



Bank liquidity creation and asset market liquidity

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ABSTRACT

Consistent with the credit channel theory of monetary policy transmission, this paper finds novel evidence that asset market liquidity as one of the proxies for the external finance premium explains bank liquidity creation. While efficacy of monetary policy depends on how banks create liquidity, the existing literature does not find any conclusive evidence that monetary policy variables explain aggregate bank liquidity creation. We use both stock market and the Treasury bond market liquidity as proxies for asset market liquidity, and find that: (1) asset market liquidity and credit-spreads explain aggregate bank liquidity creation and liquidity creation of larger banks; (2) stock market liquidity rather than credit-spreads or the Treasury bond market liquidity has robust and higher impact on aggregate liquidity creation; (3) while stock market liquidity better explains off-balance sheet liquidity creation, the short-term off-the-run Treasury bond liquidity has higher impact on on-balance sheet liquidity creation; (4) the Federal funds rate as a proxy for monetary policy impacts liquidity creation of smaller banks more than it does liquidity creation of larger banks.

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1. Introduction

One of the primary reasons that banks exist is that they create liquidity and transform credit risk (e.g., Diamond, 1984; Diamond and Rajan, 2001; Berger and Bouwman, 2009). Banks create liquidity on the balance sheet by activities, such as providing loans to businesses and individuals, with deposits (e.g. Diamond and Dybvig, 1983; Berger and Bouwman, 2009). Banks also create liquidity off the balance sheet by activities, such as extending standby letter of credit and loan commitments to their customers (e.g., Holmstrom and Tirole, 1998; Kashyap et al., 2002; Thakor, 2005; Diamond and Rajan, 2005; Berger and Bouwman, 2009). Monetary policy is generally loosened in recessions to address the scarcity of liquidity and to stimulate the economy. One evident and

immediate impact of the recent loose monetary policy and other policy measures, such as large-scale asset purchases (e.g., D'Amico et al., 2012) and capital injections to big banks (e.g., Black and Hazelwood, 2013), has been higher asset prices and asset liquidity.² In this paper, we ask whether higher asset market liquidity leads to more bank liquidity creation.

The effectiveness of monetary policy depends on how it affects banks' liquidity creation, and hence measuring bank liquidity creation and investigating the role of monetary policy on bank liquidity creation are crucial for macro-prudential policy measures.³ Berger and Bouwman (2012), however, find that monetary policy proxy variables impact liquidity creation of smaller banks, but have no effect on liquidity creation of larger banks. That is, their findings are relevant to smaller banks. However, as per their sample, larger banks contribute to about 90% of aggregate bank liquidity creation in the U.S. Since macro-prudential policy measures are typically targeted towards too-large-too-fail banks as is evident from the

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² The effect is not limited to the recent crisis and subsequent policy statements and measures. In general, securities' trading activities respond to the U.S. Federal Open Market Committee (FOMC) policy statements instantly.

³ Berger and Bouwman (2009) propose an innovative measure of liquidity creation, a comprehensive measure of bank output that takes into account banks' on- and off-balance sheet activities, and find that larger banks create more liquidity.

recent crises (e.g., Kaufman, 2014, among others), we ask what drives liquidity creation of larger banks, and hence aggregate bank liquidity creation? Without this knowledge, bank liquidity creation measurement by itself has no policy implication.

Building on Berger and Bouwman (2012), we investigate the role of known market-based factors on the liquidity creation of larger banks.⁴ Indeed, larger banks are expected to be affected by market conditions. For example, larger banks use substantially higher non-deposit funding than smaller banks do.⁵ Since non-deposit sources of funds are very sensitive to market conditions, we argue that the market dependent systematic factors must have considerable effects on liquidity creation of larger banks. Additionally, large banks are more integrated with the financial markets across the globe through different channels of financial intermediation via on- and off-balance sheet activities. As a result, we further argue that financial constraints that large banks encounter in the marketplace are captured by common market factors, such as credit-spreads and asset market liquidity, and hence those market-based factors determine not only liquidity creation of large banks but also aggregate bank liquidity creation.

The existing literature does not find any conclusive evidence that monetary policy affects bank lending (e.g., Kashyap and Stein, 2000) or bank liquidity creation (e.g., Berger and Bouwman, 2012). If monetary policy cannot explain bank liquidity creation, then what does? Since the credit channel theory of monetary policy transmission posits that the external finance premium (the difference in cost between external and internal finance) changes with monetary policy shocks (e.g., Bernanke and Gertler, 1995), we argue that variables, such as asset market liquidity, that are known to determine the implied cost of capital may explain bank liquidity creation. Certainly, the existing market microstructure literature shows that monetary policy shocks are transferred to asset market liquidity through the changes in the Treasury bond liquidity (e.g., Chordia et al., 2005; Goyenko and Ukhov, 2009). The asset pricing literature (e.g., Acharya and Pedersen, 2005; Pastor and Stambaugh, 2003) further shows that asset market liquidity explains the cross-section of asset returns, and hence their results imply that asset market liquidity determines cost of capital. Indeed, Butler et al. (2005) show that asset market liquidity is an important determinant of the cost of raising external capital and Bharath et al. (2009) document that asset liquidity is a determinant of cost of capital and firm capital structure.

We are interested in exploring the role of asset market liquidity on bank liquidity creation for the following reasons. Asset market liquidity affects both supply- and demand-side of bank liquidity creation. As asset market liquidity falls, the market implied cost of capital increases, which may reduce demand for funds from banks. Additionally, as is evident from the recent crisis, in an illiquid asset market, banks' non-deposit sources of funds, such as Repos (repurchase agreements), may become prohibitively expensive. Hence, we argue that asset market liquidity, as one of the proxies for the external finance premium, determines bank liquidity creation. While financial variables, such as credit-spreads, are used as proxies for the external finance premium, the literature (e.g., Stock and Watson, 2003) find that asset prices are unstable predictors for economic growth. By contrast, asset liquidity better explains real economic activities (Næs et al., 2011, hereafter called as NSØ).

⁴ While Papanikolaou and Wolff (2014) investigate the role of on- and off-balance sheet activities on bank soundness, they do not investigate whether on- and off-balance sheet activities are related to common market risk factors.

⁵ As an illustration, consider the bank Federal funds purchased & repurchase agreements (Repos) to Total Assets ratio. As per the 2010 FDIC data, for banks with less than \$100 million in total assets, the ratio is about 0.5%. By contrast, for banks with over \$1 billion in total assets, the ratio is about 5%.

In this paper, we focus on five systematic market factors: term-spreads, credit-spreads, asset market returns, volatility and liquidity and explore their effects on bank liquidity creation. In addition, we use the Federal funds rate as a policy variable, which is commonly used in the banking literature. Following macroeconomic research (e.g., Romer and Romer, 2004), we estimate a macroeconomic model using both a single-equation and a vector autoregression (VAR) approach to examine the effects of systematic factors on aggregate bank liquidity creation and its two components, on- and off-balance sheet liquidity creation. For bank liquidity creation variables, we use the measures proposed in Berger and Bouwman (2009). We use both stock market liquidity (i.e., the costs of trading equities) and the Treasury bond market liquidity (i.e., the costs of trading Treasury bonds) as proxies for asset market liquidity.⁶ In addition to bank total deposits and core-deposits, we control for market-driven bank non-deposit funding and this allows for controlling banks' funding constraints in determining bank liquidity creation. Since Thakor (2005) argues that bank liquidity creation depends on the business cycle, real GDP (Gross Domestic Product) is used as an additional control. Using a quarterly sample of virtually all the U.S. commercial banks for the period 1984 through 2010, our main findings are as follows.

First, we document that asset market liquidity explains aggregate bank liquidity creation: illiquidity in asset market translates to lower bank liquidity creation.⁷ The results carry through to liquidity creation of large banks that have total assets of over \$3 billion. The results hold after controlling for the recent crisis and recessions, considering out-of-sample tests performances and using alternative measures of bank liquidity creation.

We further show that stock market liquidity as a proxy for asset market liquidity better explains bank off-balance sheet rather than bank on-balance sheet liquidity creation. However, short-term off-the-run Treasury bond liquidity as a proxy for asset market liquidity explains bank on-balance sheet liquidity creation better than bank off-balance sheet liquidity creation. While the results are not as robust as asset market liquidity or credit-spreads, the Federal funds rate as a proxy for monetary policy impacts bank liquidity creation.

Second, credit-spreads are another important factor for aggregate bank liquidity creation. When the recent crisis period is controlled for, the results show that the predictive power of credit-spreads is not as stable as stock market liquidity. Out-of-sample tests results confirm that credit-spreads as a predictor is not as robust as stock market liquidity.

Third, we show that asset market liquidity has no effect on liquidity creation of smaller banks that have total assets of less than \$3 billion. While we find some evidence that the Federal funds rate and credit-spreads have statistically significant effects on liquidity creation of smaller banks, the results are not robust and the associated adjusted *R*-squared values are too low to have any meaningful economic significance.

Finally, we show that aggregate bank liquidity creation is dependent on the business cycle and bank non-deposit funding. In the presence of other systematic factors, however, the results show that aggregate bank liquidity creation is primarily driven by asset

⁶ Goyenko and Ukhov (2009) point out that the trading volume for Treasury securities is about 5 times that of stock market liquidity, and hence we include both stock and the Treasury bond liquidity to capture asset market liquidity.

⁷ Everything else being equal, for a one standard deviation increase in stock market quoted bid-ask spreads, bank liquidity creation growth reduce by about 44% of one standard deviation of bank liquidity creation growth. Similarly, when everything else is held constant, for a one standard deviation increase in change in quoted bid-ask spreads of Treasury bills of maturities up to one-year, bank liquidity creation growth reduce by about 23% of one standard deviation of bank liquidity creation growth.

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