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The impact of interest rates on firms' financing policies☆

Sigitas Karpavičius [a,*], Fan Yu [b]

[a] Accounting & Finance, Adelaide Business School, The University of Adelaide, SA 5005, Australia
[b] Department of Applied Finance and Actuarial Studies, Faculty of Business and Economics, Macquarie University, E4A, Eastern Road, North Ryde, NSW 2109, Australia

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ABSTRACT

This study analyzes whether corporate financing policies of the US industrial firms have depended on borrowing costs during the last forty years. The results show that the impact is either zero or slightly negative. Even in the latter case, the results are economically insignificant. Overall, our findings suggest that firms do not adjust their capital structures based on interest rates, except when market participants expect that real gross domestic product growth will be negative. Using a dynamic partial equilibrium model, we show that relatively high leverage adjustment costs are able to explain the weak negative relation between interest rates and a firm's leverage. Our results are also consistent with the view that firms target debt-to-asset ratio rather than debt level.

1. Introduction

Despite the extensive research on firm's financing policies since the seminal paper by Modigliani and Miller (1958), the literature—both theoretical and empirical—of how interest rates and changes in monetary policy regime impact a firm's financing decisions is limited and the results of the existing studies are mixed. In this paper, we analyze whether corporate financing policies of the US industrial firms have depended on borrowing costs during the last forty years.

The effective interest rate that a firm is facing, can be expressed as $r_D \times (1 - \tau)$ where r_D is the nominal interest rate and τ is the effective tax rate. The empirical studies have mainly focused on the relation between tax rate and firm leverage. They find that tax rate has a significantly positive impact on the firms' borrowings (see, for example, recent studies by Faccio and Xu (2015) and Heider and Ljungqvist (2015)). Interest rates vary more than tax rates and their impact on interests paid is substantially higher. For example, the yield on Moody's Aaa-rated bonds decreased from 8.80% to 4.20% (i.e., by more than half (52%)) during the 1975–2014 period whereas the top rate of corporate income tax was cut from 48% to 35% (i.e., by slightly more than a quarter (27%)) during the same period; that is, the drop in yield is about twice the decrease in tax rate. Thus, the fact that the relation between interest rates and firms' leverage is under-researched is quite surprising.

The challenge of this study is that interest rates and macroeconomic conditions are interrelated. For example, official interest rates set by monetary authorities tend to be lower during the recessions and higher during non-recessionary periods. Further, the

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* Corresponding author at: Adelaide Business School, The University of Adelaide, Level 12, 10 Pulteney Street, Adelaide, SA 5005, Australia.
E-mail addresses: sigitas.karpavicius@adelaide.edu.au (S. Karpavičius), fan.yu@mq.edu.au (F. Yu).

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empirical studies provide some evidence that macroeconomic and market conditions significantly impact bond yields and firms' financing decisions. Cenesizoglu and Essid (2012) find that the positive impact of unexpected monthly changes in the Fed funds target rate on monthly changes in credit spreads between Moody's Baa- and Aaa-, Aa-, and A-rated bond indices is only significant during recession periods. Baum et al. (2009) find that firms' short-term leverage decreases with macroeconomic uncertainty measured as the conditional variance of the detrended index of leading indicators. Our article is also closely related to the growing literature on how corporate financing policies depend on the business cycle. Frank and Goyal (2009) report that firms' leverage is negatively impacted by the growth in aggregate corporate profits of non-financial firms but positively impacted by the expected inflation and gross domestic product (GDP) growth. Jermann and Quadrini (2008) also report a pro-cyclical behavior of aggregate corporate debt. This suggests that the firms' leverage is likely to be lower during recession periods. Korajczyk and Levy (2003) report that target leverage of financially unconstrained firms is counter-cyclical, but pro-cyclical for the constrained firms. The implications of recent theoretical papers are generally consistent with the results in Korajczyk and Levy (2003). For example, a contingent claims model of the levered firm in Hackbarth et al. (2006) predicts that leverage is countercyclical. A general equilibrium model in Levy and Hennessy (2007) implies that less financially-constrained firms choose more counter-cyclical financing policies; however, the debt ratio for more constrained firms does not depend on the business cycle. Bhamra et al. (2010) use a contingent-claim corporate financing model within a consumption-based asset-pricing model and show that capital structure is pro-cyclical; however, it is counter-cyclical in aggregate dynamics. They also find that leverage of financially constrained firms exhibits pro-cyclicality. In a similar framework, Chen (2010) shows that the firm's target leverage ratio is pro-cyclical; however, the actual leverage exhibits counter-cyclicality. A recent study by Halling et al. (2016) reports that target leverage ratios evolve counter-cyclically, on average. Erel et al. (2012) analyze how macroeconomic conditions affect capital raising. They find that for noninvestment-grade borrowers, capital raising tends to be pro-cyclical, while for investment-grade borrowers, it is countercyclical. Given the non-random relations between interest rates and business cycle, as well as between financial leverage and business cycle, we need to ensure that our empirical models are properly identified; that is, that we capture the impact of interest rates rather than the impact of macroeconomic conditions on firms' leverage. Thus, we control for year fixed effects in the regressions. Also, we estimate our models separately for recessionary and non-recessionary periods.

As we discuss in the next section, finance theory does not provide a clear answer about whether there should be a negative or positive, or no, relation between interest rates and a firm's leverage. If we find a significantly negative relation between interest rates and a firm's leverage, it will mean that firm behavior could be consistent with several theories; that is, that firms could be timing the market and/or that firms target debt level or leverage ratio. A significantly positive or no relation would indicate that firms target leverage ratio and do not time the market, in general (or at least, the former effect dominates the market timing activities). Thus, our results will shed some light on which theory dominates in explaining firm behavior.

The empirical evidence for the relation between interest rates and firm's leverage are mixed. Frank and Goyal (2004) estimate a VAR(1) model of aggregate values of debt and equity of all US public non-financial firms and find that interest rates impact neither debt nor equity significantly. Graham et al. (2015) report that aggregate leverage of US unregulated firms is higher in the periods of high 3-month Treasury bill rate over the 1925–2010 period. The effects of interest rates' spreads on firms' leverage and the volume of debt issues are not consistent across different empirical studies. Korajczyk and Levy (2003) find that firms' leverage increases with the difference between the three-month commercial paper rate and the rate on the three-month Treasury bill for firms that pay dividends and/or have a net equity or debt purchase within the quarter, or have a market-to-book ratio smaller or equal to one. Cai et al. (2013) report that straight debt initial public offerings' volume increases with the difference in the yields of 10-year Treasury bond and Treasury bill and the difference in the yield on Moody's Baa-rated bonds and on Aaa-rated bonds. However, Frank and Goyal (2009) find that firms' leverage decreases with the difference between the 10-year and the one-year Treasury bond yields. Neither Korajczyk and Levy (2003) nor Frank and Goyal (2009), nor Cai et al. (2013) test their hypotheses using market interest rates rather than spreads.[1] The recent study by Graham et al. (2015) finds that the aggregate leverage of US unregulated firms decreases with the spread between the yield on Moody's Baa-rated bonds and on Aaa-rated bonds.

In this context, we analyze how corporate financing policies depend on borrowing costs. This study differs from the previous related studies as we consider the large number of different proxies of interest rates, including the expected interest rates. In comparison, other studies use one measure for a firm's borrowing costs (primarily, because they focus on other issues rather than the relation between interest rates and a firm's leverage). To the best of our knowledge, no previous study investigates how expected future interest rates or effective interest rates impact firms' leverage ratios. Further, our paper is different from the studies that analyze the relation between macro factors and leverage ratios (e.g., Korajczyk and Levy (2003), Jermann and Quadrini (2008), Frank and Goyal (2009) and others) because we analyze the relation between firm leverage and interest rates from the perspective of a firm. In other words, we investigate whether firms borrow more money when borrowing costs are lower whereas the papers mentioned above analyze firms' financing policies under different macroeconomic conditions. The relation between interest rates and macroeconomic activity is not straightforward. On the one hand, interest rates tend to be lower during economic downturns due to a lower demand for external financing and interventions by the monetary authorities. For example, US Fed cut gradually federal funds rate from 5.25% in September 2007 to 0–0.25% in December 2008. On the other hand, due to a higher uncertainty and increased bankruptcy costs, borrowing rates can be higher during economic downturns. For example, the average values of Moody's Seasoned Aaa and Baa Corporate Bond Yields are higher during the 2008–2009 period (5.47% and 7.37%,

[1] In addition, Cook and Tang (2010) show that the adjustment speed of capital structure increases with the difference between the twenty-year government bond yield series and the three-month Treasury-bill rate series but decreases with the difference between the average yield of bonds rated Baa and the average yield of bonds rated Aaa. That is, the adjustment speed is higher in good macroeconomic states.