



How and why do small firms manage interest rate risk? ☆

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Abstract

Although small firms are particularly sensitive to interest rates and other shocks, empirical work on corporate risk management has focused instead on large public companies. This paper studies fixed-rate and adjustable-rate loans to see how small firms manage their exposure to interest rate risk. Credit-constrained firms are found to match significantly more often with fixed-rate loans, consistent with prior research that shows the supply of credit shrinks during periods of rising interest rates. Banks originate a higher share of adjustable-rate loans than other lenders, ameliorating maturity mismatch and exposure to the lending channel of monetary policy. Time-series patterns in the fixed-rate share are consistent with recent evidence on debt market timing.

Introduction

Empirical research on corporate risk management has generally focused on large public companies, most often studying firms' use of financial derivatives.¹ This paper instead examines fixed-rate and adjustable-rate commercial loan contracts to study how small firms adjust their exposure to interest rate risk. Small and medium-size firms are important to the US economy; firms with fewer than five hundred employees generate half of non-farm private gross domestic product². Small firms are often financially constrained, which is considered a key theoretical rationale for why firms engage in risk management (e.g., Froot, Scharfstein, and Stein, 1993, hereafter FSS). Moreover, work on the credit channel of monetary policy shows directly that small firms are sensitive to interest rate shocks (e.g., Gertler and Gilchrist, 1994; Ehrmann, 2000).

Although small and medium-size firms make little use of derivatives, they do borrow extensively from financial institutions. In some cases the interest rate on these loans is fixed, while in other cases it adjusts

with market interest rates. I study this variation in fixed-versus-adjustable outcomes as a window into how small firms adjust their exposure to interest rate risk.

I firstly examine the relationship between fixed-versus-adjustable outcomes and firm financial constraints. FSS show that optimal risk management policy should aim to generate cash in states of nature in which an additional dollar of internal funds is most valuable. Empirically, research on the credit channel of monetary policy finds that the availability of finance to bank dependent firms becomes scarcer relative to investment opportunities during periods of rising interest rates, causing lower investment and output amongst credit-constrained firms. (Section 2 reviews this literature in detail.) Correspondingly, I test the hypothesis that credit-constrained firms match with fixed-rate debt, thereby maximizing net cash flows during periods of rising interest rates when the shadow value of internal funds is high.³

A related implication of FSS is that risk management outcomes should reflect variation across firms in the correlation between interest rates and pre-interest firm cash flows. In sectors in which industry output or cash flows covary positively with interest rates, firms have a partial or complete natural hedge against interest rate risk, and thus fixed-rate debt is less likely to be optimal. I test the hypothesis that the share of adjustable-rate loans is higher in such industries, using an estimated index of industry interest rate procyclicality.

Although plausible, there are several reasons for why these two FSS hedging hypotheses might fail to hold empirically. One alternative hypothesis is that fixed-versus-adjustable outcomes are set by the firm's banks (e.g., perhaps the firm's relationship lender originates only fixed-rate loans or only adjustable-rate loans, so the firm does not have a choice between contracts). Another possibility is that small firms prefer to amplify volatility in the shadow value of internal funds. Adam, Dasgupta, and Titman (2007) presents a model in which such behavior could be optimal in an imperfectly competitive industry setting. A third possibility is that small firms are financially unsophisticated or the fixed-versus-adjustable margin is unimportant, so no systematic correlations exist in the data.

Using data from the Federal Reserve Board's Survey of Small Business Finance (SBF) I find evidence consistent with the two FSS hedging hypotheses. First, as predicted, matching with a fixed-rate loan is positively correlated with several different proxies for financial constraints. Fixed-rate debt is most popular amongst smaller firms, younger firms, firms switching from their primary lender, and firms with low cash flows (measured by current profits) or high investment opportunities (measured by sales growth). These results are economically as well as statistically significant. For example young, small firms in the SBF are about twice as likely to match with fixed-rate debt as old, large firms (69% compared with 38%). Second, fixed-rate debt is less prevalent in two-digit standard industrial classification (SIC) sectors in which industry output comoves most positively with interest rates, and thus when firms have a partial natural hedge against interest rate risk.

Next, I study how lender characteristics influence fixed-versus-adjustable outcomes. Several theoretical papers on loan contract design and bank risk management suggest that the share of interest rate risk in a loan borne by the borrower should depend in part on the lender's interest rate risk profile (Arvan and Brueckner, 1986; Edelstein and Urosevic, 2003; Froot and Stein, 1998). These models predict that lenders who are exposed ex ante to rising interest rates optimally originate a smaller share of fixed-rate loans, because the present value of such loans declines by comparison with adjustable-rate loans when interest rates rise.

I test this prediction by comparing bank loans with loans from nonbank institutions. Banks are exposed to rising interest rates in two ways that are specifically tied to their reliance on deposit finance. First, banks are

affected by the lending channel of monetary policy (Stein, 1998; Kashyap and Stein, 2000; Ashcraft, 2006), in which tight monetary policy reduces the insured deposit base, raising banks' cost of funds. Second, banks are subject to maturity mismatch, in which demand deposits and short-term time deposits fund long-duration assets such as mortgages.

Correspondingly, I test the hypothesis that bank loans are more likely to involve an adjustable interest rate than loans from other lender types. This lender risk management hypothesis receives strong support in the data. I find that a loan from a commercial or savings bank is 14 percentage points more likely to involve an adjustable interest rate compared with a loan from a nonbank financial institution.

Because many small bank-dependent enterprises are closely held and owner-managed, it also seems plausible that owner characteristics play a significant role in fixed-versus-adjustable outcomes. Somewhat surprisingly, I find that variables such as the owner's age and the concentration of ownership are nearly uncorrelated with the loan type chosen. I do find some evidence that adjustable-rate loans are more common amongst firms with wealthier owners, consistent with the view that risk aversion is declining in wealth.

The last part of the paper studies time-series patterns in the aggregate share of fixed-rate loans. Using data from the Survey of Terms of Business Lending (STBL), I construct and study a 28-year quarterly time series of the fixed-rate share for business loans originated by commercial banks. I find that high real interest rates and a steep yield curve are correlated with a lower proportion of fixed-rate loans, consistent with previous work on debt market timing by Faulkender (2005) and Baker, Greenwood, and Wurgler (2003). To my knowledge, this paper is the first to show these results also extend to small, bank dependent firms. Implications of these findings for theoretical explanations of market timing patterns are discussed.

The rest of this paper proceeds as follows. Section 2 reviews existing literature on the sensitivity of small firms to interest rate shocks. Section 3 describes the Survey of Small Business Finance and discusses the measures of financial constraints I use. Section 4 presents cross-sectional empirical evidence from the SBF. Section 5 presents time-series evidence on the share of fixed-rate commercial loans. Section 6 presents cross-sectional evidence from the STBL. Section 7 concludes.

Section snippets

Small firms and interest rate shocks

Research on the credit channel of monetary policy argues that higher interest rates lead to a decline in the availability of internal and external finance relative to investment opportunities, resulting in lower investment and output amongst credit-constrained firms. This channel is considered to be most important for small, informationally opaque, bank-dependent firms, which are most likely to be constrained in their access to finance. Consistent with this view, Gertler and Gilchrist (1994)...

Survey of small business finance data

The SBF is a cross-sectional survey conducted approximately every five years by the Federal Reserve Board, containing detailed microeconomic information on firm characteristics and financing behavior for a representative sample of US small and medium-size enterprises, defined as firms with fewer than five

hundred employees at the end of the reference year. The SBF provides detailed information on the firm's most recent loan, including the size of the loan, interest rate and fees paid, category...

Evidence from the survey of small business finance

I begin by estimating a simple probit regression to study the cross-sectional determinants of firms' matching to fixed-rate or adjustable-rate loans. The probit takes the form

$$P(\text{fixed}) = \Phi(a_0 + a_1 \cdot \text{financial constraints} + a_2 \cdot \text{lender type} + a_3 \cdot \text{lender controls} + a_4 \cdot \text{loan controls} + a_5 \cdot \text{other firm controls} + a_6 \cdot \text{year dummies} + e)$$

one for a fixed-rate loan, and zero for an adjustable-rate loan. Financial constraints includes the proxies for credit constraints discussed in Section 3: firm size ...

Time-series patterns in fixed- and adjustable-rate lending

Recent work by Baker, Greenwood, and Wurgler (2003) and Faulkender (2005) shows that the interest rate exposure of firms' new debt fundings fluctuates over time in response to changes in debt market conditions such as the level of interest rates and the shape of the yield curve, an empirical regularity they refer to as debt market timing. For example, both these papers find firms are more likely to borrow short term or at a floating interest rate when the yield curve is steep. Baker, Greenwood, ...

Cross-sectional evidence from the STBL

As a final robustness exercise, I use the STBL microdata to analyze cross-sectional patterns in fixed-versus-adjustable outcomes. An attractive feature of the STBL is that it identifies the commercial bank that provided each loan, enabling the use of controls for bank characteristics or bank fixed effects. Hence, I am able to check whether previous results are robust to the inclusion of these additional lender controls, which are not available in the SBF. Because the STBL does not report any of ...

Conclusions

This paper finds evidence that small, bank-dependent firms use loan contracts to systematically adjust their exposure to interest rate risk. Credit-constrained firms are more likely to match with fixed-rate debt, consistent with evidence on the credit channel of monetary policy that suggests such firms are most sensitive to rising interest rates. Fixed-rate debt is also less prevalent in sectors in which industry output moves procyclically with interest rates, consistent with the idea that...

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...This allows me to control for demand-side confounders using a rich array of fixed effects. I further exploit the fact that borrowers prefer debts that reprice more often when the yield curve steepens and less often when it flattens to reduce the cost of capital (Faulklender, 2005; Vickery, 2008). The results show that, during a flattening of the yield curve, banks under the IM increase the repricing maturity of commercial loans by 19% more than those under the SA....

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