance on provisions related to loan quality, we separate loan loss provisions as measured by the total loan ratio (*LLP* ratio) into their discretionary (*DLLP* ratio) and non-discretionary (*NDLLP* ratio) components.[1] *DLLP* is under the control of bank managers and will most likely drop following underperformance to smooth the bank's income. In contrast, *NDLLP* is associated with the fundamental credit risk of the bank's outstanding loan portfolio.

To address the above issues, we introduce bank on- and off-balance sheet *LC* and partition the *LLP* ratio into *DLLP* and *NDLLP* ratios. We use quarterly call report data on US commercial banks from 1996–2014. We use a 2SLS model with a financial crisis dummy as an instrument to analyze the impact of underperformance on bank structures. Our findings show that banks increase their on-balance sheet and off-balance *LC* and equity capital following underperformance. Thus, banks try to recover from underperformance through *LC* and become safer through higher equity capital. The results also show that the reaction targets *LLP* as banks improve the quality of their loans by decreasing their *NDDLP* and try to assure investors by signaling their ability to deal with underperformance by increasing their *DLLP*. By separating our sample into large, medium-size, and small banks, we find that large banks' primary tool to recover from underperformance is increasing their off-balance sheet *LC*. In contrast, medium-size and small banks' primary tool is an increase in equity capital to become safer.[2] Also, the regressions show with weak significance levels that medium-size banks target an increase in on-balance sheet *LC* while small banks target an increase in *DLLP*.

[1] Our *LLP* computations use loan loss provisions from income statements (The flow item) since they are considered timelier for capturing credit quality changes than the loan loss reserve account from balance sheets (The stock item).

[2] This is not always possible. A 2023 example is the second largest failure in the US banking history of Silicon Vallely Bank (SVB), a medium-size bank, which followed a tech funding slowdown, a large loss on its holdings of long-term bonds (mostly federal agency mortgage-backed securities with minimal credit risk but potentially sizable interest-rate risk) given a large increase in interest rates (i.e., a failed duration-risk bet), a run on the bank by its primarily institutional depositors, and the inability to raise sufficient equity capital to meet demands of its depositors (e.g., Bary, 2023; Dickson, 2023). The long-term bonds represented over 50% of its assets at the end of 2022.

This paper contributes to the relatively new literature on the effect of peers on corporate management.[3] If banks underperforming relative to peers resort to additional *LC* to increase their reported profitability, these banks could be exposed to additional risks, especially illiquidity. This risk-taking approach, usually motivated by regulatory safety nets, could lead to poor asset quality and bank runs (e.g., Gorton, 1988) or result in asset bubbles that possibly burst during financial crises due to poor prior lending policies (Acharya & Naqvi, 2012; Rajan, 1994). Therefore, whether banks seek to increase their *LC* and risk to improve their *ROE* or engage in more prudent practices such as higher provisioning to limit their risk exposure are essential issues from the regulatory perspective. Second, the paper contributes to the literature on earnings management (e.g., Jin et al., 2018; Cohen et al., 2014). GAAP allows management some flexibility in shifting the recognition of accruals to improve the reliability of financial performance measures. However, management might deliberately exercise their accounting judgment to incur benefits in earnings management (Wall & Koch, 2000). By analyzing how banks manage their earnings following underperformance, we help to understand how banks manage their earnings and why they engage in this behavior. Consequently, this paper contributes to the literature on the monitoring and regulation of bank performance (e.g., Macey & O'Hara, 2003; De Haan & Vlahu, 2015; Fernandes et al., 2018), which is complicated by the fact that bank profit components are observed only at low frequencies (Albertazzi & Gambacorta, 2009).

In the next section, we review the literature and develop the hypotheses we test in this paper. Section three discusses the data. Sections four and five describe the empirical methodology and report the empirical results. Section six concludes the paper.

2 | LITERATURE REVIEW AND HYPOTHESES

2.1 | Underperformance and liquidity creation

According to the *LC* hypothesis, banks create liquidity by transforming a comparable amount of liquid liability into a relatively illiquid asset through both on and off-balance sheet activities (e.g., Diamond and Dybvig, 1983; Kashyap et al., 2002). How banks manage their *LC* still needs to be fully explored, as some comprehensive *LC* measures have only been developed more recently. Some leading *LC* measures are the liquidity transformation gap (Deep & Schaefer, 2004), the Berger-Bouwman *LC* measures (Berger & Bouwman, 2009), and the liquidity mismatch index (Brunnermeier et al., 2013). Before introducing these measures, the banking literature mainly focused on the ability of banks to meet the withdrawals of deposits while considering the asset side to be passive since banks invest in assets with a given payoff. Instead, the recent theory emphasizes the importance of *LC* from both the assets and liability sides because banks play an active rather than passive role in meeting economic credit demands.

LC management is motivated by associated expected profits and risks. The reason is that transforming cheap funding into higher-return illiquid assets should generate a high net interest margin and a higher maturity mismatch of assets and liabilities. However, banks might increase their profitability by increasing their liquid assets, although they promise to yield much lower returns than illiquid assets. For instance, Bordeleau and Graham (2010) argue that holding more liquid assets does not need to affect bank profitability negatively. Reducing default risk lowers financing costs which can increase bank profitability if the cost reduction outweighs the opportunity cost of investing in illiquid assets. Accordingly, the quantity of liquidity a bank produces should generally be positively related to bank profitability (e.g., Goddard et al., 2011; Molyneux & Thornton, 1992) unless the cost of financial distress erodes this higher profitability. Therefore, while we generally expect to find a positive association between *LC* and profitability, there is the likelihood that increasing *LC* can lead to higher financing costs when banks underperform. For instance, Tran et al. (2016) find that banks that create more liquidity and have higher illiquidity risk have lower profitability. They also find that

[3] This literature includes the effect of peer pressure on the capital structure of firms (Leary & Roberts, 2014), cash holding levels (Hoberg et al., 2014), CSR decisions by firms and banks (Malik et al., 2019), dividend decisions (Grennan, 2019), investment decisions (Foucault & Fresard, 2014), and financial misconduct extent (Parsons et al., 2018).

the relationship between regulatory capital and bank performance is related to the level of capitalization and is non-linear, where lower capitalized banks' profitability is positively related to regulatory capital, opposite of the case for higher capitalized banks' profitability. Therefore, whether banks increase or decrease on-balance sheet *LC* following underperformance remains an empirical question to be answered.

Curcio and Hasan (2015) report that large and medium-size banks mainly rely on off-balance sheet activities, while small banks rely on on-balance sheet activities to generate profits. Based on their findings, we expect the impact of on-balance sheet *LC* on *ROE* to have a more prominent effect as the size of the bank decreases. We expect small banks to decrease their on-balance sheet *LC* following underperformance since they are not perceived as too-big-to-fail, so that managing their financing and bankruptcy costs rather than profitability will be their main priority.

In this paper, we separate on-balance sheet and off-balance sheet *LC* since the trade-off between them and the dynamics of off-balance sheet activities still need to be better understood (Berger & Bouwman, 2015). Although off-balance sheet activities might constitute up to half of all US bank *LC*, off-balance sheet *LC*s are still not vigorously investigated (Berger & Bouwman, 2009). Thus, we examine whether banks revert to on-balance or off-balance sheet items when their performance is relatively unsatisfactory.

Similar to the on-balance sheet *LC* argument, we expect off-balance sheet activities to increase bank profitability, given the fees and commissions they generate. Nonetheless, a negative impact of *LC* on profitability remains possible if granting more loans and commitments increases the probability of default and the funding costs for banks (Bordeleau & Graham, 2010), implying that underperforming banks will reduce off-balance sheet activities under these conditions. However, whether banks increase or decrease off-balance sheet activities following underperformance is an empirical question to be answered. Even so, we expect different behavior across different bank size groups since the role of off-balance sheet activities becomes more prominent as the size of the bank increases (Curcio & Hasan, 2015). Hence, we can state our first hypothesis related to liquidity creation and bank size as follows:

H1: Large banks react to underperformance by increasing their on- and off-balance sheet liquidity creation to increase their interest income, commissions, and fees.

2.2 | Underperformance and risk

2.2.1 | Underperformance and the equity capital determinant

Banks often find themselves on the wrong side of the risk level. For instance, Taylor (2009) states that excessive risk-taking and the lack of balance sheet transparency and quality led to the 2008 subprime crisis. Therefore, banks can face excessive risk when trying to achieve higher *ROE*, especially underperforming banks, since their ability to build up internal capital through retained earnings is diminished.

Higher capital is often considered costly for banks, suggesting it reduces their profitability (e.g., Altunbas et al., 2007). This is particularly true for small banks where raising capital from external sources is costly. Therefore, we expect a bank's underperformance to lead to a lower equity capital relative to total assets when the capital impedes their returns. However, capital can act as a safety net in the case of adverse developments while enabling the bank to compete more efficiently for risky loans or achieve cost savings with increased size (e.g., Athanasoglou et al., 2008; Berger, 1995; García-Herrero et al., 2009; Molyneux & Thornton, 1992). For instance, Berger (1995) and Athanasoglou et al. (2008) argue that capital can mitigate bankruptcy costs and enable a bank to finance its assets at more favorable interest rates. Given the mixed theoretical and empirical arguments related to the effect of capital on profitability, research can help to answer the question by compiling more empirical evidence. Hence, our competing alternative hypotheses (H2A and H2B) relating to equity capital are:

H2A: Banks react to underperformance by decreasing their equity capital to make themselves more profitable.
H2B: Banks react to underperformance by increasing their equity capital to make themselves safer.

2.2.2 | Underperformance and LLP

The literature decomposes the *LLP* (loan loss provisions) account into a non-discretionary component that measures expected credit losses and a discretionary one that captures management objectives (e.g., Tran et al., 2020). The literature concludes that the market can differentiate between the two components (e.g., Beaver & Engel, 1996). However, it makes assessing the risk of the balance sheet opaquer (Anandarajan et al., 2005).

Prior research mainly focuses on three managerial objectives behind *DLLP*: income smoothing, capital management, and signaling. The income smoothing theory claims that *DLLP* aims to stabilize profitability over time to meet a firm-specific mean or the average benchmark of comparable firms by following a countercyclical behavior (e.g., Kanagaretnam et al., 2005). Alternatively, the capital management theory posits that banks resort to *DLLP* to boost their capital adequacy ratio and mitigate regulatory costs (e.g., Beatty et al., 1995). The signaling theory argues that *DLLP* could signal to investors that a bank's expected earnings can easily absorb additional provisions (e.g., Beaver & Engel, 1996; Curcio & Hasan, 2015).

Commercial banks frequently use *DLLP* to smooth income (e.g., Ma, 1988). If the bank's primary focus is to avoid underperformance, we expect to find a negative association between *DLLP* and *ROE* following underperformance based on the income smoothing theory. The reason is that commercial banks could use their lower *DLLP* to move their *ROE* closer to their peer banks. However, the literature has documented positive news components associated with higher *DLLP* (Wahlen, 1994; Beaver et al., 1997; Liu et al., 1997; Kanagaretnam et al., 2009). Wahlen (1994) supports the signaling theory by arguing that banks convey their ability to absorb a "hit to earnings" by increasing *DLLP*. Beaver et al. (1997) support the good news signaling hypothesis and argue that *DLLP* conveys bad news about loan defaults. Liu et al. (1997) state that *DLLP* is considered good news only for banks that seem to have loan default risk difficulties based on prior information. Kanagaretnam et al. (2009) find that auditor expertise in the banking industry enhances the positive impact of *DLLP*.

NDLLP are used to absorb expected credit losses, which are extremely important when banks are poorly capitalized (Bouvatier & Lepetit, 2008). During periods of hardship, banks are more likely to boost their discretionary provisions by decreasing them as an earnings management strategy. However, the *NDLLP* component reflects the recognition of credit losses based on objective evidence. Consequently, the nature of *NDLLP* is dynamic and is expected to change when the credit risk of an existing bank portfolio is revealed. Since profitability underperformance causes a bank to reassess credit risk, we expect these banks to reduce their exposure to bad loans. We attribute this to two main reasons. First, the dependence of a bank on retained earnings and internal capital with lower profitability will likely reduce the ability of the bank to deal with risk. Second, underperformance could be related to previous lending policies that failed to generate the desired incomes. Therefore, we expect banks to decrease *NDLLP* following an underperformance shock, and this effect will be most prominent for small banks because they cannot raise capital quickly. Thus, our third and fourth hypotheses:

H3: Banks send good news signals following underperformance by increasing their discretionary loan provisions.

H4: Banks react to underperformance by improving the quality of their bank loans and reducing their non-performing loans and non-discretionary loan loss provisions.

3 | DATA AND SUMMARY STATISTICS

3.1 | Data description

We obtain US individual commercial bank quarterly bulk data from the Federal Reserve Bank of Chicago's website from 1996 through 2010 and the Federal Financial Institutions Examination Council (FFIEC) website from

2011–2014.[4] 1996 was the first year that the FFIEC website made the consolidated reports of condition and income for commercial banks (FFIEC forms) publicly available. Consequently, we adopted these sample years because we were able to produce our numbers using our calculations and cross-check their validity with the available resources from Christa Bouwman's website.[5]

We use quarterly data because a bank's management has the incentive to reach a target *ROE* for each quarter when they release quarterly reports to regulators (call reports) and their investors. We follow the standard practice in *LC* analysis and classify banks into three different size classes because banks of different sizes are found to behave and perform differently (e.g., Berger and Bouwman, 2009; Berger et al., 2005; Kashyap et al., 2002).[6] We follow the size classes based on nominal dollars defined by Berger and Bouwman (2009) and categorize quarterly each bank with gross total assets (*GTA*) in nominal dollars above $3 billion as large banks, banks with GTA exceeding $1 billion and up to $3 billion as medium-size banks, and those with *GTA* less than $1 billion as small banks (known as community banks). The classification was based on *GTA* expressed in real 2014 dollars using the implicit GDP price Deflator.[7]

We eliminate banks with negative equity capital or zero total loans. We also eliminate banks with a *GTA* of less than $500 million because these small banks (often called community banks) exhibit different behavior than others (DeYoung et al., 2004). All bank-specific variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. The resulting sample consists of 63,803 observations for 3,399 banks over the twenty years: 16,388 observations for 585 large banks, 23,982 observations for 1,181 medium-size banks, and 23,433 observations for 1,633 small banks. The regressions control for time trends using year and quarter dummies and bank-level heterogeneity. We use robust standard errors clustered at the bank level to correct for heteroscedasticity.

3.2 | Summary statistics

Table 1 provides the summary statistics for banks that underperformed the median peer bank of the same size group in the same state on a quarterly basis and banks that matched or outperformed this median (achiever banks). A simple comparison between the two groups shows that all reported banks' characteristics, except the change in non-discretionary loan loss provisions for small banks, are different and significant at least at a 5% level.

The cost-income ratio of underperforming banks and the higher market concentration (i.e., higher Herfindahl - Hirschman index value) in which these banks operate are always higher than those of achiever banks. In addition, achievers across all bank sizes tend to change their on-balance sheet liquidity creation and their discretionary loan loss provisions at a higher percentage than underperforming banks. On the other hand, achiever banks tend to change their off-balance sheet activities less. These results indicate that a better cost income structure and lower concentration in the market enable achievers to extend more on balance sheet liquidity when there are opportunities in the market.

4 | ESTIMATION METHODOLOGY

We investigate the impact of underperformance on bank structure using a Two Stage Least Squares (2SLS) model with state and time-fixed effects. The estimated model is:

$$Chg\_Structure_{i,t} = \alpha Underperformance\_Dummy_{it-1} + \beta X^{Specific}_{i,t-1} + \gamma X^{Macro}_{t-1} + \delta X^{Industry}_{t-1} + \mu_i + v_{t+}\varepsilon_{i,t} \quad (1)$$

[4] The Federal Reserve Bank of Chicago provides quarterly bulk SAS files of all Call Report items. These files are made available until the fourth quarter of the year 2010. The FFIEC provides bulk text files from the first quarter of 2001.

[5] https://booksite.elsevier.com/9780128002339/companion_materials.php

[6] We retrieve the data from Christa Bouwman's website: https://sites.google.com/a/tamu.edu/bouwman/data.

[7] Berger and Bouwman (2015) use a similar classification method using *GTA* expressed in real dollars of the last sample's year.

TABLE 1 Descriptive Statistics.

	Achievers					Underperformers						
Panel A: Large Banks	Mean	Median	SD	1% Percentile	99% Percentile	Mean	Median	SD	1% Percentile	99% Percentile	Difference in Means	t-test
ChgLCon	4.22	2.45	24.55	−79.26	120.08	3.09	1.27	27.86	−79.26	120.08	1.126**	2.71
ChgLCoff	2.30	2.31	19.33	−100.00	71.52	3.11	1.53	17.11	−37.87	81.94	−0.805**	−2.82
ChgEqC	3.50	2.14	10.64	−18.15	65.52	4.39	1.38	15.17	−20.35	81.41	−0.892***	−4.25
ChgDLLP	27.75	32.27	260.35	−932.01	965.47	−27.72	−28.52	241.49	−882.92	727.26	55.47***	14.12
ChgNDLLP	6.59	15.79	321.50	−1349.14	1263.07	−31.74	−30.62	361.67	−1907.34	1641.50	38.33***	7.09
Cost_Income_Ratio	41.12	39.96	11.55	15.22	73.17	44.86	42.92	13.70	15.22	85.85	−3.740***	−18.54
HH_index	1731.82	1192.68	1643.83	158.92	8802.37	1817.80	1262.97	1722.55	159.43	9161.90	−85.98**	−3.24
N	9064					7324					16388	

(Continues)

TABLE 1 (Continued)

Panel B: Medium-size Banks	Achievers					Underperformers						
	Mean	Median	SD	1% Percentile	99% Percentile	Mean	Median	SD	1% Percentile	99% Percentile	Difference in Means	t-test
ChgLCon	3.83	2.61	16.29	−42.24	69.70	1.97	1.37	20.51	−79.26	96.75	1.856***	7.69
ChgLCoff	1.08	2.07	21.29	−100.00	59.16	2.84	1.47	16.40	−36.83	73.95	−1.764***	−7.23
ChgEqC	3.30	2.37	8.10	−12.81	38.33	2.75	1.35	12.29	−20.35	81.41	0.556***	4.06
ChgDLLP	2.88	23.92	406.98	−1838.49	1709.42	−60.79	−54.07	318.85	−1377.49	1386.83	63.67***	13.56
ChgNDLLP	−19.44	−15.42	391.34	−2056.86	1868.42	−46.57	−35.12	417.40	−2056.86	1905.60	27.13***	5.17
Cost_Income_Ratio	42.08	40.87	12.05	15.22	75.05	46.38	44.19	14.49	16.37	86.10	−4.299***	−24.65
HH_index	1343.85	788.99	1483.73	86.43	7926.29	1444.99	842.61	1544.34	87.78	7484.99	−101.1***	−5.15
N	12797					11185					23982	
Panel C: Small Banks	**Achievers**					**Underperformers**						
	Mean	Median	SD	1% Percentile	99% Percentile	Mean	Median	SD	1% Percentile	99% Percentile	Difference in Means	t-test
ChgLCon	3.01	2.27	14.91	−38.17	60.85	1.54	1.02	16.29	−59.18	60.17	1.464***	7.15
ChgLCoff	−1.63	0.88	24.49	−100.00	52.35	1.64	0.65	16.04	−38.14	57.87	−3.270***	−12.21
ChgEqC	2.34	2.13	5.62	−12.99	21.36	1.33	1.16	8.51	−20.35	34.49	1.008***	10.5
ChgDLLP	−22.50	−15.03	399.70	−1838.49	1709.42	−68.26	−40.79	356.41	−1838.49	1638.11	45.76***	9.26
ChgNDLLP	−27.19	−21.90	364.95	−1772.42	1852.07	−29.65	−23.21	450.61	−2056.86	1905.60	2.459	0.46
Cost_Income_Ratio	44.13	43.01	12.26	16.90	75.39	49.24	47.20	14.65	20.38	86.10	−5.112***	−28.53
HH_index	1345.95	759.11	1483.84	83.55	7494.12	1478.21	845.30	1609.89	83.78	7484.99	−132.3***	−6.51
N	12419					11014					23433	

This table presents descriptive statistics for banks that achieved an *ROE* above the median *ROE* of peer banks (Achiever banks) and for underperforming banks with a *ROE* below the median *ROE* of peers. We also report the difference in means of achievers and underperformers. Change in on-balance sheet liquidity creation (Chg*LCon*), off-balance sheet liquidity creation (*ChgLCoff*), and equity capital (*EqC*) are normalized by *GTA*. Changes in discretionary and non-discretionary loan loss provisions (*chgDLLP* and *ChgNDLLP*) are normalized by total loans, whereas the cost-income ratio (*Cost_Income*_Ratio) represents operating costs normalized by operating income. All values are reported in percent. N is the sample size. *$p<0.1$, **$p<0.05$, ***$p<0.01$.

Where,

a) $Chg\_Structure_{it}$ reflects the percentage change in the structure of the bank following underperformance. It is the change in one of the following: on-balance sheet (*LCon*), off-balance sheet (*LCoff*), discretionary loan-loss provision (*DLLP*), non-discretionary loan-loss provision (*NDLLP*), and equity capital (*EqC*). Specifically,
   i. *ChgLCon* is the percentage change in on-balance sheet *LC* scaled by gross total assets.
   ii. *ChgLCoff* is the percentage change in off-balance sheet *LC* scaled by gross total assets.
   iii. *ChgEqC* is the percentage change in equity capital (*EqC*) to gross total asset ratio.
   iv. *ChgDLLP* is the percentage change in discretionary loan loss provision (*DLLP*) as a fraction of total loans. Like Cohen et al. (2014) and Beatty et al. (2002), we separate the discretionary from the non-discretionary $NDLLP_{it}$ ratio of bank *i* at time *t* using the following regression:

$$LLP_{i,t} = \alpha_0 + \beta_1 Size_{i,t-1} + \beta_2 \Delta NPL_{i,t} + \beta_3 ALL_{i,t} + \beta_4 RE_{i,t} + \beta_5 CI_{i,t} + \beta_6 Depository_{i,t} + \beta_7 Consumer_{i,t} + z_{i,t} \quad (2)$$

   Where $LLP_{i,t}$ is the *LLP* ratio measured as *LLP* expense from the income statement as a fraction of total loans. $Size_{i,t-1}$ is the lagged natural logarithm of total assets; $\Delta NPL_{i,t}$ is the change in non-performing loans as a percentage of the average quarterly total loans; $ALL_{i,t}$ is the allowance for loan loss as a percentage of total loans at the beginning of the quarter; $RE_{i,t}$ is the real estate loans as a percentage of total loans; $CI_{i,t}$ is the commercial and industrial loans as a percentage of total loans; $Depository_{i,t}$ is the loans to depository institutions as a percentage of total loans; $Consumer_{i,t}$ is loans to individuals as a percentage of total loans; z_{it} is $DLLP_{i,t}$ scaled by total loans and represents the *DLLP* ratio variable in equation (1). The specification of equation (2) implies that $z_{i,t}$ is scaled by total loans (Cohen et al., 2014).
   v. *ChgNDLLP* is the change in non-discretionary loan loss provision as a fraction of total loans. It is measured as the difference between the *LLP* and *DLLP* ratios in equation (2).

b) $Underperformance\_Peer_{i,t-1}$ is a one-period lagged dummy variable that equals one if the ROE_{it-1} of a bank underperformed the median of its peer group in the last four quarters defined as banks in the same size group headquartered in the same state.
   Our model's control variables ($X^{Specific}_{i,t-1}$, $X^{Industry}_{t-1}$, *and* X^{Macro}_{t-1}) help alleviate omitted variable bias concerns. Hence, we control for the following:

c) $X^{Specific}_{i,t-1}$ is bank *i's* lagged cost–income ratio (*Cost_Income_Ratio*) defined as the operating costs net of interest expenses over operating income.[8] This ratio measures management's efficiency in handling the costs of banks. It is also frequently used to assess the performance of banks since higher costs as a percentage of income would depress a bank's profitability (e.g., Beccalli et al., 2006; Hasan et al., 2009).

d) $X^{Industry}_{t-1}$ is the lagged Herfindahl-Hirschman Index (*HH_index*), calculated as the sum of the squares of the market shares of all banks in terms of total assets in percentages at time *t*. We control for *HH_index* since more concentration and competition will likely erode bank profitability.

e) X^{Macro}_{t-1} are the following lagged macro control variables that affect a bank structure drawn from the literature:
   i. *Inflation* is the lagged quarterly inflation rate whose impact on bank structure is because inflation will increase a bank's costs. However, a bank may increase its revenues faster than its costs if inflation is fully anticipated (e.g., Molyneux and Thornton, 1992).
   ii. *ST_interest* is the short-term 90-day T-bill rate. We control for this variable since the monetary policy literature shows that low-interest rates are the primary tool central banks use to stimulate the economy.
   iii. *LT_interest* is the long-term (10-year) interest rate. We control for this variable since long-term lending rates should increase the net interest margin of a bank (Bikker & Vervliet, 2017).

[8] We use the following items from the call report: [Expenses of Premises and Fixed Assets (RIAD 4217) + RIAD 4135 ("Salaries and Employee Benefits") + "Other" non-interest expenses (RIAD 4092)] divided by operating income (RIAD 4000).

All specifications include state and time-fixed effects, μ_i and v_t. These fixed effects control for the impact of time-invariant variables specific to the state and time-specific variables common to all states.

Our primary concern with the model is that the underperformance measure may be endogenous (i.e., correlated with the error term) due to simultaneity or omitted variables. Just as underperformance leads to structural changes in bank activities, a change in bank activities might lead to underperformance. In other words, underperformance might incentivize a bank to change its *LCon*, *LCoff*, *EqC*, and *LLP*, but a change in these activities might also lead to underperformance. Therefore, we use lagged explanatory variables to help mitigate these potential endogeneity problems.

To further address endogeneity concerns, we rely on a Two Stage Least Squares model. Hence, we treat the underperformance dummy as an endogenous variable in equation (1), and instrument this variable using an economic shock. In particular, we use the financial crises as an exogenous shock using the classifications of Berger and Bouwman (2009) for the periods of financial crises. Berger and Bouwman (2009) examine the effect of five financial crises between 1984:Q1 and 2008:Q4 on banks' liquidity creation. Three of these crises occurred in the time period of our study (1996-2014). These crises are the subprime lending crises (2007:Q3-2009:Q4), the Russian debt crisis and the bailout of 1998 (1998:Q3–1998:Q4), and the bursting of the dot.com bubble and the September 11 terrorist attacks of the early 2000s (2000:Q2–2002:Q3). Using the financial crisis variable as an instrument will likely satisfy both conditions for valid instruments. The first condition, instrument relevance, requires that the financial crisis instrument should be correlated with underperformance, which is most likely the case. The second condition for a valid instrument, the exclusion restriction, states that the financial crisis should not be correlated with the error term of the second-stage regression. Financial crises usually are accompanied by unexpected monetary policies, which can affect the profitability of banks but are unlikely to affect the structure of a bank immediately. Hence, to alleviate the violation of the exclusion restriction, we use a one-period lagged financial crisis shock for the underperformance variable.

5 | RESULTS

5.1 | The impact of underperformance relative to peers on banks' structure

We report the results of the core 2SLS model for various size samples using different dependent variables for bank structure in Tables 2, 3 and 4. The results partially support our H1 hypothesis and confirm that a bank's size impacts its reaction to underperformance. For example, large banks tend to target an increase in off-balance sheet activities to increase their profitability. Table 2 shows that underperforming banks increase their *LCoff* by 18.65% (with a 5% significance level) in the subsequent period. The *LCoff* findings are consistent with previous findings (Hasan & Soula, 2017) that conclude that small banks do not rely on off-balance sheet activities while large and medium-size banks use off-balance sheet activities to generate profits. Hence, the primary tool of large banks to overcome underperformance relative to peers is competing for an additional market share in the off-balance sheet market to benefit from other fee and commission-based products and financial services. For example, De La Torre et al. (2010) point out that large banks aspire to become the principal banks of SMEs. To become the main bank, the large bank provides special products as part of a larger overall package, such as asset-based lending, leasing, factoring, and fixed-asset lending, none of which small banks can offer.

The change in *LCon* regression reported in table 2 for large banks indicates no impact of underperformance on on-balance sheet *LC*. The F-test for overall significance, with a P-value of 0.971, indicates that our linear regression model does not fit the data better than a model without independent variables.[9]

[9] We run the Ramsey(1969) reset test to check whether a non-linear model fits the data. We generate the second, third, and fourth powers of the fitted values and include them in the model (1) regression with clustered standard errors. The joint test for the significance of the fitted value coefficients indicates insignificance.

TABLE 2 The Impact of Underperformance vs. Peers on the Structure of Large Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_Peer	−3.388	18.651**	3.173	−25.435	4.046
	(11.234)	(8.264)	(5.647)	(89.456)	(136.151)
Cost_Income_Ratio	0.014	−0.225**	−0.012	0.478	−0.098
	(0.126)	(0.093)	(0.065)	(1.008)	(1.548)
HH_index	−0.000	−0.001**	−0.000*	0.003	−0.001
	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)
ST_interest	0.635*	−0.417**	−0.272	9.980***	6.564
	(0.360)	(0.203)	(0.186)	(2.507)	(4.726)
LT_interest	1.753***	0.027	0.434*	3.161	0.261
	(0.588)	(0.373)	(0.254)	(5.062)	(7.715)
Inflation	−0.388	0.290	−0.034	−1.927	3.830
	(0.282)	(0.178)	(0.136)	(2.499)	(4.055)
Constant	−10.642	27.844***	3.124	−175.051**	−25.561
	(11.583)	(7.572)	(4.783)	(83.139)	(141.152)
First stage: Financial crisis instrument	0.088***	0.088***	0.088***	0.088***	0.088***
	(0.013)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	16,388	16,336	16,191	16,388	16,388
Number of Firms	585	582	580	585	585
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0.971	0	0	0	0

This table reports the results of the panel regressions for the 1996–2014 period using a sample of large banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance relative to peers in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), and the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

Also, we do not find any impact of underperformance relative to peers on the change in equity capital or the loan loss provision components. Hence, *ChgLCoff* is the primary tool for large banks to overcome underperformance.

Unlike large banks, medium-size banks resort to equity capital to deal with underperformance. The *ChgEqC* regression's underperformance coefficient in table 3 is positive, 14.155, and significant at the 1% level. This supports our H2B hypothesis as medium-size banks seek to become safer following underperformance. Medium-size banks may seek to increase their equity capital to secure a lower cost of funding. Subsequent analysis reported in section 5.4 favors the safety argument since the coefficients of underperformance for the *ChgEqC* regressions are significant and positive after controlling for the cost of funding. We find a less significant impact of underperformance on *ChgLCon* with a coefficient of 12.562 with a 10% significance level. We

TABLE 3 The Impact of Underperformance vs. Peers on the Structure of Medium-size Banks

	(1)	(2)	(3)	(4)	(5)
VARIABLES	***ChgLCon***	***ChgLCoff***	***ChgEqC***	***ChgDLLP***	***ChgNDLLP***
Underperformance_Peer	12.562*	0.768	14.155***	216.258	−160.191
	(7.177)	(5.949)	(4.473)	(149.275)	(161.921)
Cost_Income_Ratio	−0.229**	−0.023	−0.232***	−3.403	2.194
	(0.105)	(0.084)	(0.066)	(2.084)	(2.270)
HH_index	0.000	−0.000	0.000	0.008*	0.002
	(0.000)	(0.000)	(0.000)	(0.005)	(0.005)
ST_interest	0.577***	0.607***	0.279**	10.014***	1.413
	(0.173)	(0.158)	(0.117)	(3.208)	(4.195)
LT_interest	0.900**	−0.584*	−0.491**	−17.407**	2.463
	(0.397)	(0.318)	(0.223)	(6.988)	(8.232)
Inflation	−0.486***	0.273*	−0.350***	1.928	4.003
	(0.176)	(0.149)	(0.106)	(3.308)	(4.402)
Constant	4.022	12.814**	18.657***	140.197	−196.996
	(7.062)	(5.763)	(4.428)	(140.878)	(155.077)
First stage: Financial crisis instrument	0.08***	0.08***	0.08***	0.08***	0.08***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	23,982	23,936	23,662	23,982	23,982
Number of Firms	1,181	1,178	1,175	1,181	1,181
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0	0	0	0.013	0

This table reports the results of the panel regressions for the 1996–2014 period using a sample of medium-size banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance relative to peers in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), and the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

find that medium-size banks do not rely on off-balance sheet activities nor loan loss provisions to deal with underperformance.

We find strong support for our H2B hypothesis for small banks in table 4. Like medium-size banks, small banks also increase their capital following underperformance with a coefficient of 11.566 and a 1% significance level. We find weak support for our H3 hypothesis that banks increase their *DLLP* to signal their ability to handle underperformance, as the coefficient of underperformance of the *ChgDLLP* regression is significant only at the 10% level. It is noteworthy that similar to the *ChgLCon* regression for large banks, the F test for the overall significance of the *ChgNDLLP* regression is also insignificant.

TABLE 4 The Impact of Underperformance vs. Peers on the Structure of Small Banks

VARIABLES	(1) ChgLCon	(2) ChgLCoff	(3) ChgEqC	(4) ChgDLLP	(5) ChgNDLLP
Underperformance_Peer	4.723	6.205	11.566***	216.468*	−405.142***
	(4.235)	(3.989)	(2.321)	(113.973)	(124.752)
Cost_Income_Ratio	−0.094	−0.110*	−0.248***	−4.011**	6.721***
	(0.065)	(0.066)	(0.040)	(1.876)	(2.072)
HH_index	−0.000	0.000	−0.000	−0.009*	0.004
	(0.000)	(0.000)	(0.000)	(0.005)	(0.006)
ST_interest	0.189	0.429***	0.406***	2.607	−12.035**
	(0.138)	(0.153)	(0.082)	(3.868)	(4.795)
LT_interest	0.236	−1.333***	−0.414***	−18.936***	7.791
	(0.322)	(0.305)	(0.146)	(6.768)	(8.589)
Inflation	−0.162	0.161	−0.410***	−1.438	4.790
	(0.136)	(0.140)	(0.079)	(3.523)	(4.161)
Constant	8.177	21.383***	15.645***	272.528**	−315.169**
	(5.221)	(4.525)	(2.628)	(122.088)	(138.056)
First stage: Financial crisis instrument	0.115***	0.115***	0.115***	0.115***	0.115***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	23,433	23,423	22,933	23,433	23,433
Number of Firms	1,633	1,632	1,613	1,633	1,633
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0	0.103	0	0	0.411

This table reports the results of the panel regressions for the 1996–2014 period using a sample of small banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance relative to peers in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), and the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

5.2 | The impact of underperformance relative to the past on the structure of banks

To check the robustness of our results, we repeat the analysis using a different definition of underperformance. Firms likely also compare their performance relative to their past performance and consider this benchmark as a primary target along with using peers as a benchmark for performance measurement. Hence, we use an underperformance dummy relative to the past performance measured as the median *ROE* of the last four quarters in model (1). This dummy variable takes the value of 1 if the current *ROE* is below the median of the last four quarters and 0 otherwise.

Like the regression results for the underperformance relative to peers, we find partial support for our H1 hypothesis as the coefficient of underperformance in the *ChgLCoff* regression in table 5 (column 2) is 18.772 with a 5%

TABLE 5 Impact of Underperformance vs. Past Performance on the Structure of Large Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_Past	−3.410	18.772**	3.194	−25.600	4.072
	(11.534)	(8.327)	(5.685)	(90.041)	(137.038)
Cost_Income_Ratio	0.014	−0.226**	−0.013	0.478	−0.098
	(0.130)	(0.093)	(0.065)	(1.009)	(1.550)
HH_index	−0.000	−0.001**	−0.000*	0.003	−0.001
	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)
ST_interest	0.634*	−0.412**	−0.271	9.974***	6.565
	(0.346)	(0.202)	(0.185)	(2.497)	(4.711)
LT_interest	1.755***	0.013	0.432*	3.180	0.258
	(0.601)	(0.376)	(0.255)	(5.081)	(7.742)
Inflation	−0.386	0.275	−0.037	−1.906	3.827
	(0.277)	(0.179)	(0.137)	(2.507)	(4.070)
Constant	−10.838	28.937***	3.310	−176.523**	−25.327
	(10.339)	(7.972)	(5.081)	(87.732)	(147.570)
First stage: Financial crisis instrument	0.088***	0.088***	0.088***	0.088***	0.088***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	16,388	16,336	16,191	16,388	16,388
Number of rssd9001	585	582	580	585	585
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0.971	0	0	0	0

This table reports the results of the panel regressions for the 1996–2014 period using a sample of large banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance relative to the past performance in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), and the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

significance level. Also, like the results reported in table 2 for large banks, the underperformance relative to past performance does not impact any other bank structure in our study. Tables 6 and 7 also report the results of the regressions for medium-size and small banks using the past performance benchmark. The results are very close to those reported in tables 3 and 4 when underperformance is benchmarked against peers, which suggests that banks consider both peers and past performance in determining their reaction to underperformance. Also, like the results reported in tables 3 and 4, medium-size and small banks target higher equity capital following underperformance with a coefficient of 14.456 and 11.591 for the underperformance variable, respectively, at a 1% significance level. Also, like the analysis in the previous section, we find that the coefficient of underperformance for the *ChgLCon* corresponding to medium-size banks and for the *ChgDLLP* corresponding to small banks to be significant at the 10% level only with coefficients of 12.828 (table 6) and 216.912 (table 7), respectively.

TABLE 6 Impact of Underperformance vs. Past Performance on the Structure of Medium-size Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) ChgDLLP	(5) *ChgNDLLP*
Underperformance_Past	12.828*	0.784	14.456***	220.851	−163.593
	(7.339)	(6.072)	(4.582)	(152.527)	(165.396)
Cost_Income_Ratio	−0.232**	−0.023	−0.235***	−3.455	2.232
	(0.107)	(0.086)	(0.067)	(2.120)	(2.309)
HH_index	0.000	−0.000	0.000	0.008*	0.002
	(0.000)	(0.000)	(0.000)	(0.005)	(0.005)
ST_interest	0.578***	0.607***	0.281**	10.035***	1.397
	(0.173)	(0.158)	(0.118)	(3.207)	(4.194)
LT_interest	0.886**	−0.585*	−0.507**	−17.658**	2.649
	(0.401)	(0.322)	(0.227)	(7.096)	(8.342)
Inflation	−0.498***	0.272*	−0.365***	1.713	4.163
	(0.181)	(0.152)	(0.109)	(3.402)	(4.500)
Constant	5.317	12.821**	20.087***	156.280	−212.216
	(7.592)	(6.240)	(4.773)	(151.986)	(167.157)
First stage: Financial crisis instrument	0.078***	0.079***	0.078***	0.078***	0.078***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	23,982	23,936	23,662	23,982	23,982
Number of rssd9001	1,181	1,178	1,175	1,181	1,181
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0	0	0	0.0153	0.000631

This table reports the results of the panel regressions for the 1996–2014 period using a sample of medium-size banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance relative to the past performance in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), and the 10-year interest rate (*LT_interest*), and the inflation rate (Inflation). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

Moreover, the F test for the overall significance of the *ChgNDLLP* for small banks is insignificant. Hence, the results for both benchmarks of relative performance indicate that large banks mainly target a change in off-balance sheet liquidity creation (consistent with H1) and medium-size and small banks target higher equity capital (consistent with H2B).

An important conclusion that we can draw from this section is that the underperformance relative to peers appears to be unrelated to overperformance of peers since the results when banks underperform relative to their past performance is very close to the results reported in section 5.1 when our performance benchmark is the peers. Hence, the evidence suggests that the bank's deteriorating performance is not due to the improvement in the performance of other banks.

TABLE 7 Impact of Underperformance vs. Past Performance on the Structure of Small Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_Past	4.733	6.218	11.591***	216.912*	−405.974***
	(4.240)	(3.998)	(2.332)	(114.153)	(125.228)
Cost_Income_Ratio	−0.094	−0.109*	−0.247***	−4.000**	6.702***
	(0.065)	(0.066)	(0.040)	(1.869)	(2.070)
HH_index	−0.000	0.000	−0.000	−0.009*	0.004
	(0.000)	(0.000)	(0.000)	(0.005)	(0.006)
ST_interest	0.185	0.423***	0.397***	2.423	−11.690**
	(0.137)	(0.152)	(0.082)	(3.859)	(4.782)
LT_interest	0.248	−1.318***	−0.386***	−18.410***	6.806
	(0.316)	(0.300)	(0.144)	(6.631)	(8.439)
Inflation	−0.159	0.166	−0.401***	−1.274	4.483
	(0.134)	(0.138)	(0.078)	(3.477)	(4.113)
Constant	8.180	21.387***	15.478***	272.641**	−315.381**
	(5.201)	(4.525)	(2.616)	(121.872)	(139.318)
First stage: Financial crisis instrument	0.115***	0.114***	0.114***	0.115***	0.115***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	23,433	23,423	22,933	23,433	23,433
Number of rssd9001	1,633	1,632	1,613	1,633	1,633
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0	0.102	0	0	0.427

This table reports the results of the panel regressions for the 1996–2014 period using a sample of small banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance relative to the past performance in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

5.3 | Impact of Persistence of Underperformance Relative to Peers on the Structure of Banks

Management of banks might react slowly to underperformance in a specific quarter while waiting to see if underperformance persists for several quarters. To test if this possibility affects our results, we use a relative underperformance benchmark in model (1) (Underperformance_PeerPersistence) that measures the number of consecutive quarters with underperformance relative to peers.

Tables 8,9, and 10, show that the F-test for overall significance is insignificant for most of the regressions and the Underperformance_PeerPersistence coefficient is insignificant when the F test for overall significance is significant.

TABLE 8 Impact of Underperformance Persistence vs. Peers on the Structure of Large Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_PeerPersistence	−3.405	19.898	3.181	−25.561	4.066
	(11.440)	(12.981)	(5.933)	(89.914)	(136.868)
Cost_Income_Ratio	0.286	−1.830	−0.261	2.522	−0.423
	(1.042)	(1.193)	(0.524)	(8.218)	(12.446)
HH_index	−0.002	0.007	0.001	−0.007	0.000
	(0.004)	(0.006)	(0.002)	(0.033)	(0.050)
ST_interest	0.850	−1.710	−0.466	11.598	6.306
	(0.948)	(1.082)	(0.477)	(7.272)	(11.588)
LT_interest	1.855**	−0.591	0.338	3.931	0.139
	(0.774)	(0.797)	(0.348)	(6.333)	(9.674)
Inflation	−0.395	0.309	−0.027	−1.979	3.839
	(0.271)	(0.289)	(0.142)	(2.504)	(4.035)
Constant	−26.023	186.420*	28.068	−437.467	−219.391
	(62.270)	(112.593)	(51.006)	(491.281)	(746.967)
First stage: Financial crisis instrument	0.088**	0.083**	0.088**	0.088**	0.088**
	(0.038)	(2.17)	(0.038)	(0.038)	(0.038)
Observations	16,388	16,336	16,191	16,388	16,388
Number of rssd9001	585	582	580	585	585
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	1	1	0.466	0.00728	0.00130

This table reports the results of the panel regressions for the 1996–2014 period using a sample of large banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance persistence relative to peers in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

This indicates that banks consider the impact of underperformance on their bank structure before waiting for evidence of underperformance persistence. Thus, banks dynamically manage their liquidity creation, capital, and loan loss provisions while responding to the early evidence of underperformance.

5.4 | Impact of Underperformance Relative to Peers on Structure of Banks with a Cost of Funds Control

Our final test is to examine the entire sample without bank-size delineation. Recent research shows that following interstate and intrastate deregulations, the banking industry has benefited from economies of scale for the cost

TABLE 9 Impact of Underperformance Persistence vs. Peers on the Structure of Medium-size Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_PeerPersistence	6.892	0.434	7.903**	118.648	−87.887
	(4.413)	(3.365)	(3.337)	(87.138)	(91.243)
Cost_Income_Ratio	−0.720*	−0.054	−0.777**	−11.850	8.451
	(0.408)	(0.324)	(0.304)	(8.466)	(8.689)
HH_index	0.001	−0.000	0.001	0.025	−0.010
	(0.001)	(0.001)	(0.001)	(0.022)	(0.020)
ST_interest	0.119	0.579**	−0.224	2.135	7.250
	(0.357)	(0.278)	(0.293)	(7.435)	(7.951)
LT_interest	0.827*	−0.589*	−0.589*	−18.666**	3.395
	(0.450)	(0.342)	(0.304)	(8.061)	(9.090)
Inflation	−0.331**	0.282**	−0.172*	4.599*	2.025
	(0.142)	(0.129)	(0.098)	(2.746)	(3.646)
Constant	38.171	15.248	60.152***	728.103	−632.482
	(28.102)	(24.390)	(21.828)	(572.300)	(602.296)
First stage: Financial crisis instrument	0.145***	0.145***	0.143***	0.143***	0.145***
	(0.043)	(0.043)	(0.042)	(0.041)	(0.043)
Observations	23,982	23,936	23,662	23,982	23,982
Number of rssd9001	1,181	1,178	1,175	1,181	1,181
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	1	0	1	1	0.999

This table reports the results of the panel regressions for the 1996–2014 period using a sample of medium-size banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance persistence relative to peers in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *HH*. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

of funding (e.g., Hughes and Mester, 2013). To test this possibility, we rerun model (1) after controlling for the following bank-specific variables: Bank size (*logGTA*) which is measured as the natural logarithm of gross total assets in real terms where *logGTA* is expressed in real 2014 dollars using the implicit GDP price Deflator. *logGTA* which is obtained from Christa Bouwman's website. The cost of funds (*Cost_Funds*): measured as the interest expenses on deposits (riad 4170) divided by the sum of total deposits (rcfd 2200).[10] An interaction term between bank size and the cost of funds (*logGTA x Cost_Funds*) which is used to capture the impact of a Bank's economies of scale.

[10] Alternatively, we used the cost of borrowing measured as interest expenses on deposits and interest expenses on fed funds(riad 4170+ riad 4180) divided by the sum of total deposits and the fed funds purchased (rcfd 2200+ rcfd 2800). Our findings are robust.

TABLE 10 Impact of Underperformance Persistence vs. Peers on the Structure of Small Banks

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_PeerPersistence	2.089	2.758	5.150***	95.739*	−179.185***
	(1.914)	(1.784)	(1.252)	(53.189)	(59.993)
Cost_Income_Ratio	−0.272	−0.344	−0.680***	−12.152*	21.959***
	(0.223)	(0.217)	(0.149)	(6.413)	(7.131)
HH_index	−0.000	−0.000	−0.000	−0.014	0.012
	(0.000)	(0.000)	(0.001)	(0.016)	(0.028)
ST_interest	0.008	0.189	−0.033	−5.693	3.500
	(0.175)	(0.207)	(0.143)	(5.758)	(6.821)
LT_interest	0.320	−1.220***	−0.217	−15.093**	0.597
	(0.283)	(0.280)	(0.151)	(6.198)	(8.171)
Inflation	−0.106	0.235*	−0.273***	1.153	−0.059
	(0.115)	(0.123)	(0.069)	(3.019)	(3.733)
Constant	22.306	39.872**	49.439***	910.973*	−1,514.304***
	(17.235)	(16.194)	(11.460)	(476.542)	(553.693)
First stage: Financial crisis instrument	0.259***	0.258***	0.257***	0.259***	0.259***
	(0.043)	(0.043)	(0.042)	(0.043)	(0.043)
Observations	23,433	23,423	22,933	23,433	23,433
Number of rssd9001	1,633	1,632	1,613	1,633	1,633
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0	0.930	1	0.976	1

This table reports the results of the panel regressions for the 1996–2014 period using a sample of small banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance persistence relative to peers in columns (1) to (5), respectively. The models include a firm-specific control variable, the cost income ratio (*Cost_Income_Ratio*), an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except HH. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

We report the findings in table 11. Interestingly, the results support our four hypotheses.[11] As predicted by H1, banks tend to increase their on-balance sheet liquidity creation following underperformance with underperformance coefficients of 9.407 and 7.738 significant at the 5% level for the *ChgLCon* and *ChgLCoff* regressions, respectively. This supports previous findings that bank profitability increases when banks produce *LC* (Goddard et al., 2011; Molyneux & Thornton, 1992). These findings are consistent with our previous findings reported in section 5.1 that large banks resort to an increase in off-balance sheet activities following underperformance. Our results also support H2B by finding that controlling for the cost of funds, banks tend to increase their equity capital following underperformance (underperformance coefficient of 9.912; significant at the 1% level). As we argued previously in section 5.1, this is

[11] The results are robust when defining underperformance as underperformance relative to the median of the past performance over the last four quarters.

TABLE 11 Impact of Underperformance vs. peers on the Structure of Banks Controlling for the Cost of Funds

VARIABLES	(1) *ChgLCon*	(2) *ChgLCoff*	(3) *ChgEqC*	(4) *ChgDLLP*	(5) *ChgNDLLP*
Underperformance_Peer	9.407**	7.738**	9.588***	116.645*	−193.309**
	(3.788)	(3.072)	(2.064)	(65.942)	(75.084)
Costfunds	−0.957	1.303	1.789***	7.911	17.317
	(1.487)	(0.937)	(0.659)	(17.033)	(22.073)
logGTA	−6.095***	−5.533***	−5.820***	4.156	31.285***
	(0.688)	(0.524)	(0.425)	(10.033)	(11.510)
logGTA x Costfunds	0.031	−0.120**	−0.123***	−0.201	−1.102
	(0.097)	(0.060)	(0.043)	(1.055)	(1.409)
Cost_Income_Ratio	−0.227***	−0.178***	−0.202***	−1.780*	2.912***
	(0.057)	(0.046)	(0.033)	(0.975)	(1.117)
HH_index	0.000	−0.000	−0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)
ST_interest	0.041	0.200	0.042	5.737**	4.187
	(0.162)	(0.135)	(0.090)	(2.736)	(3.316)
LT_interest	2.161***	−0.401	0.037	−11.463**	−9.714
	(0.374)	(0.257)	(0.166)	(4.986)	(6.093)
Inflation	−0.333***	0.305***	−0.267***	2.172	1.128
	(0.109)	(0.088)	(0.058)	(1.818)	(2.367)
Constant	77.393***	98.371***	90.398***	82.206	−477.477**
	(12.039)	(9.359)	(7.445)	(182.920)	(213.147)
	(3.705)	(3.219)	(2.537)	(68.706)	(69.420)
First stage: Financial crisis instrument	0.101***	0.101***	0.101***	0.101***	0.101***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Observations	51,845	51,740	51,845	51,845	51,845
Number of rssd9001	2,120	2,115	2,120	2,120	2,120
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Prob > F	0	0	0	0	0

This table reports the results of the panel regressions for the 1996–2014 period using the entire sample of large, medium-size, and small banks. The models regress the change in on-balance balance sheet liquidity creation (*ChgLCon*), change in off-balance sheet liquidity creation (*ChgLCoff*), change in equity capital (*ChgEqC*), change in discretionary loan loss provisions (*ChgDLLP*), and change in non-discretionary loan loss provisions (*ChgNDLLP*) on the lagged underperformance persistence relative to peers in columns (1) to (5), respectively. The models include firm-specific control variables: the cost income ratio (*Cost_Income_Ratio*), the cost of funds (*Cost_Funds*), and size (*GTA*). The model also includes an industry control variable, the Herfindahl-Hirschman Index (*HH*), and macroeconomic control variables: the 90-day interest rate (*ST_interest*), the 10-year interest rate (*LT_interest*), and the inflation rate (*Inflation*). All independent variables are lagged one period and are in percent except *H*H. Standard errors are clustered at the bank level. P-values are reported in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

consistent with the conjecture that medium-size and small banks seek to increase their equity capital to become safer following underperformance. Furthermore, we find weak support for H3 that states that banks tend to send good news signals to investors about the ability of their expected earnings to absorb additional provisions (Beaver & Engel, 1996; Curcio & Hasan, 2015) following underperformance by increasing their *DLLP* (coefficient of *ChgDLLP* of 116.645; significant at the 10% level only). Finally, we find strong support for H4 as the coefficient of underperformance in the *ChgNDLLP* regressions is -193.309 with a 5% significance level, which implies that the underperformance of banks triggers an increase in loan quality.

6 | CONCLUSION

In this paper, we investigate the impact of bank underperformance on its liquidity creation (*LC*), equity capital, and loan loss provision structures. Since *LC* relies on the synergy between the asset and liability sides of the balance sheet, using this measure in our analysis is more efficient and informative than using an asset-side measure such as loans or a liability-side measure such as deposits to investigate profitability determinants. Furthermore, this measure captures off-balance sheet activities and the liquidity of the balance sheet. Our findings show that underperformance leads to higher *LCon* and *LCoff* levels in the subsequent period. When segregating the samples by size, we find that the dependence of banks on off-balance sheet *LC* activities to generate returns outweighs that of on-balance sheet activities as banks become larger. Thus, large banks mainly target higher off-balance sheet *LC*s following underperformance with high significance level while medium-size banks target a higher level of *LCon* with a weak significance level. We also find that small and medium-size banks tend to increase their equity capital following underperformance when their ability to generate internal funds diminishes.

Also, we show that all banks improve the quality of their loans following underperformance, which leads to lower non-discretionary loan loss provisions in the period following underperformance. Banks respond to underperformance by increasing their discretionary loan loss provision component, which implies that banks send a signal to investors of the ability of their expected earnings to overcome current underperformance.

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