



Liquidity creation, regulatory capital, and bank profitability



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ABSTRACT

We examine the interrelationships among liquidity creation, regulatory capital, and bank profitability of US banks. We find that regulatory capital and liquidity creation affect each other positively after controlling for bank profitability. However, this relationship is largely driven by small banks and primarily during non-crisis periods. It is also sensitive to the level of banks' regulatory capital and how it is measured. Furthermore, we find that banks which create more liquidity and exhibit higher illiquidity risk have lower profitability. Finally, the relationship between regulatory capital and bank performance is not linear and depends on the level of capitalization. Regulatory capital is negatively related to bank profitability for higher capitalized banks but positively related to profitability for lower capitalized banks. Therefore, a change in regulatory capital has differential impacts on bank performance. Our findings have various implications for policymakers and bank regulators.

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1. Introduction

In the wake of the recent global financial crisis, the Basel Committee on Banking Supervision (BCBS) introduced a number of new macroprudential regulatory measures designed to address the systemic risk due to bank interconnectedness in the global banking system. This regulatory framework, known as Basel III, contains a central piece of reform that strengthens capital requirements. More specifically, banks are required to hold equity capital of up to 9.5% of total risk-weighted assets, a substantial increase in capital requirements from Basel II. Additional capital requirements can be imposed on banks that are deemed to be systemically important. Banks may also be required to build up capital buffers during periods of excessive credit growth for potential losses during economic downturns.

Another key banking reform by BCBS requires banks to maintain a minimum net stable funding ratio and unencumbered high-quality liquid assets to meet liquidity needs in a 30-day liquidity stress scenario. A bank creates liquidity when it issues long-term illiquid assets (e.g., housing loans) that are funded by short-term liquid liabilities (e.g., deposits). Therefore, as liquidity is created by mismatching long-term assets with short-term liabilities, it exposes banks to illiquidity risk—the risk of disposing of illiquid assets in a fire sale to meet the demands of liquid liabilities. It follows that the liquidity requirements

intended to reduce illiquidity risk also limit a bank's capacity to create liquidity.

Against this backdrop of regulatory changes, our study examines the dynamic interrelationships among liquidity creation, regulatory capital, and bank profitability. We seek to address a series of questions about the effects of the most recent capital and liquidity requirements. First, how does a change in capital affect a bank's capacity to create liquidity and generate profits? Conversely, how does a change in liquidity creation influence a bank's regulatory capital and profitability? Taken together, what are the joint impacts of regulatory capital and liquidity creation on bank performance? Furthermore, do the interrelationships differ with bank size? More specifically, do large banks perform differently from small banks when there are changes in regulatory capital and liquidity creation? If so, do too-big-too-fail (TBTf) banks behave differently among large banks? Finally, do the interrelationships vary between crisis and non-crisis periods, and do they fluctuate with the level of bank capitalization? Answers to these questions may have important policy implications in relation to the safety and soundness of the banking system.

Our investigations into these questions contribute to the ongoing debate over the effects of the Dodd-Frank Act of 2010 and Basel capital requirements on liquidity creation and bank profitability. On the one hand, the banking industry argues that tougher capital rules will drive up funding costs and reduce liquidity creation, which would lead to lower lending and investment activities in the economy. Banks are therefore likely to experience lower profitability, since a higher capital ratio shifts funding from liquid deposits to less liquid capital, which in turn reduces a bank's capacity to create liquidity. Consistent with this

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line of argument, [Goddard, Liu, Molyneux, and Wilson \(2010\)](#) find that an increase in capital requirements has a negative impact on bank profitability. Furthermore, [Andreou, Philip, and Robejsek \(2016\)](#) highlight that more able bank managers create more liquidity per dollar of assets and take on more risk but reduce liquidity creation and debt during the financial crisis. It suggests that regulators should incentivize these banks to lend and create liquidity.

On the other hand, [Admati, DeMarzo, Hellwig, and Pfleiderer \(2013\)](#) suggest that arguments claiming that more stringent capital rules will raise the cost of capital and lower liquidity creation are fallacious, irrelevant, or weak. They contend that banks that are highly capitalized are less likely to engage in excessive risk-taking activities. As a result, banks tend to perform better due to less distortions in lending decisions and lower moral hazard. Supporting the importance of regulatory capital, [Demirgüç-Kunt and Huizinga \(2000\)](#), [Iannotta, Nocera, and Sironi \(2007\)](#), and [Lee and Hsieh \(2013\)](#) document that the capital ratio is positively related to bank profitability. [Greenspan \(2010\)](#) sums up the importance of capital adequacy as follows: “The reason I raise the capital issue so often, is that, in a sense, it solves every problem.”

Our study also contributes to the current literature, which tends to focus on the effect of either capital or liquidity creation on bank profitability without considering both effects together. For example, [Berger and Bouwman \(2009\)](#), who develop comprehensive measures of liquidity creation, examine the impact of capital on liquidity creation and the relationship between liquidity creation and bank value separately. Extending their study, we examine both the mediating effect of liquidity creation when regulatory capital changes, and that of regulatory capital as liquidity creation varies. The bi-directional interactions between regulatory capital and liquidity creation should provide a more complete picture of how bank performance is affected through these two channels.

Expanding upon [Berger and Bouwman \(2009\)](#), [Distinguin, Roulet, and Tarazi \(2013\)](#) investigate the relationship between regulatory capital and bank liquidity in a simultaneous equation setting. However, they assume that bank profitability is exogenous as banks with higher profits, and hence higher retained earnings, increase their capital ratio. Such an assumption does not consider that changes in regulatory capital are also influential in subsequent bank profits, which in turn affect regulatory capital. In a related study, [Horváth, Seidler, and Weill \(2014\)](#) examine the potential reverse causality between capital and liquidity creation without incorporating bank profitability in their interrelationship.

To our knowledge, this is the first study that investigates the dynamic interrelationships among liquidity creation, regulatory capital, and bank performance. Furthermore, we investigate whether the interrelationships differ across bank size, sub-periods, regulatory capital measurements, and levels of capitalization. We use vector autoregression (VAR) to estimate the dynamic interrelationships, thereby addressing the endogeneity problems among the three key variables. However, the estimations may still be plagued with heterogeneity related to potential correlations between the lagged dependent variables and the error terms. We therefore apply the generalized methods of moments (GMM) to correct for the heterogeneity problem present in the ordinary least square (OLS) estimation.

It is important to note that our study does not address the effectiveness of the Federal Reserve Bank's (Fed) open market operations in the economy, a process that can also result in liquidity creation. For example, as the global financial crisis unfolded, the Fed immediately carried out quantitative easing (QE), followed by additional QEs to encourage liquidity creation. Similarly, the European Central Bank launched its own QE program during the most recent European sovereign debt crisis. While it is an important channel through which the Fed can change liquidity, it is beyond the scope of this study. Rather, our focus is on the interactions among capital requirements, liquidity creation, and bank profitability in response to the latest macro-prudential regulatory measures.

We find that the relationship between liquidity creation and capital is positive and bidirectional. An increase in a bank's liquidity creation corresponds to a rise in regulatory capital. Conversely, an increase in regulatory capital is also likely to improve a bank's capacity to create liquidity. However, this positive bidirectional relationship is driven by small banks and applies mainly during non-crisis periods. Furthermore, liquidity creation appears to be negatively related to bank performance, as an increase (decrease) in liquidity creation corresponds to a decline (rise) in bank profitability. In contrast, the effect of regulatory capital on bank performance and liquidity creation depends on the extent that a bank is capitalized. The relationship is positive for a lower capitalized bank but negative for a higher capitalized bank. Hence, an increase in capital requirements is likely to have differential impacts on bank performance. These differential effects tend to be present during normal periods.

Overall, our results support the risk absorption hypothesis (see [Bhattacharya and Thakor \(1993\)](#) and [Repullo \(2004\)](#)), which suggests that banks with more capital are in a better position to absorb liquidity risk resulting from liquidity creation. It can therefore be said that banks with more capital have a higher capacity to create liquidity. Our results also suggest that a higher level of regulatory capital can be potentially costly to an adequately capitalized bank, as the bank is likely to move away from the optimal capital structure and thus experience lower profitability. Our results are also consistent with the expected bankruptcy cost hypothesis, which argues that liquidity creation is negatively related to bank profitability. A higher level of illiquidity risk due to liquidity creation increases the likelihood of bankruptcy, hence lowering bank profitability.

Our findings show that the interrelationships vary with bank size, sub-periods, regulatory capital measurements, and levels of regulatory capital. From a policy perspective, our results suggest that policymakers and bank regulators should be cautious about a one-size-fits-all approach and may need to develop regulations for banks with different characteristics. For example, a change in capital standards has a limited impact on liquidity creation except for small banks. Therefore, increasing capital requirements on all banks may not affect liquidity creation to the extent that regulators expect.

The remainder of our paper is organized as follows: [Section 2](#) provides a literature review on the relationships among liquidity creation, capital, and bank performance. [Sections 3 and 4](#) discuss our data and methodology respectively. Our empirical results are reported in [Section 5](#). In the final section, we discuss our findings and their regulatory implications.

2. Literature review

2.1. Liquidity creation and regulatory capital

According to [Berger and Bouwman \(2009\)](#), regulatory capital can be related to liquidity creation in two opposing ways. One theory, known as the “financial fragility-crowding out” hypothesis, suggests a negative relationship between capital and liquidity creation. [Diamond and Rajan \(2000, 2001\)](#) argue that banks are inherently fragile because they collect funds from depositors to issue loans. With an informational advantage in monitoring borrowers, banks have the incentive to increase deposits for a greater share of loan income at the expense of their depositors. Furthermore, in the absence of complete deposit insurance, banks tend to adopt a fragile financial structure with a large share of liquid deposits to gain depositors' confidence and reduce the likelihood of a bank run. Taken together, banks prefer to raise deposits for issuing loans to maximize liquidity creation. While a higher capital standard mitigates financial fragility, it “crowds out” deposits in an unsegmented capital market (see [Gorton and Winton \(2000\)](#)). As a result, a bank with higher regulatory capital may experience lower liquidity creation.

According to the risk absorption hypothesis, on the other hand, regulatory capital is positively related to liquidity creation. As liquidity

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