Earnings Management and Bank Liquidity Creation in an Emerging Market

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Abstract: This paper empirically examines the impact of bank earnings opacity on liquidity creation. Using a sample of commercial banks in Vietnam from 2007 to 2019, we find that more opaque banks tend to reduce liquidity creation growth. We further offer sharp evidence that the impact of earnings management on bank liquidity creation depends on bank-specific characteristics. More precisely, the negative impact of bank earnings management on banks' core function is stronger for banks that are more poorly capitalised, less liquid, smaller and less profitable. With these findings, our work display implications on the supply-side effect (i.e., the limited access to funding of financially weak banks).

Keywords: Bank funding, bank opacity, earnings management, liquidity creation
JEL classification: G21, G28

1. Introduction

For the past decades, especially since the 2008 global financial crisis, bank opacity has become an essential but controversial issue in the banking literature. Bank opacity implies a lack of bank information accessible to outsiders or insufficient informativeness in bank financial disclosure, making outsiders fail to evaluate the true quality of bank assets and valuation (Flannery et al., 2004). A vast strand of research has emerged on the link between opacity and bank risk-taking, valuation and financial stability. Some authors provide reasons why banks should inherently keep opaque, such as to produce money more efficiently (Dang et al., 2017). Nevertheless, many works suggest that banks should operate in a transparent manner due to the negative impacts associated with bank opacity. For example, bank opacity may reduce bank valuation (Jones et al., 2013), increase bank risk (Cao & Juelsrud, 2022; Fosu et al., 2017), mitigate the efficiency of financial markets (Blau et al., 2017), and cause more financial instability of the banking sector (Tran et al., 2022).

This paper extends the current literature stand by exploring a channel through which bank opacity may hurt the real economy via bank liquidity creation. Liquidity creation is the core function of banks. It occurs when banks transform liquid liabilities into illiquid assets on the balance sheet (Diamond & Dybvig, 1983) or supply loan

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commitments and similar claims off the balance sheet (Kashyap et al., 2002). Theoretically, liquidity creation by banks offer multiple vital economic and financial activities, such as granting loans, affording payment assistance (Kashyap et al., 2002), organising investments and hedging financial risks (Boot et al., 1993). Empirically, bank liquidity creation is suggested to fuel economic growth (Berger & Sedunov, 2017). It is affirmed that bank lending on the asset side is not an optimal proxy of bank output, so one should pay further attention to the nature of the liability and off-balance sheet sides by looking into bank liquidity creation (Berger & Bouwman, 2009; Davydov et al., 2018).

We carry out the research using the procedure of Berger and Bouwman (2009) to comprehensively quantify bank liquidity creation that covers all asset-, liability- and off-balance sheet banking items. Building on the seminal work of Berger and Bouwman (2009), many studies have explored the relationship between bank liquidity creation and a rich set of bank-specific and market factors (see recent works by Evans and Haq (2022), and Guo and Zhang (2023) for the most updated reviews). We employ discretionary loan loss provisions as our bank opacity proxy from the perspective of bank earnings management in this paper. Loan loss provisions reveal information asymmetry since the volumes reported rely on bank managers' judgment, thus showing bank earnings management practice. Various prior banking studies have used discretionary loan loss provisions (the residuals from loan loss provision models) as a measure of bank opacity while dealing with different research questions (Desalegn & Zhu, 2021; Tran et al., 2019; Zheng, 2020).

Beyond exploring whether there is a significant impact of bank opacity on liquidity creation, we further provide more insights regarding how bank opacity drives liquidity creation. We do this by extending our model setup by adding interaction terms between bank opacity and various moderating factors from bank-specific variables (i.e., bank capital, liquidity positions, bank size, bank risk and return). Extending our investigation in this way could help detect whether the linkage between bank opacity and bank liquidity creation is attributable to banks' own decisions on the supply side.

We consider the Vietnamese banking system for our research and utilise financial data from Vietnamese commercial banks from 2007 to 2019. The banking sector has continually played a dominant part in Vietnam's financial system, in the context that the capital market has still been far from the maturity level, thus highlighting the importance of commercial banks as primary liquidity providers for the economy (Dang & Huynh, 2022). Nevertheless, the transparency of the Vietnamese banking system causes a major concern since the level of opacity has been regarded to be even higher than other emerging markets (Dang & Huynh, 2023). For the past decade, banking regulators have commanded individual banks to upgrade their banking management to international standards. Despite the efforts, the banking sector in Vietnam has only implemented the Basel II standards, leaving the transparency practice as mentioned in Basel III rarely discussed. Regarding tremendous reforms in the banking sector, especially after Vietnam joined the World Trade Organization in 2007, they have considerably transformed the entire banking system in Vietnam, including significant changes in business models, risk appetite and balance sheets (Nguyen et al., 2016). The modification of bank operations makes Vietnam an ideal laboratory for examining how bank-specific factors moderate the impact of bank opacity on liquidity creation.

We are aware of a closely related paper by Haq et al. (2019) that shares a similar topic. The prior authors examined the link between discretionary loan loss provisions and banks' core function and documented that earning management via discretionary loan loss provisions tended to hamper bank liquidity creation. Our paper is different from theirs in multiple dimensions. First, they utilised the data of US banks while we focus on banks in Vietnam – an emerging market. Due to differences in regulatory backgrounds and market features between emerging and developed countries, implications of the prior study could not necessarily work for emerging markets. Second, Haq et al. (2019) only considered the single "cat fat" measure for their analysis, while in our effort to offer better insight, we not only include the total liquidity creation captured by the "cat fat" measure but also the on-balance sheet liquidity creation reflected by the "cat nonfat" measure. These two liquidity creation measures were preferred by Berger and Bouwman (2009) to adequately display banks' ability to create liquidity in the real sectors. Third, the analytical framework in Haq et al. (2019) neglected the persistent nature of bank liquidity creation, while our work allows for this nature by using the dynamic panel model. As widely demonstrated in the literature, bank liquidity creation behaviour is dynamic and highly driven by the previous period's behaviour (Davydov et al., 2018; Evans & Haq, 2022). By considering both static and dynamic panel models, our analytical framework is expected to be more comprehensive than that of Haq et al. (2019). Fourth, most importantly, the prior authors only pay attention to the prelude link between bank opacity and liquidity creation but fail to further discuss how this link varies across different banks. In this paper, we try to provide more insights regarding how bank opacity drives liquidity creation by exploring how bank-specific factors moderate this impact.

This paper introduces some contributions to the existing literature. It offers a comprehensive analysis of the impact of bank earnings opacity on liquidity creation from an emerging market perspective. Focusing on banks' core function, we explore an essential channel through which bank opacity affects the real economy. In doing this, we also contribute to two growing strands of literature on bank opacity and bank liquidity creation. Notably, we complement the work of Haq et al. (2019) that exhibited a simple relationship between bank opacity and liquidity creation for US banks. More importantly, we try to deepen our contribution by investigating whether and how the link between earnings opacity and banks' core function is conditional on bank-specific characteristics. Hence, we could reveal numerous new insights into the nature of the effect found on the supply side. This issue has been completely ignored in the extant literature. In this vein, we also enrich the interesting literature strand referring to how differences in financial strength affect bank behaviours (Kashyap & Stein, 1995; Kishan & Opiela, 2006).

2. Related Literature

Although the analyses for the influences of opacity on bank operations vary across multiple dimensions, one common line centres around the argument related to bank funding. Theory suggests that opacity in intermediation activities yields uncertainty

to outsiders about the risk exposure of banks (Berlin & Loeys, 1988). In this situation, outsiders typically assume that opaque banks are of high risk. As a consequence, these opaque banks face higher costs of financing compared to transparent banks. Higher funding costs may incentivise banks to enhance risk-taking strategies (Fosu et al., 2017). Accordingly, banks may choose to invest more in risky assets (such as loans, instead of liquid assets) and risky off-balance-sheet commitments (such as loan guarantees, instead of derivative contracts). In a sense, an optimal strategy with maximum risk-taking due to high opacity could lead banks to create more liquidity.

However, an alternative competing hypothesis may dominate. Because bank opacity may weaken market disciplines and outside monitoring, it is challenging for fund suppliers (as outsiders) to assess the true quality of assets at funds-receiving banks. This challenge may raise outsiders' great concerns about the financial position of their banks, leading outsiders to withdraw their funds or cancel the supply of additional funds. Based on this mechanism, a high level of bank opacity is more likely to limit banks' access to funds (Huang & Ratnovski, 2011). Due to the limited availability of funds, banks may experience decreases in lending activities and loan commitments (Kashyap et al., 2002). Overall, it could be expected that bank opacity is associated with a reduction in bank liquidity creation, mainly due to a shortage of funds.

Our above arguments indicate that the relationship between bank opacity and liquidity creation is mixed. Moreover, though the literature has been absent on testing further conditions for the effect of bank earnings opacity on liquidity creation, it still delivers suggestions that the heterogeneity of this effect could be attributable to bank-specific characteristics. The banking literature has well established that the responses of liquidity creation activities or bank lending (as the key component of bank liquidity creation) to internal and external shocks may vary across heterogeneous banks. For example, Kashyap and Stein (1995) and Kishan and Opiela (2006) adopted an identification strategy to anatomise the bank lending channel of monetary policy pass-through and indicate that banks' financial strength (traditionally measured by bank size, liquidity and capital) could modify how bank lending reacts to monetary policy shocks. More broadly focussing on the bank liquidity creation channel of monetary policy, Dang and Dang (2021) found the conditional effects of monetary policy on bank liquidity creation according to bank size and liquid assets. In a related paper, Zheng (2020) documented that the adverse impact of bank opacity on lending is mitigated for better-capitalised banks.

Motivated by prior research, our theoretical prediction that needs to be tested is that if the financial opacity detrimentally influences the capacity of outsiders to evaluate banks properly, potentially resulting in a lack of funding supply, then whether this mechanism would be amplified at weaker banks that have difficulties gaining funds or not. Going a step further than these existing papers, we employ a rich set of bank-level factors while analysing the heterogeneity across banks in the link between bank earnings management and liquidity creation. Our variables range from traditional indicators (including bank capital, liquidity and bank size) to better-informed measures that can adequately and accurately evaluate banks' capacity and willingness to expand banking activities (namely, bank return and bank risk) (Altunbas et al., 2010).

3. Methodology and Data

3.1 Variables

3.1.1 Bank Opacity

Bank managers utilise loan loss provisions as the largest and most essential accruals in the process of managing earnings or evading the requirement of a capital buffer. So, discretionary loan loss provisions are a widely accepted factor in evaluating the financial disclosure informativeness of banks (Desalegn & Zhu, 2021; Tran et al., 2019; Zheng, 2020). To determine discretionary loan loss provisions, we design a regression model with loan loss provisions as the dependent variable and a rich set of bank-level characteristics and macroeconomic factors as independent variables, in particular with the main concentration on the differences in non-performing loans:

$$LLP_{i,t} = \alpha_0 + \alpha_1 \times \Delta NPL_{i,t+1} + \alpha_2 \times \Delta NPL_{i,t} + \alpha_3 \times \Delta NPL_{i,t-1} + \alpha_4 \times Size_{i,t-1} + \alpha_5 \times \Delta Loan_{i,t} + \alpha_6 \times \Delta GDP_t + \alpha_7 \times Unemploy_t + \varepsilon_{i,t} \quad (1)$$

The dependent variable $LLP_{i,t}$ is loan loss provisions as a share of lagged total loans. $\Delta NPL_{i,t}$ is the change in non-performing loans over the year, divided by total loans at the beginning of the year. Following Tran et al. (2019), we consider the changes in non-performing loans in the current year, the next year and the previous year; we do not allow for the inclusion of the $\Delta NPL_{i,t+2}$, which is costly in eliminating many observations. $Size_{i,t-1}$ is the natural logarithm of total assets in year t–1. $\Delta Loan_{i,t}$ is the change in total loans, scaled by total assets in the last year. Following Desalegn and Zhu (2021), we include two macro variables: ΔGDP_t indicates the change in the gross domestic product, and $\Delta Unemploy_t$ displays the change in unemployment rates. The residuals $\varepsilon_{i,t}$ derived from Equation (1) represent the discretionary elements of loan loss provisions, hence their absolute values could be used to gauge the disclosure of bank financial information and thus bank earning opacity.

3.1.2 Bank Liquidity Creation

We estimate bank liquidity creation using the three-step procedure suggested by Berger and Bouwman (2009). This procedure is utilised by almost every recent paper focussing on this core function of banks. We concisely introduce these three steps as follows. In step 1, we classify all on- and off-balance sheet items as liquid, semiliquid, or illiquid. The classification mechanism is based on the ease, cost and time for customers to gain liquid funds from banks, and the ease, cost and time for banks to dispose of their obligations to meet liquidity demands. In step 2, we allocate appropriate weights to all categorised items according to the following approach: (i) we apply positive weights to the classes of illiquid assets and liquid liabilities, assigning a value of +0.5 to each given the principle that one unit of liquidity is generated when a unit of liquid liabilities is used to fund a unit of illiquid assets, (ii) we assign negative weights to liquid assets, illiquid liabilities and equity, designating a value of –0.5 to each given that one unit of liquidity is depleted when one unit of illiquid liabilities or equity is employed to support a unit of liquid assets, and (iii) weights assigned for off-balance sheet items are

manipulated with the equivalent rule. Finally, in step 3, we merge the first two steps and calculate bank liquidity creation as follows:

$$\textit{Liquidity creation} = 0.5\times(\textit{Illiquid assets} + \textit{Liquid liabilities} + \textit{Illiquid off-balance sheet guarantees}) - 0.5\times(\textit{Liquid assets} + \textit{Illiquid liabilities and equity} + \textit{Liquid off-balance sheet guarantees}) \quad (2)$$

When proposing bank liquidity creation measures, Berger and Bouwman (2009) look into the maturity or category of loans ("mat" or "cat", respectively), with the inclusion or exclusion of off-balance sheet items ("fat" or "nonfat", respectively). The prior authors prefer two category-based measures of "cat fat" and "cat nonfat" in their empirical work, which capture total and on-balance-sheet liquidity creation, since they adequately indicate banks' ability to produce liquidity to the economy. Motivated by this fact, along with another fact that we cannot gain necessary information from the "mat" strategy, we select two liquidity creation measures of "cat fat" and "cat nonfat" in this paper. It is worth a note that the above-presented equation displays the "cat fat" estimation, and we need to drop all off-balance-sheet items to establish the "cat nonfat" measure. We show in Table 1 the classified items with their corresponding weights.

Table 1. Liquidity creation calculation

Illiquid assets (0.5)	*Liquid assets* (–0.5)
Corporate loans	Total securities
Consumer/Retail loans	Cash and due from other institutions
Other assets	
Liquid liabilities (0.5)	*Illiquid liabilities and equity* (–0.5)
Customer deposits	Other liabilities
Trading liabilities	Equity
Illiquid guarantees (0.5)	*Liquid guarantees* (–0.5)
Commitments of loan guarantee	All derivatives
Letters of credit commitments	

3.1.3 Control Variables

As suggested by the rich literature on the determinants of bank liquidity creation, we further add into our model some key control variables that could better explain banks' core functions. Normally, it is argued that larger banks should enjoy larger expansion in banking activities (Kashyap & Stein, 2000); thus, we control bank size. Next, we consider bank capitalisation because a larger buffer of capital may facilitate banks to absorb risks better, thus motivating them to take more risks and create more liquidity (Koehn & Santomero, 1980). We also control for liquidity positions as motivated by the stylised evidence that the more liquid assets banks hoard, the more likely banks can finance their future investments (Gennaioli et al., 2014). This implies that banks can create more liquidity, and we expect the variable of liquidity positions to be positively associated with bank liquidity creation. Additionally, it is generally accepted that bank

risk and return may influence bank activity strategies as well. More specifically, more risky banks are more reluctant to expand their operations (Altunbas et al., 2010), and less profitable banks tend to "search for yield" by creating more liquidity to improve their current business outcomes (Dell'Ariccia et al., 2014).

Besides bank-specific control variables, we also allow in our empirical model some macroeconomic factors, including economic cycles and monetary policy. Regarding economic cycles, we expect that economic upturns may potentially encourage bank operations in general and thereby enhance bank liquidity creation in particular (Davydov et al., 2018). For monetary policy, we argue that relaxing monetary policy via lower interest rates could lead to an increase in both on and off-balance sheet liquidity creation, in line with the "bank liquidity creation channel" of monetary policy pass-through (Berger & Bouwman, 2017).

3.2 Empirical Model

We specify the following model to investigate the relationship between bank opacity and liquidity creation:

$$Liquidity\ creation_{i,t} = \alpha_0 + \alpha_1 \times Opacity_{i,t-1} + \alpha_2 \times Bank_{i,t-1} + \alpha_3 \times Macro_{t-1} + \varepsilon_{i,t} \quad (3)$$

where *i* and *t* illustrate banks and years, respectively. The dependent variable is captured by the annual percentage change of the two liquidity creation "cat fat" and "cat nonfat" measures. The independent variable of interest $Opacity_{i,t-1}$ is proxied via loan loss provision regressions as described in subsection 3.1.1. $Bank_{i,t-1}$ is a vector of bank-level control variables, and $Macro_{t-1}$ is a matrix of macroeconomic factors, as defined in detail in Table 2. $\varepsilon_{i,t}$ is the error term. Using one-lag independent variables in our regressions reflects that bank liquidity creation behaviour is mainly explained by previous shocks (banks cannot react instantly to current shocks). Moreover, the potential reserve causality should be mitigated.

We also conduct further analyses to unveil the potential underlying mechanisms behind our main finding. Accordingly, we augment our baseline specification by inserting the interaction terms of bank opacity and various modifying bank-level factors ($Moderator_{i,t-1}$). Hence, the extended model is written as follows:

$$\begin{aligned} Liquidity\ creation_{i,t} = {} & \alpha_0 + \alpha_1 \times Opacity_{i,t-1} + \alpha_2 \times Opacity_{i,t-1} \times Moderator_{i,t-1} + \\ & \alpha_3 \times Moderator_{i,t-1} + \alpha_4 \times Control_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

The coefficients on the interaction terms could reveal the conditionality for the bank opacity–bank liquidity creation nexus, in other words, whether the nexus between bank opacity and liquidity creation is stronger for certain moments in the data, thereby shedding some further light on how opacity affects bank liquidity creation. Accordingly, our modifying bank-level factors ($Moderator_{i,t-1}$) include bank capital, liquidity, size, return and risk profiles.

Our models are estimated by fixed effect regressions (as suggested by the Hausman test) with corrected Driscoll-Kraay standard errors (Hoechle, 2007). It should be reminded that our approach with fixed effect regressions may be biased since we cannot fully control potential endogeneity sources, such as measurement errors

Table 2. Summary statistics

	Mean	SD	Min	Max	Observations	Definitions
LC*catfat*	23.461	55.769	–114.788	177.555	359	Growth rate of total liquidity creation based on the "cat fat" measure (%)
LC*catnonfat*	24.761	48.076	–101.742	151.069	359	Growth rate of on-balance-sheet liquidity creation based on the "cat nonfat" measure (%)
Opacity	0.006	0.005	0.000	0.017	322	Bank earnings opacity measure according to the estimation procedures described in subsection 3.1.1
Capital	9.930	4.551	4.747	21.951	383	Ratio of equity to total assets (%)
Liquidity	17.214	9.444	5.271	38.376	383	Ratio of liquid assets to total assets (%)
Size	32.011	1.232	29.952	34.405	383	Natural logarithm of total assets
Return	1.562	0.841	0.222	3.478	383	Ratio of returns to total assets (%)
Risk	2.178	1.251	0.438	5.661	383	Ratio of non-performing loans to gross loans (%)
Policy rates	8.021	2.536	6.000	15.000	383	Refinancing rates by the central bank (%)
Economic growth	6.245	0.640	5.247	7.130	383	Growth rate of GDP (%)

or omitted variables. Hence, to overcome this problem and allow for the persistent properties of bank liquidity creation, we insert the lagged dependent variable as a regressor in the right-hand side of the model equation and then utilise the two-step system generalized method of moments (GMM) estimator (Blundell & Bond, 1998). To perform this dynamic estimator with our present panel more effectively, we restrict the number of instruments created via collapse options and apply corrected standard errors for small samples (Roodman, 2009).

3.3 Data

Our data come from the annual financial reports of commercial banks in Vietnam. If a bank publishes its financial data for less than five consecutive years, we eliminate it. Due to data accessibility, our unbalanced panel data contain 31 banks with a total amount of 383 observations between 2007 and 2019. In any sample year, the total assets of the bank sample account for about 90% of the total banking sector assets, thus making our sample a good representative of the Vietnamese banking system. Besides, the data of macroeconomic variables are gathered from the State Bank of Vietnam and the World Bank database.

4. Results

4.1 Baseline Results

We report the estimation results of the baseline model in Table 3, using both LC*catfat* and LC*catnonfat* as the dependent variables. We perform regressions by both fixed effect and dynamic GMM estimations, where we first control only bank-level characteristics, and then we expand our specification with the inclusion of macro-economic factors.

Across all columns, we find that bank opacity produces a significantly negative coefficient, suggesting that greater bank opacity reduces bank liquidity creation. It is worth noticing that the significant coefficients on bank opacity remain unaltered throughout the specifications of both static and dynamic models with alternative liquidity creation measures, showing the negative impact of bank earnings management on liquidity creation is quite robust. The economic effect of bank opacity is also significant. For example, a one standard deviation increase in the bank opacity measure (0.005) may lead to a decrease of 15.423 percentage points in total liquidity creation (3,084.696∗0.005, column 1) or 9.053 percentage points in on-balance sheet liquidity creation (1,810.562∗0.005, column 5). This represents plausible changes given the means and standard deviations of the LC*catfat* and LC*catnonfat* variables. The magnitudes of other coefficients in the remaining columns slightly change but constantly highlight the significant economic patterns. Overall, as banks manipulate earnings, it appears that they are more likely to reduce the liquidity creation growth. Our result confirms the work of Haq et al. (2019) that reveals the adverse impact of earning manipulation by discretionary loan loss provision on liquidity creation for US banks.

Table 3. Baseline results

	Dependent variable: LC*catfat*				Dependent variable: LC*catnonfat*			
	Fixed effect regressions (columns 1–2)		Two-step system GMM (columns 3–4)		Fixed effect regressions (columns 5–6)		Two-step system GMM (columns 7–8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged dependent variable			0.097***	0.077***			0.177***	0.172***
			(0.016)	(0.016)			(0.011)	(0.010)
Opacity	–3,084.696***	–2,755.593***	–1,753.163***	–1,475.108***	–1,810.562**	–1,729.280**	–900.846***	–696.597***
	(684.411)	(689.659)	(198.249)	(236.329)	(572.688)	(628.668)	(240.947)	(217.208)
Capital	–2.291**	–2.240**	–0.897	–1.360**	–1.927***	–1.945***	–0.371	–0.477
	(0.797)	(0.864)	(0.584)	(0.552)	(0.391)	(0.478)	(0.322)	(0.314)
Liquidity	–0.655	–0.585	1.226***	0.982***	–1.121*	–1.077*	0.868***	0.729***
	(0.495)	(0.440)	(0.115)	(0.120)	(0.509)	(0.489)	(0.134)	(0.122)
Size	–13.690***	–6.159	–0.362	–0.885	–16.817***	–12.925***	–0.927	–0.964
	(2.580)	(3.708)	(1.506)	(1.300)	(1.875)	(2.455)	(1.096)	(1.038)
Return	14.675***	12.795**	10.346***	8.545***	8.457**	8.402**	4.433***	4.217***
	(4.524)	(4.293)	(1.361)	(1.307)	(3.548)	(3.742)	(1.359)	(1.231)
Risk	3.356	0.053	9.417***	5.353**	–2.135	–3.761	7.322***	4.541*
	(3.672)	(4.209)	(1.971)	(2.285)	(2.234)	(2.207)	(1.823)	(2.600)
Policy rates		1.542*		1.799**		0.295		0.636
		(0.800)		(0.823)		(0.635)		(0.698)
Economic growth		–6.481		–2.028*		–4.889		–2.148
		(4.685)		(1.181)		(2.857)		(1.362)
Number of observations	291	291	291	291	291	291	291	291
Number of banks	31	31	31	31	31	31	31	31
R-squared	0.600	0.670			0.540	0.570		
Number of instruments			27	29			27	29
AR(1) test (p-value)			0.001	0.001			0.001	0.001
AR(2) test (p-value)			0.220	0.203			0.290	0.285
Hansen test (p-value)			0.512	0.601			0.302	0.348

Notes: ***, **, and * designate significance at the 1%, 5% and 10% levels, respectively.

4.2 Bank-specific Heterogeneity

Tables 4–8 report the results for the mediating role of bank financial strength in the link between earnings opacity and liquidity creation. The fixed effect regression and the two-step system GMM estimation are employed in the functions of both "cat fat" and "cat nonfat" liquidity creation measures. We start our discussion with the interaction term of bank opacity and bank capital in Table 4. In all regressions, the coefficient on the interaction term is positive and statistically significant. Given that the coefficient on the stand-alone bank opacity variable is still significantly negative, our result suggests that banks with larger capital buffers may adjust the liquidity creation growth less strongly to changes in earnings opacity than banks with smaller capital buffers.

Next, the impact of bank liquidity positions on the sensitivity of liquidity creation to bank financial disclosure is highlighted by the estimates reported in Table 5. Regardless of the model specifications, the interaction term is significant and positive, partially offsetting the significantly negative impact of bank opacity on liquidity creation. This finding suggests that the extent to which bank opacity drives liquidity creation growth is weaker when banks store more liquid assets. In Table 6, our results present the estimates from models that examine how the impact of bank opacity on liquidity creation relates to bank size. In most columns, we find that the consistent negative effect of bank opacity on liquidity creation is mitigated in magnitude for larger banks and strengthened in magnitude for smaller banks, as illustrated by the positive and significant coefficient of the interaction variable. Likewise, examining the conditional impacts related to bank return, Table 7 displays that the interaction term enters the regressions positively and significantly in most columns. This result implies a less pronounced impact of bank earnings management on liquidity creation growth for more profitable banks. Lastly, we observe that in some columns of Table 8, the coefficient of bank earnings opacity interacting with liquidity creation is significantly negative, showing a smaller adverse effect by bank opacity on liquidity creation at less risky banks. However, due to the low level of significance (only at 10%), our estimates lend weak support for the heterogeneous impact on different banks by the level of risk.

Overall, our identification strategy could demonstrate the differential effects across heterogeneous banks according to bank-specific characteristics. The heterogeneity in the effect of bank financial disclosure on liquidity creation sharply originates from bank capital, liquidity positions, bank size and bank return. We also reveal that the bank opacity–liquidity creation nexus depends on bank risk, but the evidence is rather weak. Through these findings, a common and consistent pattern is found: financially weaker banks (banks that are more poorly capitalised, less liquid, smaller, less profitable and riskier) tend to induce a greater detrimental impact of bank opacity on liquidity creation. This pattern is highly comparable with those exhibited in the bank lending channel literature, which posits that weaker banks become more sensitive to monetary policy shocks because of their more limited access to alternative funding (Kashyap & Stein, 1995; Kishan & Opiela, 2006). In this regard, we conjecture that the earnings opacity of banks adversely affects the ability of outsiders to accurately assess banks, potentially causing a shortage of funding supply, which should be exacerbated at financially weaker banks that face difficulties in accessing funds.

Table 4. Impact of bank opacity on liquidity creation and the moderating role of bank capital

	Dependent variable: LC*catfat*				Dependent variable: LC*catnonfat*			
	Fixed effect regressions (columns 1–2)		Two-step system GMM (columns 3–4)		Fixed effect regressions (columns 5–6)		Two-step system GMM (columns 7–8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged dependent variable			0.156***	0.135***			0.168***	0.162***
			(0.015)	(0.013)			(0.017)	(0.017)
Opacity	−5,788.819***	−5,424.120***	−1,723.055***	−1,651.134***	−4,070.569***	−3,930.687***	−894.323***	−889.546***
	(1,237.442)	(1,129.306)	(292.255)	(231.918)	(1,130.106)	(1,093.440)	(313.166)	(300.115)
Opacity∗Capital	254.577**	251.772**	63.535**	68.761**	212.766**	207.700**	64.611*	73.760**
	(91.719)	(93.391)	(29.929)	(34.026)	(78.747)	(78.022)	(37.655)	(34.686)
Capital	−3.531***	−3.460***	−3.558**	−4.982***	−2.963***	−2.952***	−2.512***	−3.288***
	(0.975)	(0.969)	(1.441)	(1.316)	(0.561)	(0.595)	(0.917)	(0.832)
Liquidity	−0.770	−0.700	1.171***	0.860***	−1.217**	−1.173**	0.902***	0.718***
	(0.501)	(0.438)	(0.201)	(0.173)	(0.516)	(0.492)	(0.186)	(0.151)
Size	−14.574***	−7.202*	−8.514**	−11.894***	−17.556***	−13.785***	−5.811**	−7.942***
	(2.697)	(3.781)	(3.794)	(3.577)	(1.976)	(2.570)	(2.536)	(2.022)
Return	15.254***	13.274**	10.752***	11.384***	8.941**	8.798**	6.124***	6.489***
	(4.653)	(4.388)	(3.089)	(2.745)	(3.723)	(3.905)	(1.757)	(1.784)
Risk	2.036	−1.190	11.075***	7.944***	−3.239	4.787*	7.243***	5.216**
	(4.295)	(4.752)	(2.440)	(2.800)	(2.182)	(2.228)	(2.098)	(2.158)
Policy rates		1.582*		0.937		0.328		0.293
		(0.845)		(0.896)		(0.686)		(0.634)
Economic growth		−6.106		−2.604		−4.580		−3.251*
		(4.384)		(1.731)		(2.575)		(1.834)
Number of observations	291	291	291	291	291	291	291	291
Number of banks	31	31	31	31	31	31	31	31
R-squared	0.663	0.732			0.604	0.630		
Number of instruments			28	30			28	30
AR(1) test (p-value)			0.001	0.000			0.001	0.001
AR(2) test (p-value)			0.229	0.199			0.221	0.201
Hansen test (p-value)			0.482	0.455			0.466	0.422

Notes: ***, ** and * designate significance at the 1%, 5% and 10% levels, respectively.

Table 5. Impact of bank opacity on liquidity creation and the moderating role of bank liquidity

	Dependent variable: LC*catfat*				Dependent variable: LC*catnonfat*			
	Fixed effect regressions (columns 1–2)		Two-step system GMM (columns 3–4)		Fixed effect regressions (columns 5–6)		Two-step system GMM (columns 7–8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged dependent variable			0.130***	0.106***			0.146***	0.131***
			(0.012)	(0.015)			(0.013)	(0.014)
Opacity	–5,888.852***	–5,649.721***	–2,485.962***	–1,793.513***	–4,112.467***	–4,240.687***	–1,676.110***	–1,489.914***
	(654.070)	(541.984)	(214.804)	(192.981)	(740.881)	(729.453)	(232.517)	(221.178)
Opacity∗Liquidity	231.934***	224.724***	92.876***	68.974***	190.393***	195.007***	88.942***	70.280**
	(43.727)	(42.990)	(21.436)	(21.314)	(36.811)	(29.762)	(31.324)	(29.972)
Capital	–1.675*	–1.698*	–1.711***	–1.963***	–1.421***	–1.474**	–1.112***	–1.273***
	(0.814)	(0.911)	(0.439)	(0.518)	(0.447)	(0.572)	(0.414)	(0.414)
Liquidity	–1.359***	–1.280***	–0.001	0.115	–1.699***	–1.680***	–0.276	–0.144
	(0.344)	(0.315)	(0.201)	(0.192)	(0.384)	(0.381)	(0.226)	(0.195)
Size	–8.229**	–3.086	–5.533***	–3.594*	–12.335***	–10.258**	–5.283***	–4.667***
	(3.540)	(5.364)	(1.561)	(1.936)	(2.817)	(3.853)	(1.336)	(1.489)
Return	14.354***	13.866***	12.982***	8.571***	8.193**	9.332**	8.459***	7.382***
	(3.810)	(4.094)	(1.911)	(1.793)	(2.827)	(3.532)	(1.805)	(1.736)
Risk	3.900	1.627	6.405***	–0.051	–1.689	–2.395	6.072***	2.503
	(3.366)	(3.845)	(2.293)	(2.975)	(2.479)	(2.352)	(1.980)	(2.606)
Policy rates		0.635		2.716***		–0.492		0.423
		(0.917)		(0.826)		(0.680)		(0.726)
Economic growth		–5.962		–3.793**		–4.439		–4.620***
		(5.129)		(1.486)		(3.277)		(1.500)
Number of observations	291	291	291	291	291	291	291	291
Number of banks	31	31	31	31	31	31	31	31
R-squared	0.698	0.102			0.089	0.269		
Number of instruments			28	30			28	30
AR(1) test (p-value)			0.001	0.001			0.001	0.001
AR(2) test (p-value)			0.211	0.199			0.254	0.214
Hansen test (p-value)			0.402	0.611			0.262	0.308

Notes: ***, ** and * designate significance at the 1%, 5% and 10% levels, respectively.

Table 6. Impact of bank opacity on liquidity creation and the moderating role of bank size

	Dependent variable: LC*catfat*				Dependent variable: LC*catnonfat*			
	Fixed effect regressions (columns 1–2)		Two-step system GMM (columns 3–4)		Fixed effect regressions (columns 5–6)		Two-step system GMM (columns 7–8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged dependent variable			0.192***	0.162***			0.171***	0.145***
			(0.023)	(0.017)			(0.024)	(0.024)
Opacity	–2,363.798***	–2,159.527**	–2,024.182***	–1,707.476***	–1,453.870**	–1,487.200**	–1,309.747***	–1,015.638***
	(713.471)	(681.605)	(292.414)	(277.798)	(643.820)	(631.201)	(351.514)	(376.507)
Opacity∗Size	19.880	21.394	85.044***	89.439***	31.630**	31.078**	57.995**	52.354*
	(23.146)	(20.685)	(23.695)	(22.266)	(12.928)	(9.933)	(29.366)	(28.682)
Capital	–2.493***	–2.628***	–1.646***	–1.800***	–1.749***	–1.036*	–1.204***	–1.038***
	(0.450)	(0.484)	(0.439)	(0.361)	(0.385)	(0.467)	(0.384)	(0.288)
Liquidity	1.118***	1.039**	1.365***	1.108***	0.599	0.779**	0.954***	0.779***
	(0.333)	(0.378)	(0.293)	(0.202)	(0.336)	(0.309)	(0.251)	(0.202)
Size	–4.308	0.821	–6.221***	–4.539**	–6.800	9.909	–4.657***	–3.666***
	(6.541)	(8.215)	(1.696)	(1.772)	(5.038)	(8.498)	(1.433)	(1.369)
Return	9.056	8.357	6.940***	2.841	3.717	3.613	3.644*	1.639
	(5.504)	(5.484)	(2.245)	(2.091)	(3.864)	(4.096)	(2.018)	(2.034)
Risk	8.656***	4.925**	6.216*	–0.688	4.855	1.806	6.967***	4.078
	(2.568)	(1.986)	(3.548)	(3.727)	(4.014)	(2.994)	(2.674)	(2.665)
Policy rates		0.912		3.341***		0.638		1.289*
		(1.202)		(0.976)		(0.805)		(0.772)
Economic growth		–9.055		–3.310**		–10.679**		–2.471*
		(6.363)		(1.543)		(4.460)		(1.499)
Number of observations	291	291	291	291	291	291	291	291
Number of banks	31	31	31	31	31	31	31	31
R-squared	0.268	0.489			0.403	0.499		
Number of instruments			28	30			28	30
AR(1) test (p-value)			0.001	0.001			0.001	0.001
AR(2) test (p-value)			0.326	0.352			0.262	0.262
Hansen test (p-value)			0.751	0.774			0.552	0.462

Notes: ***, ** and * designate significance at the 1%, 5% and 10% levels, respectively.

Table 7. Impact of bank opacity on liquidity creation and the moderating role of bank return

	Dependent variable: LC*catfat*				Dependent variable: LC*catnonfat*			
	Fixed effect regressions (columns 1–2)		Two-step system GMM (columns 3–4)		Fixed effect regressions (columns 5–6)		Two-step system GMM (columns 7–8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged dependent variable			0.193***	0.136***			0.186***	0.163***
			(0.028)	(0.020)			(0.021)	(0.022)
Opacity	–1,596.213**	–1,459.611**	–1,984.485***	–1,483.690***	–1,012.505*	–1,102.295**	–809.504***	–837.089***
	(536.940)	(525.048)	(192.654)	(223.926)	(461.408)	(458.355)	(236.630)	(211.203)
Opacity∗Return	709.705*	656.317	1,261.942***	857.455**	757.387***	627.777**	714.609**	656.087**
	(385.329)	(446.582)	(422.244)	(342.129)	(192.891)	(215.995)	(290.071)	(285.418)
Capital	–1.775***	–1.998***	–1.746***	–2.006***	–1.279**	–0.576	0.349	–0.174
	(0.479)	(0.450)	(0.616)	(0.570)	(0.505)	(0.560)	(0.486)	(0.465)
Liquidity	1.474***	1.284**	1.378***	0.909***	0.820**	0.933**	1.194***	0.976***
	(0.310)	(0.426)	(0.287)	(0.174)	(0.336)	(0.350)	(0.167)	(0.111)
Size	–6.691	–1.699	–5.081***	–4.167**	–8.535*	8.686	1.792	1.208
	(5.728)	(7.737)	(1.846)	(1.927)	(4.065)	(8.335)	(1.259)	(1.104)
Return	12.717**	–11.137	–0.696	–0.170	12.588**	–9.326	13.944***	11.828**
	(5.690)	(7.545)	(4.665)	(3.032)	(4.809)	(5.358)	(4.960)	(4.624)
Risk	7.726**	3.919*	7.068**	–0.381	3.251	0.569	5.546**	2.414
	(3.054)	(1.961)	(3.232)	(4.006)	(4.655)	(3.571)	(2.688)	(2.639)
Policy rates		1.346		2.404***		0.772		0.656
		(1.061)		(0.851)		(0.747)		(0.458)
Economic growth		–7.332		–3.864**		–9.604*		–3.583**
		(6.035)		(1.818)		(4.497)		(1.766)
Number of observations	291	291	291	291	291	291	291	291
Number of banks	31	31	31	31	31	31	31	31
R-squared	0.388	0.090			0.474	0.525		
Number of instruments			28	30			28	30
AR(1) test (p-value)			0.001	0.001			0.001	0.001
AR(2) test (p-value)			0.272	0.213			0.323	0.272
Hansen test (p-value)			0.661	0.614			0.160	0.256

Notes: ***, ** and * designate significance at the 1%, 5% and 10% levels, respectively.

Table 8. Impact of bank opacity on liquidity creation and the moderating role of bank risk

	Dependent variable: LC*catfat*				Dependent variable: LC*catnonfat*			
	Fixed effect regressions (columns 1–2)		Two-step system GMM (columns 3–4)		Fixed effect regressions (columns 5–6)		Two-step system GMM (columns 7–8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged dependent variable			0.145***	0.098***			0.162***	0.166***
			(0.013)	(0.019)			(0.017)	(0.017)
Opacity	–2,065.571**	–1,831.792*	–1,378.499***	–720.892***	–1,813.469**	–1,823.797**	–757.901***	–835.891***
	(864.219)	(835.349)	(254.989)	(197.235)	(673.017)	(802.489)	(282.912)	(285.063)
Opacity∗Risk	–590.564*	–585.406*	–190.895	–133.190	–704.008*	–632.770*	–201.638	–25.177
	(278.340)	(277.522)	(139.748)	(165.120)	(385.909)	(310.769)	(254.810)	(271.606)
Capital	–2.350***	–2.472***	–1.154*	–1.253**	–2.081***	–1.185**	–0.201	–0.442
	(0.419)	(0.507)	(0.632)	(0.615)	(0.453)	(0.517)	(0.279)	(0.290)
Liquidity	0.990***	0.885**	1.135***	0.639***	–1.333**	–0.971*	0.806***	0.738***
	(0.299)	(0.349)	(0.175)	(0.115)	(0.597)	(0.510)	(0.155)	(0.128)
Size	–3.377	1.630	–1.024	1.238	–17.646***	1.249	–1.113	–1.972
	(6.131)	(7.453)	(1.653)	(1.952)	(2.773)	(5.179)	(1.196)	(1.244)
Return	10.090	9.090	9.471***	2.426	10.032*	9.051	4.108***	4.548***
	(6.018)	(5.809)	(2.162)	(2.680)	(4.839)	(5.485)	(1.468)	(1.357)
Risk	9.723**	5.870***	8.050***	–3.016	–0.794	–4.249	7.851***	5.906*
	(3.292)	(1.715)	(2.360)	(4.189)	(2.765)	(2.710)	(2.647)	(3.036)
Policy rates		1.097		4.736***		1.168		–0.095
		(1.236)		(1.115)		(0.703)		(0.611)
Economic growth		–8.402		–4.050***		–10.039***		–2.195
		(5.883)		(1.508)		(2.372)		(1.429)
Number of observations	291	291	291	291	291	291	291	291
Number of banks	31	31	31	31	31	31	31	31
R-squared	0.085	0.092			0.063	0.056		
Number of instruments			28	30			28	30
AR(1) test (p-value)			0.001	0.001			0.001	0.001
AR(2) test (p-value)			0.216	0.184			0.245	0.229
Hansen test (p-value)			0.517	0.580			0.251	0.226

Notes: ***, ** and * designate significance at the 1%, 5% and 10% levels, respectively.

4.3 Robustness Checks

Though the properties of Driscoll-Kraay standard errors in fixed effect regressions and the finite-sample correction for the two-step standard errors of the dynamic GMM estimation could improve our estimation results in the case of our small sample, we still desire to employ another econometric methodology that could fully tackle the weakness of our dataset. To this end, we realise that the least squares dummy variable corrected (LSDVC) estimator emerges as a perfect one. This estimator works well even if the sample is small and the panel data is heavily unbalanced (Bruno, 2005). We conduct the estimation by the LSDVC estimator by replicating 50 repetitions while producing bootstrapped standard errors.

Moreover, our sample period contains the 2007–2009 financial crisis, which may distort the relationship between opacity and bank liquidity creation. Hence, we desire to conduct a subsample analysis with the exclusion of the financial crisis period. In Table 9, we present our robustness checks using the subsample with the LSDVC estimator for the equation of the dependent variable LC*catfat*. As a note, all control variables are incorporated in the robustness tests; however, the estimates for these variables are not presented to conserve space. We only interpret LSDVC (Anderson-Hsiao) estimates in this part, while other regressions using the LSDVC (Arellano-Bond and Blundell-Bond) estimator and the LC*catnonfat* as the dependent variable produce similar results, but we do not report them for brevity. Except for the statistically insignificant coefficient of the interaction term between bank opacity and bank risk, which is slightly different from its low level of significance exhibited previously, all of the other main findings remain unchanged. Our results once again indicate that the impact of bank earnings management on liquidity creation is not necessarily constant, but it tends to vary with a wide range of bank-specific characteristics.[1]

5. Conclusion

This paper contributes to the existing literature by examining the impact of bank earnings opacity on bank liquidity creation. Using a sample of commercial banks in Vietnam, we reveal multiple interesting results as follows. First, more opaque banks tend to reduce the growth rate of liquidity creation. Second, the unfavourable impact of bank earnings opacity is more pronounced at more poorly capitalised and/or less liquid and/or smaller and/or less profitable banks. Earnings opacity may adversely affects the ability of stakeholders to accurately evaluate banks, potentially causing a shortage of funding supply, which may place a heavier burden on financially weaker banks that confront difficulties to reach alternative funding. This pattern describes the supply-side effect that happens due to the limited access to funding of banks.

The findings from our paper offer salient policy implications. An increased transparent disclosure requirement is needed to encourage banks to stimulate liquidity creation, which is considered as their core function and essentially fuels the entire

[1] We also perform robustness checks separately using the subsample analysis and the LSDVC estimator, and our conclusions remain unchanged. For brevity, only such a test combination, as in Table 9, is reported.

Table 9. Robustness checks

	Dependent variable: LC*catfat*					
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged dependent variable	0.066***	0.098***	0.067**	0.087***	0.104***	0.101***
	(0.024)	(0.022)	(0.028)	(0.028)	(0.026)	(0.031)
Opacity	–942.945***	–839.551***	–1,305.934***	–989.888***	–1,310.213***	–751.004***
	(204.745)	(211.308)	(228.781)	(237.620)	(270.168)	(233.236)
Opacity∗Capital		45.259**				
		(21.903)				
Opacity∗Liquidity			77.746***			
			(28.743)			
Opacity∗Size				35.771*		
				(20.109)		
Opacity∗Return					1,141.825***	
					(357.297)	
Opacity∗Risk						115.544
						(223.948)
Capital	0.096	–2.464***	–1.286**	–0.504	–0.539	–0.208
	(0.435)	(0.796)	(0.521)	(0.406)	(0.341)	(0.407)
Liquidity	0.902***	0.847***	–0.082	0.982***	1.112***	1.048***
	(0.092)	(0.129)	(0.317)	(0.122)	(0.154)	(0.128)
Size	0.962	–5.702**	–4.221*	–1.468	–1.022	0.087
	(1.538)	(2.387)	(2.188)	(1.580)	(1.706)	(1.568)
Return	0.738	0.857	1.958	–1.606	9.273***	–0.458
	(1.397)	(2.465)	(2.146)	(2.041)	(3.256)	(2.163)
Risk	–0.392	1.681	–2.639	0.556	0.460	0.083
	(2.170)	(1.703)	(1.986)	(1.772)	(1.902)	(2.813)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	234	234	234	234	234	234
Number of banks	31	31	31	31	31	31

Notes: The table reports the results from using the LSDVC (Anderson-Hsiao) estimator. Bootstrapped standard errors are in parentheses. ***, **, * designate significance at the 1%, 5% and 10% levels, respectively.

economy. For instance, if the transparency across the bank operations is crucial, our findings suggest some implications for the ongoing debate on Basel III regarding the importance of market discipline (the "third pillar"). Along this process, we claim that it is also necessary to utilise parallel policies to mitigate the adverse impact of bank opacity on liquidity creation. Accordingly, relevant actions should be encouraged to enhance the financial strength of individual banks.

We recognise the limitation of our analysis, particularly in the context of being a single-country study focused on an emerging market. It is also important to note that banking regulations in Vietnam may diverge from those in other emerging markets. Therefore, we recommend that future research should aim to generalise our findings to a broader spectrum of emerging economies, thereby offering a more comprehensive understanding of the present subject.

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