



## Funding liquidity and bank risk taking<sup>☆</sup>



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### ABSTRACT

This study examines the relationship between funding liquidity and bank risk taking. Using quarterly data for U.S. bank holding companies from 1986 to 2014, we find evidence that banks having lower funding liquidity risk as proxied by higher deposit ratios, take more risk. A reduction in banks' funding liquidity risk increases bank risk as evidenced by higher risk-weighted assets, greater liquidity creation and lower Z-scores. However, our results show that bank size and capital buffers usually limit banks from taking more risk when they have lower funding liquidity risk. Moreover, during the Global Financial Crisis banks with lower funding liquidity risk took less risk. The findings of this study have implications for bank regulators advocating greater liquidity and capital requirements for banks under Basel III.

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### 1. Introduction

Bank liquidity has become an important focus of financial regulatory reforms since the dangers of liquidity crunches became all too apparent in the recent Global Financial Crisis (GFC). In response to ongoing regulatory pressure and the introduction of the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, large US banks like JP Morgan Chase increased the amount of liquid securities and cash they held in an effort to allay concerns about liquidity risks. However, it is uncertain whether the new emphasis on funding liquidity requirements suggested in the new Basel III guidelines globally and in the Dodd-Frank Act within the U.S. will make banks less risky and the whole financial system more stable going forward. Therefore, better understanding the potential relation between banks' funding liquidity risk and their risk-taking behaviour is of paramount importance when current regulatory reforms in global banking regulation have focused

on getting banks to become more liquid than they have been in the past.

Liquidity risk has long been recognized as a significant threat to financial institutions management and financial system stability. Banks are generally advised to maintain a liquidity buffer for managing liquidity risk and to insure against small liquidity shocks. Recently, [Hong et al. \(2014\)](#) showed that systematic liquidity risk was an important contributor to bank failures occurring over 2009–2010 in the aftermath of the 2007–2008 GFC. They revealed that liquidity risk could lead to bank failures through systematic and idiosyncratic channels. Corroborating with this, the theoretical predictions of [Acharya and Naqvi \(2012\)](#) and [Wagner \(2007\)](#) on the implications of short-term liquidity for bank risk taking and bank stability suggest that high levels of asset liquidity can potentially increase bank risk and warrants further attention given the significant welfare costs that risky banks may pose as witnessed in recent banking crises. Deposits shield banks from "run" risk and banks with higher deposits have less funding liquidity risk, which in turn reduces market discipline and leads to greater risk taking by banks<sup>1</sup>. Moreover, deposit insurance creates a moral hazard for excessive risk taking by banks in response to increases in deposits at the cost of the deposit insurer ([Keeley, 1990](#)). Deposit insurance acts like a put option on the banks' assets. [Drehmann and Nikolaou \(2013\)](#) define funding liquidity risk as the banks' failure to

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settle obligations immediately and measure funding liquidity risk based on banks' aggressive bidding at central bank auctions to secure liquidity. We are considering banks having higher deposits to have lower funding liquidity risk because these banks will have enough funds to settle their obligations and there is less "run" risk in the presence of deposit insurance.

The objective of this study is to examine the impact of varying funding liquidity risk on bank risk taking. Using quarterly data for U.S. bank holding companies from 1986 to 2014, we empirically test the impact of banks' funding liquidity risk on various proxies for bank risk taking. Following [Acharya and Naqvi \(2012\)](#) we consider the amount of deposits relative to total assets as our proxy for banks' funding liquidity risk because deposits shield banks from "run" risk. Banks having excessive deposits are less likely to have funding shortfalls in the near future, and bank managers will take more risk. We consider banks having higher deposits have lower funding liquidity risk. We also examine the influence of banks' capital buffers and bank size on the funding liquidity risk and bank risk relation.

Bank risk has been measured in the literature in many different ways. We focus specifically on the overall riskiness of banks and their asset risk. We consider alternative proxies for each risk category. For banks' overall risk, we examine the Z-scores (a measure of their distance to default), liquidity creation (financial intermediation risk) as well as the standard deviation of bank stock returns. To measure banks' asset risks, we consider the relative amounts of risk-weighted assets as well as loan loss provisions as they capture banks' asset quality. We use quarterly data for US bank holding companies for the time period from December 1986 to December 2014. To the best of our knowledge, no prior study has empirically investigated the relationship between banks' funding liquidity risk and bank risk taking while controlling for bank characteristics and macroeconomic changes over time.

Akin to the free cash flow hypothesis developed by [Jensen \(1986\)](#) for corporations, managers having free cash flows will make poor investments. We examine comprehensively whether lower funding liquidity risk resulting from deposit taking will cause bank managers to lend more aggressively and ultimately increase the riskiness of banks. As there is a dearth of attention on this issue in the banking literature, it warrants a thorough investigation in light of the implications that regulatory liquidity requirements may present for financial system stability. There is some evidence in the extant literature to support a potential adverse relationship between lower funding liquidity risk and bank risk. For example, [Acharya and Naqvi \(2012\)](#) present theoretical evidence to show that lower funding liquidity risk measured by deposits can induce bank managers to engage in more aggressive lending practices. In line with this view, [Ivashina and Scharfstein \(2010\)](#) revealed that banks with greater access to deposit funding during the 2007–2008 international financial crisis were willing to lend more than those that relied more on short-term debt financing. Similarly, [Wagner \(2007\)](#) developed a model showing that higher liquidity can increase banking system instability and the externalities related to bank failure. Moreover, extended periods of relatively low-interest rates have been shown by [Altunbas et al. \(2014\)](#) to influence banks to take more risk.

We present new empirical evidence in this study that strongly indicates a significant inverse relationship between banks' funding liquidity risk and bank risk-taking. In particular, we find evidence to support [Acharya and Naqvi's \(2012\)](#) theoretical prediction that decreases in banks' funding liquidity risk as proxied by deposits leads to an increase in bank risk. In theory, an abundance of deposit funding spurs more aggressive lending (that is, allows banks to make more loans at lower interest rates). In support of this, we find that an increase in deposit funding is consistently followed by an increase in banks' risk-weighted assets and liquidity cre-

ation. Moreover, an increase in deposit funding increases overall bank risk as evidenced by lower Z-scores. However, we find that bank size and capital buffers impede banks to some extent from taking more risk when they face lower funding liquidity risk. Consistent with expectations, we also find that in times of financial crises, banks when they are subjected to greater monitoring have less scope to take greater risks in response to lower funding liquidity risk as proxied by deposits.

There are clear implications of our findings for policymakers and market participants alike. A clearer understanding of the ramifications of banks' funding liquidity risk, bank size and capital levels on banks' risk-taking behaviour can help regulators to improve the banking regulatory framework to better discipline and control the behaviour of bank managers and to enhance financial resilience going forward. Our findings are supportive of the new requirements under Basel 3 for banks to use longer term funding sources to match their use of funds and to hold more capital going forwards as these measures will effectively help to curb bank risk taking.

The remainder of this paper is organised as follows. [Section 2](#) summarises the theoretical motivations for examining funding liquidity and bank risk taking. [Section 3](#) explains our key hypotheses. [Section 4](#) describes the data used. [Section 5](#) presents our empirical models before results are discussed in [Section 6](#). Finally, conclusions are provided in [Section 7](#).

## 2. Theoretical motivation

Our empirical analyses are well supported by existing theoretical frameworks in the literature. First, [Acharya and Naqvi \(2012\)](#) theoretically show that when banks have lower funding liquidity risk as a result of large amounts of deposit inflows, bank managers have the incentive to take more risk by aggressively lowering the lending rate to increase loan volumes in order to enhance their own compensation. Banks with more deposits may lower lending standards because bank managers' compensation could be partially based on the amount of loans that is used as a benchmark for managerial performance or alternatively long-term risks created may not be considered for managers' compensation. Banks only perform the costly audit to investigate managers' decisions regarding the lending standard if the funding liquidity deficit experienced by the bank is sufficiently large. Hence, excess deposits make bank managers overconfident that banks will not face a funding liquidity crisis shortly and their lending practices will not be questioned. Banks may face a capital shortfall from losses in relation to aggressive lending which may in turn trigger bank failure.

In a related vein, [Cheng et al. \(2015\)](#) show that based on classical principal-agent theory, risk-averse managers require higher compensation levels to work in riskier financial firms as they face greater uncertainty in their wealth. Hence, in order to achieve the higher compensation levels required by managers to work in riskier banks, they may also be given more leeway to pursue aggressive lending strategies when liquidity is in abundance. We develop our core hypotheses in the subsequent section.

## 3. Hypothesis development

### 3.1. Liquidity risk and bank risk

It has been recognised that liquidity risk and credit risk of banks do not have contemporaneous or causal relations, but both of the risks individually and jointly contribute to banks' probability of default ([Imbierowicz and Rauch, 2014](#)). Consistent with this view, [Hong et al. \(2014\)](#) find that systemic liquidity risk

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