



Bank liquidity creation, monetary policy, and financial crises



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ABSTRACT

This paper examines the interplay among bank liquidity creation (which incorporates all bank on- and off-balance sheet activities), monetary policy, and financial crises. We find that: (1) high liquidity creation (relative to trend) – particularly off-balance sheet liquidity creation – helps predict crises, controlling for other factors; (2) monetary policy has statistically significant, but economically minor effects on liquidity creation by small banks during normal times, and these effects are even weaker during financial crises; (3) monetary policy has very little effects on medium and large bank liquidity creation during both normal times and crises. These findings suggest that authorities may wish to monitor bank liquidity creation closely in order to predict and perhaps lessen the likelihood of financial crises. They might also consider other tools to control bank liquidity creation, such as capital and liquidity requirements.

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1. Introduction

Liquidity creation is a key reason why banks exist. Banks create liquidity on the balance sheet by financing relatively illiquid assets such as business loans with relatively liquid liabilities such as transactions deposits (e.g., Bryant, 1980; Diamond and Dybvig, 1983). The loans provide bank customers with the necessary funds to make investments, while the deposits deliver liquidity and payment services to the public to make purchases. Banks also create liquidity off the balance sheet through loan commitments and similar claims to liquid funds (e.g., Holmstrom and Tirole, 1998; Kashyap et al., 2002). For example, loan commitments allow customers to plan their investments and expenditures, knowing that the required funds will be forthcoming when needed (e.g., Boot et al., 1993). Empirical evidence confirms that on- and off-balance sheet liquidity creation have positive effects on the economy (Berger and Sedunov, 2017).

While bank liquidity creation is important for the macroeconomy, it may also sow the seeds of a financial crisis. Acharya and Naqvi (2012) argue that during uncertain times, deposits flow into banks, who may lower their lending standards and lend more. This increases on-balance sheet liquidity creation and may generate asset price bubbles that heighten the fragility of the banking sector. Thakor (2005) shows that excessive risk-taking and greater bank liquidity creation may also occur off the balance sheet during booms, when banks shy away from exercising material adverse change clauses in loan commitment contracts due to reputational concerns. Brunnermeier et al. (2011) argue that models that assess systemic risk should include liquidity build-ups in the financial sector. Nonetheless, studies of early warning systems for financial crises do not use bank liquidity creation. Instead, they usually focus on macroeconomic variables, such as GDP growth, balance of payments problems, and real interest rates, and include banks only as part of domestic credit growth (e.g., Demirguc-Kunt and Detragiache, 1998; Kaminsky and Reinhart, 1999; Edison, 2003; Bussiere and Fratzscher, 2006; Reinhart and Rogoff, 2009).¹

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¹ The one early warning study to our knowledge that includes an aggregate bank liquidity ratio uses liquid assets over total assets (Barrell et al., 2010). This excludes

Our first contribution is to fill this void by addressing empirically whether aggregate bank liquidity creation indicates an impending crisis. Our main bank liquidity creation measure is Berger and Bouwman's (2009) preferred measure (see Appendix A for details), which is also used in a number of other studies (e.g., Distinguin et al., 2013; Horvath et al., 2014; Jiang et al., 2016; Berger and Sedunov, 2017). We use five U.S. financial crises described in Berger and Bouwman (2013): 1) the 1987 stock market crash; 2) the credit crunch of the early 1990s; 3) the Russian debt crisis plus the Long-Term Capital Management meltdown in 1998; 4) the bursting of the dot.com bubble plus the September 11 terrorist attack of the early 2000s; and 5) the subprime lending crisis of the late 2000s. We find that high liquidity creation relative to trend tends to be followed by financial crises – even after controlling for other macroeconomic factors and market returns – suggesting that abnormally high liquidity creation may be a harbinger of a crisis. This result is driven primarily by off-balance sheet liquidity creation.

The importance of bank liquidity creation in the macroeconomy and in foreshadowing financial crises raises the issue of controlling this liquidity creation. We therefore next focus on the effects of monetary policy on bank liquidity creation. Theory predicts that monetary policy may affect both on- and off-balance sheet liquidity creation. For example, expansionary monetary policy may increase bank deposits as well as loans, both of which expand bank liquidity creation, but may have ambiguous effects on off-balance sheet loan commitments. These effects are not examined in the extant empirical literature on how monetary policy affects the economy through banking. That literature employs the bank lending channel, in which the effects of monetary policy are transmitted through bank lending, rather than bank liquidity creation, of which lending is only a part (e.g., Bernanke and Gertler, 1995; Kashyap and Stein, 2000).

Moreover, there is no evidence of which we are aware on whether the effectiveness of monetary policy in changing bank behavior differs during financial crises and normal times. During financial crises, banks may hoard loanable funds due to the difficulty of accessing liquidity in the market and be less responsive to incentives to lend (Diamond and Rajan, 2011; Caballero and Simsek, 2013). The demand for and supply of loan commitments and other off-balance sheet guarantees may also be affected by financial crises (e.g., Thakor, 2005).

The second and third contributions of our paper are to fill these gaps in the monetary policy literature. We address how monetary policy affects total bank liquidity creation and its on-balance sheet and off-balance sheet components during normal times and during financial crises. For these analyses, we divide banks into small, medium, and large size classes. We find that during normal times, monetary policy has statistically significant, but economically small effects on small bank liquidity creation. This effect is reduced further during financial crises. Monetary policy has very little effects on liquidity creation by medium and large banks during both normal times and crises. Our stronger results for small banks are consistent with the literature that uses bank lending rather than bank liquidity creation (e.g., Kashyap and Stein, 2000), while our results on the differences between normal times and crisis effects are entirely novel.

The remainder of the paper is organized as follows. Section 2 describes our data sample and provides summary statistics on liquidity creation. Section 3 examines the relationship between liquidity creation and financial crises. Section 4 addresses the effects

of monetary policy on bank liquidity creation during normal times and financial crises. Section 5 concludes.

2. Data sample and summary statistics on liquidity creation

We include virtually all commercial and credit card banks in the U.S. in our study.² For each bank, we obtain quarterly Call Report data from 1984:Q1 to 2008:Q4. We stop the data in 2008:Q4 because this marked the end of the monetary policy regime in which the Federal Reserve targeted the federal funds rate with open market operations as its main policy instrument. Monetary policy was later dominated by quantitative easing, forward guidance, setting rates on reserves, and other measures. We keep a bank in the sample if it: 1) has commercial real estate or commercial and industrial loans outstanding; 2) has deposits; 3) has gross total assets (GTA) exceeding \$25 million³; 4) has an equity capital to GTA ratio of at least 1%.

For each bank, we calculate the dollar amount of liquidity creation in each quarter (933,209 bank-quarter observations from 18,294 distinct banks) using the process described in the Appendix A. We aggregate these amounts to obtain the dollar amount of liquidity creation by the banking sector, and put these (and all other financial values) into real 2008:Q4 dollars using the implicit GDP price deflator. Our final sample contains 100 inflation-adjusted, quarterly liquidity creation amounts.

Fig. 1 Panel A shows the dollar amount of liquidity created by the banking sector over our sample period. It also shows the break-out into on- and off-balance sheet liquidity creation. Dotted lines indicate when the five financial crises occurred. As shown, liquidity creation increased substantially over time: it almost quadrupled from \$1.398 trillion in 1984:Q1 to \$5.304 trillion in 2008:Q4 (in real 2008:Q4 dollars). Since the mid-1990s, off-balance sheet liquidity creation has exceeded and grown faster than on-balance sheet liquidity creation, primarily due to growth in unused loan commitments. Fig. 1 Panel B shows that most of the liquidity in the banking sector is created by large banks and their share of the total has increased from 76% in 1984:Q1 to 86% in 2008:Q4. Over this same time frame, the shares of medium and small banks dropped from 8% to 5% and from 16% to 9%, respectively.

3. Predicting financial crises

This section first formulates our hypothesis on the relationship between liquidity creation and financial crises. It then discusses our methodology, followed by the results.

3.1. Hypothesis development

Hypothesis: High liquidity creation (relative to trend) indicates an impending financial crisis.

Motivation: Acharya and Naqvi (2012) provide a theoretical argument why an excessive build-up of liquidity may be the precursor to a crisis. They show that when macroeconomic risk increases, more deposits flow into the banking sector, which causes banks to lower their lending standards and lend more. This increases on-balance sheet bank liquidity creation that results in an asset bubble

² Berger and Bouwman (2009) include only commercial banks. We also include credit card banks to avoid an artificial \$0.19 trillion drop in bank liquidity creation in the fourth quarter of 2006 when Citibank N.A. moved its credit-card lines to Citibank South Dakota N.A., a credit card bank.

³ GTA equals total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve (a reserve for certain foreign loans). Total assets on Call Reports deduct these two reserves, which are held to cover potential credit losses. We add these reserves back to measure the full value of the loans financed and the liquidity created by the bank on the asset side.

the liquidity contributions of other on-balance sheet activities and all off-balance sheet activities, which together account for most of bank liquidity creation.

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