

Chicago Fed Letter

Rising interest rates, bank loans, and deposits

by Hesna Genay, economist, and Darrin R. Halcomb, associate economist

The authors show how the relationships between interest rate changes, deposit growth rates, and loan growth rates have changed in the last ten years, discuss some possible reasons, and assess the likely impact of rising interest rates on loans and deposits going forward.

Historically, rising interest rates have been associated with slower growth of bank loans and deposits.

Between January 2001 and June 2004, the federal funds rate declined steadily to reach a historically low 1%. Between June and October, however, the Federal Reserve raised the target fed funds rate in three increments to 1.75%. Moreover, based on recent economic data and the statements of the Federal Open Market Committee (FOMC), market participants expect interest rates to rise further: In early October, the fed funds futures market predicted that the target rate will reach a little over 2% by the end of 2004 and 2.5% by May of 2005.

What is the likely impact of rising interest rates on bank loans and deposits? Historically, rising interest rates have been associated with slower growth of bank loans and deposits. Furthermore, the impact of rising interest rates on bank loans has depended on bank size, with small banks typically suffering greater declines in loan growth during periods of rising interest rates than large banks.

In this *Chicago Fed Letter*, we show that these relationships between interest rate changes, deposit growth rates, and loan growth rates have weakened in the last ten years. We discuss some possible reasons and the likely impact of rising interest rates on loans and deposits going forward.

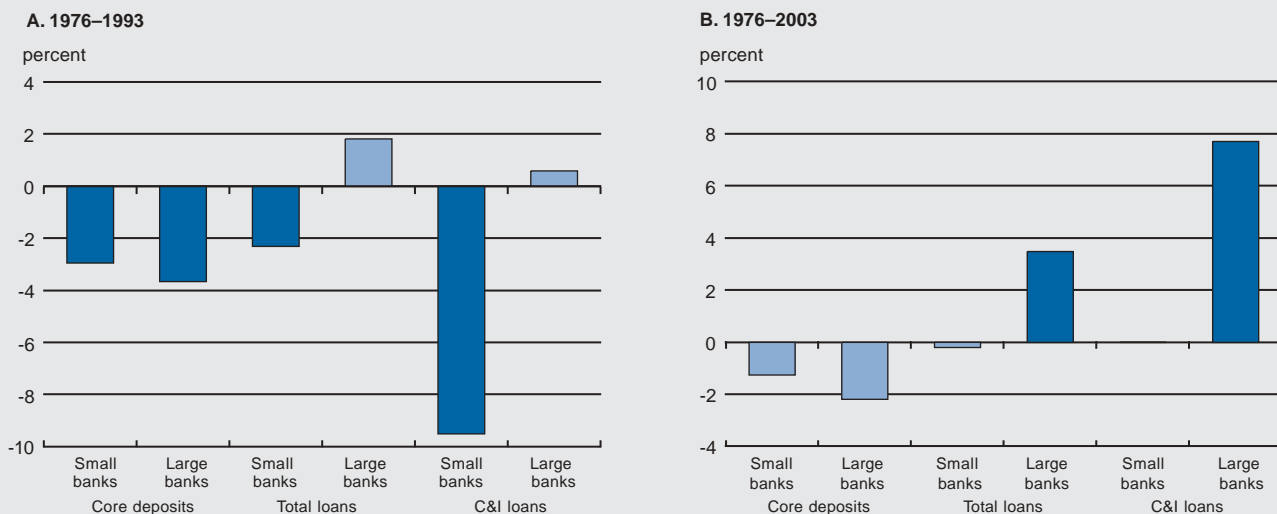
Theoretical implications

First, consider the effects of a contractionary monetary policy that raises short-term interest rates. Changes in monetary policy can be transmitted to the real economy through various channels. In the “credit channel,” bank loans and deposits play a central role and interest rate changes are transmitted to aggregate spending through the balance sheets of banks and nonfinancial firms.¹

Under a contractionary monetary policy, the Federal Reserve raises the target fed funds rate and reduces the supply of reserves in the banking system.² Because certain deposit liabilities of banks are subject to reserve requirements, a higher fed funds rate and a smaller supply of reserves can slow down growth of bank deposits.

The effects of slower deposit growth on bank loans are likely to depend on the banks’ ability to substitute other forms of funding for deposits. If banks can easily access other sources of funding, then they may be able to fund loan growth at the same rate as before the increase in interest rates. For instance, banks with an extra capital cushion may have greater access to financial markets, allowing them to substitute other liabilities for core deposits.

1. Interest rate sensitivity of deposits and loans at small and large banks



NOTES: Large banks are in the top 1st percentile and small banks are in the bottom 75th percentile of the asset distribution in each quarter. Data are adjusted for mergers, entry, and exit in each quarter. Core deposits are defined as total deposits minus time deposits in greater than \$100,000 denominations. The figure reports the sum of coefficient estimates on four lags of quarterly changes in the effective federal funds rate. The regression model also includes four lags of annualized quarterly growth rates of nominal gross domestic product, four lags of quarterly growth rates of total Consumer Price Index, and four lags of the dependent variable. The dark blue bars indicate cumulative interest rate sensitivities that are significant at 5% or better; pale blue bars indicate estimates that are statistically insignificant.

SOURCE: Authors' calculations from banks' *Report of Condition and Income* (call report).

On the other hand, if banks cannot fully counteract the decline in deposits by increasing other forms of funding, they have to slow the growth rate of their assets to match the slower deposit growth. As a result, higher interest rates can lead to slower loan growth through their effect on deposits.

Are there impediments to the ability of banks to substitute nondeposit liabilities for deposits? One potential impediment is imperfections in capital markets, such as asymmetric information between investors and banks seeking funding. Information asymmetries can raise the cost of external, nondeposit sources of funding or limit their supply to banks. As a result, growth of bank loans and other assets can be limited by deposit growth.

Capital market imperfections and the financial constraints they impose are one potential source for differences in the interest rate sensitivity of large and small banks. Typically, information on small banks is less readily available to investors than information on large banks. This information gap between small banks and investors can potentially restrain their ability to fully substitute for deposits with other sources

of funding. As a result, small banks may rely more on deposits.

At the end of 2003, insured deposits funded 61.7% of total assets at small banks (banks with total assets less than \$1 billion), almost twice the 31% at large banks (banks with total assets greater than \$1 billion). On the other hand, fed funds and brokered deposits purchased in capital markets financed only 2.3% and 2.0%, respectively, of total assets at small banks. In contrast, fed funds financed 7.8%, and brokered deposits financed 4.0%, of total assets at large banks.

If small banks are subject to greater capital market imperfections than large banks, then we would expect rising interest rates and slower deposit growth to have a greater adverse effect on loan growth at small banks.

Empirical evidence

A number of studies compare the sensitivity of loan growth at large and small banks to changes in interest rates and deposit growth.³ These studies, which use data through the mid-1990s, show that either a 1% increase in interest rates or a 1% decline in deposit growth is associated with a greater decline in

growth rates of loans at small banks than at large banks.

In figure 1, panel A, we replicate the type of response documented in these studies. Using the same methodology as in Kashyap and Stein (1995), we sort banks according to their size for every quarter in the 1976–93 period.⁴ We form two portfolios: Banks in the top 1st percentile of the size distribution in any quarter are classified as “large,” and banks in the bottom 75th percentile are “small.” For each portfolio, we calculate annualized quarterly growth rates of core deposits (total deposits minus time deposits greater than \$100,000), total loans, and commercial and industrial (C&I) loans. We regress these growth rates on four lags of changes in the effective fed funds rate and a set of control variables. The sum of coefficients on the interest rate changes provides us with a measure of interest rate sensitivity of core deposits, total loans, and C&I loans for large and small banks (see figure 1, panel A).

During the 1976–93 period, rising interest rates are associated with slower growth of core deposits at both large and small banks. A 1% increase in the fed funds rate over four quarters is

associated with a 2.96% decline in the growth of core deposits at small banks and a 3.66% decline at large banks. The interest rate sensitivity of core deposits is statistically significant for each size category, and the sensitivities of the two portfolios are not statistically different from each other.

However, loan growth rates (both total and C&I loans) at large banks and small banks respond differently to rising interest rates. At small banks, a 1% rise in the fed funds rate over four quarters is associated with a 2.32% decline in total loan growth and a 9.5% decline in C&I loans (these sensitivities are statistically significant). In contrast, rising interest rates are associated with positive, but statistically insignificant, changes in loan growth rates at large banks. In other words, during the 1976–93 period, rising interest rates are associated with slower loan growth at small banks, but have no discernible effect on loan growth at large banks.

These results are consistent with small banks facing greater capital market imperfections and financial constraints in funding their loan growth. They also provide evidence consistent with the credit channel of monetary policy transmission.

In figure 1, panel B, we extend our sample period to the end of 2003 and re-estimate our models. Clearly, the results for the entire 1976–2003 period are very different from the earlier period.

Over the 1976–2003 period, a cumulative 1% increase in interest rates over four quarters is still associated with declines in the growth rates of core deposits at large and small banks: a 1.27% decline at small banks and a 2.2% decline at large banks. However, the estimates are no longer statistically significant. Moreover, rising interest rates are no longer associated with statistically significant declines in the growth rates of total and C&I loans at small banks. And, surprisingly, rising interest rates are associated with statistically significant increases in the growth rates of loans at large banks: A 1% rise in interest rates is associated with a 3.48% increase in the growth rate of

total loans and a 7.7% rise in the growth rate of C&I loans.

Our results suggest that the relationship between interest rate changes, deposit growth, and loan growth changed significantly sometime during the mid-1990s.

Developments since the mid-1990s

Although pinpointing the exact source of the change in the relationships between interest rates, deposits, and loans is beyond the scope of this article, we can point to some developments since the mid-1990s that might have played a role.

One of the distinguishing features of the period since 1993 has been the strength and stability of the U.S. economy. The U.S. emerged from a recession in 1991 to enjoy the longest business cycle expansion in its history. During this period, economic growth has been rapid, yet remarkably stable. We have also enjoyed a low and stable inflationary environment, accompanied by similarly low and stable short-run interest rates.

Macroeconomic stability, deregulation, and technological advances have allowed both financial and nonfinancial firms to improve their balance sheets and offered them new financing options. These developments could have altered demand for loans and deposits in ways that are not captured by our model.

Today, firms are able to meet their funding needs from a much wider array of financial instruments and institutions than before. Deregulation has allowed banks to move into insurance and investment banking, but it has also allowed investment banks, finance companies, and other intermediaries to provide traditional banking services.

In addition, technological innovation has allowed better management and transfer of risk in financial markets. Firms that were previously too small or opaque to borrow in the bond markets are now able to access these markets. Consequently, at the end of 2003, corporate bonds comprised 27.6% of total liabilities of nonfinancial corporate businesses, up from 22.8% at the

end of 1993. At the same time, the share of bank loans in total liabilities declined from 8.9% in 1993 to 5.9% in 2003.⁵ These changes were particularly pronounced during the most recent recession. Over the last three years, corporations have increased the share of bonds in their liabilities from 23% to 27%, while decreasing their reliance on bank loans.

Moreover, changes in technology and improvements in productivity allowed firms to trim costs even as consumer demand remained strong during this most recent recession. The resulting record profits and lower expenses have led to an unprecedented increase in the rate at which firms generate internal funds.

Overall, these developments might have changed the demand for loans by businesses significantly. The relatively simple model we estimate may not be able to fully capture changes in loan demand and instead may attribute them to changes in the interest-rate sensitivity of loan growth.

The market forces that increased the sources of funding for nonfinancial businesses have also brought significant changes to the banking industry. Banks recovered from the 1991 recession in

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a remarkable fashion, with capital levels becoming stable yet substantial by the mid-1990s. As we noted before, strong profits and higher capital levels can provide a cushion against the impact of lower deposit growth on loan volume by permitting greater access to financial markets.

In recent years, consolidation has been the byword in the banking sector. Today, banks with assets greater than \$1 billion account for over 85% of total banking sector assets, up from 73% at the end of 1993. If larger size allows banks greater access to capital markets, then the relationship between deposit and loan growth for all banks would be closer to that observed for large banks in the past. Indeed, evidence suggests that banks of all sizes now rely more on market (nondeposit) sources. Today, deposits fund a smaller share of total assets (66.2% at the end of 2003) than a decade ago (74.3% at the end of 1993). As a result, a decline in deposit growth is likely to have a

smaller impact on loan growth today, irrespective of bank size.

Conclusion

These and more recent developments may also alter our expectations about how interest rate increases will affect bank loans and deposits going forward.

The business caution that has characterized the economy in recent years has eased some, with firms boosting investment and increasing payrolls. As a result, demand for bank borrowing may continue to increase, though this rise could be tempered by the availability of alternative funding sources.

However, the earlier caution has left businesses with greater financial slack than they had at similar points in previous economic recoveries, reducing the demand for bank loans. Since the last recession, firms have been allocating a smaller portion of their internal funds to capital investment and a greater

fraction to purchasing financial assets. Over the eight quarters since the end of the last recession, 88% of internally generated funds, on average, were used to fund capital investment. In contrast, over the eight quarters following the previous five recessions, capital spending averaged 109% of internally generated funds, with the gap being financed with external funds. As a result, nonfinancial firms have only very recently begun to increase their bank borrowing.

On balance, it would not be surprising to see C&I lending increase in the short run, despite the presence of higher short-term interest rates. In the longer term, the historical economic trends and cycles are more likely to return, so that higher interest rates are associated with slower loan and deposit growth. Still, the strength of this effect in the future may be mitigated by the financial market changes that have occurred over the last 15 years.

¹ See Ben S. Bernanke and Alan S. Blinder, 1992, "The federal funds rate and the channels of monetary transmission," *American Economic Review*, Vol. 82, No. 4, pp. 901–921.

² See Cheryl L. Edwards, 1997, "Open market operations in the 1990s," *Federal Reserve Bulletin*, November, pp. 859–874.

³ See Anil K Kashyap and Jeremy C. Stein, 1995, "The impact of monetary policy on bank balance sheets," *Carnegie-Rochester*

Conference Series on Public Policy, Vol. 42, pp. 151–195; Ruby P. Kishan and Timothy P. Opiela, 2000, "Bank size, bank capital, and the bank lending channel," *Journal of Money, Credit, and Banking*, Vol. 32, No. 1, pp. 121–141; Jith Jayaratne and Donald P. Morgan, 2000, "Capital market frictions and deposit constraints at banks," *Journal of Money, Credit, and Banking*, Vol. 32, No. 1, pp. 74–92; and Hesna Genay, 2000, "Recent trends in deposit and loan growth:

Implications for small and large banks," *Chicago Fed Letter*, December, No. 160.

⁴ As in Kashyap and Stein, we adjust our sample for mergers, entry, and exit. The results do not change if the period extends to 1994 or 1995.

⁵ Part of the shift away from bank loans toward bonds may be due to firms lengthening the maturity structure of their liabilities in a low interest-rate environment.