

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM
DIVISION OF MONETARY AFFAIRS

Date: January 18, 2018
To: Board of Governors
From: Rebecca Zarutskie¹
Subject: Implications of U.S. Yield Curve Flattening or Inversion for U.S. Banks

Overview

This memo provides an expanded summary of the content of a briefing delivered to Governors Brainard and Powell and Vice Chair Quarles on December 8, 2017, on the topic of how U.S. yield curve flattening or inversion can affect bank profitability and the possible implications for U.S. banks of an extended multi-year period of a very flat or inverted yield curve. In the current Tealbook baseline forecast, the federal funds rate is projected to rise above the 10-year Treasury yield in the 2020, after a period of a generally flattening yield curve. The inverted yield curve is then projected to persist for more than five years.²

How have banks' net interest margins generally changed with the slope of yield curve?

Before turning to a discussion of the possible effects of an extended period of a flat or inverted yield curve on bank profitability and behavior, we first examine the historical relationship between the slope of the yield curve and bank profitability more generally. A key measure of the profitability of a bank as it relates to the interest rate environment that it is facing is its net interest margin (NIM). As can be seen by the black line in the top left chart of the exhibit, in aggregate, banks' NIMs have been fairly stable over time, especially relative to the difference between long- and short-term interest rates, the red and blue lines in the chart. In general, banks' NIMs tend to rise for a time during recessions, when short-term interest rates tend to be declining, as banks' assets—its loans and securities, some of which earn a fixed rate—generally reprice downward more slowly than do their liabilities, which mainly consist of deposits which banks are relatively quick to reprice downward in such environments. Thus during such times, we see a mildly positive correlation between banks' NIMs and the slope of the yield curve, as measured either by the 10-2 year Treasury spread, the red line, or the 10-year-3 month Treasury spread, the blue line.

¹ With input from Rochelle Edge and Gretchen Weinbach. Jared Berry provided excellent research assistance.

² See the box in the December 2017 Tealbook A, "Why is the Yield Curve Inverted in the Tealbook Projection?" for a discussion of the factors underlying the forecast.

Outside of recessions, however, banks' NIMs have generally exhibited a gradual downward trend, one that we think largely reflects ongoing competitive forces in this industry.³ In particular, when the slope of the yield curve flattens, even substantially so, as in the early 2000s, banks' NIMs do not appear to be much affected. Other measures of bank profitability, such as return on assets and return on equity which reflect more considerations than just the interest rate environment, also do not exhibit a strong correlation with the slope of the yield curve.

NIMs are so stable because banks have generally been able to manage their interest rate risk, especially for shorter-term fluctuations in the slope of the yield curve. Banks tend to match the repricing interval of their interest-bearing assets to the repricing interval of the liabilities used to fund these assets, and they also manage their deposit rates carefully. Many types of loans held by banks, such as commercial and industrial (C&I), construction and land development and nonfarm nonresidential commercial real estate loans, home equity lines of credit, and credit card loans are floating rate loans whose rates are tied to a short-term interest rate such as LIBOR or the prime rate, or which tend to reprice frequently. Rates on such loans adjust upward with changes in short rates, while banks tend to increase their deposit rates, their main source of funding, with a lag. Banks located in deposit markets which require less frequent repricing to maintain deposit funding tend to make longer-term loans (e.g., Dreschler, Itamar and Savov, 2017). Banks may also hedge interest rate risk using derivatives, such as interest rate swaps, and other financial instruments. Income gains from such hedging activities are often reflected in banks' trading revenue or other income rather than in interest income.

More recently, why did NIMs decline through 2014 and then since tick up?

As shown in the top right chart of the exhibit, NIMs, especially at the large banks (the black line), declined steadily through 2014. As the effective lower bound on the level of short-term interest rates was reached, large banks' ability to lower their deposit rates over this period was especially limited relative to their smaller counterparts, as large banks generally pay lower rates on deposits. At the same time, interest income earned on banks' loans and other assets continued to decline over this period as these balance sheet items continued to reprice downward.

Banks' NIMs have ticked up since the start of monetary policy tightening in December 2015. Deposit rates have not repriced upward much, yet, but loan rates and rates on other assets have, as shown in the middle two panels of the exhibit, so that the gains to banks' NIMs from asset repricing has so far outweighed the drag to banks' NIMs from liabilities repricing. In particular, in recent quarters, increased income from floating rate consumer and business loans have contributed to the increase in NIMs. Interest on excess reserves at the largest banks and banks' securities portfolios have also played a role in increasing interest income relative to expense.

³ The longer-term downtrend in NIMs may also reflect the fact that the general level of interest rates has been gradually declining over this same time period.

How would a prolonged flattening, or inversion, of the yield curve affect banks?

In general, banks have been able to manage their interest rate risk fairly well for short episodes of yield curve flattening or inversion, typically lasting no more than a couple of years. In the Tealbook extended baseline forecast, the yield curve is projected to be inverted for more than five years and generally flattening for two years before that. Such a rate configuration has not been witnessed, and as such, the typical historical relationship between the slope of the yield curve and bank profitability, described above, may no longer hold under such conditions. In addition, the changed financial regulatory environment and its effects on banks' balance sheet management also make it difficult to say how such a rate configuration would play out for banks' profitability. Moreover, the nature of the flat or inverted rate configuration would matter in assessing its effects on bank profitability, and the extent of such effects could also depend in part on banks' business models, their chosen balance sheet compositions, and the degree of risk exposure in their asset and liability portfolios.

In general, a prolonged flattening, or inversion, of the yield curve over the course of several years would tend to strain the profitability of banks due to the compressed spreads between rates paid on short-term liabilities and those earned on longer-dated assets. However, a flattening resulting primarily from an increase in short rates, especially from zero, could boost profitability if banks retained core deposits and core deposit rates rose sluggishly. A key factor in the current U.S. environment is the combination of the large number of deposits in the banking system and the recent period spent at the zero lower bound which may cause banks to adjust their deposit rates upward even more slowly than usual as banks try to regain profit margins. On the other hand, post-crisis liquidity regulations could cause some large banks to compete more aggressively for some types of deposits as short-term rates rise, such as those that receive relatively favorable treatment under the LCR, likely causing a faster upward adjustment in some deposit rates—and a slower recovery in NIMs—than has historically been observed.⁴

A pricing strategy that acts as a hedge against a flattening of the yield curve due to rising short-term rates is having a loan portfolio that consists more heavily of loans tied to shorter-term rates. Banks with such strategies would likely experience less immediate negative profitability effects of such a yield curve inversion conditional on not having to reduce spreads or other terms on such loans in response to greater competition to make such loans. It is also possible in such an environment that banks may seek to make somewhat riskier loans so as to maintain profit margins by charging higher spreads to some borrowers.

A very prolonged period of a flat or inverted yield curve could necessitate changes in banks' business models. If longer-term rates remained significantly below short-term rates, borrowers may migrate to fixed-term rate loans from nonbank lenders whose funding may not be tied, or as

⁴ See the box in the April 2015 Tealbook B “The Transmission of Monetary Policy to Deposit Rates ” for a discussion of these possible competing forces on deposit pricing as monetary policy tightens from the effective lower bound.

tied, to short-term rates. If so, over time, banks' loan portfolios could be eroded by competition from such lenders and the capital markets. As a result, banks may also migrate toward using alternative sources of funding such as longer term bonds rather than short-term money instruments, such as deposits, since longer-term funding would become relatively cheaper in a period of yield curve inversion.

It is worth noting that at least so far, market participants do not seem to be concerned about the prospect of reduced bank profitability and health due to a future prolonged inversion of the yield curve. Even though core loan growth at banks has slowed in recent quarters, depicted in the bottom left chart, bank stock prices, as shown in the bottom right chart, have not so far reacted negatively to the flattening of the yield curve since the start of monetary policy tightening. Slower loan growth may be partially a response to reduced borrower demand for bank loans that are tied to short-term rates and have become more expensive since the onset of monetary policy tightening. Indeed, reduced demand for banks loans, especially C&I loans, which are mainly tied to shorter-term rates, has been reported in the Senior Loan Officer Opinion Survey in recent quarters. To date, bank stock prices appear to have been strongly influenced by expectations of economic growth, perhaps in part via regulatory rollback, increased fiscal impetus, or changed tax policy, and accordingly loan growth.

Overall, while historical periods of yield curve flattening or inversion in the U.S. have not been associated with large adverse effects on bank profitability or health, and current market perceptions do not point to concern about future bank profitability, a prolonged period of a flattening and inverted yield curve, as in the Tealbook baseline forecast, has not been experienced in the past and would merit very close monitoring.

Selected bibliography of research on the topic

Altavilla, Carlo and Boucinha, Miguel and Peydro, Jose-Luis, Monetary Policy and Bank Profitability in a Low Interest Rate Environment (October 12, 2017). ECB Working Paper No. 2105. Available at SSRN: <https://ssrn.com/abstract=3052073>

Claessens, Stijn, Nicholas Coleman, and Michael Donnelly (2017). "Low-For-Long" Interest Rates and Banks' Interest Margins and Profitability: Cross-Country Evidence," International Finance Discussion Papers 1197. Board of Governors of the Federal Reserve System (U.S.). <https://www.federalreserve.gov/econresdata/ifdp/2017/files/ifdp1197.pdf>

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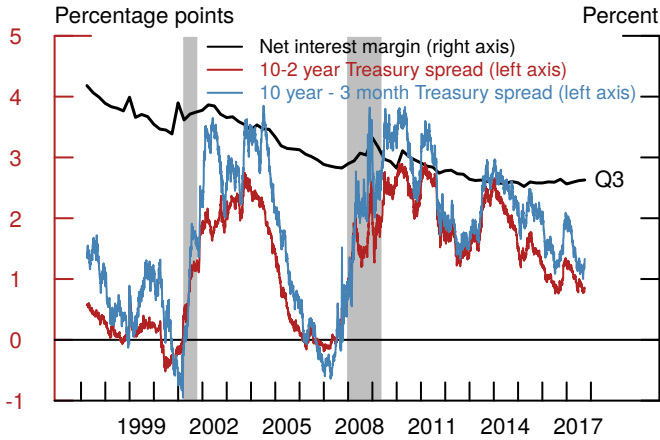
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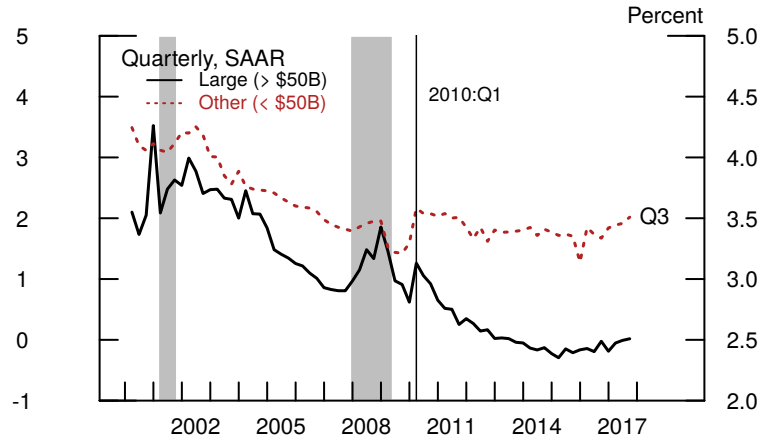
Recent Changes in the Yield Curve and Bank Profitability in the US

Net Interest Margin and Treasury Spreads, All BHCs



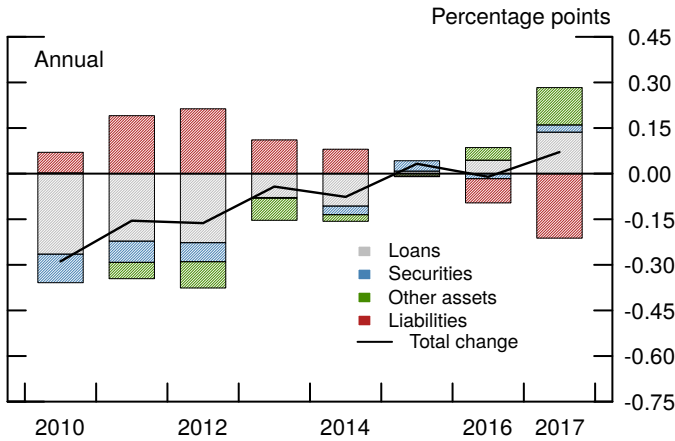
Note: Net interest margin series is quarterly, seasonally adjusted annual rates.
 Source: FR Y-9C, Consolidated Financial Statements for Holding Companies.

Net Interest Margin, by BHC Size



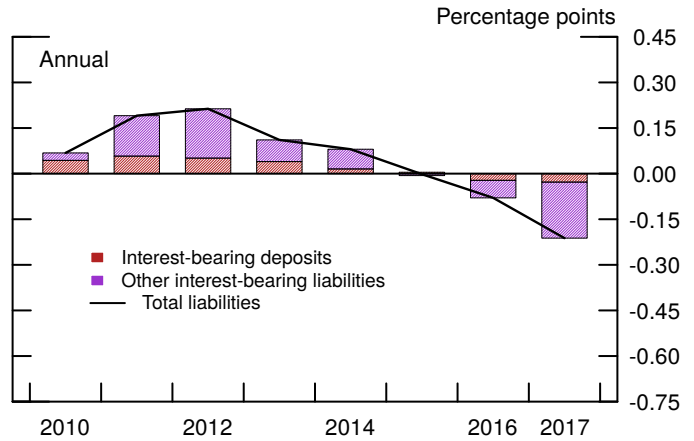
Note: Large and small groups have balanced panels of 31 and 800 firms, respectively, after 2010.
 Source: Staff calculations, FR Y-9C, Consolidated Financial Statements for Holding Companies.

Contributions to Changes in Net Interest Margin at Large BHCs



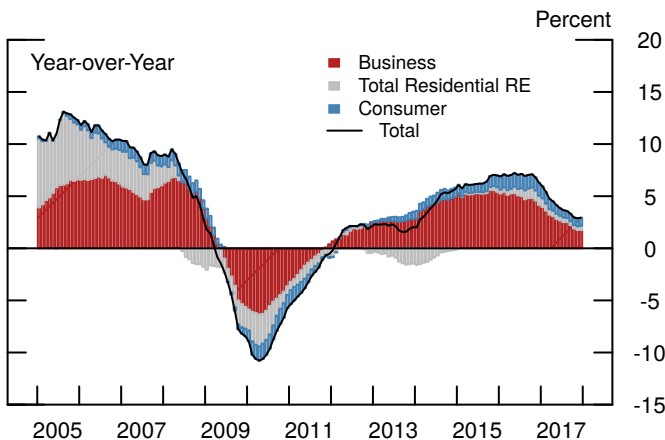
Note: The 2017 bar is based on data through the third quarter.
 Source: Staff calculations, FR Y-9C, Consolidated Financial Statements for Holding Companies.

Liabilities' Contribution to Changes in Net Interest Margin at Large BHCs



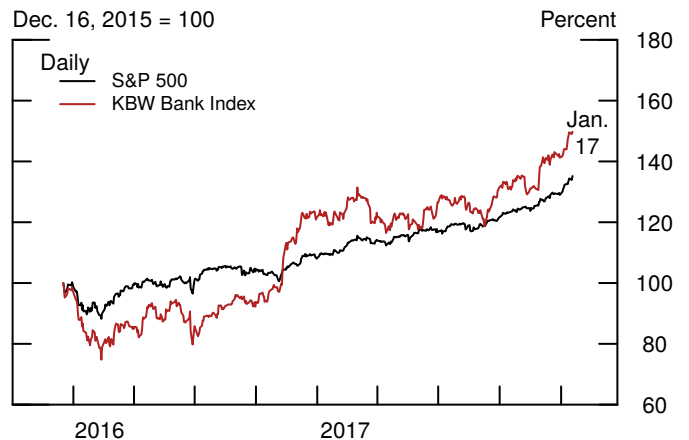
Note: The 2017 bar is based on data through the third quarter.
 Source: Staff calculations, FR Y-9C, Consolidated Financial Statements for Holding Companies.

Core Loan Growth at Commercial Banks



Note: Business loans include C&I and CRE. Consumer loans include credit card, auto, and other consumer loans.
 Source: Staff calculations, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

S&P 500 and KBW Bank Indexes



Source: Bloomberg.