



Bank funding costs in a rising interest rate environment



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ABSTRACT

One key risk to the banking system is how funding costs will change as monetary policy is normalized and interest rates rise after almost a decade of near-zero rates. Our contribution is to develop a model that jointly estimates banks' balance sheets and retail interest rates to arrive at a consistent estimate of the change in bank funding costs as market rates change. Our estimates imply a 100 basis-point shock to the Federal Funds rate would increase overall deposit funding costs by about \$40 billion, which is roughly equal to 25% of aggregate annual net income for commercial banks and savings institutions. We also find that deposit rate responses are largely symmetric, in contrast to some previous research showing deposit rates are less responsive to upward movements in reference rates. We introduce unique and confidential data on bank deposit betas to anchor our results.

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1. Introduction

In the aftermath of the financial crisis, the way banks fund themselves has changed substantially, with deposits making up an increasingly large percentage of banks' funding. As the Federal Reserve's policy of holding interest rates at historically low levels comes to an end, one key risk faced by banks is uncertainty about how their funding costs will change as rates rise.¹ This paper focuses on two sources of funding risk and their interaction: (1) increases in deposit rates as the overall level of interest rates rise, and (2) deposit outflows as bank customers seek higher returns. Not accounting for both sources of risk will lead to biased estimates of how funding costs are likely to change as interest rates change.

In its 2015 Annual Report, the Financial Stability Oversight Council (FSOC) highlighted one aspect of this risk, stating that "... non-interest bearing deposit accounts as a share of liabilities are near all-time highs and could leave the banking sector when inter-

est rates begin to rise."² In addition to households, corporates have been parking their cash in the banking system at record levels.³

Fig. 1 shows the ratio of total deposits to total assets at all U.S. commercial banks.⁴ After the financial crisis, deposits as a percentage of total bank balance sheets increased sharply from about 65% to about 75%. Along with an overall increase in deposits relative to total liabilities, the composition of deposits also changed. Fig. 2 shows how time deposits, such as CDs, as a percentage of total deposits have fallen from about 29% before the crisis to 14%, while non-time domestic deposits have increased from about 53% to 76%. Non-time deposits (also known as non-maturity deposits) are composed of transaction accounts such as checking accounts as well as savings accounts such as money market deposit accounts (MMDAs). It is especially striking that non-time deposits now account for more than 75% of total deposits given that, historically the non-time share rarely exceeded 60% based on Call Report data going back to 1976 as shown in Fig. 2. Therefore, the main contributor to the surge in deposits after the crisis comes from non-time deposits accompanied by a fall in time deposits as well as deposits sourced from foreign offices (from 19% prior to the crisis to 11% by 2016).

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¹ This paper focuses on funding risk, but there is interest rate risk on the asset side of the balance sheet as well. The low-rate environment has led some firms to take on more risk by holding longer-duration, higher-yielding assets that will decrease in value if rates rise. (See, for example, the 2015 Annual Report, Financial Stability Oversight Council, p. 106.) Thus, higher interest rates could generate substantial losses by increasing bank funding costs and decreasing the value of their assets.

² 2015 Annual Report, Financial Stability Oversight Council, p. 58.

³ For example, 56% of U.S. corporate cash is in bank deposit accounts compared to only 20% in 2008 ("The US economy is infested with zombie corporate cash," *Financial Times*, August 13, 2015). There is also evidence of pressure on banks to raise deposit rates for their corporate customers ("Meet the bank customers pushing for a better deposit deal," *Wall Street Journal*, July 25, 2017).

⁴ This is equivalent to the ratio of total deposits to total liabilities including equity. It makes sense to relate this to all sources of funding including equity, as equity has increased as a share of bank funding and debt has gone down since the financial crisis.

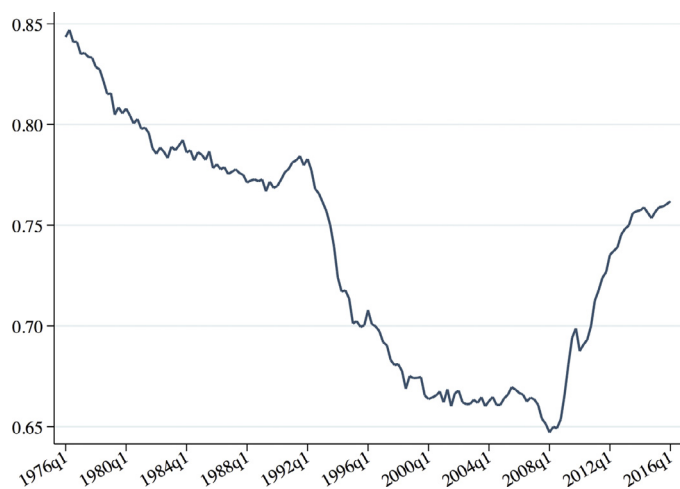


Fig. 1. This figure plots the ratio of deposits to total assets in the banking system. The source of the data is the quarterly Call Reports (1976–2016). The bank-level series have been aggregated over time and seasonally adjusted.

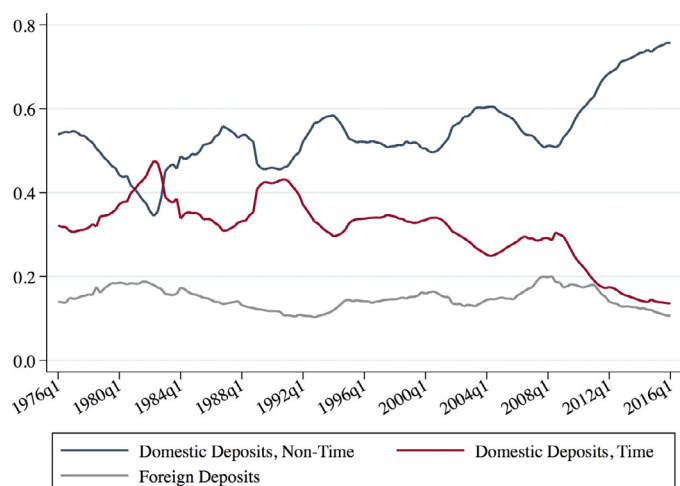


Fig. 2. This figure plots the components of deposits to total deposits in the banking system. Note that total deposits are the sum of foreign deposits and domestic deposits (time + non-time). Time deposits are any deposit with a contractual maturity such as a 12-month CD. Non-time deposits (also known as non-maturity deposits) make up the largest share of deposits and are broadly defined to include checking accounts, savings accounts, etc. Non-interest bearing deposit accounts (not shown) largely fall under non-time domestic deposits and have also trended up from 15% of total deposits in 2007 to roughly 25% currently. The source of the data is the quarterly Call Reports (1976–2016). The bank-level series have been aggregated over time and seasonally adjusted.

Figs. 1 and 2 together illustrate the funding risk⁵ as interest rates rise from historically low levels. First, deposits may flow out of the banking system, requiring banks to sell assets or seek other funding sources, which are likely to be more expensive and less stable than deposits. Second, the mix of remaining deposits may change so that time and foreign deposits become a larger fraction of total deposits. These deposits are likely to be a more expensive funding source as interest rates rise because time and foreign deposits track the reference interest rate more closely than other deposits. Non-time deposits offer valuable payment and liquidity services to households and businesses that offset their lower return compared with higher yielding CDs.

⁵ Bank funding includes other sources besides deposits. In this paper, we focus on funding costs associated with deposits and use the term ‘funding costs’, without always specifying deposit funding costs, for convenience.

For the U.S. banking sector, the magnitudes of these potential changes are large. U.S. commercial banks hold about \$12 trillion in deposits (at the end of 2015 based on the same aggregated Call Report data). If deposits as a percentage of total assets returned to pre-crisis levels, banks would have to replace, *ceteris paribus*, more than 10% of that \$12 trillion.⁶ That roughly \$1.6 trillion would likely require banks to pay rates close to market rates, which are generally higher than deposit rates.

On top of this conjectured shift in total deposits, to return to the deposit mix before the financial crisis would require time deposits to increase as a percentage of overall deposits by about 15 percentage points and foreign deposits to increase by 8 percentage points, which combined amounts to roughly \$2.1 trillion. The shift away from deposits in general, and the higher percentage of funding via time and foreign deposits will increase funding costs. For example, based on estimates from our analysis, the rate on time and foreign deposits may increase by about 67 basis points (bp) for a 100 bp increase in the reference rate, while the rate on a savings account may increase by only 42 bp. Assuming that replacing deposits with other types of funding results in similar cost increases, the 25 bp difference implies higher funding costs of about \$9 billion for a 100 bp increase in market rates. That \$9 billion represents about 6% of the average annual total return for U.S. banks.

Note that the additional funding costs are only for the shift away from deposits generally, and the shift from demand and saving deposits to time and foreign deposits. The extra costs do not include the higher funding costs for deposits overall (roughly an additional \$40 billion). One caveat is we assume that deposit funding costs are fully determined by interest rates. Processing costs are higher for non-time deposits than for time deposits because transactional deposits have a greater service component. Not accounting for changes to the service cost component likely underestimates the overall funding cost of non-time deposits and overestimates that on alternative bank funding. A second caveat is we do not account for reductions in non-interest income from reduced deposit service charges, which comprise a large component of bank earnings (more than 20% of total net income).⁷ Further, these rough examples are based on a 100 bp increase in market rates so funding costs would be commensurately higher for larger rate increases. The key point is that the way in which deposits change in a rising rate environment is likely to have a large impact on banks’ funding costs and earnings.

While the outlined hypothetical return to pre-crisis funding levels and mix illustrates the potential for a large impact on the banking system, a further complication is that there are many shocks and structural factors that affect the level and components of deposits. Therefore, it is important to qualify this descriptive analysis by not attributing the effects *solely* to a rise in market rates from a normalization in monetary policy. While the Federal Funds rate (henceforth FFR) has been pushed down by accommodative monetary policy since 2007 and short- and long-rates have tracked the policy rate downward on the path toward the zero floor (Fig. 3), other shocks are likely responsible for the high deposit and non-time shares. One such driver was a shift in investor risk preferences that supported flight-to-safety inflows to the banking system from market sources after the Lehman failure (Acharya and Mora (2015)). A second driver was the government’s expansion of

⁶ Specifically, to return to pre-crisis deposit funding, total deposits as a share of assets would need to decrease 10 percentage points from 0.76 to 0.66. Total assets at the end of 2015 were close to \$16 trillion, thus necessitating a reduction in total deposits from \$12.2 to \$10.6 trillion.

⁷ For example, *Financial Times*, June 7, 2016 “Wells Fargo: Branched Out,” demonstrates the importance of deposits for the bottom line of deposit-dependent financial institutions such as Wells Fargo. The point is generalizable: total service charges on deposit accounts as a share of non-interest income (net income) were 13.7% (21.2%) in 2015 based on FDIC statistics for all FDIC-insured institutions.

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