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journal homepage: www.elsevier.com/locate/jmonecoInterest rate risk and bank equity valuations[☆]William B. English^a, Skander J. Van den Heuvel^b, Egon Zakrajšek^{c,*}^a Yale University, New Haven, CT 06520, USA^b Division of Financial Stability, Federal Reserve Board, Washington, D.C. 20551, USA^c Division of Monetary Affairs, Federal Reserve Board, Washington, D.C. 20551, USA

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ABSTRACT

Using high-frequency identification, we estimate the reaction of bank stock prices to movements in interest rates prompted by FOMC announcements and examine how this reaction varies with key bank characteristics. Bank stock prices decline significantly following unanticipated increases in the level or slope of the yield curve. The reaction is larger for banks that rely heavily on core deposits but is reduced for banks with a large maturity mismatch, consistent with banks' role in maturity transformation. Policy-induced interest rate changes appear to affect accounting profits primarily through net interest margins and changes in the composition of bank balance sheets.

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1. Introduction

Effective management of interest rate risk is central to the business of banking. Understanding banks' exposure to interest rate risk is important not only for banks' risk managers, shareholders, creditors, and counterparties, but also for policymakers. At the most basic level, bank supervisors are keenly interested in banks' management of interest rate risk because fluctuations in the profitability and market value of individual institutions can undermine their safety and soundness, as exemplified by the savings and loan crisis of the 1980s.

At the same time, macroprudential policymakers must understand how fluctuations in market interest rates affect the stability of the financial system as a whole. To the extent that a change in the configuration of interest rates lowers bank

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profits, this is likely to eat into banks' capital buffers and thus may erode the industry's resilience to adverse shocks. Moreover, banks may respond to such a reduction in profitability by taking on additional risk. Indeed, some have argued that the current prolonged period of low interest rates in many advanced economies may be depressing bank profits, making banks more willing to accept lower premiums for bearing duration and credit risk—that is, to “reach for yield”—which, in turn, could undermine the stability of the financial sector over time (see [Claessens et al., 2017](#); [Dell'Ariccia and Marquez, 2013](#); [Hanson and Stein, 2015](#); [Jiménez et al., 2014](#); [Rajan, 2006](#)). In addition, monetary policymakers need to know what effects changes in interest rates have on the health of banks because this may influence their willingness to lend, providing an additional mechanism through which monetary policy can affect the real economy (see [Van den Heuvel, 2012](#)).

As a theoretical matter, changes in interest rates can have a range of effects on the financial strength of banks, not all acting in the same direction. Conventional wisdom holds that banks benefit from a steep yield curve because they engage in maturity transformation by borrowing “short” and lending “long”. However, a steepening of the yield curve caused by rising long-term interest rates will also result in immediate capital losses on longer-term assets, which may offset part of any benefits of higher net interest margins over time. Further exposure to interest rate risk arises from the banks' ability to fund a portion of their assets with low or zero interest-rate liabilities, such as core deposits. This traditional role of banks implies that an upward shift of the yield curve could result in higher net interest margins over time (see [Samuelson, 1945](#)). And while interest rate risk is intrinsic to the process of maturity transformation and liquidity provision, banks may hedge such exposure through the use of interest rate derivatives or limit its effects on interest income by making longer-term loans at floating rates.

To further complicate matters, interest rate changes do not occur in a vacuum. They are, in general, correlated with cyclical changes in economic conditions, which can exert their own influence on bank profitability, including through its noninterest components, such as credit losses or fee income. Changes in macroeconomic conditions can also be expected to change the size and composition of bank balance sheets, thereby affecting bank profitability.

Given the myriad of direct and indirect channels through which fluctuations in interest rates can affect bank profits, along with the endogeneity of interest rates, it is perhaps not surprising that the existing literature on this topic finds mixed results. On the one hand, there is some evidence that higher levels of interest rates and a steeper yield curve are associated with higher levels of bank net interest margins or accounting profits (see [Borio et al., 2017](#); [Claessens et al., 2017](#); [English, 2002](#)). On the other hand, the literature that studies how changes in interest rates affect bank stock prices finds that bank share prices tend to decline when interest rates rise (see, for example, [Aharony et al., 1986](#); [Akella and Greenbaum, 1992](#); [Flannery and James, 1984](#); [Kane and Ünal, 1990](#); [Lumpkin and O'Brien, 1997](#)). However, those papers generally do not consider the underlying reasons for the changes in interest rates and do not fully control for the economic news that might be causing those changes. Because such news may have its own direct effects on bank stock prices, the results from this literature cannot be seen as measuring the effect of an exogenous change in interest rates on bank equity valuations.¹

In this paper we take a novel empirical approach to address this question. Our contribution is three-fold. First, we handle the identification problem by using an event-study approach. To do so, we use intraday data on changes in the stock prices of US bank holding companies and on changes in the short- and longer-term interest rates around the times of monetary policy announcements. As emphasized by [Bernanke and Kuttner \(2005\)](#), high-frequency interest rate movements associated with monetary policy announcements are unlikely to be correlated with other economic news, so we can use these data to identify the effect of an exogenous change in interest rates on bank stock returns. Second, we supplement these high-frequency data on asset prices with lower frequency, bank-level data to analyze how differences in bank characteristics—including a new measure of the maturity mismatch, the dependence on core deposits, and the use of interest rate derivatives—affect the reaction of bank stock prices to interest rate surprises in the cross section. Finally, to better understand the mechanisms driving the interest rate effects on equity values, we turn to bank-level Call Report data on balance sheet and income items. Using our high-frequency interest rate shocks as instruments in the local projections approach of [Jordà \(2005\)](#), we examine how policy-induced changes in market interest rates affect banks' net interest income, return on assets, and balance sheet dynamics, and consider how these effects could influence the valuation of bank stocks.

Our results indicate that an unexpected increase in either the level or the slope of the yield curve around the time of monetary policy announcements causes an economically and statistically large decline in bank equity values. Specifically, a parallel upward shift in the yield curve of 25 basis points is estimated to lower the average bank's stock price between 2 and 2.5 percent; a shock that steepens the yield curve by the same amount causes the average bank's stock price to drop by a bit more than 1 percent. These findings are broadly consistent with those of [Bernanke and Kuttner \(2005\)](#) and [Gürkaynak et al. \(2005\)](#), although they focus on the aggregate stock market. By using the prices of individual bank stocks, we are able to show that the negative effect of higher rates on bank equity returns is amplified for banks with more core deposits, while the effect of a steeper slope of the yield curve is attenuated for banks that engage in more maturity transformation; this latter result provides a measure of confirmation for the conventional wisdom that banks benefit from a steep yield curve. Interest rate derivatives are only used by a small number of relatively large banks. For those banks, however, intense derivatives usage appears to mitigate somewhat the negative reaction of stock returns to a slope surprise, though this effect is estimated relatively imprecisely. Overall, these results indicate that both on- and off-balance sheet activities can significantly affect the sensitivity of bank stock prices to fluctuations in interest rates.

¹ Relatedly, [den Haan et al. \(2007\)](#) employ a vector autoregression in an effort to identify the effect of monetary policy “shocks” on bank capital.

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