

# THE HISTORIC RELATIONSHIP BETWEEN BANK NET INTEREST MARGINS AND SHORT-TERM INTEREST RATES

## Overview

Developments since the Great Recession generally support the idea that protracted periods of low interest rates tend to compress net interest margin (NIM) at FDIC-insured institutions (banks). NIM decreased during the period of historically low interest rates after that recession, increased during the upward interest rate cycle (rate cycle) between 2015 and 2019, and decreased again as interest rates fell toward zero with the onset of the COVID-19 pandemic. While recent rate movements have been associated with a change in NIM, the direction of the relationship can differ across banks depending on a variety of factors. This article explores the historical relationship between interest rates and NIM at banks, discusses how NIM responded to interest rate changes in previous rate cycles, and then considers which types of banks may have a NIM that is more sensitive to changes in the effective federal funds rate (federal funds rate). The analysis shows that in most rate cycles since the 1980s, the NIM of typical community banks (median NIM) has moved in the same direction as changes in the federal funds rate, but that this relationship has been much less pronounced for banks with high concentrations of long-term assets.

## The Effect of Short-Term Interest Rates on NIM Is Theoretically Ambiguous and Influenced by Many Banking and Economic Conditions

It is often assumed that higher short-term market interest rates result in higher net interest income, which translates into higher NIM and greater profitability in the banking industry more generally.<sup>1</sup> This reasoning led to broader concerns about bank profitability when a prolonged period of low interest rates began in 2008.<sup>2</sup>

But the directional effect of rising short-term market interest rates on NIM is theoretically ambiguous because a bank's cost of funds may increase either faster or slower than its yield on earning assets. When interest rates rise, banks may have to pay higher interest rates on some portion of their deposits or other liabilities to attract or keep funding; some portion of the bank's assets, meanwhile, will continue to yield their contractual interest rates and therefore not reprice upward.

Many factors can influence the comparative changes in bank asset yields and funding costs. In addition to the maturity distribution and repricing distribution of bank assets, which figure heavily in this article's analysis, the contractual and effective maturities of liabilities play an important role. Certain banks may have a high number of longer-term loans with a floating rate that reprice quickly as short-term interest rates increase, such as credit cards, other types of consumer loans, and commercial loans. Even longer-term assets without a

## What Is Net Interest Margin?

Net interest margin (NIM) is a key profitability ratio that measures the difference between the interest income generated by bank lending and investment and the interest expense incurred from bank borrowing activities, normalized by average earning assets. The ratio is comparable over time and across banks of different sizes.

This measure is so popular that banks report it, bank examiners assess it for individual banks, and the FDIC calculates it for the industry every quarter in the *Quarterly Banking Profile*. For a vast majority of banks, net interest income is the primary source of income, and for such banks NIM is a primary component of profitability.

Several components of the Reports of Condition and Income (Call Reports) feed into the yield on earning assets: income on loans, leases, balances due from depository institutions, securities, trading assets, federal funds sold, and other interest income. Similarly, several components of the Call Report feed into the cost of funds: expense on deposits, federal funds purchased, trading liabilities, subordinated notes, and other interest expense.

<sup>1</sup>For academic discussion on the subject see: Diana Hancock, "Bank Profitability, Interest Rates, and Monetary Policy," *Journal of Money, Credit, and Banking* 17, no. 2 (May 1985), or Paul A. Samuelson, "The Effect of Interest Rate Increases on the Banking System," *American Economic Review* 35, no. 1 (March 1945). For discussion in the popular press, see: John Carney, "When the Fed Lifts Off, This Is What to Watch at Banks," *Wall Street Journal*, September 29, 2015, and Avi Salzman, "Banks Will Benefit From Rising Rates. Other Sectors, Not So Much," *Barron's*, October 12, 2018.

<sup>2</sup>The interest rate is just one factor that affects bank profitability. For a discussion of some of the other determinants of bank profitability, see Jared Fronk, "Core Profitability of Community Banks: 1985–2015," *FDIC Quarterly* 10, no. 4 (November 2016).

floating rate can reprice during times of lower interest rates, in particular 30-year residential mortgage loans which can be prepaid without penalty to get a lower interest rate for the borrower. The same is true of the composition of their deposits. For example, some banks may be able to delay increasing their deposit interest rates when market interest rates increase and reduce deposit interest rates relatively promptly when market interest rates decrease. All of these factors, unique to each specific bank's portfolio of loans and deposits, will have an effect on NIM over the course of a rate cycle.

Broad economic factors can affect NIM as well. For instance, in a time of economic contraction (out of which stem some of the rate cycles in this analysis) the Federal Reserve may lower the federal funds rate. Simultaneously, many banks may report an increase in nonaccrual loans, which would likely hurt their NIM in a way that is not predictable by maturity structure, but by loan quality. Similarly, economic expansions influence NIM in unique ways. Often, upward rate environments are caused by good economic times, when banks tend to lend more, and the resulting increase in the composition of loans relative to investments tends to increase asset yields. At the same time, expanding lending requires increasing bank funding. This could require increasing the cost of funding to attract new deposits or using other more expensive funding sources. These potentially countervailing effects add to the ambiguity of whether NIM increases or decreases when interest rates rise.

Finally, effects of interest rates on NIM reflect not just changes to the federal funds rate but changes in interest rates across the yield curve. Thus, for example, the yield a bank will earn on a new mortgage loan depends on the prevailing interest rates on mortgages, not on the federal funds rate. Changes in NIM will vary by bank depending on the composition of assets and liabilities by yield, cost, and maturity, and on the specific changes in the yield curve.

Because it is not immediately clear how rising interest rates will affect NIM, previous research examined the actual effects over time. Two studies found that NIM moves in the opposite direction as the federal funds rate, in contrast to conventional wisdom. Staff studies from the Federal Reserve Bank of St. Louis and the Federal Reserve Bank of Richmond published in 2016 found that over shorter periods the banking industry's weighted average NIM often moves in the opposite direction of interest rates.<sup>3</sup> The studies computed the weighted average NIM of all FDIC-insured banks and the weighted average cost of funds and yield on assets and concluded that NIM typically increased during falling rate cycles and decreased during rising rate cycles. The studies posited that the results are driven by the sensitivity of funding costs to changes in interest rates.

Previous work has also considered the historically low interest rates that prevailed in the decade after the onset of the Great Recession in 2008.<sup>4</sup> Over that period, interest rates, including the federal funds rate, and bank funding costs were historically low. But NIM was low as well. A contributing factor to low NIM during this period was the extended length of the historically low rates; maturing assets were replaced by new assets with lower interest rates. This steadily drove the yield on earning assets lower. As this research was conducted before liftoff from the zero lower bound in 2015, it bears revisiting now that an additional interest rate cycle has completed.

Considering that the theoretical predictions of how interest rates affect NIM are unclear, this article explores the topic in all rate cycles since 1984 by examining the change in the median bank NIM during rising and falling rate cycles. It looks at this change for the median community bank and the median noncommunity bank over each rate cycle, and for banks with relatively short-term asset portfolios and with relatively long-term asset portfolios. For simplicity, the analysis of interest rates focuses solely on changes in the federal funds rate. Importantly, the analysis focuses on median changes in NIM rather

<sup>3</sup> David Wheelock, "Are Banks More Profitable When Interest Rates Are High or Low?" Federal Reserve Bank of St. Louis Economy Blog, May 16, 2016; and Huberto M. Ennis, Helen Fessenden, and John R. Walter, "Do Net Interest Margins and Interest Rates Move Together?" Federal Reserve Bank of Richmond Economic Brief no. 16-05, May 2016.

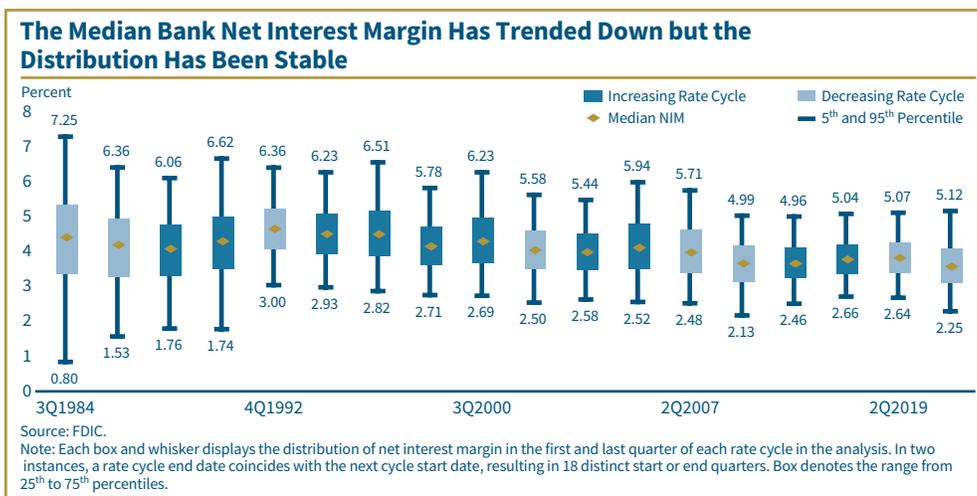
<sup>4</sup> Francisco B. Covas, Marcelo Rezende, and Cindy M. Vojtech, "Why Are Net Interest Margins of Large Banks So Compressed?" FEDS Notes, Federal Reserve Board of Governors, October 5, 2015.

than weighted average changes. The NIM changes reported in this article are thus more reflective of typical small banks than of the large banks that dominate weighted average calculations. In line with conventional wisdom, the analysis demonstrates that at the median—in other words, for the typical community bank—NIM has tended to increase when short-term interest rates increase, and decrease when short-term interest rates decrease. The analysis also confirms the importance of the maturity distribution of bank assets in determining how NIM responds to interest-rate changes, including how differences in asset maturities help explain differences in NIM between the responses of community banks versus the responses of noncommunity banks. The analysis thus sheds some light on the broader discussion of bank profitability and may help banks understand the challenging interest rate environment.

**The Spread Between the Banks With the Highest and Lowest NIM Has Been Relatively Stable Since the Early 1990s**

Both the NIM of the median bank and the distribution of NIM for the entire industry have trended down during each rate cycle since the 1980s. Chart 1 shows the NIM for the 5<sup>th</sup> and 95<sup>th</sup> percentile of banks at the beginning and end of each rate cycle; while the distribution has decreased slowly over time, it does not display any major jumps. The spread between NIM at the 25<sup>th</sup> and 75<sup>th</sup> percentile, illustrated by the boxes, appears more stable over time, a trend comparable to the trend for NIM of the median bank. This suggests that examining trends based on the median NIM instead of the average NIM is also a good method for capturing industry trends. This approach also adds to the understanding of trends affecting the vast majority of small banks, as much previous analysis has been based on the industry-weighted average NIM, which is influenced by the largest banks.<sup>5</sup>

**Chart 1**



**NIM Has Varied With Interest Rates Over Time, but Both Have Trended Downward**

Since the 1980s, interest rates have declined notably and bank NIM has trended downward. The median quarterly NIM for both community and noncommunity banks and the federal funds rate since 1984 are displayed in Chart 2.<sup>6</sup> The Federal Reserve adjusts the federal funds rate in response to real economic conditions as part of conducting monetary policy, but the rate still displays a clear downward trend over time. The corresponding decline in NIM has been even more pronounced for noncommunity banks than for community banks,

<sup>5</sup> As of first quarter 2021, FDIC-insured banks had a median asset size of \$294.4 million. FDIC-insured community banks had a median asset size of \$266.2 million and noncommunity banks had a median asset size of \$3.8 billion.

<sup>6</sup> This article analyzes quarterly net interest margins using the calculation that the *Quarterly Banking Profile* uses: annualized quarterly net interest income, interest income minus interest expense, divided by two-period average earning assets. For simplicity, when discussing the banking industry NIM, the article is referring to the median industry quarterly NIM. Likewise, when discussing community and noncommunity bank NIM, the article is referring to the median community and noncommunity bank quarterly NIM. Community banks are identified using criteria in Appendix A of the *FDIC Community Banking Study*, December 2020, <https://www.fdic.gov/resources/community-banking/report/2020/2020-cbi-study-full.pdf>.

which may have occurred for a variety of reasons. Noncommunity banks often have more sources of noninterest income, which mitigates the adverse impact of this trend for these banks. This overall downward trend in industry NIM has caused recent concerns about profitability challenges for community banks, and how community banks may be responding by changing asset and liability structures or by adopting other strategies to maintain NIM that could pose additional risk.

**Chart 2**

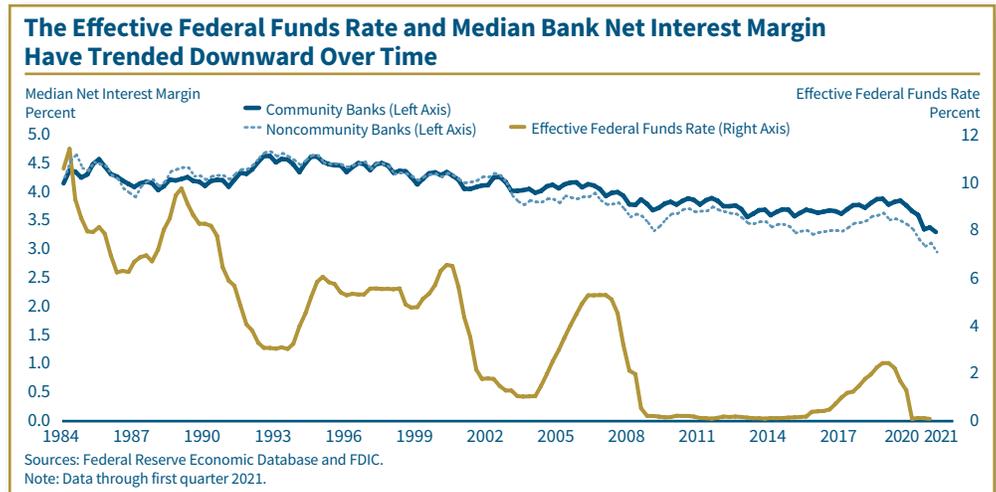


Chart 2 shows that while interest rates and NIM both have generally drifted downward over time, the relationship between them is less clear. In some periods, NIM continued to decline during an upward rate cycle. This makes sense in light of the above discussion about how a change in interest rates may not necessarily result in a corresponding change in NIM. Decomposing median NIM into two components, the median yield on earning assets and median cost of funds, tells a similar story. The trends of both components for both community banks and noncommunity banks move in a similar pattern over time. One key difference is that the percentage point declines in the yield on earning assets and in the cost of funds have been more pronounced than the overall decline in median NIM. But since both components have trended downward roughly the same level, this change is netted out of median NIM to create the decline shown in Chart 2.

The rest of this study breaks the historical changes in the federal funds rate—the gold line in Chart 2—into upward and downward rate cycles. In determining the exact cycle starts and endpoints in this analysis, downward cycles are dated from the peak of a rate cycle to the beginning of the trough and do not include flat periods of interest rates, similar to work conducted by the Federal Reserve Bank of Richmond.<sup>7</sup> Upward rate cycles are dated from the end of the trough to the peak.<sup>8</sup>

<sup>7</sup>Ennis et al. May 2016.

<sup>8</sup>To limit our analysis to the immediate effects of the upward or downward adjustment in interest rates, some months in which interest rates were held constant—typically following downward cycles—are excluded from analysis. We determined five separate upward rate cycles for analysis: first quarter 1987 to second quarter 1989, fourth quarter 1993 to second quarter 1995, first quarter 1999 to 3<sup>rd</sup> quarter 2000, first quarter 2004 to third quarter 2006, and fourth quarter 2015 to first quarter 2019. We determined five separate downward rate cycles for analysis: third quarter 1984 to third quarter 1986, second quarter 1989 to fourth quarter 1992, third quarter 2000 to fourth quarter 2003, second quarter 2007 to first quarter 2009, and second quarter 2019 to second quarter 2020.

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### Median NIM for the Banking Industry as a Whole Has Generally Increased in Upward Rate Cycles and Decreased in Downward Rate Cycles

Interest rates and median NIM have generally moved in the same direction in both downward and upward rate cycles since the 1980s (Table 1). In nearly every upward rate cycle, median NIM expanded between 12 and 22 basis points, with one exception in the early 1990s. Similarly, in all but one downward rate cycle, NIM contracted between 22 and 32 basis points. The average length of downward and upward rate cycles was the same (ten quarters). During downward rate cycles, however, the magnitude of the reductions in both NIM and the federal funds rate tended to exceed the increases in NIM and the federal funds rate that occurred in the upward rate cycles. One striking finding is that the change in NIM was fairly consistent in size throughout rate cycles, even though the total change in the federal funds rate was much smaller in later cycles.

Table 1

Change in Median Industry Net Interest Margin Over Upward and Downward Rate Cycles					
Upward Rate Cycles (Percentage Points)	1Q 1987 to 2Q 1989	4Q 1993 to 2Q 1995	1Q 1999 to 3Q 2000	1Q 2004 to 3Q 2006	4Q 2015 to 1Q 2019
Change in Effective Federal Funds Rate	3.51	3.03	1.79	4.24	2.04
Change in Median					
Yield on Earning Assets	-0.19	0.74	0.70	2.71	0.16
Cost of Funds	-0.40	0.75	0.55	2.58	0.05
Net Interest Margin	0.22	-0.01	0.15	0.13	0.12
Downward Rate Cycles (Percentage Points)	3Q 1984 to 3Q 1986	2Q 1989 to 4Q 1992	3Q 2000 to 4Q 2003	2Q 2007 to 1Q 2009	2Q 2019 to 2Q 2020
Change in Effective Federal Funds Rate	-5.18	-6.69	-5.52	-5.07	-0.85
Change in Median					
Yield on Earning Assets	-3.08	-1.71	-3.07	-0.77	-0.44
Cost of Funds	-2.86	-2.07	-2.81	-0.45	-0.20
Net Interest Margin	-0.22	0.36	-0.25	-0.32	-0.25

Sources: Federal Reserve Economic Database and FDIC.

Note: Change measured in percentage points. For the first and last quarter of each cycle, the bank with the median NIM is found, and the corresponding yield on earning assets and cost of funds for that bank are selected. Then the change is calculated.

### This Relationship Holds for Both Community and Noncommunity Banks

Generally, upward rate cycles have corresponded with an expansion of NIM for both community and noncommunity banks. Table 2 shows changes for the median bank between the starting quarter and ending quarter of each rate cycle.<sup>9</sup> Community banks reported an increase or no change in NIM in each of the five upward rate cycles, consistent with the conventional wisdom that increasing interest rates increase NIM. In each of these five periods, both the yield on earning assets and cost of funds increased, but the yield on earning assets increased more, resulting in the increase in NIM. Noncommunity banks reported a similar trend, with NIM increasing in four out of five upward rate cycles. Like community banks, in each of these upward rate cycles both their yield on earning assets and their cost of funds increased, most often resulting in NIM expansion. These results demonstrate that banks may be able to exert market power as interest rates begin to rise to hold their cost of funds down at the beginning of upward cycles, as was observed in the most recent upward cycle, again affecting NIM.

<sup>9</sup> For the first and last quarter of each cycle, the bank with the median NIM is found, and the corresponding yield on earning assets and cost of funds for that bank is selected. Then the change is calculated.

Table 2

Change in Median Community and Noncommunity Bank Net Interest Margin Over Upward Rate Cycles					
Upward Rate Cycles (Percentage Points)	1Q 1987 to 2Q 1989	4Q 1993 to 2Q 1995	1Q 1999 to 3Q 2000	1Q 2004 to 3Q 2006	4Q 2015 to 1Q 2019
Change in Effective Federal Funds Rate	3.51	3.03	1.79	4.24	2.04
Change in Median					
Noncommunity Bank					
Yield on Earning Assets	1.25	0.26	0.75	1.41	0.71
Cost of Funds	0.74	0.32	0.66	1.26	0.45
Net Interest Margin	0.51	-0.07	0.09	0.15	0.25
Community Bank					
Yield on Earning Assets	1.97	0.88	0.20	1.47	0.97
Cost of Funds	1.80	0.88	0.04	1.34	0.86
Net Interest Margin	0.17	0.00	0.15	0.13	0.11

Sources: Federal Reserve Economic Database and FDIC.

Note: Change measured in percentage points. For the first and last quarter of each cycle, the bank with the median NIM in each group is found, and the corresponding yield on earning assets and cost of funds for that bank are selected. Then the change is calculated.

Conversely, downward rate cycles most often resulted in a compression of median NIM for both community and noncommunity banks. Table 3 shows that during four out of the five downward rate cycles between 1984 and 2020, community banks reported a decline in median NIM. While both the yield on earning assets and cost of funds fell during each cycle, the yield on earning assets almost always fell by more, and as a result median NIM declined in all downward cycles except that between second quarter 1989 and fourth quarter 1992. Noncommunity banks reported a decrease in median NIM in the same four out of five downward rate cycles. Like community banks, in each downward rate cycle both the yield on earning assets and cost of funds fell for noncommunity banks, but the yield on earning assets almost always fell by more. The two most recent downward cycles have encountered the zero lower bound, resulting in liabilities being unable to reprice as low as they otherwise would in a typical downward cycle, thereby further compressing NIM. Even so, because interest rates have started from relatively lower rates, the percentage change in the federal funds rate is in line with the percentage changes in previous downward cycles. Table 3 shows that the effects on NIM in downward cycles that reach the zero lower bound are similar to previous downward cycles.

Table 3

Change in Median Community and Noncommunity Bank Net Interest Margin Over Downward Rate Cycles					
Downward Rate Cycles (Percentage Points)	3Q 1984 to 3Q 1986	2Q 1989 to 4Q 1992	3Q 2000 to 4Q 2003	2Q 2007 to 1Q 2009	2Q 2019 to 2Q 2020
Change in Effective Federal Funds Rate	-5.18	-6.69	-5.52	-5.07	-0.85
Change in Median					
Noncommunity Bank					
Yield on Earning Assets	-3.14	-2.20	-2.96	-2.34	-1.02
Cost of Funds	-2.55	-2.48	-2.52	-1.87	-0.66
Net Interest Margin	-0.59	0.28	-0.43	-0.47	-0.36
Community Bank					
Yield on Earning Assets	-0.94	-3.20	-2.81	-0.95	-0.26
Cost of Funds	-0.79	-3.58	-2.58	-0.65	-0.04
Net Interest Margin	-0.15	0.37	-0.23	-0.30	-0.23

Sources: Federal Reserve Economic Database and FDIC.

Note: Change measured in percentage points. For the first and last quarter of each cycle, the bank with the median NIM in each group is found, and the corresponding yield on earning assets and cost of funds for that bank are selected. Then the change is calculated.

### **While Community and Noncommunity Banks Reported the Same Directional Change in Median NIM in Nearly Every Rate Cycle, the Magnitude of Change Was Different**

The change in community bank median NIM was almost always smaller in magnitude than that of noncommunity banks regardless of interest rate direction. For instance, in the most recent downward rate cycle from second quarter 2019 to second quarter 2020, noncommunity banks reported a 36 basis point decline in median NIM, while community banks reported a decline of only 23 basis points (Table 3). Similarly, in the most recent upward rate cycle from fourth quarter 2015 to first quarter 2019, noncommunity banks reported a 25 basis point increase in median NIM, while community banks reported an increase of 11 basis points (Table 2). Community banks reported a smaller absolute change in median NIM than noncommunity banks in eight out of ten rate cycles. The difference was especially pronounced during downward rate cycles: the reduction in median NIM was markedly greater for noncommunity banks than for community banks in four of the five downward cycles (Table 2).

It is worth noting that in downward rate cycles, while both community and noncommunity banks reported declining yields and costs, noncommunity bank yields and costs responded with a substantially greater basis point decline in three of the five cycles. Interestingly, during upward rate cycles, community banks tended to report a larger change in both components, but the components changed more proportionally, resulting in median community bank NIMs that have been more insulated from changes in interest rates in both directions.

Dividing the data into community and noncommunity banks allows a better understanding of the differing experiences of many of the banks that the FDIC supervises and insures. As discussed below, the differing responses of community and noncommunity bank NIM to changes in interest rates are likely driven to an important extent by the differing asset maturity structures of the two types of banks.

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### **The Maturity and Repricing Structure of Bank Assets Is an Important Factor in How NIM Responds to Rate Changes**

The maturity structures of bank balance sheets—the relative volumes, maturities, and rates of assets and liabilities—naturally play a central role in determining how NIM will respond to a change in prevailing interest rates. Regulators and banking institutions themselves dedicate much time to understanding these relationships at individual banks through asset-liability management and complex interest rate risk models. Given the difficulties associated with analyzing the effective maturity of deposits, however, the analysis in this paper focuses on how asset maturities have affected the response of NIM to changes in market interest rates.

Long-term assets are defined in this analysis as assets that mature or reprice in three years or more. Banks with a higher share of long-term assets to total assets should report smaller NIM compression than their counterparts during downward rate cycles, as they reprice their deposits and lower their cost of funds, but have a larger proportion of assets that do not immediately reprice downward, propping up their yield on earning assets. Conversely, those banks should report less NIM expansion during upward rate cycles, as they will reprice their deposits upward (albeit as slowly as possible) and increase their cost of funds, but have a larger proportion of assets that do not reprice upward in their favor, suppressing their yield on earning assets. In response to these pressures, banks may seek higher returns by taking on more credit risk or issuing longer maturities, which often increases their income at the expense of additional risk to improve their margins. While either taking on more credit risk or increasing maturities can increase net interest income, changing the structure of their balance sheet may affect how their NIM responds to interest rate changes.

Table 4 breaks down the industry into quartiles of the proportion of long-term assets to total assets at the beginning of each rate cycle. Banks with the highest share of long-term assets to total assets (those in the fourth quartile) nearly always reported the least NIM expansion during upward rate cycles and the least NIM compression during downward rate

cycles.<sup>10</sup> In fact, in the upward rate cycle between first quarter 2004 and third quarter 2006, banks with the highest proportion of long-term assets actually reported a *decline* in NIM. Similarly, during the downward rate cycle between second quarter 2007 and first quarter 2009, those banks in the highest quartile reported NIM expansion.

The only rate cycle in which the change in NIM was not strongly related to the proportion of long-term assets to total assets was the most-recent downward rate cycle of second quarter 2019 to second quarter 2020. In that cycle, banks with the highest share of long-term assets reported a slightly larger decline in NIM than those in the third quartile. There are many reasons this may have occurred, since many factors other than a bank's share of long-term assets influence NIM. It could be that the banks in the fourth quartile saw larger prepayment volumes than other banks. In this analysis, the designation of a bank's quartile was held fixed as of the quarter before the rate cycle. Therefore, a bank in the highest quartile would remain in that quartile despite prepayment activity shortening its maturity profile. As a result, if banks in the highest quartile of long-term assets to total assets experienced the most prepayment activity, they may have seen yield on earning assets fall faster than would be expected given their relatively longer maturities at the beginning of the period. Many banks in the fourth quartile held a comparatively high share of mortgage loans and are more likely to be classified as mortgage specialists, and therefore may have experienced a relatively high share of the refinancing activity that occurred as mortgage rates fell. The percentage of single-family mortgage originations that were refinancings doubled from 34 percent to 68 percent over the course of the most-recent downward rate cycle, and such an increase in refinancing activity could affect the composition of their balance sheet and hence NIM.

Table 4

Change in Median Net Interest Margin Over Upward and Downward Rate Cycles by Share of Long-Term Assets			
<b>Upward Rate Cycles (Percentage Points)</b>	<b>1Q 1999 to 3Q 2000</b>	<b>1Q 2004 to 3Q 2006</b>	<b>4Q 2015 to 1Q 2019</b>
Change in Effective Federal Funds Rate	1.79	4.24	2.04
Change in Median NIM by Share of Long-Term Assets			
First Quartile	0.36	0.50	0.20
Second Quartile	0.19	0.21	0.11
Third Quartile	0.11	0.05	0.09
Fourth Quartile	0.04	-0.18	0.04
<b>Downward Rate Cycles (Percentage Points)</b>	<b>3Q 2000 to 4Q 2003</b>	<b>2Q 2007 to 1Q 2009</b>	<b>2Q 2019 to 2Q 2020</b>
Change in Effective Federal Funds Rate	-5.52	-5.07	-0.21
Change in Median NIM by Share of Long-Term Assets			
First Quartile	-0.58	-0.80	-0.36
Second Quartile	-0.29	-0.40	-0.27
Third Quartile	-0.21	-0.22	-0.22
Fourth Quartile	-0.09	0.09	-0.24

Sources: Federal Reserve Economic Database and FDIC.

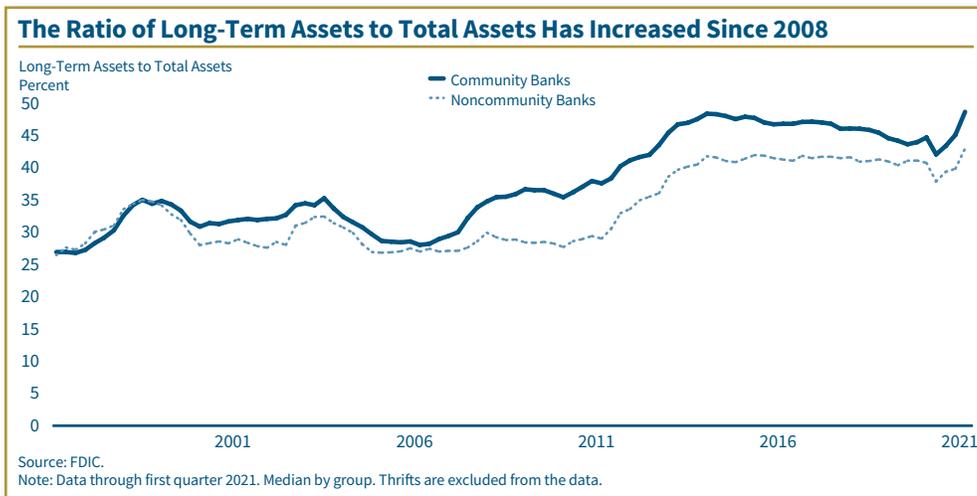
Note: Change measured in percentage points. Maturity is determined by the proportion of assets with a remaining maturity or next repricing frequency of three years or more ("long-term assets") to total assets. Maturity buckets are calculated based on industry quartiles in the quarter before each cycle. Each bank is placed into a maturity bucket based on the proportion of long-term assets as of the quarter prior to each cycle. Each bank's bucket is held constant throughout the cycle. For the first and last quarter of each cycle, the median NIM of each bucket is found and the change is calculated. Reports of Condition and Income (Call Report) filers began reporting asset maturity breakdowns in 1997. Thrifts are excluded from this analysis because they did not begin reporting maturity and repricing data until their adoption of the Call Report in first quarter 2011.

<sup>10</sup>Maturity buckets are calculated based on industry quartiles in the quarter before each cycle. Each bank is placed into a maturity bucket based on its proportion of long-term assets as of the quarter before each cycle. Each bank's bucket is held constant throughout the cycle. For the first and last quarter of each cycle, the median NIM of banks in each bucket is found and the change between those two NIMs is calculated. Therefore, "banks" in this portion of the analysis are defined by the bank with the median NIM within a quartile of long-term assets to total assets. Reports of Condition and Income (Call Reports) first included asset maturity breakdowns in 1997. Thrifts are excluded from this analysis, as they did not begin reporting maturity and repricing data until their adoption of the Call Report in first quarter 2011.

**Community and Noncommunity Banks Have Increased Their Share of Long-Term Assets Since the Great Recession**

While community and noncommunity banks use different business models and strategies that influence how NIM will change when interest rates change, one trend apparent for both types of banks in recent years is an increase in the share of long-term assets to total assets. Community banks traditionally hold a higher share of long-term assets to total assets, but both community banks and noncommunity banks have increased their shares in the aftermath of the Great Recession (Chart 3). As of first quarter 2021, community banks reported that 49 percent of their total assets repriced in three or more years, while noncommunity banks reported that 43 percent of their total assets repriced in three or more years.

**Chart 3**



The effect long-term asset holdings has on NIM becomes clearer when examining banks grouped into quartiles based on their share of long-term assets to total assets. Both community and noncommunity banks in the fourth quartile of long-term assets to total assets reported the least NIM expansion during each upward rate cycle (Table 5). During downward rate cycles, the results were slightly mixed: community banks in the fourth quartile consistently reported the least NIM contraction, while noncommunity banks in either the third or fourth quartile reported the least NIM contraction.

**The Effect of Heightened Long-Term Assets to Total Assets Shares Can Be Seen in Recent Rate Cycles**

During the low-for-long interest rate environment of 2008 to 2015, many banks pursued a strategy of investing in longer-maturity assets in an attempt to bolster their yield on earning assets. This drove the share of long-term assets to total assets at community and noncommunity banks to the highest levels in available data. While this strategy helped bolster NIM at these banks when rates were low, it hurt them during the upward rate cycle that followed. As seen in Table 5, the relative interest-rate insensitivity of their assets was met with increasing costs of funding, and community banks and noncommunity banks with the highest share of long-term assets to total assets reported the least NIM expansion (3 basis points) as a result.

During the downward rate cycle of second quarter 2019 to second quarter 2020, however, banks with the highest share of long-term assets reported slightly less NIM compression than other banks, though the relationship was not as strong. Community banks in the highest quartile of long-term assets to total assets reported a decline in NIM that was 12 basis points less than in community banks in the lowest quartile of long-term assets, and a decline similar to that of community banks in the middle two quartiles. Noncommunity banks in the highest quartile of long-term assets to total assets reported a decline in NIM that was 27 basis points less than in noncommunity banks in the lowest quartile of long-term assets.

Table 5

<b>Change in Median Community and Noncommunity Bank Net Interest Margin Over Upward and Downward Rate Cycles by Share of Long-Term Assets</b>			
<b>Upward Rate Cycles (Percentage Points)</b>	<b>1Q 1999 to 3Q 2000</b>	<b>1Q 2004 to 3Q 2006</b>	<b>4Q 2015 to 1Q 2019</b>
Change in Effective Federal Funds Rate	1.79	4.24	2.04
Change in Median NIM by Share of Long-Term Assets			
Noncommunity Banks			
First Quartile	0.38	0.55	0.46
Second Quartile	0.23	0.20	0.13
Third Quartile	0.04	0.04	0.15
Fourth Quartile	-0.11	-0.17	0.07
Community Banks			
First Quartile	0.36	0.50	0.19
Second Quartile	0.18	0.23	0.12
Third Quartile	0.12	0.05	0.08
Fourth Quartile	0.05	-0.17	0.03
<b>Downward Rate Cycles (Percentage Points)</b>	<b>3Q 2000 to 4Q 2003</b>	<b>2Q 2007 to 1Q 2009</b>	<b>2Q 2019 to 2Q 2020</b>
Change in Effective Federal Funds Rate	-5.52	-5.07	-0.21
Change in Median NIM by Share of Long-Term Assets			
Noncommunity Banks			
First Quartile	-1.16	-1.18	-0.55
Second Quartile	-0.38	-0.45	-0.39
Third Quartile	-0.19	-0.44	-0.12
Fourth Quartile	-0.23	0.20	-0.28
Community Banks			
First Quartile	-0.54	-0.78	-0.35
Second Quartile	-0.29	-0.39	-0.24
Third Quartile	-0.21	-0.19	-0.24
Fourth Quartile	-0.08	0.08	-0.23

Sources: Federal Reserve Economic Database and FDIC.

Note: Change measured in percentage points. Maturity is determined by the proportion of assets with a remaining maturity or next repricing frequency of three years or more ("long-term assets") to total assets. Maturity buckets are calculated based on industry quartiles in the quarter before each cycle. Each bank is placed into a maturity bucket based on the proportion of long-term assets as of the quarter prior to each cycle. Each bank's bucket is held constant throughout the cycle. For the first and last quarter of each cycle, the median NIM of each bucket is found and the change is calculated. Report of Condition and Income (Call Report) filers began reporting asset maturity breakdowns in 1997. Thrifts are excluded from this analysis because they did not begin reporting maturity and repricing data until their adoption of the Call Report in first quarter 2011.

### Since the End of the Most Recent Downward Rate Cycle, Industry NIM Has Fallen to a Record Low

The Federal Reserve lowered the target federal funds rate three times in the second half of 2019 and two more times in March 2020, bringing the lower bound of the target rate to zero. While the effective rate ended its downward cycle in second quarter 2020, which is the end of the downward rate cycle in this analysis, this low interest rate and other impacts of the COVID-19 pandemic have had a severe adverse impact on NIMs in the months since. Fiscal and monetary stimulus to combat the economic impact of the pandemic resulted in bank balance sheets flooded with deposits. The banking industry reported annual deposit growth of \$3.3 trillion (22.6 percent) in 2020. However, with weak loan demand and tightening credit standards, banks placed much of that liquidity into low-yielding cash and balances due from depository institutions (up 91.2 percent year over year) instead of into higher-yielding loans, whose 3.3 percent growth was driven in large part by low-yielding Paycheck Protection Program loans.<sup>11</sup> The combined effect of balance sheet composition changes and lower prevailing market rates resulted in third quarter 2020 in the largest year-over-year basis point decline in NIM and the lowest level of industry NIM on record, where it remained in first quarter 2021.

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### Summary

The directional response of NIM to changes in prevailing interest rates is theoretically ambiguous. Analyzing the changes in median NIM for the industry, community banks, and noncommunity banks over upward and downward rate cycles since the early 1980s clarifies the potential effects of short-term interest rate changes on NIM. In line with conventional wisdom, at the median, NIM has tended to increase when short-term interest rates increase and decline when short-term interest rates decline.

While many factors influence NIM, one that is particularly important is the maturity structure of bank assets. Those banks with a relatively high proportion of long-term assets to total assets report greater insulation from changes in short-term interest rates. This means that their NIM falls less during downward rate cycles but rises less during upward rate cycles. This positive relationship between short-term interest rates and NIM and the effect of maturity structure on this relationship generally hold true over time for both community and noncommunity banks.

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<sup>11</sup> Federal Reserve Senior Loan Officer Opinion Survey on Bank Lending Practices, October 2020, <https://www.federalreserve.gov/data/sloos/sloos-202010.htm>. For more information on the Paycheck Protection Program see: <https://www.sba.gov/funding-programs/loans/coronavirus-relief-options/paycheck-protection-program#:~:text=The%20Paycheck%20Protection%20Program%20is,an%20interest%20rate%20of%201%25.>